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ABSTRACT

The paper explores empirically the tight links between exchange rates and the global network of equity holdings. Exchange rates can be expressed in terms of "equity net currency supplies", i.e. local currency stock market capitalization minus equity holdings, denominated in investors' currencies, as well as elasticities, reflecting the "centrality" of currencies in global equity markets. The observed components of our exchange rate decomposition account for, on average, 95% of the monthly variation of 28 bilateral currency crosses vis-à-vis the USD and 98% vis-à-vis the EUR. We use the decomposition to elucidate the unique role of the USD in transmitting risk aversion and U.S. macroeconomic news throughout the global equity network. Our findings contribute towards explaining global financial cycles and "risk-on"/"risk-off" episodes.

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1 Introduction

The exchange rate is a fundamental variable in international economics, equilibrating all markets—from goods and services to equity and bond markets. It plays a crucial role in how shocks are transmitted across countries. Due to price stickiness, exchange rates influence the relative prices of goods and services; in financial markets, they play a central role in financial stability. Despite their critical importance, exchange rates remain one of the least understood variables in international finance (see Meese and Rogoff 1983a and subsequent literature).[1]

In this paper, we explore the equilibrating role exchange rates play in equity markets to gain deeper insights into currency dynamics. We introduce a novel empirical exchange rate change decomposition that highlights the connections between 29 different stock markets and incorporates the global network of equity holdings. The observed sub-components of the decomposition account for 95% of the average monthly variation of 28 bilateral currency crosses vis-à-vis the USD and 98% vis-à-vis the EUR. This decomposition allows us to analyze the channels through which US macroeconomic and risk aversion news—news that are also important drivers of global financial cycles—impact exchange rates. Our findings reveal the exceptional role played by the USD currency base for the propagation of these news. We can trace the effect of news on exchange rate fluctuations back to the unique way the U.S. stock market equilibrates in response to US macroeconomic and risk aversion news, in comparison to all other global stock markets (but Japan). Given the USD's role as an international currency, these insights help us build our understanding of global financial cycles and "risk-on"/"risk-off" episodes.

Exchange Rates and Global Stock Markets: A Novel Decomposition

Our decomposition links exchange rates to net equity-related currency supplies and con-

[1] Exceptions include Stavrakeva and Tang Forthcominga who show that 50% of the monthly exchange rate change variation can be explained by macroeconomic news, with lagged news playing the most important role.

stant partial "elasticities", capturing currency "centrality" in the global network of international equity markets. Both of these variables have intuitive interpretations.

The net equity-related currency supply is defined as the market capitalization of the local stock market in local currency minus the holdings of local stocks, denominated in investors' currencies. For example, higher net equity supply of BRL means that the market capitalization of the Brazilian stock market, measured in BRL, grows by more than the holdings of Brazilian equity, measured in the currencies of the equity investors. Thus, the BRL must depreciate in order for the equity market to clear in BRL. If we consider the BRL/USD cross, higher net equity supply of BRL or lower net equity supply of USD will depreciate the BRL against the USD, *ceteris paribus*.

The partial "elasticity" is defined as the derivative of an equilibrium exchange rate with respect to the net equity supply of a given currency, holding the net equity supplies of other currencies constant. Thus, these partial elasticities can be used to estimate the effect of exogenous shocks or news, which impact the net equity supplies, on exchange rates. The elasticities depend on how important the currencies of different investors are for the local stock market (i.e., the "centrality" of currencies). Since the vast majority of global assets under management are denominated in USD, the USD net supply is associated with higher elasticities, in absolute value, than other currencies.[2] Our partial "elasticities" are directly measurable: we do not have to estimate them, which eliminates the challenge of finding valid instruments for exogenous movements in net equity supply.

An important implication of our decomposition is that the equilibrium solution for the BRL/USD cross, for example, depends on the net supplies of all currencies since the BRL-denominated equities are purchased by investors from all currency areas. In other words, the entire global network of holdings matters. For example, since Eurozone investors purchase BRL stocks, the EUR net supply also matters for the determination of the BRL/USD cross.

[2]This means that variation in the USD net supplies are important for all currency crosses, including those not involving the USD on either side.

More generally, our decomposition highlights that each bilateral exchange rate change can be theoretically described as the elasticity-weighted sum of *all* net equity related currency supplies. But surprisingly, we find that when we limit our decomposition to the local currency, EUR and USD net supply components, scaled appropriately by our measured elasticities, we already explain *almost all* monthly exchange rate variation for all USD and EUR base currency crosses for the 28 bilateral exchange rates. Adding the GBP net equity supply renders the fit almost perfect. This testifies to the importance of the USD, the EUR and, to a lesser extent, the GBP in the international equity network.

Unconditional Comovement Between Exchange Rates and Global Stock Markets

We can ask which currencies' net supply variations, appropriately scaled by the relevant partial elasticities, account for most of the fluctuations of bilateral exchange rates. Through a variance-covariance decomposition, we find strikingly different results for USD and EUR bases. For the USD base, the *local currency net equity supply* accounts for nearly all of the variance in exchange rate changes, despite the large elasticities, in absolute value, that amplify movements in USD net supply. This highly surprising result is due to the small volatility of the USD net equity supply relative to the local currency net supply. Most of the market value of US stocks is held by US funds: the US stock market is large and close to autarky. This implies that the volatility of the USD net equity supply is low. This also implies that it is the equilibration of the non-US stock markets, rather than that of the US stock market, that drives almost all of the movements of all currency crosses against the USD base. Even so, the US centrality remains, as it is still the US investors who hold the vast majority of global stocks. Fluctuations in US investors' holdings is still the main driver of global equity holdings, and, as a result, of the local currency net equity supply.

In contrast, for the EUR base, both *local currency* and *EUR net equity supplies* significantly contribute to exchange rate changes across most currency pairs. This is because the Eurozone stock market is not as closed as the US stock market, which makes the EUR net supply more volatile than the USD net supply. To sum up, the variation in bilateral exchange rates is explained not only by the "centrality" of investor currencies in our network, but also by the degree of home bias of different equity markets, which impacts the volatility of the net equity currency supply measures.[3] This is a novel insight, which should inform any exchange rate model.

Tracing the Impact of "Risk-on"/"Risk-off" News on Exchange Rates via Global Stock Markets

One of the major appeals of our global equity network framework is that it helps us understand key aspects of the Global Financial Cycle and "risk-on"/"risk-off" episodes.[4] Why are cycles of USD depreciation concomitant with higher global stock market valuations? How do global equity markets equilibrate during "risk-off" episodes, which coincide with USD appreciation, higher risk aversion, and global "flight to safety" into US Treasuries?[5] To answer these questions, among others, we construct a US stock market macroeconomic news index and a risk aversion news index using a two-step procedure similar to Stavrakeva and Tang (Forthcominga). *We define positive US macroeconomic news that appreciate the US stock market (including monetary policy news), or decreases in risk aversion, orthogonal to macroeconomic news, as "risk-on" news, with the opposite being "risk-off" news.* "Risk-on" news tends to strongly correlate with an appreciation of nearly all exchange rates against the USD (with the JPY being the notable exception, which depreciates) and a rise in global stock market valuations. These results are highly statistically significant, highlighting the powerful transmission of US macroeconomic and risk aversion news through the USD. In contrast, the same news has a more varied impact on exchange rates relative to the EUR,

[3]Throughout the paper, we use home bias to imply *currency* home bias.

[4]The Global Financial Cycle is the common factor in the fluctuations of risky asset prices and of gross capital flows around the world. For a formal definition, see Miranda-Agrippino and Rey (2022). In this paper, we use "risk-on" to describe the expansion phase of the Global Financial Cycle and "risk-off" to denote the contraction phase. This includes, but is not limited to, tail events such as episodes of "flight to safety".

[5]The literature which has focused on the equilibration of asset markets during periods of high risk aversion has almost exclusively studied fixed income markets (see, for example Jiang et al. 2021, Jiang et al. 2024a and Stavrakeva and Tang Forthcomingb, among others). Instead, we study the equilibration of equity markets.

with some currencies appreciating against the EUR while others depreciate. The estimated coefficients for these effects are also much less statistically significant.[6]

Through the lens of our exchange rate decomposition, we can analyze the heterogeneous transmission of news across the USD and EUR currency bases. During "risk-on" episodes, the net supplies of all currencies decrease, *except for the USD and the JPY*. This pushes all currencies to appreciate against *both* the USD and EUR, holding all else constant. However, because the EUR net equity supply also decreases in response to the "risk-on" news, this places pressure on the EUR to appreciate, holding all else constant, dampening the overall exchange rate appreciation of other currencies against the EUR, or even reversing it entirely. In contrast, the *increase* of the USD net equity supply in response to "risk-on" news pushes the USD to depreciate, holding all else constant, further appreciating all currencies against the USD, generating a very strong transmission channel of news through the USD currency base. In summary, we explain the heterogeneous transmission of "risk-on" and "risk-off" news *across currency bases* through the unique response of the US stock market's net supply compared to stock markets in the rest of the world.[7]

Our findings explain the striking comovement between the USD, global equity markets, and the Global Financial Cycle, as captured by our news indices. These co-movements are crucial to understand as the USD has large effects on the world economy through its dominant role in trade and financial contracts (see Obstfeld and Zhou 2022). "Risk-on" states are characterised by rising global risky asset prices (see Miranda-Agrippino and Rey 2022). As documented here for the first time, the USD also depreciates during "risk-on" states to balance global equity markets. The process of equilibrating global equity markets in response to "risk-on" news is primarily driven by US investors, who significantly increase their holdings

[6]In results available upon request, we also show that we draw similar conclusions for a measure of news based on the increase of the Eurozone stock market due to Eurozone and US specific news. Thus, the results for the EU base are not driven by the fact that we use the US stock market to construct the macro news index or because we do not include Eurozone macroeconomic news.

[7]Japan is the only other country with a similar response, though, the estimated coefficients are not statistically significant for the JPY net equity supply measure.

of both US and non-US equities. This surge in holdings is also accompanied by rising stock market valuations in both the US and abroad. However, in the US, stock market valuations rise more than the increase in equity holdings (denominated in investors' currencies), while the opposite holds true for other stock markets (except Japan). The heterogeneous adjustment of both US and non-US stock markets during "risk-on" periods ultimately leads to a very significant depreciation of the USD. "Risk-off" periods exhibit the opposite dynamics. Therefore, our paper explains how the vast pool of USD-denominated assets held by international equity investors, responding to news, shapes the USD's comovement with the Global Financial Cycle.

Section 2 of the paper provides a literature review. In Section 3, we derive our novel exchange rate change decomposition and in Section 4, we present the data used and the construction of the key variables in our decomposition. Section 5 describe the results based on our variance covariance decomposition while Section 6 presents the transmission of macroeconomic and risk aversion news. Section 7 concludes.

2 Literature Review

Understanding exchange rate fluctuations has long been a central focus of international economics. The pioneering work of Meese and Rogoff (1983a) and Meese and Rogoff (1983b), showing the inability of exchange rate models to beat a random walk at short to medium horizons, has demonstrated the difficulty of this enterprise.

The first strand of research our paper relates to are papers seeking to link exchange rates to quantities. Early on, the literature on portfolio balance models (for example Kouri (1976) and Branson and Henderson (1985)) jointly derived the behaviour of asset prices and exchange rates, assuming imperfect substitutability across domestic and foreign assets. These papers related the supply and demand of currencies to exchange rate fluctuations. Recent papers have revived this approach in the context of international bond markets (see for example, Gabaix and Maggiori (2015), Gourinchas et al. (2022), Greenwood, Hanson, Stein, and Sunderam (2023), Itskhoki and Mukhin (2021), Kekre and Lenel (2024), and Valchev (2020)). Our empirical exchange rate decomposition can inform this class of exchange rate models in a number of ways, including by providing direct measures of the elasticity of exchange rates with respect to changes in the net equity supply of a currency.

The most closely related empirical papers to our work are by Hau and Rey (2004; 2006) and Camanho et al. (2022) who jointly model the dynamics of international equity prices and the exchange rate in a two-country partial equilibrium model with optimal portfolio choice. Camanho, Hau, and Rey (2022) studies the re-balancing behaviour of equity funds and identifies the causal effect of cross-border net equity flows on exchange rates via a granular instrument. Koijen and Yogo (2020) estimate a demand system to study exchange rates jointly with short-term rates, long-term yields and equity prices across many countries using aggregate portfolio holdings data. They rely on a partial equilibrium structural IO model and instrumental variables to decompose variations in exchange rate and equity prices. Jiang et al. (2024b) builds on Koijen and Yogo (2020), and perform counterfactuals to tease out the drivers of the sustained appreciation of the USD from 2011 to 2019. Another very related paper is by Goldberg and Krogstrup (2023) who construct an Exchange Market Pressure index for a large cross-section of countries using balance of payment information and a portfolio balance framework. Their index incorporates exchange rate movements, monetary policy adjustments and foreign exchange intervention, enabling international comparisons of capital flow pressures.[8]

Unlike these papers, we make use solely of market-clearing conditions—accounting identities—to analyse the interplay between exchange rates and international equity markets. Our exchange rate decomposition allows us to account for almost all of exchange rate variations simply based on *observed* equity net supplies, scaled by exchange rate elasticities, constructed

[8]Fang et al. (2024) and Nenova (2023) study international fixed income markets using granular holdings data.

from mutual funds' holdings data. A significant advantage of our approach, relative to the existing literature, which studies the equilibrating role of exchange rates for equity and fixed income markets, is that we do not need to rely on the use of external instruments, as we directly observe the exchange rate elasticities with respect to net equity supply.

Our work is also linked to the literature on the propagation of US news to exchange rates and global variables. Methodologically, we build on Stavrakeva and Tang (Forthcominga) for the construction of the US macroeconomic stock market news index and the risk aversion news index. The main contribution of Stavrakeva and Tang (Forthcominga) is to show that most of the variation in exchange rates at the monthly and quarterly frequencies can be explained by macroeconomic news, in particular lagged ones. Boehm and Kroner (2023) finds that US macroeconomic news impact global stock markets and commodity prices significantly. Since foreign news have small effects on US markets, the authors point out that global shocks do not appear important while US news are dominant and transmit mostly by affecting global risk aversion.

Our paper also contributes to the large literature studying global financial and trade and commodity cycles - see e.g. Miranda-Agrippino and Rey (2020), Kalemli-Özcan (2019), Davis, Valente, and Van Wincoop (2021), Miranda-Agrippino and Rey (2022), Akinci et al. (2022), Cesa-Bianchi and Sokol (2022) and Juvenal and Petrella (2024). Avdjiev et al. (2019), Obstfeld and Zhou (2022), Bruno et al. (2022) and Gelos et al. (2024) discuss many aspects of the global US dollar cycle while Hofmann et al. (2022) develop a theoretical model of bond portfolio flows being driven by the USD factor. One branch of the global financial cycle literature studies how higher risk aversion propagates through asset prices. Existing papers have focused mostly on fixed income markets (see, for example, Baele et al. (2020), Jiang et al. (2021), Kekre and Lenel (2024) and Jiang et al. (2024a), Stavrakeva and Tang (Forthcomingb)).[9] We complement the results in these papers by being the first

[9]In particular, Baele et al. (2020) document that "flight-to-safety" episodes are associated with statistically significant outflows from equity funds and inflows into government debt and money market funds. Stavrakeva and Tang (Forthcomingb) show that "flight-to-safety" episodes due to the strong information

paper to explain how equity markets and exchange rates equilibrate jointly, unconditionally, and conditionally on news that drive the Global Financial Cycle and "risk-on"/"risk-off" episodes.

An interesting but less related literature in international asset pricing studies exchange rate determination through the prism of factor models. Lustig et al. (2011) and Verdelhan (2018) show that two global factors, a carry factor and a USD factor, explain an important share of the variation in bilateral exchange rates. The results in these papers are related to the variance covariance decomposition results in our paper, where we show that a single "factor", i.e. the local currency net equity supply, is sufficient to explain almost all of the USD base currency cross variation, while for the EUR base, one would need two "factors"— the local currency and the EUR net equities supplies.

Following a more structural approach, Richmond (2019) shows that countries which are more central in the global trade network tend to have lower interest rates and currency risk premia. Lustig and Richmond (2020) relate the risk characteristics of currencies to systematic differences across countries such as physical, cultural, or institutional distance (see Hassan and Mano (2019) for a comprehensive study of this heterogeneity and Hassan (2013) for the role played by country size). Similarly to these papers where the network of economic interactions plays a central role, the network of equity holdings across countries plays a key role in our exchange rate change decomposition.[10,11]

Finally, the methodology of this paper builds on Rey, Rousset-Planat, Stavrakeva, and Tang (2024) (RRST), who propose a new way of backing out empirically all the components

channel of US forward guidance during the Global Financial Crises were are also associated with lower expected excess return from being long US bonds and short the bonds of the other country.

[10] Another strand of the literature uses the Euler equation to express exchange rate changes as a function of forward looking currency risk premia, policy rate and inflation sub-components. (e.g. Froot and Ramadorai (2005), Engel and West (2005), Engel et al. (2008) and more recently Stavrakeva and Tang (Forthcomingc) who discipline the forward looking components using survey data on macroeconomic expectations). Unlike these papers we make use of the market-clearing condition rather than the no-arbitrage condition in global short-term bond markets.

[11] Gourinchas and Rey (2007) use the intertemporal budget constraint of the United States (another accounting identity) to decompose cyclical external US imbalances into valuation and net export components and predict the USD exchange rate out-of-sample.

of the market clearing conditions for global equity markets, despite limited coverage, by leveraging the representative behavior of asset managers with regard to all equity investors.

3 Exchange Rate Change Decomposition

In this section, we develop an exchange rate change decomposition, based on market-clearing conditions for equities. We express exchange rate changes as a function of the growth rate of net equity supply measures, scaled by constant partial elasticities.[12,13]

3.1 Network of Equity Holdings and Currency "Centrality"

Specifically, we start with the market-clearing condition for a single stock j, which implies that total nominal holdings of stock j have to equal total nominal supply of stock j:

$$\sum_{i \in I} \omega_t^{i,j} W_t^i S_t^{l/c^i} = P_t^j Q_t^j \text{ where } c^j = l, \tag{1}$$

where the universe of investors is given by I. The currency of issuance of stock j is c^j, which for this particular stock is also equal to l. W_t^i is the total wealth of investor i, which is denominated in the investor's currency, denoted as c^i. $\omega_t^{i,j}$ is the portfolio weight investor i places on stock j and S_t^{l/c^i} is the nominal exchange rate defined as units of currency l needed to purchase one unit of currency c^i. P_t^j is the price of stock j denominated in currency l and the total number of shares issued of stock j is given by Q_t^j.

After linearizing the market-clearing condition, given by equation (1), with respect to $\omega_t^{i,j}$ and log-linearizing with respect to W_t^i, S_t^{l/c^i}, Q_t^j and P_t^j around some constant values, one

[12]We define the growth rate of the equity net supply of a given currency as the growth rate of the market cap of the local stock market in local currency minus the percentage change of equity holdings in that stock market, measured in investors' currencies.

[13]This decomposition is related to the equity price growth rate decomposition introduced in RRST, where the authors use the same market-clearing conditions to decompose equity price growth rates as a function of the sub-components of equity holdings.

obtains the following expression:

$$\sum_{i\in I}\mu^{i,j}\left(\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}}+\Delta w_t^i\right)+\sum_{m\in M}\left(\sum_{\{i:\ c^i=m\}}\mu^{i,j}\right)\Delta s_t^{l/m}\approx\Delta p_t^j+\Delta q_t^j, \tag{2}$$

where lowercase letters denote logs and hats denote the values around which we linearize. In our empirical application, we use sample averages for these points of approximation. $\mu^{i,j}=\frac{\widehat{W^i}\widehat{S}^{l/c^i}\widehat{\omega}^{i,j}}{\widehat{P^jQ^j}}$ is the average holdings of investor i of stock j relative to the average market cap of stock j. M is the set of investor currencies. The left-hand-side of equation (2) is the percentage change of holdings, denominated in the currency of stock j. The first term of the left hand side of equation (2) is the percentage change in holdings of investor i, denominated in the currency of investor i, scaled by the importance of investor i for stock j, captured by $\mu^{i,j}$, and summed across all investors. The second term of the left hand side of equation (2) is the log change of the exchange rates for the cross l/m, scaled by the importance of investor currency m for the stock j, which is captured by the weight $\sum_{\{i:\ c^i=m\}}\mu^{i,j}$.

We then aggregate equation (2) up to the stock market level by weighting the different stocks by their average market cap relative to the total stock market cap, using the weight $\phi^j=\frac{\widehat{P^jQ^j}}{\sum_{\{j:c^j=l\}}\widehat{P^jQ^j}}$, as follows:

$$\begin{aligned}\sum_m\Delta s_t^{l/m}\nu^{m,l}+\Delta H_t^{ROS,l} &\approx \Delta MC_t^l, \\ \text{where } \Delta MC_t^l &\equiv \sum_{\{j:c^j=l\}}\phi^j\Delta p_t^j+\sum_{\{j:c^j=l\}}\phi^j\Delta q_t^j, \\ \Delta H_t^{ROS,l} &\equiv \sum_{\{j:c^j=l\}}\phi^j\sum_{i\in I}\mu^{i,j}\left(\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}}+\Delta w_t^i\right), \\ \text{and } \nu^{m,l} &\equiv \sum_{\{j:c^j=l\}}\phi^j\sum_{\{i:\ c^i=m\}}\mu^{i,j}.\end{aligned} \tag{3}$$

We index (and refer to) each stock market using the currency that it is associated with, in this case l. ΔMC_t^l is the growth rate of the market capitalization of the stock market associated with currency l. $\Delta H_t^{ROS,l}$ represents changes of equity holdings, with respect to stock market l, and is denominated in investors' currencies.

$\sum_m \Delta s_t^{l/m} \nu^{m,l}$ is a weighted average of (log) changes in individual exchange rates, where currency m is the investor currency. The weight $\nu^{m,l}$ reflects the importance of investor currency m for stock market l. We refer to $\nu^{m,l}$ as a measure of the *"centrality"* of currency m for the stock market associated with currency l. If, for example, Eurozone funds hold a large share of BRL-denominated equity, relative to other funds in our sample, then $\nu^{EUR,BRL}$ will be large.

If all equity denominated in currency l is held by investors with investor currency l, i.e. $\nu^{m,l} = 0$ for all $l \neq m$, then all the exchange rate terms disappear and equity holdings become irrelevant for exchange rate determination. This is an intuitive result as, without cross-border equity holdings, we are in the case of financial autarky with respect to equities and exchange rates no longer play an equilibrating role for equity markets.

We re-write equation (3) in order to express each bilateral exchange rate, $\Delta s_t^{l/z}$, in terms of *the growth rate of net equity supply of currency* l, defined as $\Delta MC_t^l - \Delta H_t^{ROS,l}$, *the net equity supply growth rate of currency* z, defined as $\Delta MC_t^z - \Delta H_t^{ROS,z}$, and all other currency crosses as follows:

$$\Delta s_t^{l/z} \approx \sum_{m \notin \{l,z\}} \Delta s_t^{m/z} \frac{\nu^{m,l} - \nu^{m,z}}{1 - \nu^{l,l} + \nu^{l,z}} + \frac{\Delta MC_t^l - \Delta H_t^{ROS,l}}{1 - \nu^{l,l} + \nu^{l,z}} - \frac{\Delta MC_t^z - \Delta H_t^{ROS,z}}{1 - \nu^{l,l} + \nu^{l,z}}, \quad (4)$$

where we use the fact that $\Delta s_t^{l/m} = \Delta s_t^{l/z} - \Delta s_t^{m/z}$, $\Delta s_t^{l/m} = -\Delta s_t^{m/l}$, and $\sum_{m \in M} \nu^{m,l} = 1$.[14]

To gain some intuition, consider for example the BRL/USD exchange rate. Based on equation (4), the importance of other currency crosses, for example, $s_t^{EUR/USD}$, and the importance of the BRL or USD currency net supply growth rates for the fluctuations of the BRL/USD cross depends on the ν's, which capture the importance of a particular investor currency for either the BRL or USD stock market. Notice also that, by definition, the ν's are always positive as they capture the fraction of a given stock market that is held by investors with a particular investor currency. Moreover, if the Brazilian stock market is not in complete autarky, i.e. $\nu^{BRL,BRL} < 1$, it will always be the case that $1 - \nu^{BRL,BRL} + \nu^{BRL,USD} > 0$.

[14]For details on the derivations, see the Appendix.

The second term in equation (4) captures the *direct* effect of a hypothetical exogenous change in the BRL equity net supply. An increase in the BRL equity net supply will depreciate the BRL against the USD. The intuition is as follows. Holding all else constant, higher BRL equity net supply implies that the change in the valuation of the BRL stock market exceeds the change in the holdings of BRL equity, denominated in investors' currencies. So investors' currencies need to appreciate, i.e. the BRL needs to depreciate, in order for the BRL equity market to clear.

The third term in equation (4) concerns the *direct* effect of the net equity supply of USD. Higher USD stock market valuation relative to the change in holdings, denominated in the investors' currencies, similarly implies that the USD needs to depreciate in order for the US stock market to clear.

The first term in equation (4) is a function of other exchange rates, which in equilibrium, will themselves depend on the net equity supplies of all currencies, as we show in the next sub-section. Indirectly, the presence of these additional currency crosses captures the idea that the whole network of global holdings plays a role for the determination of the BRL/USD cross.

3.2 Solving out for Bilateral Exchange Rates

Next, we consider the system of equations for all currencies against currency z, based on equation (4). We can solve out for the vector of exchange rates $\mathbf{\Delta s}_t^{\mathbf{1}/z}$ in terms of the growth rates of the net equity supply measures and a matrix of parameters which capture the importance or "centrality" of a particular investor's currency for a given stock market.

This system of equations in matrix notation is given by:

$$\mathbf{A}_z \underbrace{\begin{bmatrix} \Delta s_t^{GBP/z} \\ .. \\ \Delta s_t^{EUR/z} \end{bmatrix}}_{\mathbf{\Delta s}_t^{\mathbf{l}/z}} \approx \underbrace{\begin{bmatrix} \Delta MC_t^{GBP} - \Delta H_t^{ROS,GBP} \\ .. \\ \Delta MC_t^{EUR} - \Delta H_t^{ROS,EUR} \end{bmatrix}}_{\mathbf{NS}_t^{\mathbf{l}}} - \underbrace{\begin{bmatrix} \Delta MC_t^{z} - \Delta H_t^{ROS,z} \\ .. \\ \Delta MC_t^{z} - \Delta H_t^{ROS,z} \end{bmatrix}}_{\mathbf{NS}_t^{z}} \tag{5}$$

$$\text{where } \mathbf{A}_z = \begin{bmatrix} 1-\nu^{GBP,GBP}+\nu^{GBP,z} & .. & -\nu^{EUR,GBP}+\nu^{EUR,z} \\ ... & ... & .. \\ -\nu^{GBP,EUR}+\nu^{GBP,z} & ... & 1-\nu^{EUR,EUR}+\nu^{EUR,z} \end{bmatrix}$$

and $z \neq l$. From the system of equations above, we can derive the following solution for $\mathbf{\Delta s}_t^{\mathbf{l}/z}$:

$$\mathbf{\Delta s}_t^{\mathbf{l}/z} \approx \mathbf{A}_z^{-1} \left(\mathbf{NS}_t^{\mathbf{l}} - \mathbf{NS}_t^{z} \right), \tag{6}$$

where the entries in $\mathbf{A}_z^{-1}$ are the partial elasticities of equilibrium exchange rates with respect to net supply. They capture both the direct effect, discussed above, of exogenous movements of the net supply of a given currency cross and the indirect effect, captured by the first term in equation (4).

To gain more intuition, we consider a special case where we set $\nu^{k,l} = 0$ for all $k \neq USD, EUR, l$. These restrictions are akin to considering only holdings of investors whose currencies are USD or EUR, which comprise the majority of assets under management, and the holdings of local currency investors, which will capture the home bias.[15] Under these restrictions on matrix $\mathbf{A}_z$, and considering the case where $z = USD$, the exchange rate

[15] The Appendix also provides the solution for the case where we additionally consider the GBP funds, i.e. we set $\nu^{k,l} = 0$ for all $k \neq USD, EUR, GBP, l$ in the matrix $\mathbf{A}_z$. Notice that we will use all holdings of all investors in our data set to construct the total holdings for a given currency, meaning the restrictions are just on the entries in the $\mathbf{A}_z$ matrix and not on the measurement of net supplies.

change can be expressed as:

$$
\begin{aligned}
\Delta s_t^{l/USD} &\approx \sum_{j=\{l,USD,EUR\}} \xi_{USD}^{l,j} \left(\Delta MC_t^j - \Delta H_t^{ROS,j}\right) \quad (7)\\
\text{where for } l &\neq EUR,\\
\xi_{USD}^{l,l} &= \frac{1}{1-\nu^{l,l}} > 0\\
\xi_{USD}^{l,USD} &= -\frac{1}{1-\nu^{l,l}} \frac{1-\nu^{EUR,EUR}+\nu^{EUR,l}}{1-\nu^{EUR,EUR}+\nu^{EUR,USD}} < 0\\
\text{and } \xi_{USD}^{l,EUR} &= \frac{1}{1-\nu^{l,l}} \frac{\nu^{EUR,l}-\nu^{EUR,USD}}{1-\nu^{EUR,EUR}+\nu^{EUR,USD}},\\
\text{and for } l &= EUR,\\
\xi_{USD}^{EUR,EUR} &= -\xi_{USD}^{EUR,USD} = \frac{1}{1-\nu^{EUR,EUR}+\nu^{EUR,USD}} > 0.
\end{aligned}
$$

$\xi_{USD}^{l,l}$, $\xi_{USD}^{l,US}$ and $\xi_{USD}^{l,EUR}$ are the partial derivatives of the l/USD currency cross with respect to local currency, USD, and EUR net equity supply growth rates. Assuming no stock market is in full autarky, it will be always the case that $\xi_{USD}^{l,l} > 0$ and $\xi_{USD}^{l,USD} < 0$ so that higher local currency net supply depreciates currency l against the USD and higher USD net supply appreciates currency l against the USD, holding all else constant. The sign of $\xi_{USD}^{l,EUR}$, depends on the sign of $\nu^{EUR,l}-\nu^{EUR,USD}$, or the relative importance of EUR funds for the stock market associated with currency l compared to the US stock market.

$\xi_{USD}^{l,l}$, $\xi_{USD}^{l,USD}$, and $\xi_{USD}^{l,EUR}$ are partial derivatives, which implies that the parameter $\xi_{USD}^{l,USD}$ is the response of the exchange rate change to a change in the net equity supply of USD, $\Delta MC_t^{USD} - \Delta H_t^{ROS,USD}$, holding the net supply for all other currencies fixed. The total effect of an exogenous shock, χ_t, is given by the following total derivative, $\sum_{k=\{l,USD,EUR\}} \xi_{USD}^{l,k} \frac{\partial\left(\Delta MC_t^k - \Delta H_t^{ROS,k}\right)}{\partial \chi_t}$. Conditional on having estimates of the net supply derivatives, which we will provide later on for a number of different news indices, one can decompose the total effect on the exchange rate change, for any bilateral cross, by using our empirical counterparts of the partial elasticities. One can derive an equivalent decomposition to equation (7) for the EUR base, which we will also consider in the empirical results section.[16]

[16] To obtain the EUR base version of the decomposition in equation (7), we replace the USD with the EUR

4 Data Description and Variable Construction

In this section, we discuss the data and the methodology we use to construct all of the sub-components of our exchange rate change decomposition, given by equation (6), with one of the main special cases we consider being given by equation (7). We construct the sub-components of the decomposition at a monthly frequency for the Jan 2008–Dec 2021 period. We study 29 currencies—AUD, BRL, CAD, CHF, CLP, COP, CZK, EUR, GBP, HUF, IDR, ILS, INR, JPY, KRW, MXN, MYR, NOK, NZD, PHP, PLN, RUB, SEK, SGD, THB, TRY, TWD, USD, and ZAR—and report results for exchange rates against the USD and EUR bases.[17]

We proxy the growth rate of the market capitalization of stock market l, denominated in local currency, ΔMC_t^l, by using stock price growth rates at the ISIN level, aggregated to the stock market level by weighting each stock by the average relative market cap, according to equation (3). The individual-level stock prices are obtained from Refinitiv/Eikon. As RRST point out, the growth rate of the new issuance at an ISIN level, i.e. Δq_t^j, explains close to none of the variation of individual level stock price growth rates and the overall market cap growth rate, which is why we abstract from it. The exchange rates are obtained from Global Financial Data.

Next, we discuss how we proxy for the change in equity holdings with respect to stock market l, $\Delta H_t^{ROS,l}$, where the exact formula is given by equation (3). Additionally, we also need to construct the partial elasticity parameters, which enter the matrix $\mathbf{A}_z^{-1}$, and which are functions of the ν's. A key issue is that we do not observe the holdings of every single ISIN in a given stock market by every single investor. In order to circumvent this problem, we apply the methodology in RRST of reconstructing the sub-components of the equity market-clearing conditions at an individual stock level (ISIN level), given by equation (3), by aggregating holdings of a sub-sample of asset managers, each scaled up based on a

and the EUR with USD in the system of equations.

[17]The samples for MXN, CNH and COP start in Jan 2009, Jan 2014 and Jan 2012, respectively.

number of representativeness assumptions. RRST show that the proxies for average changes in equity holdings constructed in this way explain, on average, 89% of the variation of the equity price growth rates for over 20,000 stocks, and 96% of the average stock market log price changes for 33 stock markets, which is evidence of the high quality of these proxies.

Below, we briefly summarize the methodology in RRST used to construct proxies for $\Delta H_t^{ROS,l}$ and $\nu^{m,l}$. A more detailed summary can be found in Section A in the Appendix and in Rey, Rousset-Planat, Stavrakeva, and Tang (2024). RRST use the fact that the linearized change in the holdings of investor i of ISIN j can be further decomposed as:

$$\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}} + \Delta w_t^i \approx \frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}} + \underbrace{\left(R_t^{i,NF} - 1\right)}_{r_t^{i,NF}} + \underbrace{\frac{Flow_t^i}{W_{t-1}^i}}_{flow_t^i},$$

which uses the approximation $\Delta w_t^i \approx \frac{W_t^i - W_{t-1}^i}{W_{t-1}^i} \approx \left(R_t^{i,NF} - 1\right) + \frac{Flow_t^i}{W_{t-1}^i}$ with $R_t^{i,NF}$ and $Flow_t^i$ being the net-of-fee gross returns of fund i and the inflows into fund i, respectively. Within narrowly defined types of funds, RRST decompose $\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}}$, $r_t^{i,NF}$ and $flow_t^i$ into a mean and a residual. RRST combine these decompositions with two representativeness assumptions: (1) the sample means of these variables approximately equal the population averages and (2) the average holdings of ISIN j in our sample relative to the average population holdings of ISIN j, for a single type of funds, is the same across all types of investors. These assumptions allow us to scale up and sum up the sample average portfolio weight changes, net-of-fee returns and final flows sub-components to derive a proxy for the average component of $\Delta H_t^{ROS,l}$, which we denote as $\Delta\tilde{H}_t^{ROS,l}$. We refer to $\Delta\tilde{H}_t^{ROS,l}$ as the "common" component of the change in equity holdings for the stock market associated with currency l.

These same representativeness assumptions also imply that $\nu^{m,l}$ can be proxied using the weighted average holdings of stocks in stock market l by funds with investor currency m in our sample relative to the average holdings of stocks in stock market l by all funds in our sample. We will denote these proxies of $\nu^{m,l}$ as $\tilde{\nu}^{m,l}$ and the $\xi_{USD}^{l,j}$, based on these proxies, as $\tilde{\xi}_{USD}^{l,j}$. The exact formulas for $\tilde{\nu}^{m,l}$ and $\Delta\tilde{H}_t^{ROS,l}$ are presented in the Appendix in Section

A. As we do not have a balanced panel of stocks and funds, there is some time variation in $\tilde{\nu}^{m,l}$, which is why, to proxy the importance of a particular set of investors, as defined by the investor currency m, for the stock market associated with currency l, we use the average $\tilde{\nu}^{m,l}$, calculated over the Jan 2013–Dec 2021 period, ensuring that our partial elasticities are indeed constant.

For the construction of $\Delta\tilde{H}_t^{ROS,l}$ and $\tilde{\nu}^{m,l}$, we use the same data sets as in RRST. More specifically, we start with over 36,000 mutual funds in the Morningstar Direct database, out of which 16,810 are equity funds. For funds that report at monthly frequency, the assets under management of the equity funds in our sample reaches 11 trillion towards the end of the sample. The vast majority of the assets under management are denominated in USD, followed by EUR. The average coverage, sample average holdings divided by the market cap of the stock market, across stock markets is about 5%. We use data on over 20,000 ISINs, keeping only ISINs issued in the same currency as the main region of operation of the firm, which allows us to define the stock market based on the currency of the ISIN. We utilize fund-level and share-class-level data, including ISIN-level positions, assets under management, net-of-fee portfolio returns, fund flows, currency of issuance of the share class, and Fund Type. For each asset, we collect data from Refinitiv/Eikon on market capitalization and characteristics including type of the asset (fixed income vs equity, etc.), industry of the issuing firm, currency of issue, and main region of operation of the issuer, in addition to stock prices. More details can be found in the Data Appendix of this paper and also in RRST, whose methodology we build upon.

Finally, in Section 6, we examine the transmission of US macroeconomic news and risk aversion news, orthogonal at daily frequency to macroeconomic news, to exchange rates via our decomposition sub-components. The macroeconomics surprises we use are the differences between actual releases and median forecasts obtained in surveys conducted by Bloomberg and Informa Global Markets (IGM; formerly known as Money Market Services). We include surprises that capture measures of activity, inflation, trade, and the labor market. The median forecasts for these indicators are generally measured at most a few days before the data release. In the case of IGM, a survey is conducted each Friday regarding the following week's data releases. We also include some high frequency surprises based on changes in futures prices around monetary policy announcements and oil production announcements (Känzig 2021). Additional information on the exact macroeconomic surprises that we use can be found in Section B.3 of the Data Appendix. Finally, we obtain the risk aversion measure from Bekaert et al. (2017) and for the US stock market daily price growth rate we use the S&P 500 stock market index obtained from Global Financial Data.

5 Results: Exchange Rates

5.1 The Currency Network of Equity Holdings

First, we start by exploring the network of cross border holdings. Table 1 reports $\tilde{\nu}^{m,l}$ for the most important investor currencies: USD, GBP, EUR and the local currency funds. These four investors' currencies cover the majority of the holdings in our sample (above 90% for every stock market). In our sample of funds, the average ownership by USD funds across all non-US stock markets is 65% with a minimum of 27% for the UK stock market and a maximum of 86% for the Colombian stock market. The average ownership by Euro funds across all non-Eurozone stock markets is 9.4% with a minimum of 3% for the Israeli stock market and a maximum of 26% for the Russian stock market. The average ownership by GBP funds across all non-UK stock markets is 10% with a minimum of 5% for the US stock market and a maximum of 18% of the Singaporean stock market. Finally, the average home bias across the set of investor currencies with non-zero home bias in our sample is 33% with the minimum being 4.8% for the New Zealand stock market and 89% for the US stock market. The last fact implies that the US stock market is the closest one to autarky. Other stock markets with a relatively high home bias include the UK at 59%, Japan at 44%, and Europe at 40%. However, the home bias in these stock markets is still significantly lower than the home bias in the US stock market. For 16 out of 29 investor currencies, we do not observe any local funds: for these investor currencies, the currency home bias is zero.

Figure 1 presents the whole network for a number of holding thresholds. More specifically, we report all $\tilde{\nu}^{m,l}$'s, where an arrow is present if more than X percent of all stock market holdings associated with a given currency (end node) are held by funds with a given investor currency (starting node), for varying thresholds $X = 10, 30, 60, 80$. Figure 1 clearly illustrates that USD funds dominate the cross border ownership with Euro and GBP funds being important only at the 10% ownership threshold, which reflects the numbers in Table 1.

5.2 Exchange Rate Variance Covariance Decomposition

As shown in Section 3, by inverting the market-clearing conditions, we can recover any bilateral currency cross as a function of the net equity supplies of all currencies (see equation (6)). As a reminder, we refer to the term $\Delta MC_t^z - \Delta H_t^{ROS,z}$ as the change in the net supply of currency z, which we proxy in the data as the growth rate of the local stock market price in local currency minus the "common" component of the change in equity holdings, denominated in the investors' currencies. We present the results for both the USD and EUR bases.

We report the results based on equation (7), which presents a special case where we focus only on the local currency, USD, and EUR net equity supplies when studying the USD base. We will also examine a decomposition of the EUR base exchange rate for the same special case. The results from the case where we also consider the GBP net equity supply are presented in the Online Appendix while the derivations for that case can be found in Section A of the Appendix. We show that considering these special cases is without loss of generality as we obtain a fit of exchange rate changes very similar to the one obtained from equation (4), which takes into account the whole investor currency network.

5.2.1 USD Base

In Figures 2–6, we plot the sum of all the components on the right hand side of equation (7) against the exchange rate change itself. Remarkably, considering only the net equity supplies of local currency, USD, and EUR, appropriately scaled by the net supply elasticities, is sufficient to explain most of the exchange rate change variation for all crosses. This is true for the currencies of advanced economies, as well as for the currencies of emerging markets.

Next, Table 2 presents the exchange rate elasticities with respect to net equity supply $\tilde{\xi}_{USD}^{l,l}$, $\tilde{\xi}_{USD}^{l,USD}$ and $\tilde{\xi}_{USD}^{l,EUR}$, the interpretation of which is discussed below equation (7). The elasticities are positive with respect to the local currency net supply and negative with respect to the USD net supply, as expected. This implies that an increase of the net equity supply of the local currency will depreciate the local currency against the USD, allowing for the market to equilibrate so that demand and supply, as measured in local currency, are the same. The opposite is true if the USD net supply increases. The elasticities of the exchange rate change with respect to the EUR net supply tend to be positive, which captures the fact that European funds are relatively more important for non-US stock markets than for the US stock market, as can be seen from equation (7) (exceptions are the ILS, the INR and the THB). This implies that excess EUR net equity supply will depreciate the local currency against the USD. If we allow for the GBP to be a central currency as well, we also see that excess GBP net equity supply will, on average, depreciate the local currency against the USD, where the elasticities tend to be somewhat larger than the EUR net supply elasticities.[18]

In absolute value, the elasticities with respect to the USD net equity supply are larger than the elasticity with respect to the local currency net supply. Having said that, the overall importance of the various scaled net supplies measures, as drivers of exchange rate change movements, depends not only on these elasticities but also on the volatilities of the net supply

[18] We show the results from the specification where the GBP is also a central currency in Table A.12 in the Online Appendix.

components. For that reason, we perform the following variance covariance decomposition in order to evaluate the relative importance of the net supply exchange rate sub-components, scaled by the partial elasticities, as drivers of exchange rate change variation:[19]

$$1 = \sum_{j=\{l,USD,EUR\}} \beta^{s,NS_j} + \beta^{s,Resid},$$

$$\text{where } \beta^{s,NS_j} = \frac{Cov\left(\Delta s_t^{l/USD}, \tilde{\xi}_{USD}^{l,j}\left(\Delta MC_t^j - \Delta \tilde{H}_t^{ROS,j}\right)\right)}{Var\left(\Delta s_t^{l/USD}\right)}.$$

The contribution of the residual component, constructed as, $\beta^{s,Resid} = 1 - \sum_{j=\{l,USD,EUR\}} \beta^{s,NS_j}$ captures the importance of idiosyncratic holdings, measurement error, issuance at the ISIN level and the net supply of other currencies. The results for the variance covariance decomposition of equation (7) are presented in Table 3 and Figure 7.[20]

In Table 3, the last column presents the fraction of the exchange rate change variation that is explained by our measures of net supply, $\sum_{j=\{l,USD,EUR\}} \beta^{s,NS_j}$. The number is, on average, 95 percent, but there is significant variation ranging from 68 percent for the NOK/USD to 116 percent for the JPY/USD. The latter number implies that the net supply components are more volatile than the exchange rate for the JPY/USD cross. The sum of our three net supply components explain 109 and 98 percent of the GBP/USD and CHF/USD crosses, respectively. Allowing for the GBP to be a central currency makes a difference for a number of currency crosses such as the EUR/USD where the explanatory power increases from 89 to 94 percent. However, the marginal improvement of treating the GBP as a central currency for the USD base is small, implying that the specification given by equation (7) already accounts for most of the exchange rate change variation.

Next, we discuss the importance of the different net equity supply sub-components. The local currency net supply component, scaled by the relevant partial elasticity, explains the

[19] Note that there is no causal or structural interpretation of our results as the net supply measures are endogenous.

[20] The results for the case where we allow the GBP to be also a central currency are presented in Table A.13 and Figure A.16 in the Online Appendix.

vast majority of exchange rate change variation for all currency crosses. β^{s,NS_l} explains on average 86 percent of exchange rate changes, with values ranging from 49 percent to 123 percent. From Table 3 we can see that the adjusted R^2 from regressing $\tilde{\xi}^{l,l}_{USD}\left(\Delta MC^j_t - \Delta \tilde{H}^{ROS,l}_t\right)$ on $\Delta s^{l/USD}_t$ is on average 55 percent with the minimum and maximum values being 18 and 85 percent. Further, β^{s,NS_l} is always very statistically significant.

Turning to the scaled USD net supply component, we can see that, surprisingly, it explains a smaller fraction of exchange rate variance despite being an important driver of exchange rates. More specifically, it explains, on average, only 6 percent of exchange rate variation with the minimum and maximum values being -8% (for the JPY/USD cross) and 27% (for the GBP/USD cross), respectively. This is despite the USD net supply elasticities being, in absolute value, larger than the local currency net supply elasticities. This intriguing result reflects the fact that the USD net equity supply is less volatile than the local currency net equity supply. This is the case as most US equities are owned by US funds, and exchange rate valuations play a small role in equilibrating the US stock market, thus making USD net supply less important for exchange rate movements, holding the other currencies' net supply components constant. In other words, the US stock market is close to "autarky".$\beta^{s,NS_{USD}}$ is statistically significant for most currency crosses and the average adjusted R^2 from the corresponding regression is 4% with a minimum of 0% and a maximum of 11%.

Finally, turning to the EUR net supply, we find that it explains on average 2.8% of the exchange rate variation against the USD base (excluding the EUR/USD cross) with a minimum of zero and a maximum of 12% (for CHF/USD and SEK/USD). The $\beta^{s,NS_{EUR}}$ is statistically significant in all cases and the average adjusted R^2 from the corresponding regression is 20% with a minimum of 3% and a maximum of 47% .

In summary, a single observed, not estimated, variable, i.e. the scaled local currency net supply, is sufficient to explain a large part of exchange rate movements when the base currency is the USD. This result is quite surprising as it implies that it is the local stock market equilibration rather than the US stock market equilibration that explains almost all of the movement of all currency crosses against the USD base. Having said that, it is still the case that US investors play the most important role for the equilibration of all global stock markets as the vast majority of global assets under management are denominated in USD.

5.2.2 EUR Base

Turning to the EUR base, Figures 8–12 plot the sum of the scaled net supply components (local currency, EUR, and USD) against actual exchange rate changes. The fit is once again very good and our empirical specification can account for most of the exchange rate change variation.

Table 4 reports the partial elasticities with respect to the net equity supplies for our benchmark case. As the theory predicts, the partial elasticities are positive with respect to the local currency net supply and negative with respect to the EUR net supply. The partial elasticity of the exchange rate change with respect to the USD net equity supply is often positive, which captures the fact that USD funds are relatively more important for non-Eurozone stock markets rather than the Eurozone stock market. However, it is also the case that for some crosses (such as CHF, GBP, JPY, NOK, and SEK) the USD net supply partial elasticity is negative. If we allow for the GBP to be a central currency as well, we see that an increase of the GBP net equity supply will, on average, appreciate the local currency against the EUR, i.e. the elasticities are on average negative.[21]

In what follows, we turn to the variance covariance decomposition for the EUR base, presented in Table 5 and Figure 13.[22] The three scaled net supply components combined explain, on average, 98% of the bilateral exchange rate movements against the EUR (the smallest being 73% for INR/EUR and the largest 126% for ILS/EUR). The respective explanatory powers are 108, 125, and 93% for the JPY/EUR, GBP/EUR and CHF/EUR

[21]Table A.14 in the Online Appendix presents the case where the GBP is also a central currency.

[22]The case where we allow the GBP to be also a central currency is presented in Table A.15 and Figure A.17 in the Online Appendix.

crosses. What is striking is that our sample includes the period during which the CHF had a ceiling vis-à-vis the EUR (from 2011 till 2015) and one can clearly see how well our model traces the period of the upward CHF revaluation when the asymmetric peg was abandoned. Considering the case where we allow for the GBP to be a central currency, the average explanatory power of the empirical model becomes 95%, where the respective explanatory powers for the JPY/EUR, GBP/EUR, and CHF/EUR crosses are 107, 101, and 92%.

Turning to the relative importance of the various sub-components under our benchmark specification, presented in Table 5, one can see a very different picture for the relative importance of the scaled net equity supply sub-components. For some currencies (such as TWD, SGD, USD, THB, PHP), the EUR net equity supply alone explains most of the exchange rate variation for the EUR base. As seen in Figure 13, for many currencies, it is still the local currency net supply that matters the most. However, there is now a group of currencies (JPY, GBP, IDR, CAD) for which both the local currency and EUR net supplies are equally important. The contribution of the USD net equity supply towards the variance covariance decomposition is small once again for the same reasons why it did not explain a large fraction of the exchange rate movements for the USD base; i.e. the net US equity supply is not very volatile. The estimated scaled covariances are almost always highly statistically significant for the local currency and EUR net supplies and less so for the USD net supplies.

In conclusion, unlike the *USD base*, where a single scaled currency net supply was sufficient to explain most of the variation for all crosses against the USD, for the *EUR base* two variables—the scaled local currency and EUR net supplies—are needed in order to achieve a similarly almost perfect fit for all of the crosses against the EUR. In other words, it's the equilibration of both the local and EUR stock markets that drive exchange rate movements when considering the EUR base.

Finally, in Table A.16 in the Online Appendix, we examine how much the fit of our benchmark specification, given by equation (7), and the extension where we allow for GBP investors as well, can be improved by considering the whole network of investor currencies, which is captured in the specification in equation (4). To do so, we report the correlations between the exchange rate change implied from the specification in equation (4) and our two special cases. We find that these correlations are very close to one, implying that our approximations capture quite well the important investor currencies in the network for USD and EUR base currencies.

6 Transmission of News and Global Cycles

US macroeconomic news and policies have an out-sized impact on the rest of the world. Stock market indices, the VIX and other risk aversion measures and commodity prices all respond strongly to US news releases and to US monetary policy. For example, Boehm and Kroner (2023) find that a quarter of the variation in stock markets globally and in commodity prices can be explained by US macroeconomic news at the quarterly frequency. Using our decomposition of any bilateral exchange rate change, as a function of the same set of net equity supply changes, scaled by different partial elasticity parameters, we can trace the channels through which US macroeconomic news and risk aversion news transmit to exchange rates as they impact global stock markets.

Concretely, we estimate and decompose the response of the log exchange rate change to US macroeconomic news that appreciate the US stock market, as well as to risk aversion news. We define risk aversion news as an increase in the risk aversion measure developed by Bekaert et al. (2017) which is orthogonal to contemporaneous and lagged US macroeconomic news at daily frequency.

More specifically, we use equation (7) to perform the following decomposition:

$$\begin{aligned}
\gamma^{s}_{g,USD} \equiv \frac{Cov\left(\Delta s^{l/USD}_{t}, g_t\right)}{Var\left(g_t\right)} &= \sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{USD}\gamma^{ns,j}_{g} + Resid^{s}_{g,USD}, \qquad (8)\\
\text{where } \gamma^{ns,j}_{g} &\equiv \frac{Cov\left(\Delta MC^{j}_{t} - \Delta\tilde{H}^{ROS,j}_{t}, g_t\right)}{Var\left(g_t\right)},\\
Resid^{s}_{g,USD} &\equiv \gamma^{s}_{g,USD} - \sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{USD}\gamma^{ns,j}_{g}\\
\text{and } g_t &\equiv \left\{\Delta\widehat{ra}^{news}_{t}, \Delta\widehat{p}^{news,US}_{t}\right\}.
\end{aligned}$$

$\Delta\widehat{ra}^{news}_{t}$ and $\Delta\widehat{p}^{news,US}_{t}$ are the risk aversion news index and the US macroeconomic stock market news index.

In order to disentangle further the channels through which news affects exchange rates via equity markets, we decompose $\gamma^{ns,j}_{g}$ into an impact on the growth rate of equity prices, which we use as a proxy for MC^{j}_{t}, and an impact on the growth rate of equity holdings, denominated in the investor currency, $\tilde{H}^{ROS,j}_{t}$. Additionally, we decompose each growth rate of equity holdings into the percentage change in holdings of local currency investors, USD investors, and the rest. We perform these additional decompositions by estimating the following responses:

$$\gamma^{ns,j}_{g} = \gamma^{MC,j}_{g} - \gamma^{H,j}_{g} = \frac{Cov\left(\Delta MC^{j}_{t}, g_t\right)}{Var\left(g_t\right)} - \frac{Cov\left(\Delta\tilde{H}^{ROS,j}_{t}, g_t\right)}{Var\left(g_t\right)} \qquad (9)$$

$$\gamma^{H,j}_{g} = \sum_{k\in\{l,USD,REST\}} \gamma^{H,k,j}_{g} = \sum_{k\in\{l,USD,REST\}} \frac{Cov\left(\Delta\tilde{H}^{ROS,k,j}_{t}, g_t\right)}{Var\left(g_t\right)}. \qquad (10)$$

6.1 Construction of the US Stock Market Macro News Index and Risk Aversion News Index

In this subsection, we describe briefly how we construct the US stock market macro news index and the risk aversion news index. Detailed equations are presented in Section A of the Appendix.

Following the methodology in Stavrakeva and Tang (Forthcominga), we construct $\Delta\widehat{p}_t^{news,US}$ by regressing the daily US stock market price growth rate on contemporaneous and lagged US macroeconomic surprises. We include the following daily lags: $\{0, 1, 2, 30, 60, 90, 120, 150, 180\}$. The surprise series are filled in so that these lags represent the most recent macroeconomic surprise that occurred on or prior to that date. This specification is a parsimonious way to capture the dynamic response of asset prices to macroeconomic news. We then construct the fitted values from this regression and sum them up within months to obtain our monthly US macroeconomic stock market news index. To construct $\Delta\widehat{ra}_t^{news}$, we regress the daily percentage change of the risk aversion index on the same set of contemporaneous and lagged US macroeconomic surprises. We then sum the residuals from this daily regression, up to the monthly frequency, to obtain our risk aversion news index, which is, by construction, orthogonal to macro news at daily frequency. We emphasize that these news indices are themselves functions of deep economic shocks.

We show that the exchange rate transmission of US macroeconomic news appreciating the US stock market, resembles the transmission of US macroeconomic news that decrease risk aversion. [23]. This suggests that a significant propagation mechanism of US macroeconomic news globally is via their impact on global risk aversion (this is consistent with the findings of Boehm and Kroner (2023) and with Miranda-Agrippino and Rey (2020) for transmission of monetary policy shocks). We correlate our news indices with the Risk-On Risk-Off index ("RORO index") of Chari et al. (2023), which is constructed as the first principal component of daily changes of measures of advanced economy credit risk, equity market volatility, funding conditions, currencies and gold. We find that our US stock market news index and our risk aversion news index have a correlation of -52% and of 27% with their RORO index, repectively.

[23] The two indices are very highly correlated at -64%.

6.2 Empirical Results

The response of the exchange rate to news, $\gamma^{s}_{g,USD}$, and the response of the scaled net equity supplies to news, $\tilde{\xi}^{l,j}_{USD}\gamma^{ns,j}_{g}$ for $j \in \{l, USD, EUR\}$, for the USD base are reported in Tables 6 for the US stock market macro news index and in Tables 7 for the risk aversion shock. The equivalent results for the EUR base are reported in Table 8 for the US stock market macro news index and in Table 9 for the risk aversion shock. We also report the statistical significance of these responses and the adjusted R^2 from the regressions. Tables 10 and 11 report the responses of each net supply growth rate and the further decompositions of these responses, i.e., $\gamma^{ns,j}_{g}$, $\gamma^{MC,j}_{g}$, $\gamma^{H,j}_{g}$, $\gamma^{H,l,j}_{g}$, $\gamma^{H,USD,j}_{g}$ and $\gamma^{H,REST,j}_{g}$. Finally, Figures 14 and 15 represent $\gamma^{ns,j}_{g}$ visually.

6.2.1 USD Base

Starting with the responses of USD-base log exchange rate changes to the US stock market macro news index, we find that US macroeconomic news that appreciate the US stock market by one percent lead to a statistically significant appreciation of all currencies but the JPY against the USD. The average appreciation of all currencies against the USD is 0.336%.[24] We can decompose the total effect into the contribution of each one of our scaled net supply sub-components, $\tilde{\xi}^{l,j}_{USD}\gamma^{ns,j}_{\Delta\widehat{p}^{news,US}}$. On average, most of the effect can be traced to the response of the local currency scaled net supply to fluctuations in $\Delta\widehat{p}^{news,US}_{t}$, which contributes 0.25% out of the overall appreciation of 0.336% of all currencies against the USD. The equivalent numbers for the USD and EUR scaled net supplies are 0.092% and 0.014%. All three scaled net supply sub-components contribute towards the appreciation of the non-USD currencies against the USD. The JPY differs from other currencies in that it actually depreciates against the USD when the US stock market increases due to US macro news, albeit the estimated coefficient is not statistically significant. The source of the depreciation can be traced to the different response of the Japanese scaled net supply sub-component.

[24] A negative coefficient implies an appreciation of the non-USD currency.

The estimated coefficients are highly statistically significant for almost all scaled currency net supply sub-components, including the USD and EUR net supply sub-components. Summing up the average contribution of each scaled net supply sub-component accounts for the total average effect on the log exchange rate change, which confirms once again the close to perfect fit of our empirical decomposition of exchange rates discussed in the previous section.

Turning to the transmission of risk aversion news to USD-base exchange rates, we find that a one percent increase in risk aversion, orthogonal to US macro news at daily frequency, appreciates the USD against all currencies but the JPY, on average, by 0.07%. The JPY is an outlier where an increase in risk aversion, orthogonal to US macroeconomic news, leads to the appreciation of the JPY against the USD. The estimated coefficients are statistically significant for all currency crosses but the JPY. Tracing the estimated response back to our scaled net supply sub-components, $\tilde{\xi}^{l,j}_{USD}\gamma^{ns,j}_{\Delta\widehat{ra}^{news}}$, we find that the main transmission channel is once again the scaled local currency net supply which contributes on average 0.06%. Almost all scaled net supply sub-components contribute towards the appreciation of the USD in response to positive risk aversion news in a statistically significant way, where the sum of the average contribution of each scaled net supply sub-component is once again equal to the average impact of risk aversion news on USD exchange rates.

6.2.2 EUR Base

Next, we consider the transmission of the same news indices to the EUR base currency crosses. Starting with the US stock market macroeconomic news index, we find a very different picture relative to the USD base. An appreciation of the US stock market due to US macro news by one percent appreciates the non-EUR currencies against the EUR in some cases and depreciates them in others. For the EUR base, the estimated exchange rate responses are statistically significant for only 14 out of 28 currency crosses. Considering the scaled net supply sub-components' responses to the US stock market macro news index, they are still highly statistically significant, as expected, as the EUR base currency crosses are a function of the same net equity supply variables that drive the USD currency crosses; they are just scaled by different constant net supply elasticities.

While the response of the local currency scaled net supply sub-components appreciates the non-EUR currencies against the EUR (except for the USD and JPY crosses), the response of the scaled EUR net supply sub-components depreciate the non-EUR currencies against the EUR. For most currency crosses, the contribution of the scaled USD net supply sub-components is also towards a depreciation of the non-EUR currencies against the EUR. Thus, for the EUR base, the responses of the various scaled net supply sub-components often cancel each other out, leading to an insignificant overall impact of the US stock market news index on a large number of the the currency crosses considered. On net, the responses may push towards either an appreciation or a depreciation of non-EUR currencies against the EUR, depending on the relative sizes of the effects.

Moving to the transmission of risk aversion news to the EUR base, we find even fewer statistically significant results. The estimated coefficients are statistically significant in only 10 out of 28 cases, despite the fact that the scaled net supply sub-components are almost always statistically significantly correlated with the risk aversion news. Once again, this comes from the fact that the scaled local currency net supply increases in response to higher risk aversion (except for the USD and JPY crosses), contributing towards the depreciation of non-EUR currencies against the EUR, holding all else constant. In contrast, the scaled EUR and USD net supply sub-components contribute towards an appreciation of non-EUR currencies against the EUR. Hence , we have off-setting effects that often cancel out, decreasing the ability of the EUR base exchange rates to transmit macroeconomic news or risk aversion news globally.

In summary, since all bilateral exchange rates, regardless of the currency base we consider, can be decomposed as a function of the same net equity supplies (or the sub-components of net equity supplies), scaled by constant elasticities, we can attribute the source of the heterogeneous propagation of news with respect to the USD and the EUR bases to the heterogeneity in these currency-cross specific elasticities.

6.2.3 Individual Stock Market Equilibration

To gain more intuition, we next discuss the responses of our net equity supply measures and the sub-components of net equity supply, to the US stock market macro news index and risk aversion news, i.e. we report $\gamma_g^{ns,j}$, $\gamma_g^{MC,j}$, $\gamma_g^{H,j}$, $\gamma_g^{H,l,j}$, $\gamma_g^{H,USD,j}$, and $\gamma_g^{H,REST,j}$. Intuitively, in this sub-section we study how each stock market equilibrates in response to these news indices.

Starting with the US stock market macro news index and the first column of Table 10, it is clear that for every single currency but the USD and JPY, an increase of the US stock market by one percent due to US macro news decreases the net equity supply of the currency. The estimated parameters are statistically significant for 20 currencies out of 28. The opposite is true for the USD and JPY net equity supplies, where the results are insignificant for the JPY and highly significant for the USD.

Decomposing these estimated coefficients further, US macro news that appreciate the US stock market increases the stock market price growth rate of all 28 other stock markets and it also increases the equity holdings, denominated in the investors' currencies, for all these stock markets. All estimated coefficients are highly significant and the average effects are 0.79%, for $\gamma_{\Delta\widehat{p}^{news,US}}^{MC,j}$ and 1%, for $\gamma_{\Delta\widehat{p}^{news,US}}^{H,j}$. The respective average R^2 from these regressions are 18% and 18%, implying that a significant fraction of global stock market price growth and the growth rate of global stock market holdings can be explained by contemporaneous and lagged US macroeconomic news that appreciate the US stock market. For the USD, $\gamma_{\Delta\widehat{p}^{news,US}}^{MC,USD} = 0.96\%$ and $\gamma_{\Delta\widehat{p}^{news,US}}^{H,USD} = 0.88\%$, respectively, and the corresponding adjusted R^2s are 30% and 29%.

Considering the break down of the response of the change in holdings across different investor currencies, for all stock markets but the GBP, the main transmission of positive

US macro news to holdings is due to the holdings of USD investors.[25] This is true even for the EUR market. On the one hand, the importance of USD investors is not surprising given that the vast majority of assets under management globally are denominated in USD. On the other hand, it may be surprising that, for the countries where there is strong home bias in equity markets, the change in local currency fund holdings plays *less* of a role in the transmission of US macro news than the change in USD investors' holdings. For example, even for the JPY, which has a high degree of home bias (44% of the stock market is held by local investors), the transmission through US holdings dominates. This result may be due to the fact that USD investors potentially change their holdings in response to US macro news by more than non-USD investors. In other words, a key reason why US macroeconomic news impact global exchange rates so significantly may be the higher sensitivity of US investors to these news and the overall higher importance of USD equity funds globally.

Next, we consider risk aversion news. Similarly to the US macro news, the USD and JPY net equity supply responses have the opposite sign of all other net equity supply responses. Net equity supplies increase for all currencies (but the USD and JPY) in response to a one percent increase in risk aversion news, by an average of 0.055%, with coefficients being significant in 22 out of 28 cases. In contrast, the USD net supply decreases in a statistically significant way while the estimate for the JPY is not statistically significant. Once we decompose the estimated coefficients into the contribution of each sub-component, we find that the risk aversion news decrease the stock market price growth rate of all 28 stock markets; they also decrease the equity holdings, denominated in the investors' currencies, for all these stock markets. However, for the USD and the JPY stock markets (and only for those) the decrease in holdings is smaller relative to the decrease in the stock market price growth rate (hence the decrease in net supplies for these two markets). All estimated coefficients are highly statistically significant but for the Turkish stock market growth rate, and the average effects across stock markets are -0.12% for $\gamma^{MC,j}_{\Delta\widehat{ra}^{news}}$ and -0.175% for $\gamma^{H,j}_{\Delta\widehat{ra}^{news}}$.

[25] Note that, for some currencies, we do not have data for domestic investors.

Finally, decomposing $\gamma^{H,j}_{\Delta\widehat{ra}^{news}}$ further into the contribution due to the change in holdings of different investors, once again the main transmission is via the change in holdings of USD funds except for the GBP, for which local currency funds play the most important role.

6.2.4 Global Financial Cycles

In this section, we synthesize our contributions to the literature on global financial cycles and "risk-on"/"risk-off" episodes. The literature on the Global Financial Cycle has documented striking co-movements in international financial variables. Namely, US monetary policy, risk aversion news, and US macroeconomic news impact US and global asset prices in very similar ways and explain a large share of the variation of risky asset prices around the world (see Miranda-Agrippino and Rey (2022) and Boehm and Kroner (2023)).[26] Furthermore, as highlighted by Obstfeld and Zhou (2022), there is a strong negative correlation between the Global Financial Cycle and the USD: expansion phases in the cycle coincide with USD depreciation and vice versa. This is a central stylized fact in international finance.

In line with this literature, we document strong positive responses of global stock markets to US macroeconomic news that appreciate the US stock market and to news of lower risk aversion, orthogonal to US macroeconomic news (see Tables 10 and 11). We also document strong responses of global equity holdings and of USD-base exchange rates to those news. Global equity holdings, denominated in investors' currencies, increase and the USD depreciates against all currencies but the JPY. Surprisingly, we show that these news do not have a similar impact on EUR-base exchange rates (see Tables 8 and 9).[27] Understanding the mechanism behind the correlation between the USD (and EUR) base exchange rates and the Global Financial Cycle is one of the main contributions of this paper.

Our novel exchange rate decomposition, based only on market clearing conditions (i.e. accounting identities), allows us to express each bilateral exchange rates as a function of the

[26] Additionally, Boehm and Kroner (2023) show that foreign news have little effect on the US stock market, which rules out the possibility that global shocks could be the driver of the Global Financial Cycle.

[27] We also find that Eurozone or US macroeconomic news appreciating the Eurozone stock market do not trigger a strong uniform reaction of EUR-base exchange rates.

same net equity supplies and bilateral elasticities. As a result, we can trace the "specialness" of the USD base to the unique response of the USD net equity supply (Table 10, first column), relative to the net equity supplies of all other currencies (but the JPY). More specifically, the USD net equity supply increases during "risk-on" episodes, while all other currencies' net equity supplies decrease (besides the JPY). We show that this unique equilibration of the US stock market can explain why US macroeconomic news and risk aversion news have a sizable and one-directional impact for all currency crosses (but the JPY) against the USD, while that is not the case when we consider the EUR base.

Moreover, as we capture the whole global network of equity holdings, we can delve deeper into examining which investors transmit these news. Even in stock markets with large home bias (except for the UK), it is the USD investors that play the key transmission role for US macro news and risk aversion news into non-US stock markets and to exchange rates. They do so by changing their holdings of *non-US stocks* in response to these news. This affects *the local currency net equity supply*, which is the main driver of movements of the USD-base exchange rates. As a result, we can attribute the strong transmission of "risk-on"/"risk-off" episodes to equity markets and USD-base exchange rates to the fact that USD investors hold the vast majority of global equities and they appear very sensitive to US macro news and risk aversion news. This set of findings elucidates the source of the correlation between the USD and the Global Financial Cycle.[28]

7 Conclusion

We uncover a close link between exchange rates and global equity markets at the monthly frequency and are able to explain each bilateral exchange rate cross vis-à-vis any base as a function of net equity supplies and constant elasticities. Notably, from an empirical point of

[28]More broadly, our findings may also open the door to a better understanding of the co-movements between the US Dollar and international trade (see Gopinath et al. (2020) and Akinci et al. (2024)) through the role of the USD as a world numéraire.

view, only three net equity supplies are needed to get a remarkably close fit for all exchange rates: the USD, the EUR, and the local currency net equity supplies.

Using our exchange rate change decomposition, we document the importance of the equilibration of the local stock market, rather than the US stock market, as a driver of USD-base exchange rates, which we rationalize with the closed nature of the US stock market. We contrast this finding to the EUR base exchange rates, for which both the equilibration of the local stock markets and the Eurozone stock market play a role.

Furthermore, we can trace the channels through which US macroeconomic news and risk aversion news transmit to exchange rates by impacting global stock markets, with the differential equilibration of the US stock market, relative to all other stock markets (but Japan), playing a central role. This finding helps us elucidate one of the most important stylized fact in international finance: the correlation between the US Dollar Cycle and the Global Financial Cycle.

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8 Tables and Figures

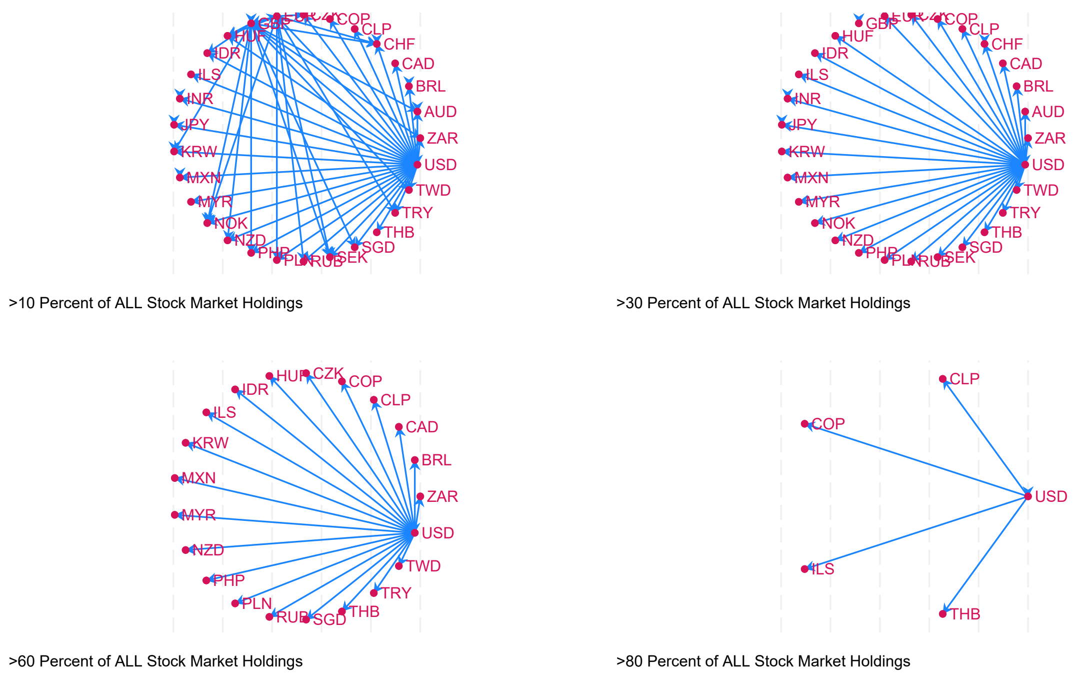
8.1 Currency Network Of Equity Holdings

Table 1: Importance of local currency, USD, EUR and GBP investors for the local stock market

Currency	$\tilde{\nu}^{l,l}$	$\tilde{\nu}^{USD,l}$	$\tilde{\nu}^{EUR,l}$	$\tilde{\nu}^{GBP,l}$	$\sum_{j=l,USD,EUR,GBP}\tilde{\nu}^{j,l}$
AUD	0.26	0.56	0.04	0.11	0.97
BRL	0.12	0.71	0.06	0.08	0.97
CAD	.	0.75	0.10	0.09	0.93
CHF	0.32	0.38	0.17	0.10	0.98
CLP	.	0.80	0.08	0.09	0.97
COP	.	0.86	0.05	0.05	0.96
CZK	.	0.72	0.16	0.09	0.96
EUR	0.40	0.44	.	0.12	0.97
GBP	0.59	0.27	0.12	.	0.98
HUF	.	0.64	0.15	0.14	0.92
IDR	.	0.80	0.06	0.11	0.96
ILS	.	0.82	0.03	0.09	0.94
INR	0.38	0.50	0.03	0.07	0.99
JPY	0.44	0.41	0.05	0.09	0.98
KRW	0.12	0.67	0.07	0.11	0.97
MXN	0.14	0.71	0.05	0.08	0.97
MYR	.	0.79	0.08	0.09	0.97
NOK	0.24	0.37	0.20	0.14	0.95
NZD	0.05	0.68	0.04	0.14	0.91
PHP	.	0.79	0.07	0.11	0.97
PLN	.	0.73	0.15	0.10	0.97
RUB	.	0.62	0.26	0.09	0.97
SEK	0.27	0.36	0.20	0.11	0.94
SGD	.	0.73	0.06	0.18	0.96
THB	.	0.85	0.04	0.09	0.98
TRY	.	0.75	0.11	0.09	0.96
TWD	.	0.76	0.08	0.12	0.97
USD	0.89	.	0.04	0.05	0.97
ZAR	.	0.74	0.10	0.13	0.96

Note: In this table we report the averages over the period Jan 2013 to Dec 2021 of $\tilde{\nu}^{l,l}$, $\tilde{\nu}^{USD,l}$, $\tilde{\nu}^{EUR,l}$, $\tilde{\nu}^{GBP,l}$ and the sum of these variables.

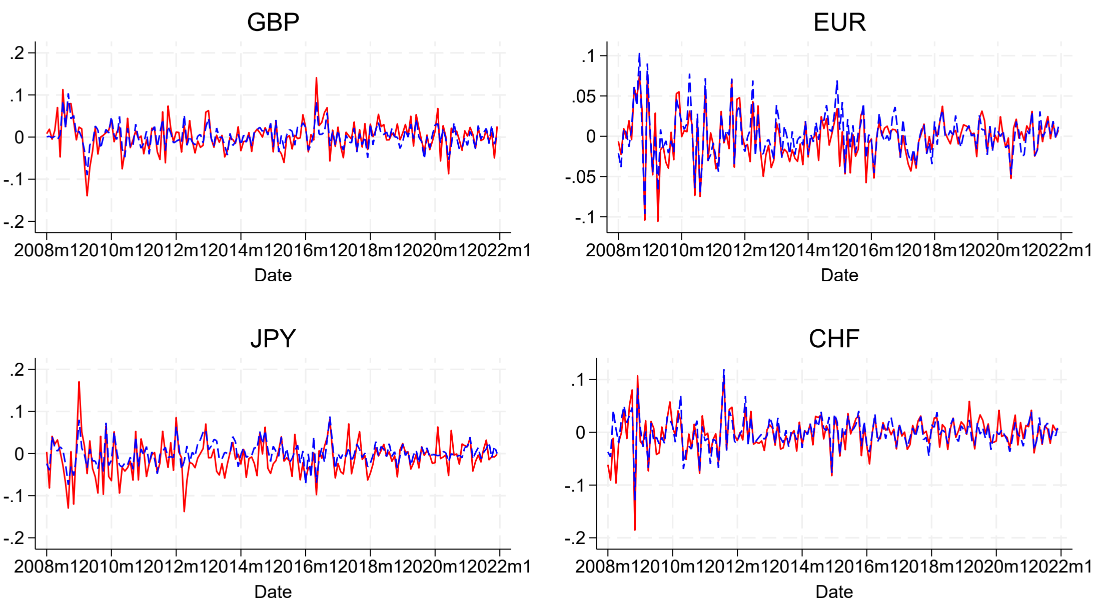
Figure 1: Importance of the Final Investor for the Local Stock Market



In this Figure we report the averages over the period Jan 2013 to Dec 2021 of all $\tilde{\nu}^{m,l}s$, where we draw an arrow if more than X percent of all stock market holdings associated with a given currency (end node) are held by funds with a given investor currency (starting node).

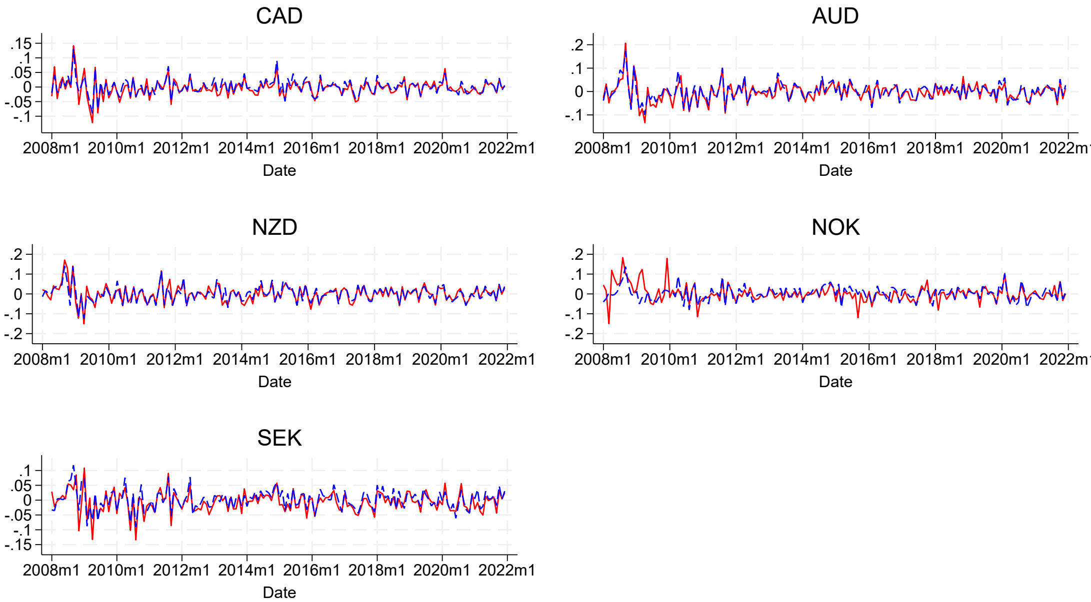
8.2 Exchange Rate Decomposition: Variance Covariance Decomposition

Figure 2: Exchange Rate Growth Rate vs Model Fit; USD Base; Local Currency, USD and EUR Investors



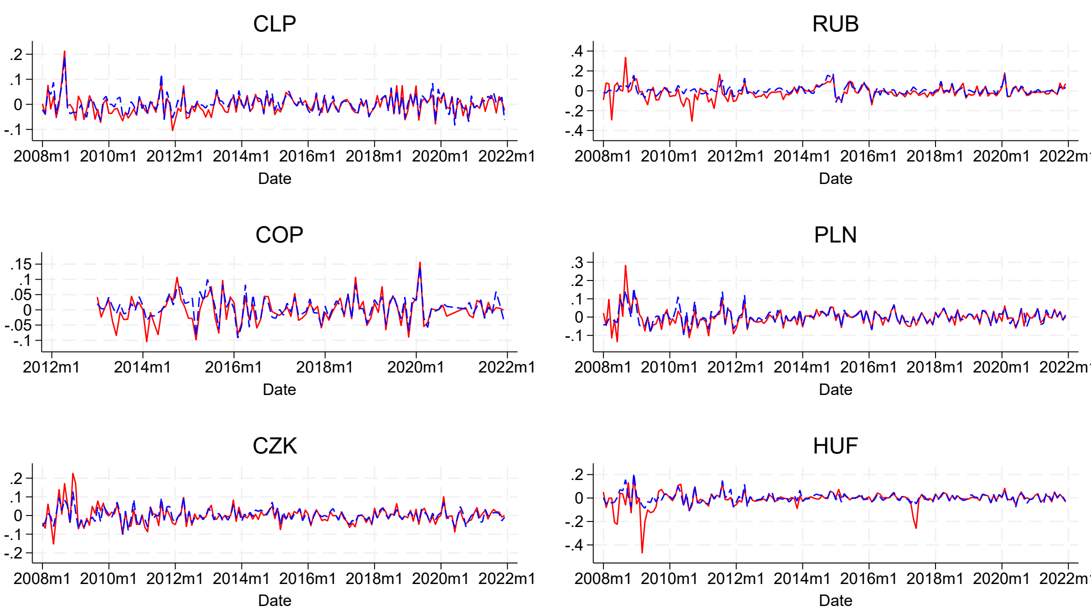
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 3: Exchange Rate Growth Rate vs Model Fit; USD Base; Local Currency, USD and EUR Investors



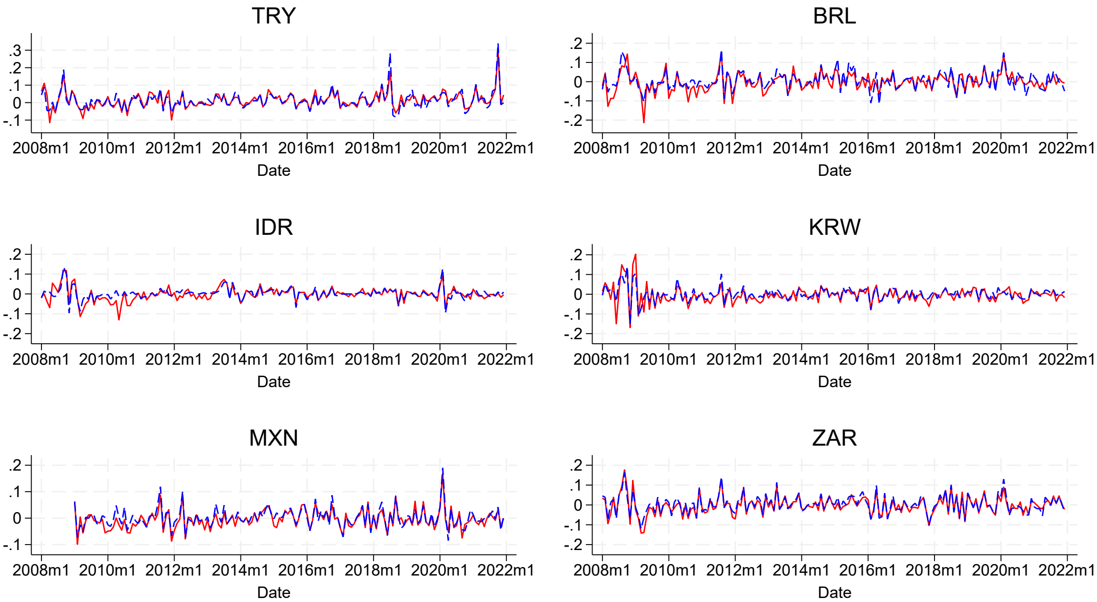
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 4: Exchange Rate Growth Rate vs Model Fit; USD Base; Local Currency, USD and EUR Investors



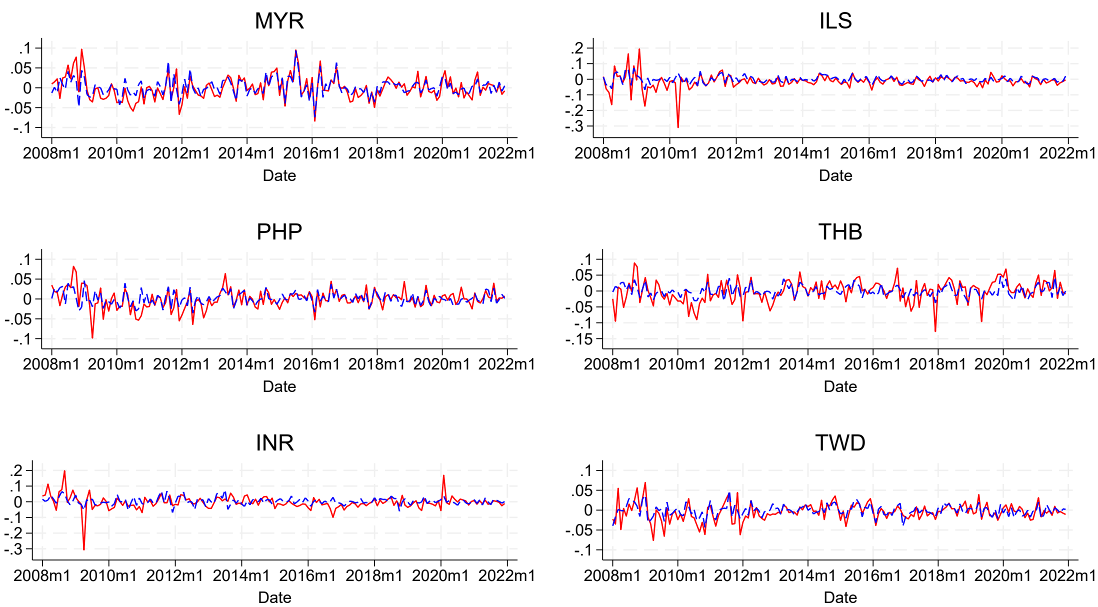
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 5: Exchange Rate Growth Rate vs Model Fit; USD Base; Local Currency, USD and EUR Investors



The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 6: Exchange Rate Growth Rate vs Model Fit; USD Base; Local Currency, USD and EUR Investors



The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Table 2: Partial Exchange Rate Elasticities with Respect to Net Supply; USD Base; Local Currency, USD and EUR Investors

Currency	$\tilde{\xi}^{l,l}_{USD}$	$\tilde{\xi}^{l,USD}_{USD}$	$\tilde{\xi}^{l,EUR}_{USD}$
AUD	1.35	-1.35	0.00
BRL	1.14	-1.17	0.03
CAD	1.00	-1.09	0.09
CHF	1.48	-1.79	0.31
CLP	1.00	-1.06	0.06
COP	1.00	-1.02	0.02
CZK	1.00	-1.18	0.18
EUR	1.57	-1.57	.
GBP	2.47	-2.77	0.30
HUF	1.00	-1.17	0.17
IDR	1.00	-1.03	0.03
ILS	1.00	-0.98	-0.02
INR	1.62	-1.61	-0.01
JPY	1.77	-1.79	0.02
KRW	1.14	-1.19	0.05
MXN	1.16	-1.17	0.02
MYR	1.00	-1.07	0.07
NOK	1.32	-1.66	0.34
NZD	1.05	-1.05	0.00
PHP	1.00	-1.04	0.04
PLN	1.00	-1.17	0.17
RUB	1.00	-1.35	0.35
SEK	1.37	-1.72	0.34
SGD	1.00	-1.02	0.02
THB	1.00	-1.00	-0.00
TRY	1.00	-1.11	0.11
TWD	1.00	-1.07	0.07
ZAR	1.00	-1.09	0.09

Note: In this table we report the elasticities associated with the partial response of the exchange rate to an unit increase of the particular net supply measure. We construct the average elasticities over the period Jan 2013 to Dec 2021.

Table 3: Exchange Rates Variance Covariance Decomposition; USD Base; Local Currency, USD and EUR Investors

Currency	$\tilde{\xi}^{l,l}_{USD} NS^{l}$	R^2	$\tilde{\xi}^{l,USD}_{USD} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{USD} NS^{EUR}$	R^2	$Resid$	R^2	$\sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{USD} NS^{j}$
AUD	0.88***	0.78	0.06*	0.04	0.00***	0.31	0.06	0.01	0.94
BRL	0.80***	0.61	0.05**	0.06	0.00***	0.11	0.15**	0.05	0.85
CAD	0.89***	0.77	0.09**	0.08	0.02***	0.15	-0.00	-0.01	1.00
CHF	0.83***	0.60	0.03	-0.00	0.12***	0.43	0.02	-0.00	0.98
CLP	0.83***	0.68	0.04	0.04	0.01***	0.14	0.11*	0.04	0.89
COP	0.93***	0.68	0.03	0.03	0.00***	0.05	0.04	-0.01	0.96
CZK	0.97***	0.63	0.07***	0.07	0.06***	0.47	-0.10	0.01	1.10
EUR	0.80***	0.66	0.09*	0.04	0.80***	0.66	0.11**	0.04	0.89
GBP	0.74***	0.38	0.27***	0.11	0.08***	0.13	-0.09	0.01	1.09
HUF	0.85***	0.31	0.05**	0.05	0.05***	0.46	0.05	-0.00	0.95
IDR	0.84***	0.55	0.08*	0.07	0.00*	0.03	0.08	0.01	0.92
ILS	1.03***	0.27	0.07*	0.04	-0.01***	0.18	-0.10	-0.00	1.10
INR	0.75***	0.19	0.06	0.01	-0.00***	0.14	0.20	0.01	0.80
JPY	1.23***	0.55	-0.08	0.01	0.00**	0.03	-0.16	0.02	1.16
KRW	0.96***	0.67	0.07*	0.07	0.01***	0.21	-0.05	-0.00	1.05
MXN	0.85***	0.77	0.03	0.02	0.00***	0.12	0.11***	0.06	0.89
MYR	1.02***	0.65	0.03	-0.00	0.02***	0.17	-0.06	0.00	1.06
NOK	0.49***	0.19	0.10**	0.07	0.09***	0.24	0.32***	0.08	0.68
NZD	0.91***	0.80	0.05**	0.05	0.00***	0.30	0.04	0.00	0.96
PHP	0.90***	0.37	0.03	-0.00	0.02***	0.14	0.05	-0.00	0.95
PLN	0.85***	0.63	0.06**	0.06	0.05***	0.41	0.05	-0.00	0.95
RUB	0.79***	0.30	0.06***	0.07	0.04***	0.07	0.11	0.00	0.89
SEK	0.66***	0.53	0.10**	0.06	0.12***	0.43	0.11	0.03	0.89
SGD	0.70***	0.47	0.07	0.02	0.01***	0.34	0.21***	0.08	0.79
THB	1.10***	0.29	0.04	0.00	-0.00***	0.12	-0.13	0.00	1.13
TRY	0.79***	0.79	0.01	-0.00	0.01***	0.09	0.19***	0.20	0.81
TWD	0.91***	0.40	0.08*	0.02	0.04***	0.18	-0.03	-0.01	1.03
ZAR	0.90***	0.85	0.05**	0.06	0.01***	0.10	0.04	0.01	0.96

Note: In this table we report the coefficients from regressing the sum of the scaled net supply components, $\sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{USD} NS^{j}_{t}$, where $NS^{j}_{t} = (\Delta MC^{j}_{t} - \Delta \tilde{H}^{ROS,j}_{t})$, or the individual scaled net supply components, on the exchange rate growth rate. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Figure 7: Exchange Rates Variance Covariance Decomposition; USD Base; Local Currency, USD and EUR Investors

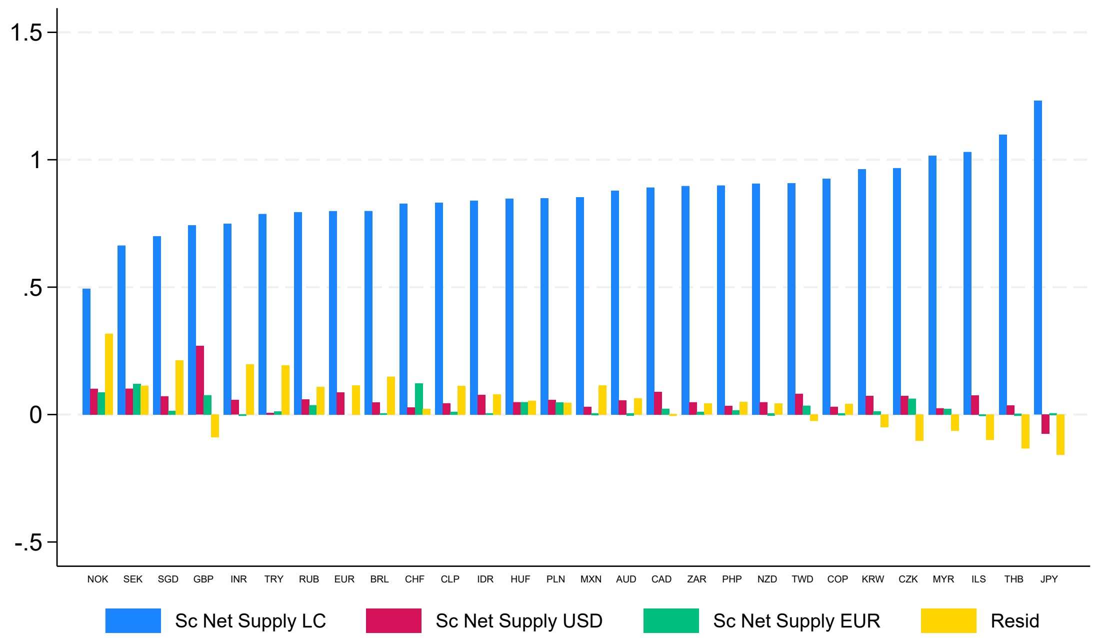
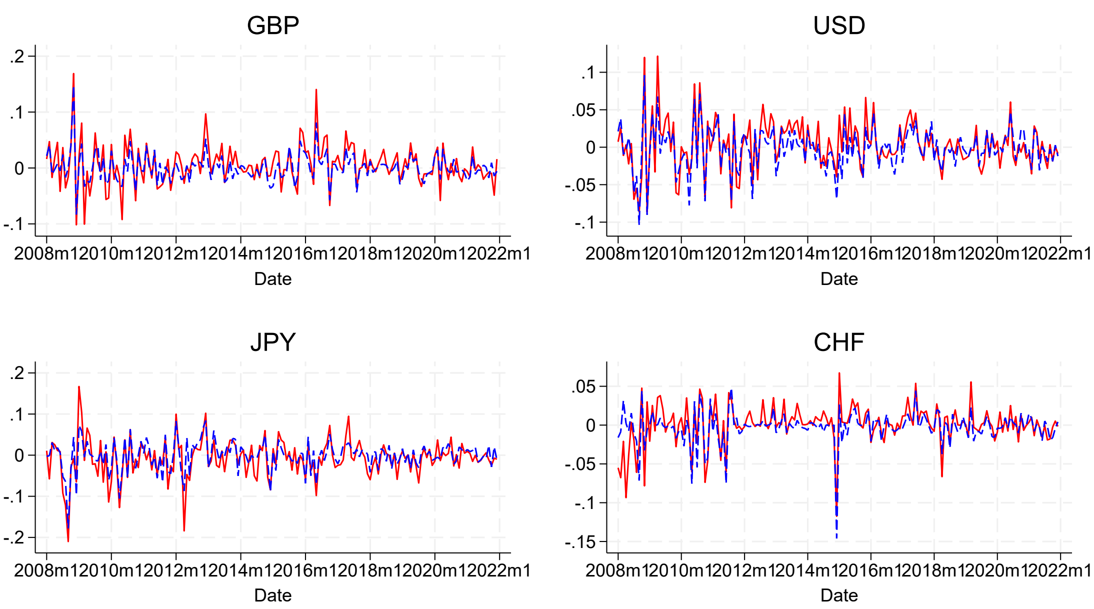
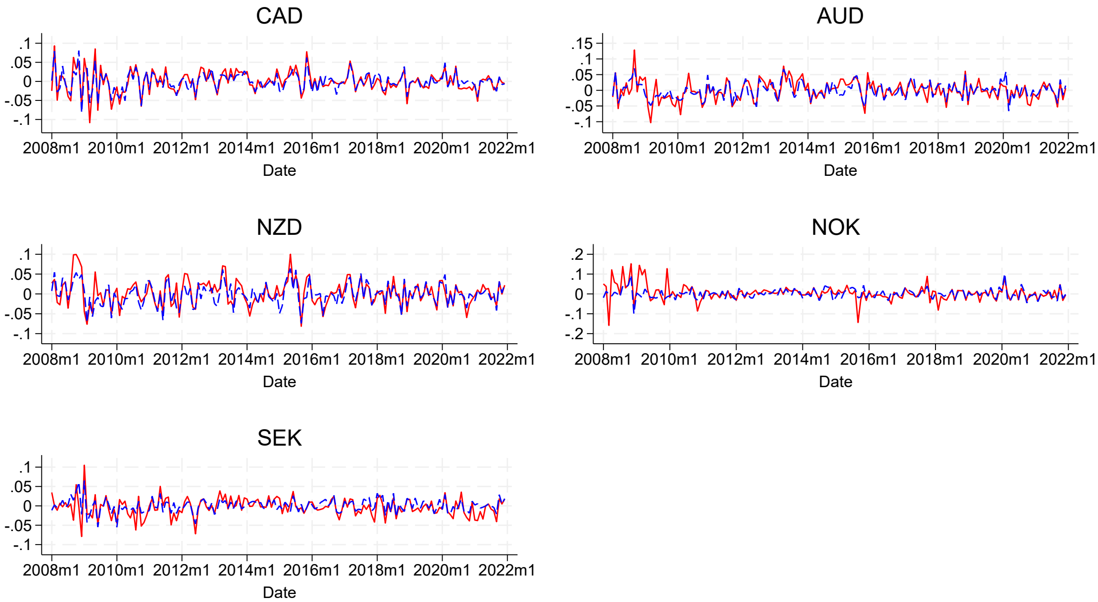


Figure 8: Exchange Rate Growth Rate vs Model Fit; EUR Base; Local Currency, USD and EUR Investors



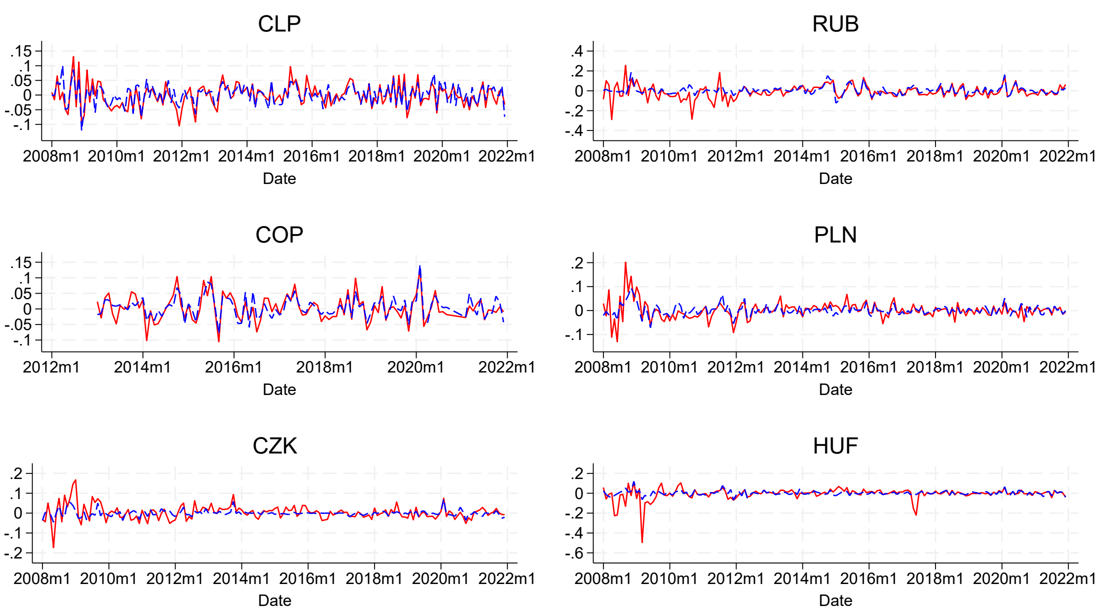
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 9: Exchange Rate Growth Rate vs Model Fit; EUR Base; Local Currency, USD and EUR Investors



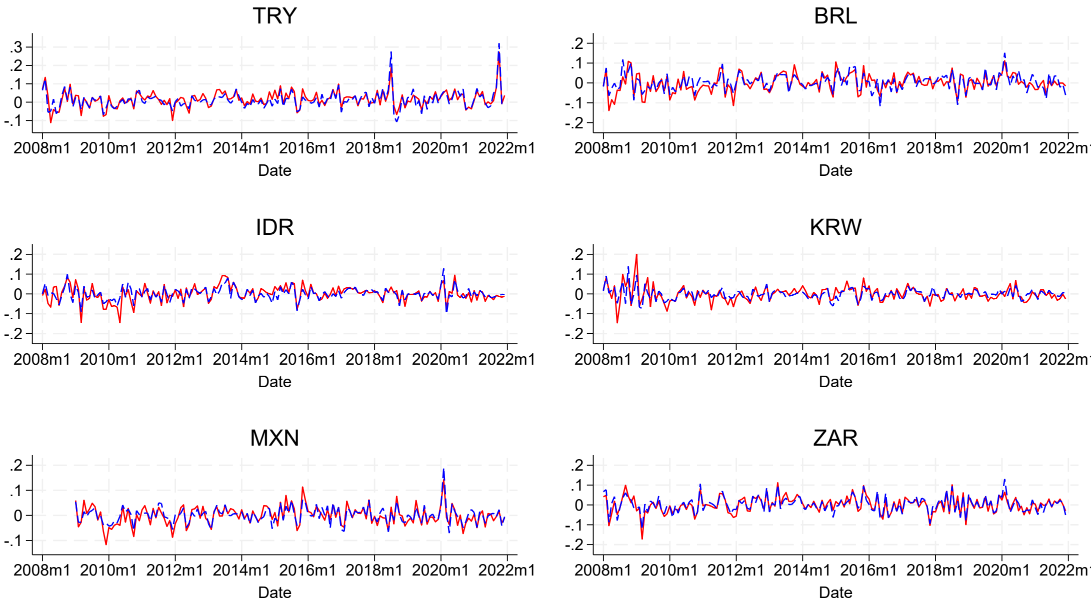
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 10: Exchange Rate Growth Rate vs Model Fit; EUR Base; Local Currency, USD and EUR Investors



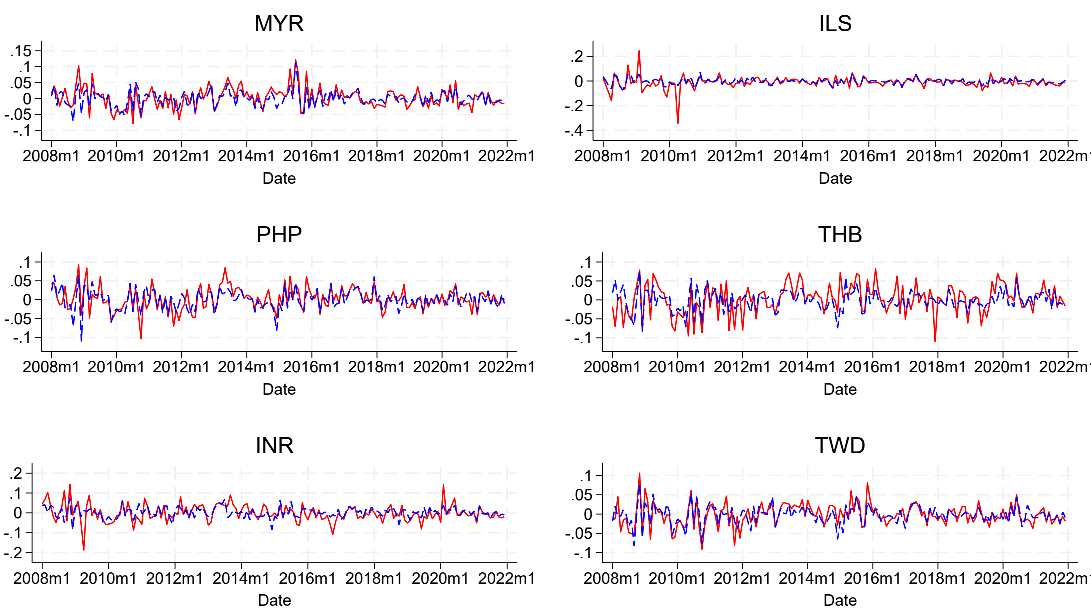
The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 11: Exchange Rate Growth Rate vs Model Fit; EUR Base; Local Currency, USD and EUR Investors



The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Figure 12: Exchange Rate Growth Rate vs Model Fit; EUR Base; Local Currency, USD and EUR Investors



The blue dashed line represents the exch rate growth rate, the red solid line is the model with LOC, USD, EUR net supply factors.

Table 4: Partial Exchange Rate Elasticities with Respect to Net Supply; EUR Base; Local Currency, USD and EUR Investors

Currency	$\tilde{\xi}^{l,l}_{EUR}$	$\tilde{\xi}^{l,USD}_{EUR}$	$\tilde{\xi}^{l,EUR}_{EUR}$
AUD	1.35	0.28	-1.63
BRL	1.14	0.55	-1.69
CAD	1.00	0.56	-1.56
CHF	1.48	-0.17	-1.31
CLP	1.00	0.65	-1.65
COP	1.00	0.76	-1.76
CZK	1.00	0.51	-1.51
GBP	2.47	-0.78	-1.68
HUF	1.00	0.35	-1.35
IDR	1.00	0.65	-1.65
ILS	1.00	0.69	-1.69
INR	1.62	0.17	-1.79
JPY	1.77	-0.11	-1.67
KRW	1.14	0.47	-1.61
MXN	1.16	0.56	-1.71
MYR	1.00	0.64	-1.64
NOK	1.32	-0.18	-1.14
NZD	1.05	0.46	-1.51
PHP	1.00	0.63	-1.63
PLN	1.00	0.51	-1.51
RUB	1.00	0.32	-1.32
SEK	1.37	-0.21	-1.16
SGD	1.00	0.52	-1.52
THB	1.00	0.74	-1.74
TRY	1.00	0.56	-1.56
TWD	1.00	0.58	-1.58
USD	1.81	.	-1.81
ZAR	1.00	0.54	-1.54

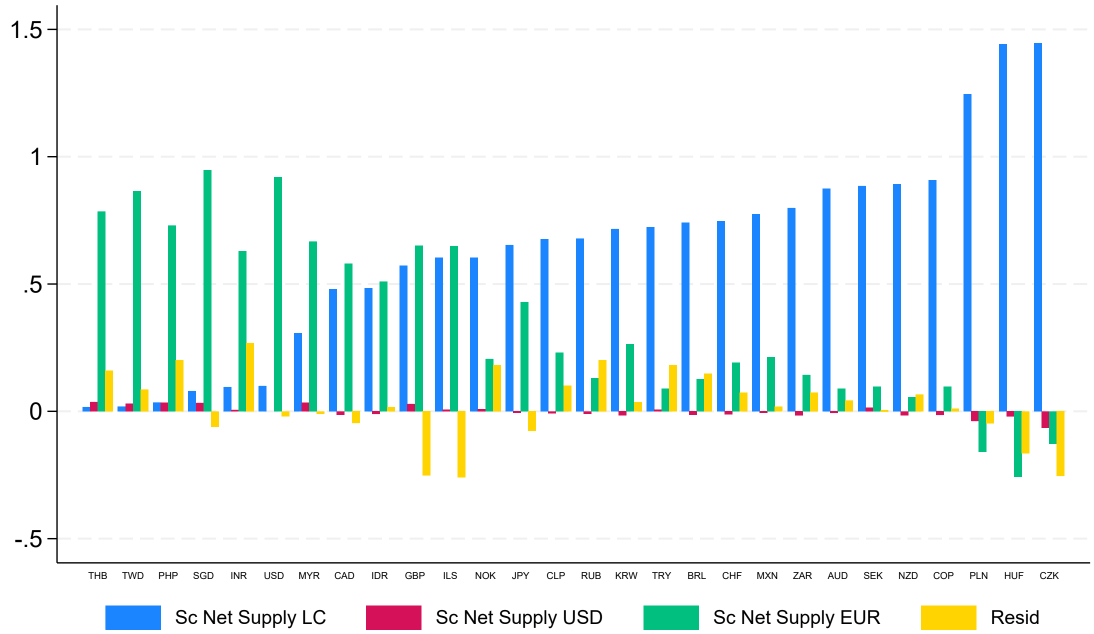
Note: In this table we report the elasticities associated with the partial response of the exchange rate to an unit increase of the particular net supply measure. We construct the average elasticities over the period Jan 2013 to Dec 2021.

Table 5: Exchange Rates Variance Covariance Decomposition; EUR Base; Local Currency, USD and EUR Investors

Currency	$\tilde{\xi}^{l,l}_{EUR} NS^{l}$	R^2	$\tilde{\xi}^{l,USD}_{EUR} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{EUR} NS^{EUR}$	R^2	$Resid$	R^2	$\sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{EUR} NS^{j}$
AUD	0.87***	0.35	-0.01	0.00	0.09	0.00	0.04	-0.00	0.96
BRL	0.74***	0.41	-0.01	0.01	0.13*	0.02	0.15**	0.04	0.85
CAD	0.48***	0.18	-0.01	-0.00	0.58***	0.26	-0.05	0.00	1.05
CHF	0.75***	0.25	-0.01*	0.03	0.19**	0.02	0.07	0.00	0.93
CLP	0.68***	0.38	-0.01	-0.00	0.23***	0.07	0.10	0.01	0.90
COP	0.91***	0.51	-0.01	0.00	0.10	0.01	0.01	-0.01	0.99
CZK	1.45***	0.28	-0.06**	0.06	-0.13	-0.00	-0.25	0.01	1.25
GBP	0.57***	0.20	0.03	0.01	0.65***	0.29	-0.25***	0.10	1.25
HUF	1.44***	0.26	-0.02*	0.02	-0.26***	0.06	-0.16	-0.00	1.16
IDR	0.48***	0.22	-0.01	-0.00	0.51***	0.31	0.02	-0.01	0.98
ILS	0.60***	0.11	0.01	-0.01	0.65***	0.29	-0.26	0.03	1.26
INR	0.10	-0.00	0.01	0.01	0.63***	0.28	0.27**	0.03	0.73
JPY	0.65***	0.28	-0.01**	0.07	0.43***	0.26	-0.08	0.00	1.08
KRW	0.72***	0.25	-0.02	0.01	0.26***	0.06	0.04	-0.00	0.96
MXN	0.77***	0.50	-0.01	-0.00	0.21***	0.05	0.02	-0.01	0.98
MYR	0.31**	0.07	0.03*	0.02	0.67***	0.32	-0.01	-0.01	1.01
NOK	0.60***	0.13	0.01	0.02	0.21**	0.05	0.18	0.01	0.82
NZD	0.89***	0.39	-0.02	0.01	0.06	-0.00	0.07	0.00	0.93
PHP	0.04	-0.00	0.03*	0.03	0.73***	0.43	0.20**	0.05	0.80
PLN	1.25***	0.40	-0.04*	0.04	-0.16	0.01	-0.05	-0.00	1.05
RUB	0.68***	0.18	-0.01*	0.02	0.13**	0.05	0.20**	0.02	0.80
SEK	0.89***	0.26	0.01	0.02	0.10	0.00	0.00	-0.01	1.00
SGD	0.08	0.00	0.03	0.02	0.95***	0.46	-0.06	-0.00	1.06
THB	0.02	-0.01	0.04	0.02	0.79***	0.44	0.16	0.01	0.84
TRY	0.72***	0.60	0.01	0.00	0.09	0.02	0.18***	0.14	0.82
TWD	0.02	-0.01	0.03	0.02	0.86***	0.52	0.09	0.00	0.91
USD	0.10*	0.04	0.10*	0.04	0.92***	0.66	-0.02	-0.00	1.02
ZAR	0.80***	0.51	-0.02*	0.02	0.14***	0.04	0.07	0.02	0.93

Note: In this table we report the coefficients from regressing the sum of the scaled net supply components, $\sum_{j=\{l,USD,EUR\}} \tilde{\xi}^{l,j}_{EUR} NS^{j}_{t}$, where $NS^{j}_{t} = (\Delta MC^{j}_{t} - \Delta \tilde{H}^{ROS,j}_{t})$, or the individual scaled net supply components, on the exchange rate growth rate. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Figure 13: Exchange Rates Variance Covariance Decomposition; EUR Base; Local Currency, USD and EUR Investors



8.3 Transmission of US Macro News and Risk Aversion News

Table 6: Response to US Stock Market News Index; USD Base; Local Currency, USD and EUR Investors

Currency	$\Delta s^{l/USD}$	R^2	$\tilde{\xi}^{l,l}_{USD} NS^l$	R^2	$\tilde{\xi}^{l,USD}_{USD} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{USD} NS^{EUR}$	R^2	$Resid$	R^2
AUD	-0.50***	0.13	-0.37***	0.07	-0.10***	0.07	-0.00**	0.01	-0.03	-0.00
BRL	-0.58***	0.12	-0.41***	0.05	-0.09***	0.07	-0.00**	0.01	-0.08	0.00
CAD	-0.36***	0.13	-0.28***	0.07	-0.08***	0.07	-0.01**	0.01	0.01	-0.01
CHF	-0.17***	0.02	-0.01	-0.01	-0.13***	0.07	-0.03**	0.01	0.01	-0.01
CLP	-0.40***	0.09	-0.27*	0.03	-0.08***	0.07	-0.01**	0.01	-0.05	-0.00
COP	-0.28*	0.03	-0.27	0.02	-0.03	0.00	-0.00*	0.02	0.01	-0.01
CZK	-0.38***	0.08	-0.35**	0.05	-0.09***	0.07	-0.02**	0.01	0.07	0.00
EUR	-0.27***	0.06	-0.14**	0.01	-0.12***	0.07	-0.14**	0.01	0.13	0.01
GBP	-0.30***	0.10	-0.14	0.01	-0.21***	0.07	-0.03**	0.01	0.07	0.00
HUF	-0.50***	0.11	-0.47**	0.04	-0.09***	0.07	-0.02**	0.01	0.07	-0.00
IDR	-0.38***	0.13	-0.26***	0.04	-0.08***	0.07	-0.00**	0.01	-0.04	-0.00
ILS	-0.25***	0.09	-0.19*	0.01	-0.07***	0.07	0.00**	0.01	0.01	-0.01
INR	-0.20***	0.06	-0.17	0.01	-0.12***	0.07	0.00**	0.01	0.09	-0.00
JPY	0.02	-0.01	0.14	0.00	-0.13***	0.07	-0.00**	0.01	0.02	-0.01
KRW	-0.34***	0.07	-0.34***	0.05	-0.09***	0.07	-0.00**	0.01	0.10	0.01
MXN	-0.34**	0.06	-0.28**	0.04	-0.03	0.00	-0.00**	0.03	-0.04	-0.00
MYR	-0.19***	0.06	-0.14**	0.01	-0.08***	0.07	-0.01**	0.01	0.03	-0.00
NOK	-0.56***	0.20	-0.46***	0.11	-0.12***	0.07	-0.03**	0.01	0.05	-0.00
NZD	-0.48***	0.11	-0.43***	0.09	-0.08***	0.07	-0.00**	0.01	0.03	-0.00
PHP	-0.12***	0.04	-0.15**	0.03	-0.08***	0.07	-0.00**	0.01	0.11*	0.02
PLN	-0.56***	0.14	-0.45**	0.08	-0.09***	0.07	-0.01**	0.01	-0.01	-0.01
RUB	-0.43***	0.06	-0.42*	0.02	-0.10***	0.07	-0.03**	0.01	0.12	-0.00
SEK	-0.43***	0.13	-0.24***	0.05	-0.13***	0.07	-0.03**	0.01	-0.03	-0.00
SGD	-0.18***	0.08	-0.08*	0.01	-0.08***	0.07	-0.00**	0.01	-0.02	-0.00
THB	-0.14***	0.05	-0.02	-0.01	-0.07***	0.07	0.00**	0.01	-0.05	-0.00
TRY	-0.34**	0.03	-0.23	0.01	-0.08***	0.07	-0.01**	0.01	-0.02	-0.01
TWD	-0.12***	0.05	-0.07	0.00	-0.08***	0.07	-0.01**	0.01	0.03	-0.00
ZAR	-0.63***	0.14	-0.55***	0.12	-0.08***	0.07	-0.01**	0.01	0.01	-0.01

Note: In this table we report the coefficients from regressing the log exchange rate change and the scaled net supply components, $NS^j = (\Delta MC^j_t - \Delta \tilde{H}^{ROS,j}_t)$, on the US stock market macroeconomic news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Table 7: Response to Risk Aversion News; USD Base; Local Currency, USD and EUR Investors

Currency	$\Delta s^{l/USD}$	R^2	$\tilde{\xi}^{l,l}_{USD} NS^l$	R^2	$\tilde{\xi}^{l,USD}_{USD} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{USD} NS^{EUR}$	R^2	$Resid$	R^2
AUD	0.11***	0.12	0.11***	0.12	0.01*	0.02	0.00**	0.03	-0.01	0.00
BRL	0.10***	0.06	0.10***	0.05	0.01*	0.02	0.00**	0.03	-0.01	-0.00
CAD	0.07***	0.10	0.07***	0.09	0.01*	0.02	0.00**	0.03	-0.01	0.01
CHF	0.05*	0.03	0.01	-0.01	0.02*	0.02	0.01**	0.03	0.01	-0.00
CLP	0.08***	0.06	0.06**	0.04	0.01*	0.02	0.00**	0.03	0.00	-0.01
COP	0.08***	0.04	0.08**	0.03	0.00	-0.01	-0.00	-0.01	-0.00	-0.01
CZK	0.07***	0.06	0.07**	0.03	0.01*	0.02	0.00**	0.03	-0.01	-0.00
EUR	0.06***	0.06	0.04**	0.03	0.02*	0.02	0.04**	0.03	-0.04	0.02
GBP	0.06***	0.08	0.02	0.00	0.03*	0.02	0.01**	0.03	0.01	-0.00
HUF	0.09***	0.06	0.03	-0.00	0.01*	0.02	0.00**	0.03	0.05	0.00
IDR	0.04**	0.03	0.04*	0.02	0.01*	0.02	0.00**	0.03	-0.01	-0.00
ILS	0.05***	0.07	0.03	-0.00	0.01*	0.02	-0.00**	0.03	0.02	-0.00
INR	0.05***	0.06	0.08***	0.06	0.02*	0.02	-0.00**	0.03	-0.05*	0.02
JPY	-0.02	0.00	-0.01	-0.00	0.02*	0.02	0.00**	0.03	-0.03	0.01
KRW	0.10***	0.11	0.09***	0.07	0.01*	0.02	0.00**	0.03	-0.01	-0.00
MXN	0.11***	0.12	0.09***	0.08	0.01	0.00	0.00	0.02	0.01	0.00
MYR	0.05***	0.07	0.05**	0.04	0.01*	0.02	0.00**	0.03	-0.01	-0.00
NOK	0.07***	0.05	0.03	0.00	0.02*	0.02	0.01**	0.03	0.01	-0.00
NZD	0.12***	0.13	0.11***	0.11	0.01*	0.02	0.00**	0.03	0.00	-0.01
PHP	0.04***	0.09	0.05***	0.07	0.01*	0.02	0.00**	0.03	-0.03*	0.02
PLN	0.10***	0.08	0.08***	0.04	0.01*	0.02	0.00**	0.03	0.00	-0.01
RUB	0.10***	0.05	0.09**	0.02	0.01*	0.02	0.01**	0.03	-0.01	-0.01
SEK	0.07***	0.06	0.06**	0.05	0.02*	0.02	0.01**	0.03	-0.02	0.00
SGD	0.05***	0.12	0.04***	0.06	0.01*	0.02	0.00**	0.03	0.00	-0.01
THB	0.04***	0.06	0.04*	0.02	0.01*	0.02	-0.00**	0.03	-0.02	-0.00
TRY	0.12**	0.07	0.09**	0.05	0.01*	0.02	0.00**	0.03	0.01	-0.00
TWD	0.03**	0.05	0.04**	0.04	0.01*	0.02	0.00**	0.03	-0.02*	0.02
ZAR	0.09***	0.05	0.09***	0.05	0.01*	0.02	0.00**	0.03	-0.01	0.00

Note: In this table we report the coefficients from regressing the log exchange rate change and the scaled net supply components, $NS^j = (\Delta MC^j_t - \Delta \tilde{H}^{ROS,j}_t)$, on the risk aversion news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Table 8: Response to US Stock Market News Index; EUR Base; Local Currency, USD and EUR Investors

Currency	$\Delta s^{l/EUR}$	R^2	$\tilde{\xi}^{l,l}_{EUR} NS^l$	R^2	$\tilde{\xi}^{l,USD}_{EUR} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{EUR} NS^{EUR}$	R^2	$Resid$	R^2
AUD	-0.24***	0.06	-0.37***	0.07	0.02***	0.07	0.14**	0.01	-0.03	-0.00
BRL	-0.31**	0.04	-0.41***	0.05	0.04***	0.07	0.15**	0.01	-0.10	0.00
CAD	-0.09	0.00	-0.28***	0.07	0.04***	0.07	0.14**	0.01	0.01	-0.01
CHF	0.10*	0.01	-0.01	-0.01	-0.01***	0.07	0.12**	0.01	0.01	-0.01
CLP	-0.14	0.01	-0.27*	0.03	0.05***	0.07	0.15**	0.01	-0.06	-0.00
COP	-0.12	-0.00	-0.27	0.02	0.02	0.00	0.14*	0.02	-0.01	-0.01
CZK	-0.11*	0.03	-0.35**	0.05	0.04***	0.07	0.13**	0.01	0.06	-0.00
GBP	-0.04	-0.00	-0.14	0.01	-0.06***	0.07	0.15**	0.01	0.01	-0.01
HUF	-0.24***	0.08	-0.47**	0.04	0.03***	0.07	0.12**	0.01	0.08	-0.00
IDR	-0.11	0.00	-0.26***	0.04	0.05***	0.07	0.15**	0.01	-0.05	-0.00
ILS	0.02	-0.01	-0.19*	0.01	0.05***	0.07	0.15**	0.01	0.01	-0.01
INR	0.06	-0.00	-0.17	0.01	0.01***	0.07	0.16**	0.01	0.06	-0.00
JPY	0.29**	0.05	0.14	0.00	-0.01***	0.07	0.15**	0.01	0.01	-0.01
KRW	-0.07	-0.00	-0.34***	0.05	0.04***	0.07	0.14**	0.01	0.09	0.00
MXN	-0.10	0.00	-0.28**	0.04	0.01	0.00	0.19**	0.03	-0.03	-0.00
MYR	0.07	0.00	-0.14**	0.01	0.05***	0.07	0.15**	0.01	0.02	-0.01
NOK	-0.30***	0.11	-0.46***	0.11	-0.01***	0.07	0.10**	0.01	0.08	-0.00
NZD	-0.21***	0.04	-0.43***	0.09	0.03***	0.07	0.13**	0.01	0.05	-0.00
PHP	0.15**	0.02	-0.15**	0.03	0.05***	0.07	0.14**	0.01	0.10	0.01
PLN	-0.29***	0.13	-0.45**	0.08	0.04***	0.07	0.13**	0.01	-0.01	-0.01
RUB	-0.16	0.01	-0.42*	0.02	0.02***	0.07	0.12**	0.01	0.12	-0.00
SEK	-0.16***	0.06	-0.24***	0.05	-0.02***	0.07	0.10**	0.01	-0.01	-0.01
SGD	0.09	0.01	-0.08*	0.01	0.04***	0.07	0.13**	0.01	-0.00	-0.01
THB	0.12	0.01	-0.02	-0.01	0.05***	0.07	0.15**	0.01	-0.07	-0.00
TRY	-0.08	-0.00	-0.23	0.01	0.04***	0.07	0.14**	0.01	-0.03	-0.00
TWD	0.15**	0.03	-0.07	0.00	0.04***	0.07	0.14**	0.01	0.03	-0.00
USD	0.27***	0.06	0.13***	0.07	0.13***	0.07	0.16**	0.01	-0.16*	0.03
ZAR	-0.36***	0.06	-0.55***	0.12	0.04***	0.07	0.14**	0.01	0.02	-0.01

Note: In this table we report the coefficients from regressing the log exchange rate change and the scaled net supply components, $NS^j = (\Delta MC^j_t - \Delta\tilde{H}^{ROS,j}_t)$, on the US stock market macroeconomic news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Table 9: Response to Risk Aversion News; EUR Base; Local Currency, USD and EUR Investors

Currency	$\Delta s^{l/EUR}$	R^2	$\tilde{\xi}^{l,l}_{EUR} NS^l$	R^2	$\tilde{\xi}^{l,USD}_{EUR} NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{EUR} NS^{EUR}$	R^2	$Resid$	R^2
AUD	0.05***	0.05	0.11***	0.12	-0.00*	0.02	-0.04**	0.03	-0.01	-0.00
BRL	0.04	0.01	0.10***	0.05	-0.01*	0.02	-0.05**	0.03	-0.01	-0.00
CAD	0.01	-0.00	0.07***	0.09	-0.01*	0.02	-0.04**	0.03	-0.01	0.00
CHF	-0.01	0.00	0.01	-0.01	0.00*	0.02	-0.04**	0.03	0.01	0.00
CLP	0.02	-0.00	0.06**	0.04	-0.01*	0.02	-0.05**	0.03	0.00	-0.01
COP	0.08***	0.05	0.08**	0.03	-0.00	-0.01	0.01	-0.01	-0.01	-0.01
CZK	0.01	0.00	0.07**	0.03	-0.01*	0.02	-0.04**	0.03	-0.01	-0.00
GBP	0.00	-0.01	0.02	0.00	0.01*	0.02	-0.05**	0.03	0.02	0.01
HUF	0.03	0.02	0.03	-0.00	-0.00*	0.02	-0.04**	0.03	0.04	0.00
IDR	-0.02	-0.00	0.04*	0.02	-0.01*	0.02	-0.05**	0.03	-0.01	-0.00
ILS	-0.01	-0.00	0.03	-0.00	-0.01*	0.02	-0.05**	0.03	0.02	-0.00
INR	-0.01	-0.00	0.08***	0.06	-0.00*	0.02	-0.05**	0.03	-0.04	0.01
JPY	-0.08***	0.07	-0.01	-0.00	0.00*	0.02	-0.05**	0.03	-0.02	0.00
KRW	0.04*	0.02	0.09***	0.07	-0.00*	0.02	-0.04**	0.03	-0.01	-0.00
MXN	0.06***	0.05	0.09***	0.08	-0.00	0.00	-0.04	0.02	0.01	0.00
MYR	-0.01	-0.00	0.05**	0.04	-0.01*	0.02	-0.05**	0.03	-0.00	-0.01
NOK	0.01	-0.00	0.03	0.00	0.00*	0.02	-0.03**	0.03	0.01	-0.01
NZD	0.06***	0.07	0.11***	0.11	-0.00*	0.02	-0.04**	0.03	-0.00	-0.01
PHP	-0.02	0.00	0.05***	0.07	-0.01*	0.02	-0.04**	0.03	-0.02	0.01
PLN	0.04**	0.04	0.08***	0.04	-0.01*	0.02	-0.04**	0.03	0.01	-0.01
RUB	0.04*	0.00	0.09**	0.02	-0.00*	0.02	-0.04**	0.03	-0.01	-0.01
SEK	0.01	-0.00	0.06**	0.05	0.00*	0.02	-0.03**	0.03	-0.02*	0.01
SGD	-0.01	-0.00	0.04***	0.06	-0.01*	0.02	-0.04**	0.03	-0.00	-0.01
THB	-0.02	0.01	0.04*	0.02	-0.01*	0.02	-0.05**	0.03	-0.01	-0.00
TRY	0.06	0.01	0.09**	0.05	-0.01*	0.02	-0.04**	0.03	0.01	-0.00
TWD	-0.03**	0.02	0.04**	0.04	-0.01*	0.02	-0.04**	0.03	-0.02	0.01
USD	-0.06***	0.06	-0.02*	0.02	-0.02*	0.02	-0.05**	0.03	0.03*	0.01
ZAR	0.03	0.00	0.09***	0.05	-0.01*	0.02	-0.04**	0.03	-0.01	-0.00

Note: In this table we report the coefficients from regressing the log exchange rate change and the scaled net supply components, $NS^j = (\Delta MC_t^j - \Delta \tilde{H}_t^{ROS,j})$, on the risk aversion news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Table 10: Response to US Stock Market Macroeconomic News Index: Net Supply and Its Sub-Components

Currency	NS^j	R^2	$\Delta\tilde{H}^{ROS,j}$	R^2	ΔMC^j	R^2	$\Delta\tilde{H}^{ROS,l,j}$	$\Delta\tilde{H}^{ROS,USD,j}$	$\Delta\tilde{H}^{ROS,REST,j}$
AUD	-0.28***	0.07	1.07***	0.26	0.80***	0.26	0.15***	0.75***	0.17***
BRL	-0.36***	0.05	1.44***	0.19	1.08***	0.20	0.04	1.04***	0.36***
CAD	-0.28***	0.07	1.02***	0.25	0.75***	0.29	.	0.86***	0.17***
CHF	-0.01	-0.01	0.57***	0.18	0.56***	0.18	0.17***	0.28***	0.12***
CLP	-0.27*	0.03	0.77***	0.09	0.50***	0.08	.	0.69***	0.07*
COP	-0.27	0.02	0.87*	0.06	0.60*	0.07	.	0.73*	0.14
CZK	-0.35**	0.05	1.09***	0.15	0.74***	0.14	.	0.90***	0.18***
EUR	-0.09**	0.01	1.01***	0.25	0.92***	0.25	0.33***	0.56***	0.12***
GBP	-0.06	0.01	0.83***	0.28	0.77***	0.26	0.42***	0.30***	0.10***
HUF	-0.47**	0.04	1.70***	0.16	1.23***	0.15	.	1.27***	0.44***
IDR	-0.26***	0.04	1.07***	0.13	0.81***	0.14	.	0.86***	0.20**
ILS	-0.19*	0.01	0.83***	0.13	0.64***	0.14	.	0.77***	0.06**
INR	-0.11	0.01	1.03***	0.20	0.92***	0.21	0.18***	0.74***	0.10***
JPY	0.08	0.00	0.58***	0.15	0.66***	0.13	0.15***	0.36***	0.07***
KRW	-0.30***	0.05	1.07***	0.19	0.77***	0.20	0.13**	0.74***	0.20***
MXN	-0.24**	0.04	0.72***	0.09	0.48***	0.10	0.05	0.58***	0.10**
MYR	-0.14**	0.01	0.70***	0.13	0.56***	0.17	.	0.60***	0.10**
NOK	-0.35***	0.11	1.25***	0.27	0.90***	0.24	0.11***	0.63***	0.50***
NZD	-0.41***	0.09	0.99***	0.23	0.58***	0.20	0.01	0.78***	0.21***
PHP	-0.15**	0.03	0.86***	0.13	0.71***	0.13	.	0.74***	0.12***
PLN	-0.45**	0.08	1.41***	0.20	0.96***	0.20	.	1.08***	0.32***
RUB	-0.42*	0.02	1.15***	0.10	0.74***	0.10	.	0.88***	0.27**
SEK	-0.18***	0.05	0.99***	0.21	0.81***	0.18	0.14***	0.53***	0.32***
SGD	-0.08*	0.01	0.96***	0.18	0.88***	0.21	.	0.75***	0.22***
THB	-0.02	-0.01	0.87***	0.10	0.85***	0.18	.	0.76***	0.11***
TRY	-0.23	0.01	1.26***	0.13	1.03***	0.15	.	1.04***	0.22***
TWD	-0.07	0.00	0.86***	0.17	0.79***	0.20	.	0.73***	0.13***
USD	0.07***	0.07	0.88***	0.29	0.96***	0.30	0.82***	0.82***	0.06***
ZAR	-0.55***	0.12	1.42***	0.25	0.87***	0.25	.	1.18***	0.24***

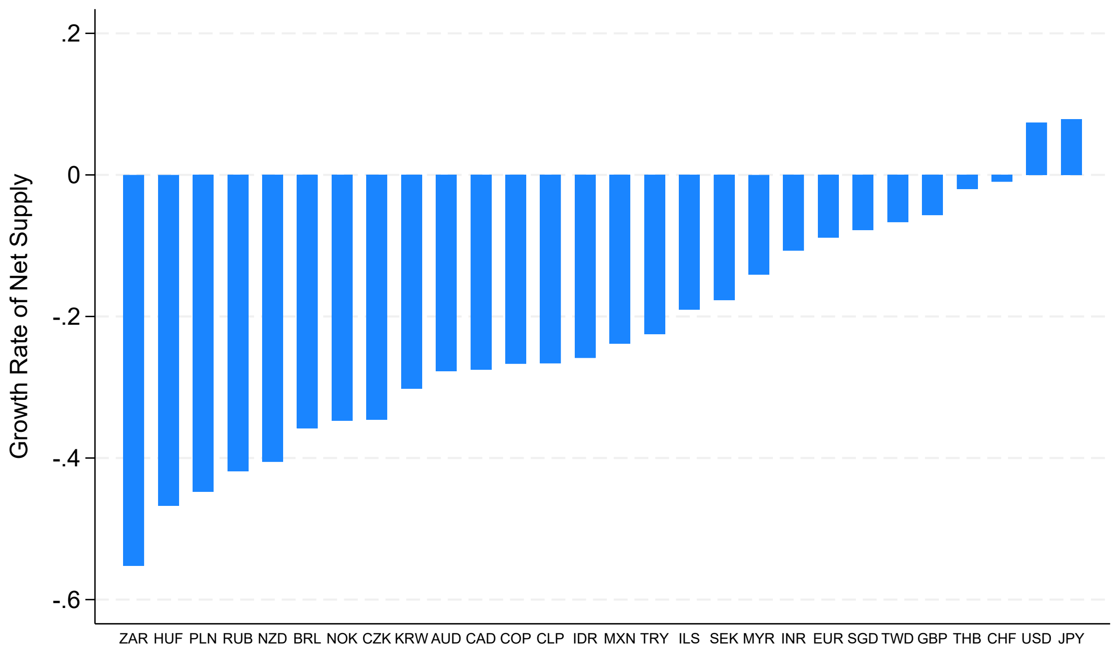
Note: In this table we report the coefficients from regressing the net supplies and the net supplies' sub-components, where $NS^j = (\Delta MC_t^j - \Delta\tilde{H}_t^{ROS,j})$ and $\Delta\tilde{H}_t^{ROS,j} = \Delta\tilde{H}_t^{ROS,j} = \Delta\tilde{H}_t^{ROS,l,j} + \Delta\tilde{H}_t^{ROS,USD,j} + \Delta\tilde{H}_t^{ROS,REST,j}$, on the US stock market macroeconomic news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Table 11: Response to Risk Aversion News: Net Supplies and Its Sub-Components

Currency	NS^j	R^2	$\Delta\tilde{H}^{ROS,j}$	R^2	ΔMC^j	R^2	$\Delta\tilde{H}^{ROS,l,j}$	$\Delta\tilde{H}^{ROS,USD,j}$	$\Delta\tilde{H}^{ROS,REST,j}$
AUD	0.08***	0.12	-0.18***	0.13	-0.10***	0.07	-0.03***	-0.13***	-0.03***
BRL	0.09***	0.05	-0.22***	0.08	-0.13***	0.05	-0.01	-0.18***	-0.04**
CAD	0.07***	0.09	-0.18***	0.14	-0.11***	0.11	.	-0.16***	-0.03***
CHF	0.01	-0.01	-0.13***	0.16	-0.12***	0.15	-0.03***	-0.07***	-0.03***
CLP	0.06**	0.04	-0.17***	0.08	-0.11***	0.06	.	-0.15***	-0.02**
COP	0.08**	0.03	-0.15***	0.03	-0.07**	0.01	.	-0.13**	-0.02***
CZK	0.07**	0.03	-0.19***	0.07	-0.12***	0.06	.	-0.16***	-0.02***
EUR	0.03**	0.03	-0.19***	0.16	-0.16***	0.14	-0.06***	-0.11***	-0.02***
GBP	0.01	0.00	-0.13***	0.12	-0.12***	0.11	-0.06***	-0.05***	-0.02***
HUF	0.03	-0.00	-0.27***	0.07	-0.25***	0.11	.	-0.21***	-0.06**
IDR	0.04*	0.02	-0.19***	0.07	-0.15***	0.09	.	-0.16***	-0.03***
ILS	0.03	-0.00	-0.13***	0.06	-0.11***	0.06	.	-0.12***	-0.01**
INR	0.05***	0.06	-0.13***	0.05	-0.08**	0.02	-0.02**	-0.09***	-0.01***
JPY	-0.01	-0.00	-0.13***	0.12	-0.14***	0.10	-0.04***	-0.07***	-0.01***
KRW	0.08***	0.07	-0.20***	0.12	-0.12***	0.08	-0.02	-0.15***	-0.04***
MXN	0.07***	0.08	-0.19***	0.14	-0.12***	0.12	-0.02***	-0.15***	-0.02***
MYR	0.05**	0.04	-0.14***	0.10	-0.10***	0.09	.	-0.12***	-0.02***
NOK	0.02	0.00	-0.17***	0.09	-0.15***	0.12	-0.03***	-0.09***	-0.05***
NZD	0.11***	0.11	-0.16***	0.10	-0.05**	0.02	-0.00	-0.14***	-0.02**
PHP	0.05***	0.07	-0.16***	0.08	-0.11***	0.05	.	-0.14***	-0.02***
PLN	0.08***	0.04	-0.23***	0.09	-0.15***	0.08	.	-0.18***	-0.05***
RUB	0.09**	0.02	-0.24***	0.08	-0.16***	0.08	.	-0.15***	-0.10***
SEK	0.04**	0.05	-0.20***	0.14	-0.15***	0.11	-0.03***	-0.10***	-0.07***
SGD	0.04***	0.06	-0.18***	0.11	-0.14***	0.09	.	-0.14***	-0.04***
THB	0.04*	0.02	-0.18***	0.07	-0.13***	0.07	.	-0.17***	-0.01
TRY	0.09**	0.05	-0.17***	0.04	-0.08	0.01	.	-0.14***	-0.03*
TWD	0.04**	0.04	-0.13***	0.06	-0.09***	0.04	.	-0.11***	-0.02***
USD	-0.01*	0.02	-0.17***	0.18	-0.18***	0.18	-0.16***	-0.16***	-0.01***
ZAR	0.09***	0.05	-0.17***	0.06	-0.08***	0.04	.	-0.15***	-0.02***

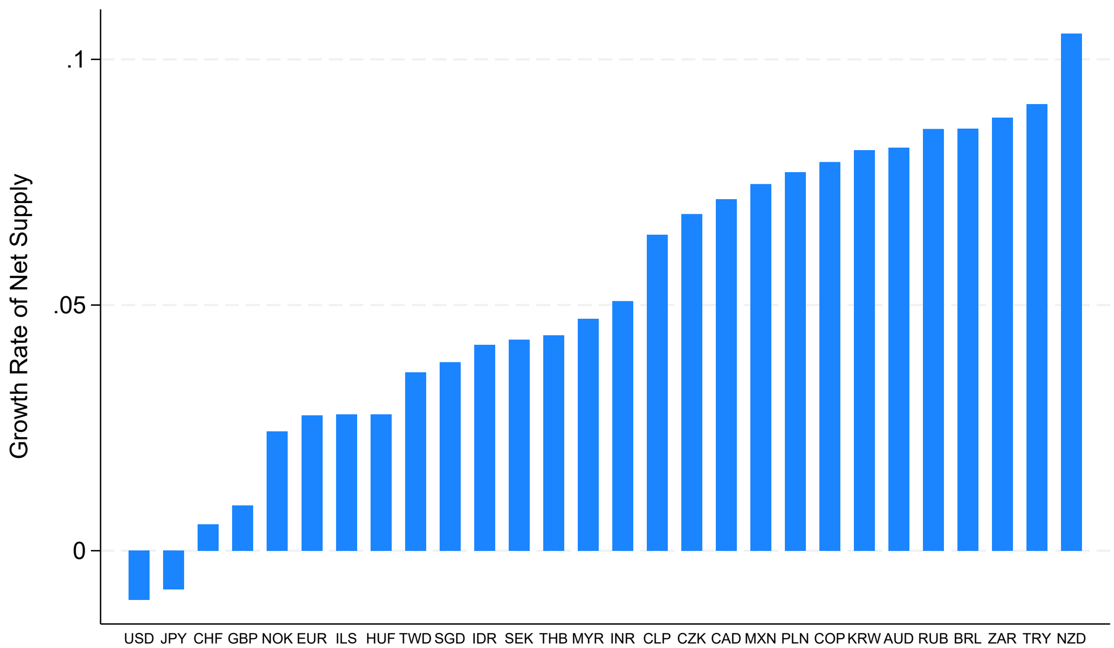
Note: In this table we report the coefficients from regressing the net supplies and the net supplies' sub-components, where $NS_j = (\Delta MC_t^j - \Delta\tilde{H}_t^{ROS,j})$ and $\Delta\tilde{H}_t^{ROS,j} = \Delta\tilde{H}_t^{ROS,j} = \Delta\tilde{H}_t^{ROS,l,j} + \Delta\tilde{H}_t^{ROS,USD,j} + \Delta\tilde{H}_t^{ROS,REST,j}$, on the risk aversion news index. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Figure 14: Response to US Stock Market News Index: Net Supply



In this figure we report the coefficients from regressing the net supplies, where $NS^j = (\Delta MC_t^j - \Delta \tilde{H}_t^{ROS,j})$ on the US stock market macroeconomic news index.

Figure 15: Response to Risk Aversion News: Net Supply



In this figure we report the coefficients from regressing the net supplies, where $NS^j = (\Delta MC_t^j - \Delta \tilde{H}_t^{ROS,j})$ on the risk aversion news index.

Appendix

A Derivations

Exchange Rate Change Decomposition

Since $\Delta s_t^{l/m} \approx \Delta s_t^{l/z} - \Delta s_t^{m/z}$ and $\sum_{m \in M} \nu^{m,l} = 1$, equation (3) can be re-written as:

$$\Delta s_t^{l/z} \left(\sum_{m \in M} \nu^{m,l} \right) - \sum_{m \in M} \Delta s_t^{m/z} \nu^{m,l} \quad \approx \quad \Delta MC_t^l - \Delta H_t^{ROS,l}$$

which can be re-written as:

$$\Delta s_t^{l/z} \left(1 - \nu^{l,l} \right) \approx \sum_{m \neq z,l} \Delta s_t^{m/z} \nu^{m,l} + \Delta MC_t^l - \Delta H_t^{ROS,l} \tag{11}$$

if $l = z$, then

$$- \sum_{m \in M} \Delta s_t^{m/z} \nu^{m,z} \approx \Delta MC_t^z - \Delta H_t^{ROS,z}$$

which can be re-written as:

$$-\Delta s_t^{l/z} \nu^{l,z} \approx \sum_{m \neq l,z} \Delta s_t^{m/z} \nu^{m,z} + \Delta MC_t^z - \Delta H_t^{ROS,z} \tag{12}$$

Combining equations (11) and (12) one obtains:

$$\Delta s_t^{l/z} \left(1 - \nu^{l,l} + \nu^{l,z} \right) \approx \sum_{m \neq z,l} \Delta s_t^{m/z} (\nu^{m,l} - \nu^{m,z}) + (\Delta MC_t^l - \Delta H_t^{ROS,l}) - (\Delta MC_t^z - \Delta H_t^{ROS,z}) \tag{13}$$

which is equivalent to equation equation (4) in the text. Equation (13) directly implies the system of equations represented in (5).

In order to obtain the special case where we impose restrictions on the matrix $\mathbf{A}_z$ that imply that only US and Eurozone investors can purchase all stocks while local currency investors can purchase only local stocks, we re-write equation (13) as follows:

$$\Delta s_t^{l/USD} \left(1 - \nu^{l,l} \right) \approx \Delta s_t^{EUR/USD} (\nu^{EUR,l} - \nu^{EUR,USD}) + \tag{14}$$

$$(\Delta MC_t^l - \Delta H_t^{ROS,l}) - (\Delta MC_t^{USD} - \Delta H_t^{ROS,USD}) \tag{15}$$

where $z = USD$ and $l \neq EUR, USD$. If $l = EUR$ (13) becomes:

$$\Delta s_t^{EUR/USD}\left(1-\nu^{EUR,EUR}+\nu^{EUR,USD}\right) \approx (\Delta MC_t^{EUR}-\Delta H_t^{ROS,EUR})-(\Delta MC_t^{USD}-\Delta H_t^{ROS,USD}) \tag{16}$$

Combining equations (15) and (16) implies:

$$\begin{aligned}\Delta s_t^{l/USD}\left(1-\nu^{l,l}\right) \approx \frac{(\nu^{EUR,l}-\nu^{EUR,USD})}{(1-\nu^{EUR,EUR}+\nu^{EUR,USD})}&((\Delta MC_t^{EUR}-\Delta H_t^{ROS,EUR}) \\ &-(\Delta MC_t^{USD}-\Delta H_t^{ROS,USD}))+ \\ (\Delta MC_t^{l}-\Delta H_t^{ROS,l})&-(\Delta MC_t^{USD}-\Delta H_t^{ROS,USD})\end{aligned} \tag{17}$$

Simplifying equations (16) and (17) delivers the system of equations in the text (7).

In order to obtain the special case where we impose restrictions on the matrix $\mathbf{A}_z$ that imply that only US, UK and Eurozone investors can purchase all stocks while local currency investors can purchase only local stocks, we re-write equation (13) as follows:

$$\Delta s_t^{l/USD}\left(1-\nu^{l,l}\right) \approx \sum_{m=EUR,GBP}\Delta s_t^{m/USD}(\nu^{m,l}-\nu^{m,USD})+(\Delta MC_t^{l}-\Delta H_t^{ROS,l})-(\Delta MC_t^{USD}-\Delta H_t^{ROS,USD}) \tag{18}$$

where $z = USD$ and $l \neq EUR, USD, GBP$. Next consider the matrix of equations representing the solutions for for $l = EUR$ and $l = GBP$:

$$\begin{bmatrix}\Delta s_t^{GBP/USD} \\ \Delta s_t^{EUR/USD}\end{bmatrix} \approx \left(\mathbf{B}^{USD}\right)^{-1}\left(\begin{bmatrix}\Delta MC_t^{GBP}-\Delta H^{ROS,GBP} \\ \Delta MC_t^{EUR}-\Delta H^{ROS,EUR}\end{bmatrix}-\begin{bmatrix}\Delta MC_t^{USD}-\Delta H^{ROS,USD} \\ \Delta MC_t^{USD}-\Delta H^{ROS,USD}\end{bmatrix}\right)$$

where

$$\begin{aligned}\mathbf{B}^{USD} &= \begin{bmatrix}1-\nu^{GBP,GBP}+\nu^{GBP,USD} & -\nu^{EUR,GBP}+\nu^{EUR,USD} \\ -\nu^{GBP,EUR}+\nu^{GBP,USD} & 1-\nu^{EUR,EUR}+\nu^{EUR,USD}\end{bmatrix} \\ &= \begin{bmatrix}\mathbf{B}_{GBP,GBP}^{USD} & \mathbf{B}_{EUR,GBP}^{USD} \\ \mathbf{B}_{GBP,EUR}^{USD} & \mathbf{B}_{EUR,EUR}^{USD}\end{bmatrix}\end{aligned}$$

$$\left(\mathbf{B}^{USD}\right)^{-1} = \frac{1}{\mathbf{B}^{USD}_{GBP,GBP}\mathbf{B}^{USD}_{EUR,EUR} - \mathbf{B}^{USD}_{GBP,EUR}\mathbf{B}^{USD}_{EUR,GBP}} \begin{bmatrix} \mathbf{B}^{USD}_{EUR,EUR} & -\mathbf{B}^{USD}_{EUR,GBP} \\ -\mathbf{B}^{USD}_{GBP,EUR} & \mathbf{B}^{USD}_{GBP,GBP} \end{bmatrix}$$

The solution for the exchange rate where $l \neq USD, EUR$ is given by:

$$\begin{aligned} & \Delta s_t^{l/USD}\left(1-\nu^{l,l}\right) \\ \approx\ & \left(\Delta MC_t^l - \Delta MC_t^{USD}\right) - \left(\Delta D_t^l - \Delta D_t^{USD}\right) + \\ & \begin{bmatrix} -\mathbf{B}^{USD}_{GBP,l} & -\mathbf{B}^{USD}_{EUR,l} \end{bmatrix} \left(\mathbf{B}^{USD}\right)^{-1} \left(\begin{bmatrix} \Delta MC_t^{GBP} - \Delta H^{ROS,GBP} \\ \Delta MC_t^{EUR} - \Delta H^{ROS,EUR} \end{bmatrix} - \begin{bmatrix} \Delta MC_t^{USD} - \Delta H^{ROS,USD} \\ \Delta MC_t^{USD} - \Delta H^{ROS,USD} \end{bmatrix} \right) \end{aligned}$$

where

$$\begin{aligned} & \begin{bmatrix} -\mathbf{B}^{USD}_{GBP,l} & -\mathbf{B}^{USD}_{EUR,l} \end{bmatrix} \left(\mathbf{B}^{USD}\right)^{-1} \\ = & \begin{bmatrix} \frac{\mathbf{B}^{USD}_{EUR,l}\mathbf{B}^{USD}_{GBP,EUR} - \mathbf{B}^{USD}_{GBP,l}\mathbf{B}^{USD}_{EUR,EUR}}{\mathbf{B}^{USD}_{GBP,GBP}\mathbf{B}^{USD}_{EUR,EUR} - \mathbf{B}^{USD}_{GBP,EUR}\mathbf{B}^{USD}_{EUR,GBP}} & \frac{\mathbf{B}^{USD}_{GBP,l}\mathbf{B}^{USD}_{EUR,GBP} - \mathbf{B}^{USD}_{EUR,l}\mathbf{B}^{USD}_{GBP,GBP}}{\mathbf{B}^{USD}_{GBP,GBP}\mathbf{B}^{USD}_{EUR,EUR} - \mathbf{B}^{USD}_{GBP,EUR}\mathbf{B}^{USD}_{EUR,GBP}} \end{bmatrix}, \end{aligned}$$

$$\begin{aligned} \text{with} \quad \mathbf{B}^{USD}_{GBP,GBP} &= 1 - \nu^{GBP,GBP} + \nu^{GBP,USD} \\ \mathbf{B}^{USD}_{EUR,EUR} &= 1 - \nu^{EUR,EUR} + \nu^{EUR,USD} \\ \mathbf{B}^{USD}_{EUR,GBP} &= -\nu^{EUR,GBP} + \nu^{EUR,USD} \\ \mathbf{B}^{USD}_{GBP,EUR} &= -\nu^{GBP,EUR} + \nu^{GBP,USD} \\ \mathbf{B}^{USD}_{GBP,l} &= -\nu^{GBP,l} + \nu^{GBP,USD} \\ \mathbf{B}^{USD}_{EUR,l} &= -\nu^{EUR,l} + \nu^{EUR,USD} \end{aligned}$$

Constructing $\Delta\tilde{H}_t^{ROS,l}$ and $\tilde{\nu}^{m,l}$

In this section, we outline how we construct $\Delta\tilde{H}_t^{ROS,l}$ and $\tilde{\nu}^{m,l}$, based on the methodology in RRST. For a given stock j, we decompose the portfolio weight change into an average portfolio weight change within a narrowly defined type of investors and an idiosyncratic residual term, $\varepsilon_t^{\omega,i,j}$:

$$\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}} = \sum_{k\in\tau_i'} \frac{1}{|\tau_i'|} \frac{\Delta\omega_t^{k,j}}{\widehat{\omega}^{k,j}} + \varepsilon_t^{\omega,i,j}. \tag{19}$$

The investor type is given by $\tau' \in \Upsilon'$, where $\Upsilon' = \mathit{Active} \times \mathit{Broad\ Strategy} \times \mathit{Freq\ Rebalance} \times \mathit{ROS\ Local\ Currency}$ and $\tau_i' = \{k \in \tau' | i \in \tau'\}$ is the set of all investors that are the same type as investor i. Finally, $|\tau_i'|$ is the number of elements in the set τ_i'.

The "Active" category conditions on whether an investor is an index fund or not. Within non-index funds, we further split the investors into more or less active types. To implement this for mutual funds, we split them based on above or below median average tracking errors. We measure tracking errors as the average absolute deviation of realized fund returns from the average returns of all funds with the same prospectus benchmark index. The "Broad Strategy" category conditions on investor specialization. For our funds, this is based on the reported specialization which can be "Equity", "Mixed Allocation", "Fixed Income" or "Other". The "Freq Rebalance" category conditions on above or below median frequency of portfolio share re-balancing. In our observed sample, this frequency of portfolio share re-balancing is computed at the fund level as the average over time of the fraction of ISINs, out of all ISINs held, at each date for which the fund changed the number of shares held. The "ROS Local Currency" category splits the investors into those whose investor's currency is or is not the same as the currency of issuance of the ISIN.[29] For mutual funds, the investor's currency is the predominant currency in which the fund sells shares to its final investors (i.e., the ROS currency).

Similarly to the portfolio weight change sub-component, we express the flows and the net-of-fee returns for each investor as an arithmetic average within each investor type plus investor-specific residuals as follows:

$$flow_t^i = \sum_{k\in\tau_i} \frac{flow_t^k}{|\tau_i|} + \varepsilon_t^{f,i} \tag{20}$$

[29]Abusing the notation slightly, as the sets need to be specific to investors and not ISINs, in the "ROS Local Currency" set we include an exhaustive list of all 33 investor currencies, which also correspond to the ISIN currencies, and a residual investor set.

$$r_t^{i,NF} = \sum_{k \in \tau_i} \frac{r_t^{k,NF}}{|\tau_i|} + \varepsilon_t^{r,i}, \tag{21}$$

where $\varepsilon_t^{f,i}$ and $\varepsilon_t^{r,i}$ are the residuals and, once again, we do not need to impose any assumptions regarding their distributions or correlation structures. For the construction of these averages, which are not ISIN-specific, we can use an even more granular grouping of investors, captured by $\tau \in \Upsilon$, where $\Upsilon = Active \times Size \times Broad\ Strategy \times Narrow\ Strategy \times Freq\ Rebalance \times ROS\ Currency$ and $\tau_i = \{k \in \tau | i \in \tau\}$ is the set of all investors of the same type as investor i. The three new sub-categories are "ROS Currency", "Size" and "Narrow Strategy".[30] "ROS Currency" is each investor's currency. We have three investor "Size" categories: "$\leq$ \$100 mil", "$>$ \$100 mil and $\leq$ \$1 bil" and "$>$ \$1 bil". The "Narrow Strategy" category further disaggregates USD, EUR, and GBP investors, the vast majority of funds in our sample, by more narrowly-defined strategies such as: "Global Emerging Markets Equity", "Europe Equity Large Cap", "US Equity Large Cap Value", and many others. The way we define the investor groups ensures that it is always the case that $\tau \subseteq \tau'$, which we will use later on in the aggregation.

We define the coverage ratios $\widehat{C}_{\tilde{I}}^{j,\tau} \equiv \sum_{\{i|\ i \in \tilde{I} \cap i \in \tau\}} \mu^{i,j}$ and $\widehat{C}_{\tilde{I}^{miss}}^{j,\tau} \equiv \sum_{\{i|\ i \in \tilde{I}^{miss} \cap i \in \tau\}} \mu^{i,j}$, where $\tilde{I}$ is the set of funds we observe in our sample that hold ISIN j and $\tilde{I}^{miss} \equiv I \setminus \tilde{I}$ is the set of investors we do not observe. Intuitively, $\widehat{C}_{\tilde{I}}^{j,\tau}$ is the sample average holdings of ISIN j by all funds of type τ in our sample, as a fraction of the sample average market capitalization of this ISIN. $\widehat{C}_{\tilde{I}^{miss}}^{j,\tau}$ is the same variable but summed across the investors that we do not observe in our sample. Similarly, we define $\widehat{C}_{\tilde{I}}^{j,m} \equiv \sum_{\{i|\ i \in \tilde{I} \cap c^i = m\}} \mu^{i,j}$ and $\widehat{C}_{\tilde{I}^{miss}}^{j,m} \equiv \sum_{\{i|\ i \in \tilde{I}^{miss} \cap c^i = m\}} \mu^{i,j}$. $\widehat{C}_{\tilde{I}}^{j,m}$ is the sample average holdings of ISIN j by all funds in our sample with a ROS currency m, as a fraction of the sample average market capitalization of stock j. $\widehat{C}_{\tilde{I}^{miss}}^{j,m}$ has a similar interpretation but we sum over the investors

[30] The reason why we cannot construct average portfolio weight changes using as fine of a grouping is because we observe weights at the ISIN×fund level and our grouping of funds within ISINs is limited by the, sometimes small, number of funds holding each ISIN.

whose holdings we do not observe. Substituting equations (19), (20), and (21) into equation

$$\begin{aligned}\Delta H_t^{ROS,l} &= \sum_{\{j:c^j=l\}} \phi^j \sum_{i\in I} \mu^{i,j} \left(\frac{\Delta\omega_t^{i,j}}{\widehat{\omega}^{i,j}} + \Delta w_t^i \right), \\ \nu^{m,l} &= \sum_{\{j:c^j=l\}} \phi^j \sum_{\{i:\ c^i=m\}} \mu^{i,j}.\end{aligned}$$

and utilizing the definitions of our coverage ratios, one obtains the following expression:

$$\begin{aligned}\Delta H_t^{ROS,l} &= \sum_{\{j:c^j=l\}} \phi^j \sum_{\tau\in\Upsilon} \left(\widehat{C}_{\tilde{I}}^{j,\tau} + \widehat{C}_{\tilde{I}^{miss}}^{j,\tau} \right) \left(\alpha_t^{f,\tau} + \alpha_t^{\omega,\tau,j} + \bar{r}_t^{NF,\tau} \right) \\ &\quad + \sum_{\{j:c^j=l\}} \phi^j \sum_{i\in I} \mu^{i,j} \left(\varepsilon_t^{r,i} + \varepsilon_t^{f,i} + \varepsilon_t^{\omega,i,j} \right), \\ \nu^{m,l} &\equiv \sum_{\{j:c^j=l\}} \phi^j \sum_{m} \left(\widehat{C}_{\tilde{I}}^{j,m} + \widehat{C}_{\tilde{I}^{miss}}^{j,m} \right).\end{aligned}$$

where

$$\begin{aligned}\alpha_t^{f,\tau} &= \sum_{k\in\tau} \frac{flow_t^k}{|\tau|}, \\ \alpha_t^{\omega,\tau,j} &= \sum_{k\in\tau'} \frac{1}{|\tau'|} \frac{\Delta\omega_t^{k,j}}{\widehat{\omega}^{k,j}} \ for\ all\ \tau \subseteq \tau', \\ \bar{r}_t^{NF,\tau} &= \sum_{k\in\tau} \frac{r_t^{k,NF}}{|\tau|}.\end{aligned}$$

We further assume that:

$$\widehat{C}_{\tilde{I}^{miss}}^{j,\tau} = \kappa^j \widehat{C}_{\tilde{I}}^{j,\tau}, \tag{22}$$

where the scaling parameter κ^j is specific to the ISIN but not to the investor type. Given that the set τ conditions on the ROS currency of the fund, equation (22) also implies $\widehat{C}_{\tilde{I}^{miss}}^{j,m} = \kappa^j \widehat{C}_{\tilde{I}}^{j,m}$.

Since total equity holdings must equal the total market capitalization of ISIN j, after imposing the assumption given by equation (22), one can solve out for $1 + \kappa^j$ as a function of observable variables as follows:

$$\sum_{\tau\in\Upsilon} \left(\widehat{C}_{\tilde{I}}^{j,\tau} + \widehat{C}_{\tilde{I}^{miss}}^{j,\tau} \right) = \left(1 + \kappa^j\right) \sum_{\tau\in\Upsilon} \widehat{C}_{\tilde{I}}^{j,\tau} = 1,$$

which implies

$$1+\kappa^j = \frac{1}{\sum_{\tau\in\Upsilon}\left(\widehat{C}_{\tilde{I}}^{j,\tau}\right)} = \frac{1}{\sum_{i\in\tilde{I}}\mu^{i,j}}. \tag{23}$$

Therefore, assumption (22), combined with equation (23), implies:

$$\begin{aligned}
\Delta H_t^{ROS,l} &= \Delta\tilde{H}_t^{ROS,l} + \sum_{\{j:c^j=l\}}\phi^j\sum_{i\in I}\mu^{i,j}\left(\varepsilon_t^{r,i}+\varepsilon_t^{f,i}+\varepsilon_t^{\omega,i,j}\right),\\
\Delta\tilde{H}_t^{ROS,l} &\equiv \sum_{\{j:c^j=l\}}\phi^j\sum_{\tau\in\Upsilon}\frac{\sum_{\{i:\ i\in\tilde{I}\cap i\in\tau\}}\mu^{i,j}}{\sum_{i\in\tilde{I}}\mu^{i,j}}\left(\alpha_t^{f,\tau}+\alpha_t^{\omega,\tau,j}+\bar{r}_t^{NF,\tau}\right)\\
\tilde{\nu}^{m,l} &\equiv \sum_{\{j:c^j=l\}}\phi^j\frac{\sum_{\{i:\ i\in\tilde{I}\cap c^i=m\}}\mu^{i,j}}{\sum_{i\in\tilde{I}}\mu^{i,j}}.
\end{aligned}$$

where $\mu^{i,j} = \frac{\widehat{W}^i\widehat{S}^{l/c^i}\widehat{\omega}^{i,j}}{\widehat{P^jQ^j}}$. We proxy the population average net-of-fee returns, flows, and portfolio weight change terms, $\bar{r}_t^{NF,\tau}, \alpha_t^{f,\tau}, \alpha_t^{\omega,\tau,j}$ for each fund type, using sample averages, which is the second "representativeness" assumption we make.

Construction of the News Indices: $\Delta\widehat{ra}_t^{news}$ and $\Delta\widehat{p}_t^{news,US}$

For the US macro news index, $\Delta\widehat{p}_t^{news,US}$, we use a method similar to the one in Stavrakeva and Tang (Forthcominga) to summarize the large number of explanatory variables, both current and lagged news on several macroeconomic indicators. We first construct a daily US stock market macroeconomic news index from the fitted values of the following daily regression:

$$\Delta p_{t_d}^{US} = \alpha_1^p + \sum_{k=1}^{K}\left(\sum_{j\in J}\beta_j^{p,k}Surp_{t_d-j}^k\right) + error_{1,t_d}^p, \tag{24}$$

where k indexes the surprises, K is the total number of surprises and $J \equiv \{0,1,2,30,60,90,120,150,180\}$. $Surp_{t_d}^k$ denotes the most recent available surprise for a given macroeconomic indicator if there is no new release on that day. The monthly US stock market news index is defined as the sum over each month of the fitted values from this daily regression $\Delta\widehat{p}_t^{news,US} = \sum_{\{t_d:m(t_d)=t\}}\widehat{\Delta p_{t_d}}^{news,US}$ where $m(t_d)$ maps daily dates to their corresponding months.

For the risk aversion news index, $\Delta\widehat{ra}_t^{news}$, we estimate the following regression:

$$\Delta ra_{t_d}^{US} = \alpha_1^{ra} + \sum_{k=1}^{K}\left(\sum_{j\in J}\beta_j^{ra,k} Surp_{t_d-j}^{k}\right) + error_{1,t_d}^{ra}, \tag{25}$$

and aggregate the residuals to a monthly index $\Delta\widehat{ra}_t^{news} = \sum_{\{t_d:m(t_d)=t\}} error_{1,t_d}^{ra}$ again using sums.

B Data Appendix

B.1 Details on Cleaning the Morningstar Data

For the set of of funds we have, we pull all holdings, shares held and portfolio weights, as well as the ISIN and CUSIP for each asset held.

Then we compile a list of all ISINs, and if the ISIN is not available, the CUSIPs, held by our sample of funds. We end up with close to 2 million ISINs or CUSIP. These are classified into types of assets such as Equities, Government Debt, Corporate Debt etc, where each subgroup has further narrow classifications. For example, ordinary shares and depository receipts are the largest categories in the Equity group. We pull a number of additional characteristics from Refinitiv/Eikon (see Section B.2 for details). From Refinitiv/Eikon, we also pull the mappings between the ISIN of an asset and its CUSIP.

When analysing the holdings, we make sure to keep only holdings that have consistent ISIN/CUSIP classifications with Refinitiv. What we mean by this is that if the holdings data reports only ISIN or only CUSIP, we use the available identifier to map this particular holding to the Refiniv data. However, if the Morningstar holdings data has both ISIN and CUSIP and they are different from the ISIN - CUSIP pair we pull from Refinitiv we consider this a mistake in the Morningstar data and drop that holding given that we do not know which asset we can attribute the entry to.

When constructing the change in weights for a given asset and fund, we make sure that we do not discard information. More precisely, if for example for fund i and asset j we observe entries in the holdings data from March 2002 to April 2008 then we assume that the fund purchased stock i

for first time in March 2002 so the holdings end of Feb 2002 are zero and similarly we assume the holdings end of May 2008 are zero as by then the asset is sold. This way we ensure we don't throw away relevant information.

Regarding the construction of flows and net returns, we combine a number of different variables reported by Morningstar in order to improve the coverage.

B.2 Refinitiv Eikon/Datastream

At an ISIN level, we construct the following time series variables and characteristics:

- "Type of Asset" – we classify an ISIN as equity vs fixed income etc, where the available level of classification is very granular. The variable in Eikon that we use is: "Asset Category Description"; We end up with 44,451 ISINs for shares, for which we will have both market cap and prices, and for which the currency of issuance of the stock coincides with the main country of exposure of the company issuing the stock (see definitions below).
- "Currency" of the ISIN or CUSIP– this is the currency of issuance of the ISIN. We cross check the currency reported in Eikon for a given ISIN and the currency reported for that same ISIN or CUSIP by the funds reporting in Morningstar. In the vast majority of the cases they are the same. We end up using the Morningstar reported currency if unique currency is reported by all investors for the given security. If multiple currencies are reported in Morningstar by different players we use the Eikon classification.
- "Market capitalization" at the ISIN or CUSIP level is obtained from Datastream, and, if missing, for all dates we supplement the series using Eikon. Notice that we drop all depository receipts and drop all equities for which a depository receipt conversion ratio is reported in Eikon or if they are classified as Depository Receipts.
- "Price" measured in "Currency" – the price we download is the "Closing Price" which corrects for shares' splits but does not adjust for dividend payments, which is consistent with our model. If we cannot find the price in Eikon or Datastream, we back it out from Morningstar,

calculated using the market value and shares reported as holdings of a given ISIN for each fund. All prices are translated into the currency of issuance of the ISIN. We further remove observations from the Eikon and Morningstar price series where the monthly or quarterly price growth rate exceeds 100 percent in absolute value. The correlation between the price growth rates from the two data sources, after this cleaning, is 96 percent. Notice that we supplement the Eikon series with Datastream or Morningstar prices only if the Eikon price is not available for any date and take care to exclude stale price series.

- "Sector" – We classify firms as belonging in one of the following sectors: Banks, Consumer Goods, Energy, Manufacturing, Other Financials, Services based on the Eikon variables "Parent Industry Sector", "TRBC Economic Sector Name" and "TRBC Business Sector Name".
- "Country of Exposure" – the country where the main operational risk of the firm is and if missing we use proxies. Then based on this variables and the variable which is the currency of issuance of the ISIN we keep only ISINs where the country of exposure is the same as the currency of issuance. We do that as we want to focus on US firms that issue in US dollars to capture the US stock market rather than Brazilian firms issuing in USD, for example. We construct this variable bases on the Eikon variable "Country of Risk" and if missing, we proxy using of the following variables"Issuer Country", "Ultimate Parent" and "Country of Headquarters".

B.3 Macroeconomic Surprises

We use surprises for the following indicators for each country. When both Bloomberg and Informa Global Markets (IGM) publish expectations for the same indicator, we choose the source based on data availability. In a few rare cases in which indicators are discontinued, we splice the surprise series with a close substitute.

- United States: (Inflation) CPI, core CPI, core PPI; (Activity) capacity utilization, Conference Board consumer confidence, University of Michigan consumer sentiment, new home sales, initial jobless claims, industrial production, leading indicators index, nonfarm payrolls, ISM manufacturing index, unemployment rate, GDP, retail sales; (External) trade balance, oil surprises from Känzig (2021); (Monetary) federal funds target rate, 3-month fed funds rate futures, 4-quarter eurodollar futures, and 10-year Treasury yields

Online Appendix

A Exchange Rate Decomposition Additional Results

Table A.12: Partial Exchange Rate Elasticities with Respect to Net Supply; USD Base; Local Currency, USD, EUR and GBP Investors

Currency	$\tilde{\xi}^{l,l}_{USD}$	$\tilde{\xi}^{l,USD}_{USD}$	$\tilde{\xi}^{l,EUR}_{USD}$	$\tilde{\xi}^{l,GBP}_{USD}$
AUD	1.35	-1.57	0.03	0.20
BRL	1.14	-1.27	0.04	0.09
CAD	1.00	-1.20	0.10	0.10
CHF	1.48	-2.05	0.34	0.24
CLP	1.00	-1.19	0.08	0.11
COP	1.00	-1.04	0.03	0.02
CZK	1.00	-1.31	0.20	0.12
EUR	1.60	-1.87	.	0.26
GBP	2.25	-2.53	0.28	.
HUF	1.00	-1.43	0.20	0.23
IDR	1.00	-1.19	0.05	0.14
ILS	1.00	-1.09	-0.01	0.09
INR	1.62	-1.71	-0.00	0.09
JPY	1.77	-1.97	0.04	0.16
KRW	1.14	-1.37	0.07	0.16
MXN	1.16	-1.27	0.03	0.08
MYR	1.00	-1.20	0.08	0.11
NOK	1.32	-2.03	0.38	0.33
NZD	1.05	-1.29	0.03	0.21
PHP	1.00	-1.22	0.06	0.16
PLN	1.00	-1.33	0.18	0.14
RUB	1.00	-1.52	0.37	0.15
SEK	1.37	-2.02	0.38	0.27
SGD	1.00	-1.36	0.06	0.30
THB	1.00	-1.11	0.01	0.10
TRY	1.00	-1.26	0.13	0.13
TWD	1.00	-1.27	0.09	0.18
ZAR	1.00	-1.30	0.11	0.19

Note: In this table we report the elasticities associated with the partial response of the exchange rate to an unit increase of the particular net supply measure. We construct the average elasticities over the period Jan 2013 to Dec 2021.

Table A.13: Exchange Rates Variance Covariance Decomposition; USD Base; Local Currency, USD, EUR and GBP Investors

Currency	$\tilde{\xi}^{l,l}_{USD}NS^{l}$	R^2	$\tilde{\xi}^{l,USD}_{USD}NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{USD}NS^{EUR}$	R^2	$\tilde{\xi}^{l,GBP}_{USD}NS^{GBP}$	R^2	$Resid$	R^2	$\sum_{j=\{l,USD,EUR,GBP\}}\tilde{\xi}^{l,j}_{USD}NS^{j}$
AUD	0.88***	0.78	0.07*	0.04	0.01***	0.31	0.02**	0.05	0.03	-0.00	0.97
BRL	0.80***	0.61	0.05**	0.06	0.01***	0.11	0.00	0.00	0.14**	0.05	0.86
CAD	0.89***	0.77	0.10**	0.08	0.03***	0.15	0.01**	0.05	-0.03	-0.00	1.03
CHF	0.83***	0.60	0.03	-0.00	0.13***	0.43	0.02**	0.04	-0.01	-0.01	1.01
CLP	0.83***	0.68	0.05	0.04	0.01***	0.14	0.00	0.01	0.10*	0.03	0.90
COP	0.93***	0.68	0.03	0.03	0.00***	0.05	0.00	-0.01	0.04	-0.01	0.96
CZK	0.97***	0.63	0.08***	0.07	0.07***	0.47	0.01**	0.03	-0.12	0.02	1.12
EUR	0.82***	0.66	0.10*	0.04	0.82***	0.66	0.02*	0.03	0.06	0.01	0.94
GBP	0.68***	0.38	0.25***	0.11	0.07***	0.13	0.68***	0.38	0.01	-0.01	0.99
HUF	0.85***	0.31	0.06**	0.05	0.06***	0.46	0.01	0.02	0.02	-0.01	0.98
IDR	0.84***	0.55	0.09*	0.07	0.01*	0.03	0.00	-0.00	0.06	0.00	0.94
ILS	1.03***	0.27	0.08*	0.04	-0.00***	0.18	0.01**	0.04	-0.12	-0.00	1.12
INR	0.75***	0.19	0.06	0.01	-0.00***	0.14	0.01**	0.04	0.18	0.01	0.82
JPY	1.23***	0.55	-0.08	0.01	0.01**	0.03	-0.00	-0.01	-0.15	0.01	1.15
KRW	0.96***	0.67	0.08*	0.07	0.02***	0.21	0.01	0.01	-0.07	0.00	1.07
MXN	0.85***	0.77	0.03	0.02	0.00***	0.12	0.00**	0.02	0.11***	0.05	0.89
MYR	1.02***	0.65	0.03	-0.00	0.03***	0.17	0.01**	0.03	-0.08	0.01	1.08
NOK	0.49***	0.19	0.12**	0.07	0.10***	0.24	0.02**	0.03	0.26***	0.05	0.74
NZD	0.91***	0.80	0.06**	0.05	0.01***	0.30	0.01	0.02	0.01	-0.01	0.99
PHP	0.90***	0.37	0.04	-0.00	0.03***	0.14	0.04***	0.08	-0.00	-0.01	1.00
PLN	0.85***	0.63	0.07**	0.06	0.05***	0.41	0.01**	0.03	0.02	-0.00	0.98
RUB	0.79***	0.30	0.07***	0.07	0.04***	0.07	0.00	-0.00	0.10	0.00	0.90
SEK	0.66***	0.53	0.12**	0.06	0.13***	0.43	0.02**	0.04	0.06	0.00	0.94
SGD	0.70***	0.47	0.10	0.02	0.04***	0.34	0.05**	0.05	0.11	0.01	0.89
THB	1.10***	0.29	0.04	0.00	0.00***	0.12	0.01**	0.02	-0.15	0.00	1.15
TRY	0.79***	0.79	0.01	-0.00	0.01***	0.09	0.00**	0.01	0.19***	0.18	0.81
TWD	0.91***	0.40	0.10*	0.02	0.05***	0.18	0.03**	0.03	-0.08	-0.00	1.08
ZAR	0.90***	0.85	0.06**	0.06	0.01***	0.10	0.00	-0.00	0.03	-0.00	0.97

Note: In this table we report the coefficients from regressing the sum of the scaled net supply components, $\sum_{j=\{l,USD,EUR,GBP\}}\tilde{\xi}^{l,j}_{USD}NS^{j}$, where $NS^{j} = (\Delta MC^{j}_{t} - \Delta\tilde{H}^{ROS,j}_{t})$, or the individual scaled net supply components, on the exchange rate growth rate. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Figure A.16: Exchange Rates Variance Covariance Decomposition; USD Base; Local Currency, USD, EUR and GBP Investors

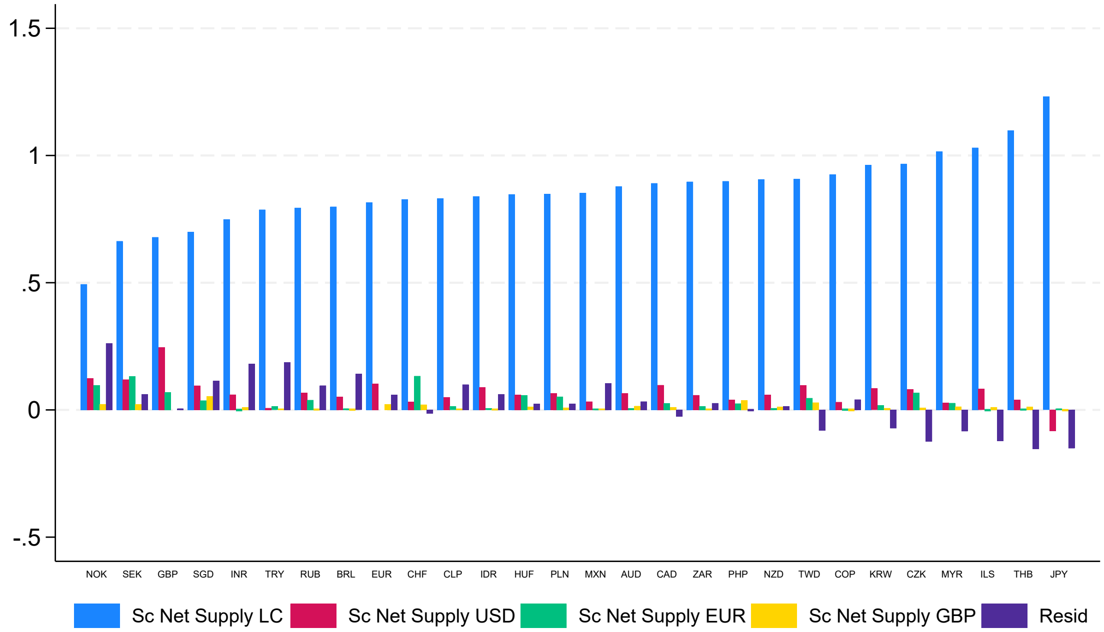


Table A.14: Partial Exchange Rate Elasticities with Respect to Net Supply; EUR Base; Local Currency, USD, EUR and GBP Investors

Currency	$\tilde{\xi}^{l,l}_{EUR}$	$\tilde{\xi}^{l,USD}_{EUR}$	$\tilde{\xi}^{l,EUR}_{EUR}$	$\tilde{\xi}^{l,GBP}_{EUR}$
AUD	1.35	0.30	-1.58	-0.07
BRL	1.14	0.60	-1.56	-0.18
CAD	1.00	0.61	-1.45	-0.15
CHF	1.48	-0.16	-1.29	-0.03
CLP	1.00	0.70	-1.54	-0.15
COP	1.00	0.84	-1.58	-0.25
CZK	1.00	0.55	-1.40	-0.15
GBP	1.99	-0.63	-1.35	.
HUF	1.00	0.36	-1.34	-0.02
IDR	1.00	0.69	-1.56	-0.13
ILS	1.00	0.74	-1.57	-0.17
INR	1.62	0.22	-1.66	-0.19
JPY	1.77	-0.07	-1.59	-0.11
KRW	1.14	0.51	-1.54	-0.10
MXN	1.16	0.61	-1.59	-0.18
MYR	1.00	0.69	-1.54	-0.15
NOK	1.32	-0.20	-1.19	0.07
NZD	1.05	0.47	-1.49	-0.04
PHP	1.00	0.66	-1.55	-0.11
PLN	1.00	0.55	-1.43	-0.12
RUB	1.00	0.36	-1.24	-0.11
SEK	1.37	-0.21	-1.17	0.01
SGD	1.00	0.51	-1.54	0.03
THB	1.00	0.79	-1.62	-0.17
TRY	1.00	0.60	-1.46	-0.14
TWD	1.00	0.61	-1.52	-0.09
USD	1.89	.	-1.62	-0.27
ZAR	1.00	0.56	-1.49	-0.07

Note: In this table we report the elasticities associated with the partial response of the exchange rate to an unit increase of the particular net supply measure. We construct the average elasticities over the period Jan 2013 to Dec 2021.

Table A.15: Exchange Rates Variance Covariance Decomposition; EUR Base; Local Currency, USD, EUR and GBP Investors

Currency	$\tilde{\xi}^{l,l}_{EUR}NS^l$	R^2	$\tilde{\xi}^{l,USD}_{EUR}NS^{USD}$	R^2	$\tilde{\xi}^{l,EUR}_{EUR}NS^{EUR}$	R^2	$\tilde{\xi}^{l,GBP}_{EUR}NS^{GBP}$	R^2	$Resid$	R^2	$\sum_{j=\{l,USD,EUR,GBP\}}\tilde{\xi}^{l,j}_{EUR}NS^j$
AUD	0.87***	0.35	-0.01	0.00	0.09	0.00	-0.00*	0.01	0.05	-0.00	0.95
BRL	0.74***	0.41	-0.02	0.01	0.12*	0.02	0.00	-0.01	0.16***	0.04	0.84
CAD	0.48***	0.18	-0.01	-0.00	0.54***	0.26	-0.00	-0.00	-0.00	-0.01	1.00
CHF	0.75***	0.25	-0.01*	0.03	0.19**	0.02	-0.00	-0.00	0.08	0.00	0.92
CLP	0.68***	0.38	-0.01	-0.00	0.22***	0.07	0.00	-0.01	0.11	0.02	0.89
COP	0.91***	0.51	-0.02	0.00	0.09	0.01	0.01	-0.00	0.01	-0.01	0.99
CZK	1.45***	0.28	-0.07**	0.06	-0.12	-0.00	-0.01	0.01	-0.24	0.01	1.24
GBP	0.46***	0.20	0.02	0.01	0.52***	0.29	0.46***	0.20	-0.01	-0.01	1.01
HUF	1.44***	0.26	-0.02*	0.02	-0.25***	0.06	-0.00	0.00	-0.17	-0.00	1.17
IDR	0.48***	0.22	-0.01	-0.00	0.48***	0.31	0.01	0.01	0.04	-0.00	0.96
ILS	0.60***	0.11	0.01	-0.01	0.61***	0.29	0.00	-0.01	-0.22	0.02	1.22
INR	0.10	-0.00	0.01	0.01	0.58***	0.28	0.00	-0.01	0.31**	0.04	0.69
JPY	0.65***	0.28	-0.00**	0.07	0.41***	0.26	0.01*	0.02	-0.07	0.00	1.07
KRW	0.72***	0.25	-0.02	0.01	0.25***	0.06	0.00	-0.00	0.05	-0.00	0.95
MXN	0.77***	0.50	-0.01	-0.00	0.20***	0.05	0.00	-0.01	0.03	-0.00	0.97
MYR	0.31**	0.07	0.04*	0.02	0.63***	0.32	0.00	-0.00	0.03	-0.01	0.97
NOK	0.60***	0.13	0.01	0.02	0.21**	0.05	0.00	-0.00	0.17	0.01	0.83
NZD	0.89***	0.39	-0.02	0.01	0.06	-0.00	-0.00	-0.00	0.07	0.00	0.93
PHP	0.04	-0.00	0.04*	0.03	0.70***	0.43	0.00	-0.01	0.23***	0.07	0.77
PLN	1.25***	0.40	-0.04*	0.04	-0.15	0.01	-0.01	0.01	-0.04	-0.00	1.04
RUB	0.68***	0.18	-0.01*	0.02	0.12**	0.05	0.00	-0.00	0.21**	0.02	0.79
SEK	0.89***	0.26	0.01	0.02	0.10	0.00	0.00	0.01	0.00	-0.01	1.00
SGD	0.08	0.00	0.03	0.02	0.96***	0.46	-0.00	-0.00	-0.07	0.00	1.07
THB	0.02	-0.01	0.04	0.02	0.73***	0.44	0.01	0.00	0.20*	0.02	0.80
TRY	0.72***	0.60	0.01	0.00	0.08	0.02	-0.00	-0.00	0.19***	0.15	0.81
TWD	0.02	-0.01	0.03	0.02	0.83***	0.52	0.01	0.01	0.11*	0.01	0.89
USD	0.10*	0.04	0.10*	0.04	0.83***	0.66	0.02*	0.03	0.05	0.00	0.95
ZAR	0.80***	0.51	-0.02*	0.02	0.14***	0.04	0.00	-0.00	0.08	0.02	0.92

Note: In this table we report the coefficients from regressing the sum of the scaled net supply components, $\sum_{j=\{l,USD,EUR,GBP\}}\tilde{\xi}^{l,j}_{EUR}NS^j$, where $NS^j = (\Delta MC^j_t - \Delta\tilde{H}^{ROS,j}_t)$, or the individual scaled net supply components, on the exchange rate growth rate. * – significant at 10%; ** – significant at 5% ; *** – significant at 1%

Figure A.17: Exchange Rates Variance Covariance Decomposition; EUR Base; Local Currency, USD, EUR and GBP Investors

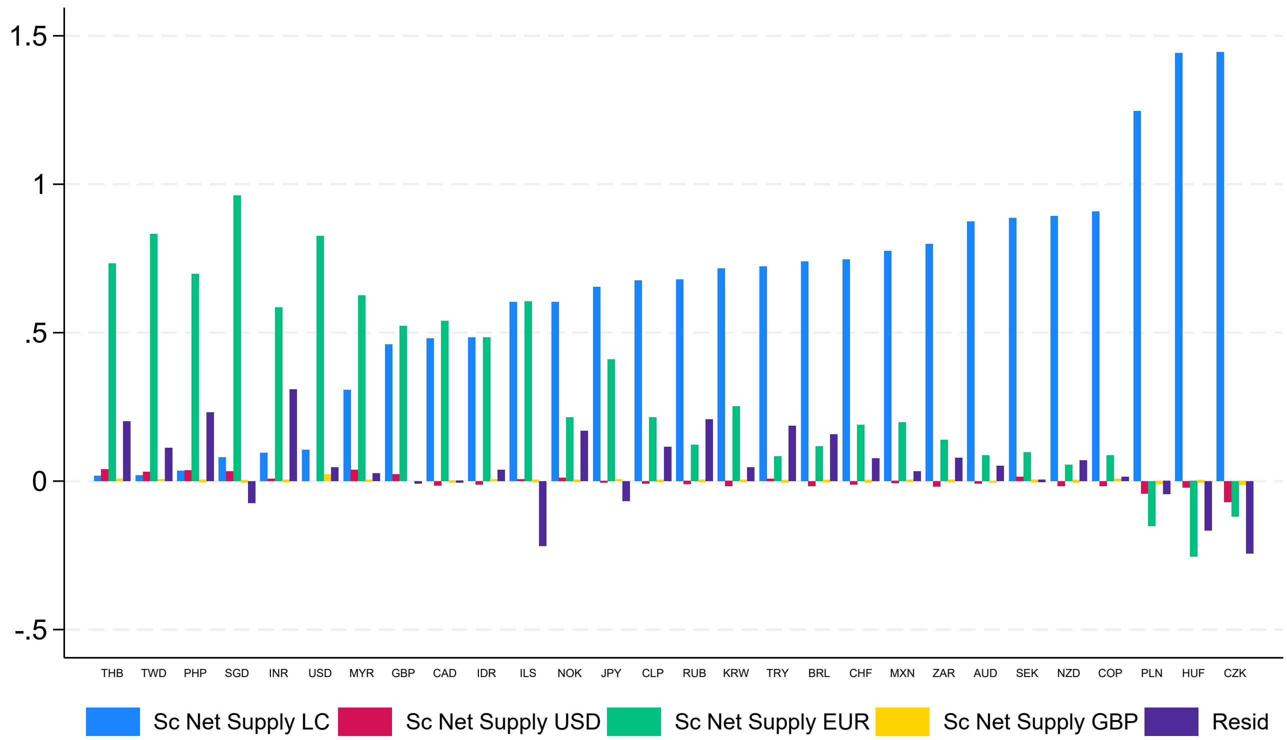


Table A.16: Comparison Across Different Model Specifications

Currency	ρ_1^{USD}	ρ_2^{USD}	ρ_1^{EUR}	ρ_2^{EUR}
AUD	1.00	1.00	1.00	1.00
BRL	1.00	1.00	0.99	0.99
CAD	1.00	1.00	0.98	0.98
CHF	0.99	0.99	1.00	1.00
CLP	1.00	1.00	0.99	0.99
COP	1.00	1.00	0.99	0.99
CZK	1.00	1.00	0.98	0.99
EUR	0.99	1.00	.	.
GBP	1.00	1.00	0.98	0.98
HUF	1.00	1.00	1.00	1.00
IDR	1.00	1.00	0.99	0.99
ILS	1.00	1.00	0.98	0.98
INR	1.00	1.00	1.00	1.00
JPY	1.00	1.00	1.00	1.00
KRW	1.00	1.00	0.99	0.99
MXN	1.00	1.00	0.99	0.99
MYR	1.00	1.00	0.99	0.99
NOK	0.99	0.99	1.00	1.00
NZD	1.00	1.00	0.99	0.99
PHP	1.00	1.00	0.98	0.98
PLN	1.00	1.00	0.98	0.98
RUB	1.00	1.00	1.00	1.00
SEK	0.99	0.98	1.00	1.00
SGD	0.98	0.99	0.98	0.98
THB	1.00	1.00	0.98	0.98
TRY	1.00	1.00	0.99	1.00
TWD	0.99	0.99	0.98	0.98
USD	.	.	0.99	1.00
ZAR	1.00	1.00	0.99	0.99

Note: In this table we report the following correlations:

$$\rho_1^{USD} = corr\left(\sum_{j=\{l,USD,EUR\}} \tilde{\xi}_{USD}^{l,j} NS_t^j, \sum_{m\notin\{l,USD\}} \Delta s_t^{m/USD} \frac{\nu^{m,l} - \nu^{m,USD}}{1-\nu^{l,l}+\nu^{l,USD}} + \frac{NS_t^l}{1-\nu^{l,l}+\nu^{l,USD}} - \frac{NS_t^{USD}}{1-\nu^{l,l}+\nu^{l,USD}}\right)$$

$$\rho_2^{USD} = corr\left(\sum_{j=\{l,USD,EUR,GBP\}} \tilde{\xi}_{USD}^{l,j} NS_t^j, \sum_{m\notin\{l,USD\}} \Delta s_t^{m/USD} \frac{\nu^{m,l} - \nu^{m,USD}}{1-\nu^{l,l}+\nu^{l,USD}} + \frac{NS_t^l}{1-\nu^{l,l}+\nu^{l,USD}} - \frac{NS_t^{USD}}{1-\nu^{l,l}+\nu^{l,USD}}\right)$$

and the equivalent correlations for the EUR base. We use the Jan 2013–Dec 2021 sample.