Foreign-currency exposures and the financial channel of exchange rates: Eroding monetary policy autonomy?*

Georgios Georgiadis†
European Central Bank

Feng Zhu‡
Luhoan Academy

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Abstract

Foreign-currency exposures on an economy's external balance sheet may jeopardise financial stability when the exchange rate depreciates. In fact, theory suggests that in such an environment it may be optimal for monetary policy in a floating regime to reduce exchange rate variation in order to safeguard financial stability by mimicking foreign monetary policy rather than focusing exclusively on stabilising macroeconomic fundamentals. We explore whether there is evidence in the data for economies facing such a trade-off between financial stability and macroeconomic stabilisation that gives rise to "fear-of-floating". In a panel data set for 21 advanced and emerging small open economies with floating regimes for the time period from 2002 to 2012 we document evidence that is consistent with fear-of-floating, i.e. that local mimics base-country monetary policy even after controlling for macroeconomic fundamentals. Importantly, we find that this fear-of-floating is particularly pronounced in the presence of foreign-currency exposures. Moreover, we find that the evidence for fear-of-floating is stronger in cases in which the foreign-currency exposures arise through debt rather than non-debt instruments, which is consistent with evidence documenting that these instruments are more fickle and sensitive to swing sin investor sentiment. Moreover, the evidence for fear-of-floating is stronger in cases in which base-country monetary policy is tightened, which is consistent with the notion that borrowing constraints are more likely to bind when the local currency depreciates and the small open economy is net short in foreign currency.

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†E-mail address: georgios.georgiadis@ecb.int
‡E-mail address: schecho8@yahoo.com

1 Introduction

A cornerstone of international macroeconomics is the notion that exchange rate flexibility confers monetary policy autonomy. The underlying rationale is that because in a flexible exchange rate regime the future exchange rate may change, deviations of a small open economy's (SOE) interest rate from that in the rest of the world do not represent arbitrage opportunities and can hence persist. A large empirical literature has documented that the data have been consistent with this prediction since the 1970s and even over much longer, historical time periods (see, for example, Shambaugh, 2004; Obstfeld et al., 2005; Klein and Shambaugh, 2015). However, much has happened relative to the time periods studied in most of this literature. For one thing, financial globalisation has taken off. For example, advanced economies (AEs) have accumulated large foreign asset and liability positions. Emerging market economies (EME) have typically accumulated smaller international investment positions, but in contrast to AEs exhibit large foreign-currency exposures. In particular in the aftermath of the global financial crisis when interest rates in AEs reached historic lows, EMEs issued large amounts of foreign-currency denominated debt (Aldasoro and Ehlers, 2018; BIS, 2019). In this paper we explore whether such foreign-currency exposures have implied trade-offs between financial stability and macroeconomic stabilisation and eventually eroded monetary policy autonomy as reflected in "fear-of-floating".

It is widely known that foreign-currency exposures come with risks, as was vividly illustrated by a series of EME crises in the 1990s; hence the term "original sin" (Eichengreen and Hausmann, 1999). In particular, when a SOE's exchange rate depreciates—for example when US monetary policy is tightened—then foreign-currency liabilities become more difficult to service and to roll over, which might eventually put at risk financial stability (Bruno and Shin, 2015). Against this background, SOE monetary policy may try to reduce exchange rate variation in a floating regime by mimicking base-country monetary policy; and SOE monetary policy may do so both in order to avoid foreign-currency exposures to build up in the first place when the local currency is facing appreciation pressures and later in order to preserve financial stability when the local currency faces depreciation pressures after the accumulation of foreign-currency exposures. In this case, despite—and in fact precisely because—a flexible exchange rate, monetary policy autonomy in the sense of being able to focus exclusively on macroeconomic stabilisation would be reduced due to an additional trade-off with financial stability implied by foreign-currency exposures. Whether it is optimal for SOE monetary policy to reduce exchange rate variation in order to safeguard financial stability rather than focus exclusively on macroeconomic stabilisation depends on the strength of this "financial channel of exchange rates", and is thus an empirical question (Gourinchas, 2018). Some policymakers claim the financial channel of exchange rates is large in their economies (Basci et al., 2008; Gudmundsson, 2017; Vegh et al., 2018).[1]

Early work discussing that SOE monetary policy may be reluctant to let the exchange rate float freely due to foreign-currency exposures goes back to Calvo and Reinhart (2002). More recently, a growing body of work has explored optimal monetary policy in the presence of foreign-currency exposures in state-of-the-art New Keynesian general equilibrium models. Specifically, Aoki et al. (2018) study a SOE with currency mismatches on banks' balance sheets. In the model, movements in the exchange rate triggered by shocks to foreign interest rates amplify spillovers to the SOE by worsening the balance sheets of banks, creating a trade-off for monetary policy between macroeconomic stabilisation and financial stability. Davis and Presno (2017) consider a SOE model with collateral constraints in which variation in capital inflows triggered by shocks to foreign interest rates jeopardise financial stability. In the model, optimal monetary policy in a floating exchange rate regime manages the SOE's external accounts by mimicking foreign monetary policy. Akinci and Queralto (2019) consider a two-country model in which spillovers from a US monetary policy tightening to EMEs are amplified due to currency mismatches. In contrast to Davis and Presno (2017), in the model of Akinci and Queralto (2019) it is however not optimal for EME monetary policy to stabilise the exchange rate by mimicking US monetary policy. And Mimir and Sunel (2019) explore the welfare implications of a variety of monetary policy rules in a rich medium-scale SOE model with currency mismatches on banks' balance sheets. While Mimir and Sunel (2019) find that the optimal policy is not unique and depends on the particular model specification and the shocks hitting the SOE, reducing exchange rate variation by responding to US interest rates is generally welfare improving relative to standard Taylor rules.[2]

While the amount of theoretical work on the subject is large and growing further, empirical evidence on how important foreign-currency exposures are in shaping trade-offs and fear-of-floating faced by SOE monetary policy in the data is limited. For example, little systematic empirical evidence exists on whether SOEs systematically pursue policies such as those prescribed by Davis and Presno (2017), i.e. whether SOE monetary policy mimics base-country monetary policy in order to reduce exchange rate variation in the presence of foreign-currency exposures. Of course, it is widely know that foreign exchange interventions are being use in order to reduce excessive exchange rate volatility. But much less evidence exists on the recourse to conventional monetary policy instruments in this context. Indeed, Carstens (2019) forcefully discusses the importance of fostering our understanding of monetary policy chal-

[1]Notice the subtle point mentioned also by Gourinchas (2019) that for policymakers to decide to reduce exchange rate variation in the face of depreciation pressures it is sufficient that they *believe* such behaviour to be optimal, regardless of whether this is true given the structure of the economy.

[2]Earlier work finding that reducing exchange rate variation may be optimal in the presence of foreign-currency exposures includes Cook (2004), Choi and Cook (2004), Elekdag and Tchakarov (2007), Rappoport (2009) as well as Kolasa and Lombardo (2014). In contrast, Cespedes et al. (2004), Devereux et al. (2006), Gertler et al. (2007) as well as Faia (2010) find it is optimal to let the exchange rate float freely.

lenges in SOEs in the context of a highly financially integrated world from a policymaker's perspective. Our paper fills this gap in the literature. We explore whether foreign-currency exposures have given rise to quantitatively meaningful trade-offs between financial stability and macroeconomic stabilisation for monetary policy in SOEs and generated fear-of-floating. More specifically, we assess empirically whether SOE monetary policy has been attempting to reduce exchange rate variation by mimicking base-country monetary policy, in particular in the presence of foreign-currency exposures.

Examining a cross-country panel data set we first document evidence that supports the hypothesis that in the presence of foreign-currency exposures SOE monetary policy is subject to fear-of-floating. In particular, we find that even after controlling for real-time forecasts of local fundamentals as well as global variables SOE monetary policy rates still respond to base-country policy rates. Moreover, consistent with the optimal policy prescriptions in Davis and Presno (2017), we find that the sensitivity of SOE to base-country monetary policy is stronger the larger the foreign-currency exposures. We also find that the sensitivity of SOE to base-country monetary policy is particularly large when the foreign-currency exposures stem from portfolio debt instruments or bank loans rather than from more resilient foreign direct investment (FDI) and portfolio equity instruments with state-contingent payoffs and longer investment horizons; this is consistent with existing literature that documents that portfolio debt and other investment items are more fickle an more sensitive to swings in investor sentiment than portfolio equity and FDI. Finally, we find that the sensitivity of SOE to base-country monetary policy is larger when the latter is tightened rather than loosened, consistent with the notion that in the presence of foreign-currency exposures exchange rate depreciations are particularly worrisome for financial stability.

We obtain these findings by estimating fixed effects dynamic panel data regressions of monetary policy reaction functions for 21 advanced and emerging SOEs with floating regimes for the time period from January 2002 to December 2012. The reaction function arguments we consider include real-time forecasts of real GDP growth and consumer-price inflation, the VIX, commodity prices, and the base-country policy rate. The inclusion of real-time forecasts and global variables accounts for the correlation between SOE and base-country policy rates that is due to common shocks and spillovers through conventional macroeconomic and financial channels. Hence, the coefficient estimate on the base-country policy rate indicates the extent to which SOE monetary policy mimics base-country monetary policy *over and above* what we would expect to observe if macroeconomic stabilisation in the medium term was the only policy objective; we interpret this as empirical evidence for fear-of-floating. In order to explore the role of the financial channel of exchange rates in shaping this fear-of-floating we interact the base-country policy rate with various variables reflecting the SOE's foreign-currency exposure. While doing so we control for alternative reasons for why SOE monetary policy may want to reduce exchange rate variation, in particular high exchange rate pass-through to consumer prices and low stocks of foreign exchange reserves. Moreover, we also control for other policy measures that may be deployed in order to mitigate risks to financial stability in the face of changes in base-country monetary policy and foreign-currency exposures, such as capital controls, macro-prudential measures and exchange rate interventions.

Our findings have important implications. First, our analysis explores whether SOE monetary policy is used *over and above* capital controls, macro-prudential measures and exchange rate interventions in order to mitigate risks to financial stability in the face of changes in base-country monetary policy and foreign-currency exposures. The "revealed preference" of SOE monetary policy to use conventional monetary policy in addition to capital controls, macro-prudential measures and exchange rate interventions we document in the data informs the design of structural models used for the analysis of trade-offs and interactions between different policies. Moreover, our finding of quantitatively relevant SOE monetary policy trade-offs between macroeconomic stabilisation and financial stability in the data also has implications for the choice of models used for the analysis of international monetary policy coordination. Finally, from a policy perspective our findings are particularly relevant at the current juncture, as many EMEs have accumulated large foreign-currency—typically US dollar—exposures concentrated in corporate debt and US monetary policy is expected to be tightened, at least in the medium term.

Finally, it is important to emphasise that our analysis does not speak to the normative question whether it is optimal for SOE monetary policy to respond to base-country monetary policy in order to reduce exchange rate variation in the presence of foreign-currency exposures. Instead, our aim in this paper is to document whether or not SOE policymakers have been doing so systematically using conventional monetary policy instruments in recent data, which we think is particularly interesting against the background of the conflicting optimal policy prescriptions in the literature (see, for example, Davis and Presno, 2017; Akinci and Queralto, 2019; Mimir and Sunel, 2019).

The rest of the paper is organised as follows. We derive our estimation equations and describe the data in Section 2. In Section 3 we present our estimation results. Finally, Section 4 concludes.

2 Empirical framework

2.1 Conceptual motivation and testable predictions

A stylised conceptualisation of the optimal policy prescription in Davis and Presno (2017)—or, alternatively, a fear-of-floating motive—is for monetary policy in a SOE with foreign-currency exposures to follow the reaction function

$$i_t^p = \phi \cdot x_{t+M}^e + \alpha \cdot \Delta^e s_{t+1}, \tag{1}$$

where x_{t+M}^e is the medium-term forecast of macroeconomic fundamentals (such as inflation and output growth); $\Delta^e s_{t+1}$ is a *counterfactual* forecast of the change in the exchange rate that monetary policymakers expect to materialise if they do not consider financial stability risks that emanate from foreign-currency exposures and instead set interest rates exclusively in order to stabilise the macroeconomy in the medium term by following the reaction function

$$\widetilde{i}_t^p = \widetilde{\phi} \cdot x_{t+M}^e. \tag{2}$$

We consider a counterfactual exchange rate expectation $\Delta^e s_{t+1}$ in Equation (1) instead of the actual value of the exchange rate s_t because we deem this more realistic and in order to avoid issues of simultaneity, namely that the realised value of the exchange rate has already responded to and hence incorporates monetary policy action induced by fear-of-floating. In principle, one could test for wether SOE monetary policy reduces exchange rate variation that could put at risk financial stability in the data by estimating α in Equation (1). Unfortunately, the counterfactual exchange rate expectation $\Delta^e s_{t+1}$ is not observed by the econometrician. However, assuming that the exchange rate is determined by an uncovered interest rate parity (UIP) condition we have that[3]

$$\Delta^e s_{t+1} \;=\; i_t^{p*} - \widetilde{i}_t^p \;=\; i_t^{p*} - \widetilde{\phi} \cdot x_{t+M}^e. \tag{3}$$

Plugging Equation (3) into Equation (1), we have

$$i_t^p = (\phi - \alpha\widetilde{\phi}) \cdot x_{t+M}^e + \alpha \cdot i_t^{p*}. \tag{4}$$

[3] Some evidence in the empirical literature on exchange rates suggests that "UIP does not hold". However, notice that what this "failure of UIP" refers to is that OLS estimation of a UIP equation produces a coefficient estimate on the interest rate differential different from unity (see Engel, 2014b, for a survey), rather than UIP not holding as a no-arbitrage relation. The counterintuitive finding of a coefficient estimate different from unity arises because structural shocks affect at the same time the interest rate differential and risk premia, and because risk premia are unobserved, hence included in the regression residual and ultimately giving rise to omitted variable bias.

Hence, we can test for whether SOE monetary policy is subject to fear-of-floating and attempts to reduce exchange rate variation that could put at risk financial stability due to foreign-currency exposures by testing $H_0 : \alpha > 0$.[4]

Before we move to estimation several important remarks are in order. First, the derivation of Equation (4) shows that the coefficient on the base-country policy rate in the corresponding regression reflects exclusively the motive of SOE monetary policy to reduce exchange rate variation; any spillovers from base-country shocks to SOE fundamentals through conventional macroeconomic and financial channels are captured by the forecasts of local fundamentals x^e_{t+M}; this is true even for the effects of common shocks that impact the base-country and the SOE simultaneously. Second, the derivation of Equation (4) also shows that it is not necessary to identify the primitive shock that is driving the base-country policy rate. Third, notice that Equation (4) is not the SOE central bank's true reaction function, which is Equation (1). Therefore, when SOE monetary policy responds to the exchange rate due to financial stability considerations the coefficient estimate of the forecast of local fundamentals x^e_{t+M} in Equation (4) cannot be interpreted as the response coefficient in the actual reaction function in Equation (1). Finally, notice that it may be optimal for SOE monetary policy to stabilise the exchange rate even in the absence of foreign-currency exposures and their financial stability implications (Faia and Monacelli, 2008; De Paoli, 2009; Engel, 2014a). In this case, Equation (4) in general reads as

$$i^p_t = (\phi - \alpha\widetilde{\phi}) \cdot x^e_{t+M} + \alpha(\xi, \boldsymbol{w}) \cdot i^{p*}_t, \tag{5}$$

where ξ denotes the SOE's foreign-currency exposure and $\boldsymbol{w}$ alternative motivations for SOE policymakers to stabilise the exchange rate. We can assess whether the fear-of-floating reflected in a positive coefficient α on the base-country policy rate in Equation (4) is indeed due to the attempt of SOE policymakers to avoid the financial channel of exchange rates to play out or due to alternative reasons by approximating $\alpha(\cdot)$, estimating

$$i^p_t = (\phi - \alpha\widetilde{\phi}) \cdot x^e_{t+M} + \alpha_1 \cdot i^{p*}_t + \alpha_2 \cdot (i^{p*}_t \times \xi) + \boldsymbol{\alpha}'_3 \cdot (i^{p*}_t \times \boldsymbol{w}), \tag{6}$$

instead of Equation (4) and testing $H_0 : \alpha_2 > 0$.

[4] Akinci and Queralto (2019) as well as Kalemli-Ozcan (2019) discuss the role of UIP deviations in the context of SOE monetary policy attempting to reduce exchange rate variation. Specifically, in this case Equation (3) features a risk premium on the right-hand side, which may depend positively on the base-country interest rate i^*_t (Bekaert et al., 2013; Miranda-Agrippino and Rey, 2015). As done by Kalemli-Ozcan (2019), in our regressions below we control for the VIX to account for such risk premia and UIP deviations.

2.2 Estimated monetary policy reaction functions

Against the background of Equation (4) we estimate the dynamic panel data regression

$$i^p_{it} \quad = \quad \chi_i + \rho i^p_{i,t-1} + (1-\rho)\left(\boldsymbol{\phi}'\boldsymbol{x}^e_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha \cdot i^p_{b_i,t}\right) + \nu_{it}, \tag{7}$$

where i^p_{it} is the SOE policy rate, $\boldsymbol{x}^e_{i,t+M}$ includes real-time forecasts of local macroeconomic fundamentals, $\boldsymbol{z}_t$ is a vector that includes global variables, and $i^p_{b_i,t}$ is the policy rate of SOE i's base-country b_i. We include the vector of global variables $\boldsymbol{z}_t$ in order to reduce the risk that the estimate for α is driven by common shocks, although the latter should already be captured by the real-time forecasts of local macroeconomic fundamentals. In order to test whether fear-of-floating is driven by foreign-currency exposures and the financial channel of exchange rates, as in Equation (6) we further estimate the regression

$$\begin{aligned} i^p_{it} \quad = \quad & \chi_i + \rho i^p_{i,t-1} + \theta \xi_{it} \\ & + (1-\rho)\left[\boldsymbol{\phi}'\boldsymbol{x}^e_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha_1 \cdot i^p_{b_i,t} + \alpha_2 \cdot (i^p_{b_i,t} \times \xi_{it}) + \boldsymbol{\alpha}'_3 \cdot (i^p_{b_i,t} \times \boldsymbol{w}_{it})\right] + \nu_{it}, \end{aligned} \tag{8}$$

where ξ_{it} represents a measure of the SOE's foreign-currency exposure, and $\boldsymbol{w}_{it}$ includes variables reflecting alternative motivations for SOE monetary policy to reduce exchange rate variation.

We omit time fixed effects in the baseline specification because these would be highly correlated with the base-country policy rate, in particular given that we only consider two base countries—the US and the euro area, see below—and that the correlation between their policy rates during our sample period was very high[5]; nevertheless, we consider such a specification as robustness check below. Moreover, notice that even if the coefficient estimate on the level of the base-country policy rate might be contaminated by common shocks, akin to a Bartik instrumental variable the coefficient estimate on the interactions with SOE variables continue to be determined by variation of SOE monetary policy's reluctance to let the exchange rate float freely across different degrees of foreign-currency exposures.

Notice also several remarks on the econometrics underlying the estimation of Equations (7) and (8). First, as we describe below, in this paper we consider a small-N/large-T panel data setting. This implies that in contrast to the traditional large-N/small-T panel data setting we expect the Nickell-bias in the dynamic fixed effects panel regression — typically addressed by using GMM estimators — to be very small (Judson and Owen, 1999). Second, Equations (7) and (8) can be interpreted as an error-correction model. Then, if at least some of the

[5] In Shambaugh (2004), Obstfeld et al. (2005), as well as Klein and Shambaugh (2015) the number of base countries is much larger and the sample period is much longer so that the correlation between base-country policy rates and the time dummies is much smaller.

variables are non-stationary, the corresponding equilibrium relationship is a co-integrating relationship; and if all variables are stationary, the equilibrium relationship is a long-run levels relationship. Importantly, if such an equilibrium relationship exists, then inference about the estimates of $\boldsymbol{\phi}_j$, $\boldsymbol{\kappa}_j$, and α_j is standard, regardless of whether the variables are non-stationary or stationary (Pesaran and Shin, 1999). Third, we could in principle test for the existence of such an equilibrium relationship at the country level, even without knowledge of the orders of integration of the variables involved (Pesaran et al., 2001). However, we have a very strong prior that such an equilibrium relationship exists, as local monetary policy is almost surely determined either by forecasts of local macroeconomic fundamentals, global variables, or by base-country policy rates. Moreover, while the corresponding tests have been worked out at the country level, they are not available for the panel context. One could then argue to resort to panel co-integration analysis, which is however known to be rather sensitive to the assumptions on cross-country heterogeneity under the null and alternative hypotheses, as well as to pre-testing for unit roots in panel data which has its own, non-trivial pitfalls. We thus proceed assuming that there exists an equilibrium relationship between local policy rate, forecasts of local macroeconomic fundamentals, global variables and base-country policy rates without carrying out formal tests at the country or panel level.

2.3 Data and definition of variables

2.3.1 Sample period and economies included

We consider a sample of monthly data for 21 advanced and emerging SOEs. We only consider observations of economies with floating regimes. Specifically, we consider the *de facto* exchange rate regime classification of Shambaugh (2004) and Obstfeld et al. (2010), and include in our sample only country-month observations that are classified as a "float", i.e. we drop observations classified as a "peg" or a "soft-peg"[6]; we consider the exchange rate regime classification of Ilzetzki et al. (2019) in a robustness check below. We additionally require that for an economy to enter the sample there are at least twelve country-month observations. Finally, we drop the UK, Singapore and Switzerland from the sample as their foreign-currency exposure data are likely to be at least in part mis-measured due to their role as international financial centers. Moreover, we drop Japan, as it is plausibly not a SOE; in fact, Japan may be more adequately regarded as another base-country. We also drop Hungary because it

[6] In particular, a country-year observation is coded as "peg" by Shambaugh (2004) in a particular year if its bilateral exchange rate vis-à-vis its base country stays within a ±2% band over the course of that year, or if its exchange rate changes only in one month. A country-year observation is coded as "soft-peg" by Obstfeld et al. (2010) if it is not classified as "peg" and if the bilateral exchange rate vis-à-vis the base country stays within a ±5% band in a given year, or if there is no month in which the exchange rate changes by more than ±2%.

features a very large gross foreign-currency position which might hide vulnerabilities that are not reflected in its essentially balanced net foreign currency position. And we drop Norway on the basis that an oil-exporting SOE with the largest sovereign wealth fund in the world might not fit into the same empirical framework as the other SOEs in our sample; our results are however robust to including these economies in our sample. The resulting sample of economies is provided in Table 1 and is constrained in particular by the availability of the data on real-time forecasts from Consensus Economics (see below).

We specify the euro area as the base-country for European economies and the US for non-European economies.[7] Accordingly, we do not include the US and the euro area in our sample. As a result, our country sample is dominated by EMEs. The time period we consider spans January 2002 to December 2012. However, we drop the time period from July 2007 to December 2009 in order to preclude that our estimates might be unduly driven by events related to the global financial crisis. We cannot consider the time period after 2012 because the data we use to measure economies' foreign-currency exposure is not available for later years (see Section 2.3.4 below).

2.3.2 Real-time forecasts and global variables

For the real-time forecasts of consumer-price inflation and real GDP growth in $\boldsymbol{x}^e_{i,t+M}$ in Equation (7) we would ideally use actual central bank projections. However, many central banks do not publish their projections. Moreover, among those central banks which do publish their projections, many produce them only a few times per year.[8] For these reasons, instead of considering actual central bank projections, we use data on real-time forecasts from Consensus Economics (CE). In particular, CE gathers forecasts of private banks and other financial institutions for more than 1,000 variables from over 85 AEs and EMEs in Europe, the Asia Pacific region and Latin America. Incoming survey responses are processed using proprietary software and checked for accuracy, completeness and integrity. CE forecasts are generally available for all 12 months in a year since 1990 for AEs, Latin American and Asian EMEs, but only since 2008 for Eastern European EMEs.[9] In Appendix C we document

[7]Specifying the US and the euro area as base-countries in this way is consistent with Shambaugh (2004), except for specifying the US rather than Australia being the base-country for New Zealand.

[8]This does not mean that central bank decision-makers are not updating their views on the outlook before monetary policy decision meetings that take place between the projection exercises; typically the projections are updated using a variety of macroeconometric tools as well as anecdotal evidence and judgement. For example, the ECB's macroeconomic projections for the euro area are published just four times a year, namely in March and September when they are produced by ECB staff alone, and in June and December when they are produced jointly by staff of euro area national central banks and the ECB. For the monetary policy decision meetings that take place between the projection exercises, the projections are updated using a variety of macroeconometric tools.

[9]Data for a subset of months in a given year are available since 1991 for Eastern European EMEs. However, the gaps in the time series preclude running panel regressions at the monthly frequency.

that CE real-time forecasts are highly correlated with publicly available, actual central bank projections.[10] We include twelve-months ahead real-time forecasts of real GDP growth and inflation in $\boldsymbol{x}^e_{i,t+M}$.[11] In the vector of global variables $\boldsymbol{z}_t$ we include the first difference of the logarithm of global commodity prices, and the level of the VIX.

2.3.3 Local and base-country policy rates

Our sample reaches into the period in which the Federal Reserve hit the zero lower bound. A widely-used statistic that reflects the Federal Reserve monetary policy stance during this time period is the shadow rate constructed by Wu and Xia (2016).[12,13] As regards other economies, in the sample period we consider Canada, Chile and Turkey experienced very short stints in which they were close to the zero lower bound in 2010 or 2011, but this was not so for extended periods of time. The remaining economies in our sample were far from the zero lower bound in the time period we consider. All data on interest rates are obtained through Haver. For conventional policy rates we in general consider central bank policy rates obtained from the IMF's International Financial Statistics, amended in a few cases by data from country-specific sources.

2.3.4 Foreign-currency exposure measurement and data

We draw on the data on foreign-currency exposures of Lane and Shambaugh (2010a) as well as the update provided by Benetrix et al. (2015). Unfortunately, at the time of writing the data of Lane and Shambaugh (2010a) as well as Benetrix et al. (2015) are available only until 2012. Hence, and as mentioned above, we estimate the sensitivity of local to base-country policy rates based on Equations (7) and (8) only for the time period between January 2002

[10]Notice that using CE forecasts also has the advantage that we can consider a large number of economies at the monthly frequency. Monthly data on real activity and inflation are typically available only for a smaller set of economies, and there are generally no real-time data available. Moreover, for real activity one would typically consider industrial production, which is not defined identically across economies, is more volatile than and also only reflects a limited share of overall real activity.

[11]One disadvantage of CE data is that they are fixed-event forecasts, that is for example a forecast in month t in year T of real GDP growth over year $T+1$. We adopt the approach of Dovern et al. (2012) to transform the CE fixed-event forecasts into fixed-horizon forecasts.

[12]Another frequently used alternative are longer term, such as two-year, rates. However, these are not available for many of the EMEs in our sample and/or for the sample period we consider. Moreover, even for the base countries we consider these have been close to or essentially at the zero lower bound, especially for the euro area for which German Bund yields are typically used.

[13]Notice that even when short-term interest rates hit the zero lower bound monetary policy—and in particular forward guidance—matters for exchange rate determination. This can easily be seen by iterating forward the UIP condition and noticing that one of the fundamental determinants of the spot exchange rate is the path of future expected short-term interest rates, the so-called "expectations component" of the yield curve. Incidentally, shadow rates are constructed exploiting information about the entire yield curve, hence including the latter expectations component and thus being particularly appealing in a sample period in which the zero lower bound was binding.

and December 2012. For the regressions we linearly interpolate the foreign-currency exposure data—which are available at the annual frequency—to monthly frequency.

The top panel in Figure 1 presents the averages of economies' foreign-currency denominated foreign assets and liabilities relative to GDP over the time period from 2002 to 2012, excluding foreign exchange reserves on the asset side. Lane and Shambaugh (2010a) define the *net* foreign-currency exposure as the difference between the foreign-currency denominated foreign assets and liabilities, both scaled by GDP. The net foreign-currency exposure is negative (positive) for an economy that is net short (long) in foreign currency on its external balance sheet. When an economy is net short in foreign currency, a depreciation of its currency implies an exchange rate valuation loss on its external balance sheet, as the local-currency value of its foreign-currency denominated foreign assets rises by a smaller amount than that of the foreign-currency denominated foreign liabilities. Notice that the net foreign-currency exposure also reflects the change in an economy's net foreign asset position relative to GDP that results from a uniform depreciation of its currency against all foreign currencies by 1% (see Appendix B in Georgiadis and Mehl, 2015, for a derivation). Hence, in terms of economic magnitude, Paraguay's net foreign-currency exposure of about -100% of GDP implies that its net foreign asset position relative to GDP would decline by one percentage point if its currency depreciated by 1%. Thus, for many of the economies in our sample the net foreign-currency exposures are economically non-trivial. Finally, notice that the SOEs in our sample cover a wide range of positive and negative net foreign-currency exposures.

The left-hand side panel in the top row in Figure 2 presents the evolution of the net foreign-currency exposure (again excluding foreign exchange reserves) for the economies we consider. The average AE was net long in foreign currency on its external balance sheet over the entire sample period we consider, even when excluding foreign exchange reserves. In contrast, the average EME was net short in foreign currency, in particular when excluding foreign exchange reserves. At the same time, the average EME improved its net foreign-currency exposure significantly since the end of the 1990s and until 2012. The right-hand side panel in the top row in Figure 2 presents information on the distribution of net foreign-currency exposures across economies within the group of AEs and EMEs in 2002 and 2012, respectively. The data suggest there has been some heterogeneity within country groups in the sense that some AEs exhibited negative net foreign-currency exposures both in 2002 and 2012, and that also some EMEs exhibited positive net foreign-currency exposures in 2002 and 2012. Hence, net short foreign-currency exposures are not exclusively an EME phenomenon. Finally, Figure 3 displays the changes in net foreign-currency exposures at the country level over the sample period. Most SOEs in the sample have experienced an improvement in the net foreign-currency exposures. In terms of magnitudes, the improvement has been rather diverse; Paraguay experienced the largest increase. Finally, the bottom panel in Figure 2 also documents that in many cases temporary deteriorations interrupted the improvements in the net foreign-currency exposures, i.e. net foreign currency exposures did not improve monotonously over the sample period.

3 Empirical results

In this section we discuss the results for the estimation of Equations (7) and (8). In order to account for alternative motivations for fear-of-floating, in $\boldsymbol{w}_{it}$ in Equation (8) we include estimates of the economy's exchange rate pass-through to consumer prices (Hausmann et al., 2001); moreover, we include the economy's stock of foreign exchange reserves, which indicates the ability of the government to support firms that are running short of foreign currency in case of funding stress.[14] While we include the stock of foreign exchange reserves primarily to reflect the SOE's ability to support ailing firms running short of foreign-currency funding, a large stock of reserves also indicates ample ammunition for exchange rate interventions.[15] For ease of interpretation of the coefficient estimates in the regression tables, we standardise the data on net foreign-currency exposure variables in $\boldsymbol{\xi}_{it}$.

3.1 Baseline results

Column (1) in Table 2 reports the result of the regression of Equation (7), i.e. without any interaction terms between the base-country policy rate and the SOE's foreign-currency exposure. The coefficient estimate on the base-country policy rate is positive and statistically significant. Columns (2) to (4) provide results from variations of the specification underlying the results in column (1) using alternative variables to reflect policymakers' counterfactual expectations of the exchange rate change in Equation (1). Specifically, instead of replacing the counterfactual exchange rate expectation by the base-country policy rate we consider the actual, lagged exchange rate against the base-country currency, the lagged three-month cumulated change of the exchange rate against the base-country currency, as well as a three-month cumulated exchange market pressure (EMP) indicator[16]; we consider lagged values in

[14]We describe estimation of exchange rate pass-through to consumer prices in Appendix C.2. An alternative would be to consider the share of imports invoiced in US dollar, in particular against the background of the importance of dominant-currency pricing (Gopinath et al.). However, data on import-invoicing currency are available only for a very limited subset of the economies we consider.

[15]The stock of foreign exchange reserves may be an incomplete measure as some central banks— for example in Brazil—have used FX swaps for interventions. However, this is a rather recent policy tool that may not have been relevant for the sample period we consider.

[16]The EMP indicator of Patnaik et al. (2017) is constructed as the sum of the actual change in the exchange rate and the amount of foreign exchange intervention scaled by an estimated conversion factor.

order to avoid possible simultaneity issues, i.e. that the recorded exchange rate has already responded to and hence incorporates monetary policy action induced by fear-of-floating. The results are very similar to those in column (1). Specifically, the coefficient estimates on the real-time forecasts are highly statistically significant and have the expected signs—in particular in columns (2) to (4) in which they can be interpreted as central bank reaction coefficients, see the discussion in Section 2.1.[17] The coefficient estimates on the VIX and commodity-price inflation are not statistically significant, which is what one would expect if the effects of common shocks and spillovers from base-country shocks to the SOE through conventional macroeconomic and financial channels would already be fully accounted for by the real-time forecasts of real GDP growth and CPI inflation. Taken together, the evidence in Table 2 suggests that SOE monetary policy responds to—broadly defined—depreciation pressures of the local against the base-country currency *over and above* what we would expect if macroeconomic stabilisation was the only policy objective. The evidence provided in Table 2 is thus consistent with fear-of-floating. We next test for the role of foreign-currency exposures in shaping this fear-of-floating motive.

Specifically, column (2) in Table 3 reports the results from the regression of Equation (8) in which we add interaction terms between the base-country policy rate and the SOE's foreign-currency foreign asset and liability exposures shown in the top panel in Figure 1; note that for the regressions we use positive numbers for the foreign-currency foreign liabilities, in contrast to Figure 1. The coefficient estimates for the SOE's foreign-currency foreign asset and liability exposures are negative and positive, respectively, and statistically significant. The positive sign of the coefficient estimate on the interaction with the liability foreign-currency exposure is consistent with the notion that variations in the exchange rate give rise to variations in whether borrowing constraints of SOE firms with foreign-currency foreign liabilities are binding, and hence elicit positive feedback effects that might jeopardise financial stability and that monetary policy may want to prevent by reducing exchange rate variation. In turn, the negative coefficient estimate on the interaction with the foreign-currency foreign asset exposure is consistent with the notion that there are offsetting valuation effects on firms' balance sheets that mitigate the extent to which variations in the exchange rate give rise to variations in whether borrowing constraints are binding. The results are thus consistent with the hypothesis that the fear-of-floating documented in column (1) is at least partly due to the financial stability implications of foreign-currency exposures.[18]

[17]Note that in contrast to the context of a structural model, the real-time forecasts refer to the growth rate of real GDP and CPI rather than output and inflation gaps. Therefore, it is not straightforward to compare the estimates to the corresponding parameter values typically considered in structural models. Moreover, we consider year-on-year rather than quarter-on-quarter changes in real GDP and consumer prices.

[18]Note that the coefficient estimate on the interaction between the base-country policy rate and the SOE's foreign exchange reserves is consistent with the finding in Cheng and Rajan (2019). Specifically, Cheng and Rajan (2019) find that the sensitivity of SOE to base-country policy rates is reduced when the SOE features

Our baseline results are consistent with those in a related literature that explores the determinants of spillovers from base-country to peripheral financial conditions. For example, Aizenman et al. (2017a) explore a range of factors that shape spillovers from center to peripheral financial conditions, including the exchange rate regime, financial openness, the stock of foreign exchange reserves, the current account balance, the stock of domestic debt, trade openness and composition, financial development, inflation volatility, as well as the stock and currency composition of external debt. Specifically, consistent with the rationale we put forth in this paper, Aizenman et al. (2017a) find that the impact of center economy policy rate changes on peripheral effective exchange rates is weaker in case of a larger share of external (sovereign) debt denominated in US dollar. Somewhat counterintuitively, however, Aizenman et al. (2017a) find that the impact of center economy policy rate changes on peripheral policy rates is also weaker in case of a larger share of external (financial institutions') debt denominated in US dollar.

An important concern regarding our main finding regarding the role of foreign-currency exposures for fear-of-floating is reverse causality. In particular, it could be that agents in the SOE acquire negative net foreign-currency exposures precisely because monetary policy minimises exchange rate variation, rather than SOE monetary policy reducing exchange rate variation in order to avoid reduce exchange rate valuation effects that could put at risk local financial stability. However, we think this is unlikely to be so. In particular, empirically, Lane and Shambaugh (2010b) find great heterogeneity in the drivers of foreign-currency exposures in the data. Of the few variables that stand out as having a fairly robust effect on economies' foreign-currency exposures is GDP per capita and the correlation between local-currency depreciation and output, as well as the volatility of the exchange rate. In particular, higher exchange rate volatility is associated with less pronounced foreign-currency exposures. This is consistent with theoretical literature that indicates that foreign-currency exposures can serve as a device for international risk sharing (Devereux and Saito, 2006; Engel and Matsumoto, 2009). On the one hand, an economy benefits from a foreign-currency long position when exchange rate depreciation correlates positively with output contractions. On the other hand, exchange rate volatility implies lower optimal foreign-currency asset holdings, as—conditional on the correlation between the exchange rate and domestic output—exchange rate volatility increases volatility in consumption, and hence the optimal foreign currency exposure falls with exchange rate volatility. Exploring a somewhat different set of potential determinants, Baek (2013) finds that exchange rate volatility as well as the exchange rate regime are inconsequential for foreign-currency exposures in SOEs. Instead, Baek (2013) finds that GDP per capita as well as the quality of policies and institutions are important determinants of foreign-currency exposures in SOEs.

larger foreign exchange reserves.

Given the coefficient estimates on the foreign-currency foreign asset and liability exposures, in order to increase efficiency in the following we consider their difference, i.e. economies' *net* foreign-currency exposures. Accordingly, column (3) reports the results from a regression in which we enter an interaction term between the base-country policy rate and the SOE's net foreign-currency exposure. The relevant coefficient estimate is negative and highly statistically significant consistent with the results in column (1). The results thus suggest that the sensitivity of the SOE to the base-country policy rate falls with the former's net foreign-currency exposure, that is the sensitivity increases with the SOE's net short position and falls with its net long position. Again, this finding is consistent with the hypothesis that the financial channel of exchange rates has been sufficiently strong in the data to affect local financial stability, and in particular that SOE monetary policy has attempted to reduce exchange rate variation by mimicking base-country monetary policy in order to address such financial stability risks (Basci et al., 2008; Gudmundsson, 2017; Vegh et al., 2018).

Columns (4) to (6) document results from regressions that explore more refined hypotheses regarding the role of foreign-currency exposures for shaping fear-of-floating of SOE monetary policy. First, column (4) reports results from a regression that distinguishes between negative and positive net foreign-currency exposures. The coefficient estimates on the interaction terms between the base-country policy rate and positive and negative net foreign-currency exposures are statistically significant. Interestingly, the coefficient estimate on the interaction with the negative net foreign-currency exposure is more than twice as large as that on the interaction with the positive net foreign-currency exposure. This result is consistent with the emphasis on negative foreign-currency exposures—i.e. net short positions—in the context of the financial channel of exchange rates and its financial stability implications. Specifically, variations in the exchange rate are more likely to induce positive feedback loops—i.e. loosen firms' borrowing constraints in case of positive shocks to the economy that are followed by local currency appreciation and tighten borrowing constraints in case of bad shocks such as base-country monetary policy tightening that are followed by local currency depreciation—when a SOE is net *short* in foreign currency.

Second, the overall net foreign-currency exposure arises as the sum of individual components. Specifically, in terms of instruments, in the definition of Lane and Shambaugh (2010a) the overall net foreign-currency exposure is the sum of debt and non-debt components.[19] The bottom panel in Figure 1 depicts the split of the overall net foreign-currency exposure into

[19]In the data of Lane and Shambaugh (2010a) as well as Benetrix et al. (2015) non-debt instruments are given by portfolio equity and FDI, and debt instruments by portfolio debt and other investment including bank loans. Lane and Shambaugh (2010a) as well as Benetrix et al. (2015) assume that portfolio equity and FDI is always denominated in the currency of the issuer. Hence, a non-debt net foreign-currency exposure stems exclusively from holdings of foreign-currency denominated foreign portfolio equity and FDI and can only assume positive values.

the components accounted for by debt and non-debt net exposures, and documents that the overall net foreign-currency exposure masks important heterogeneities across instruments. Interestingly, differences in the pay-off and maturity structures between these two instruments imply testable predictions that allow us to corroborate the evidence that foreign-currency exposures shape fear-of-floating. In particular, foreign-currency exposures plausibly imply greater vulnerabilities if they stem from more fickle portfolio debt instruments and bank loans with non-state-contingent payoffs than from more stable foreign direct investment and portfolio equity instruments with state-contingent payoffs and longer investment horizons. Indeed, Lane and Milesi-Ferretti (2012) as well as Milesi-Ferretti and Tille (2011) document that bank loans and other investment instruments exhibited the greatest volatility during the retrenchment in global capital flows in the global financial crisis; similarly, Forbes and Warnock (2012) document that debt instruments are particularly likely to exhibit abrupt swings in capital flows. Against this background, we expect that SOE monetary policy is more concerned about financial stability in the face of exchange rate variation when the economy's net foreign-currency exposure stems from debt rather than non-debt instruments. Consistent with these predictions, the results in columns (5) and (6) suggest that the sensitivity of SOE to base-country policy rates is indeed stronger the smaller—in particular negative—debt net foreign-currency exposures. This finding is particularly relevant for SOE monetary policy at the current juncture, after foreign-currency corporate debt issuance has been the major driver of the rise in EME foreign liabilities after the global financial crisis (Aldasoro and Ehlers, 2018; BIS, 2019).

In principle, one would want to test even more refined predictions, for example relating to the sector in a SOE exposed to the currency mismatch (i.e. financial versus non-financial and private versus public sector) and the maturity of the instrument (i.e. short term versus long term). Unfortunately, broad and consistent cross-country panel data on these aspects of SOEs' foreign-currency exposures are not available. Similarly, consistent cross-country data for the degree of domestic "dollarisation" is not available either. Finally, no broad and consistent cross-country information on whether the foreign-currency positions are hedged or not is available. However, note that in case these positions were hedged we would expect foreign-currency exposures to be inconsequential for fear-of-floating. In that sense, our regressions can be interpreted as tests whether the foreign-currency exposures are hedged. Moreover, as discussed in Lane and Shambaugh (2010b), for hedging to matter in the context of this paper it would have to involve a foreign counterparty; any within-country derivative sales are moot in terms of mitigating foreign-currency exposures as they simply shift these across parties within the country's overall balance sheet.

Third, it is natural to explore asymmetries not only in the sign of economies' net foreign-currency exposures, but also in the direction of change of the base-country policy rate and hence the SOE's counterfactual exchange rate expectation Δs^e in Equation (1). Specifically, immediate financial stability risks arise in particular in case of a depreciation of the local currency and in the presence of negative net foreign-currency exposures. In contrast, even if the optimal policy is symmetric in theory, for political economy reasons it may plausibly be more difficult for SOE monetary policy to limit local-currency appreciation to dampen a build-up of foreign-currency liabilities that could threaten financial stability only later when the tide turns and base-country monetary policy is loosened. Against this background, we expect the sensitivity of SOE to base-country monetary policy to be greater when the latter is tightened rather than when it is loosened, and when the SOE exhibits negative net foreign-currency exposures. To test these predictions, we run regressions analogous to that in Equation (8), but we additionally enter separate coefficients for the cases in which the base-country policy rate is raised and when it is lowered.

Accordingly, column (2) in Table 4 reports the results from a regression with separate coefficients for increases and declines in the base-country policy rate without any interactions with foreign-currency exposure variables. Consistent with the hypothesis that the trade-off between financial stability and macroeconomic stabilisation for SOE monetary policy is weaker when the local currency appreciates, we find that the sensitivity of SOE to base-country policy rates documented in the baseline results in Table 3 exclusively stems from cases in which base-country monetary policy is tightened; hence, our findings indicate evidence for a narrower "fear-of-depreciation" rather than a more general, symmetric fear-of-floating. This finding is consistent with that in Cheng and Rajan (2019) but opposite to that in Han and Wei (2018). In particular, Cheng and Rajan (2019) argue their finding of a larger sensitivity of SOE to base-country policy rates when base-country monetary policy is *tightened* is consistent with "fear-of-capital-reversal", and document that the sensitivity of SOE to base-country policy rates is smaller when foreign exchange reserves are larger; recall that our estimates for the coefficient on the interaction term between the base-country policy rate and the SOE's stock of foreign exchange reserves confirm this finding. In contrast, Han and Wei (2018) interpret their finding of a larger sensitivity of SOE to base-country policy rates when base-country monetary policy is *loosened* as "fear of appreciation". However, Han and Wei (2018) do not provide a rationale that would induce such "fear-of-appreciation", and hence it is difficult to explore in more depth the differences relative to our findings.

Column (3) reports results from a regression in which we combine the hypothesis relating to asymmetries in the sensitivity of SOE to base-country monetary policy across local-currency depreciations and appreciations with that relating to differences in foreign-currency exposures. Specifically, we consider separate interaction terms between the base-country policy rate and SOEs' net foreign-currency exposures for the cases in which the former is raised and in which it is lowered. Consistent with the previous findings, the results suggest that the sensitivity of the SOE to the base-country policy rate when the latter is raised is amplified the smaller the net foreign-currency position, i.e. the more net short/the less net long the SOE is on its external balance sheet. In contrast, any of the coefficient estimates relating to the instances in which base-country monetary policy is loosened is statistically significant.

Finally, in column (4) we report results from a regression in which we again introduce separate interaction terms between the base-country policy rate when it is raised/lowered as well as negative/positive net foreign currency exposures, respectively. As in columns (4) and (6) in Table 3, only the coefficient estimate involving the interaction with the negative net foreign-currency exposure is statistically significant. This result suggests that the sensitivity of SOE to base-country monetary policy is particularly strong when the latter is tightened and the SOE is net short in foreign currency on its external balance sheet.[20]

3.2 Robustness checks

We consider several robustness checks. First, we also include in $\boldsymbol{w}_{it}$ in Equation (8) variables that control for alternative policy measures that may be deployed in order to preserve local financial stability, namely restrictions on capital account openness as measured by the capital controls indicator of Fernandez et al. (2016), and macro-prudential policy measures as reflected by the indicator of Alam et al. (2019).[21] Specifically, SOE monetary policy may be more willing to let the exchange rate float freely when capital controls and macro-prudential policy are tightened in parallel, for example preventing foreign investors to repatriate their assets or let them do so only in sectors and instruments which have a smaller impact on local financial stability (see also Aizenman et al., 2017b). The results are reported in Tables 5 and

[20]Notice that the coefficient estimate being larger than unity can be rationalised by the presence of risk premia and UIP deviations (Kalemli-Ozcan, 2019). In particular, in this case the UIP condition in Equation (3) would read as

$$\Delta^e s_{t+1} \quad = \quad i_t^* - \widetilde{i}_t \quad + \lambda(i_t^*) = \quad i_t^* + \lambda(i_t^*) - \widetilde{\phi} \cdot x_{t+M}^e, \tag{9}$$

where the risk premium λ_t depends positively on the foreign policy rate. Then, Equation (4) reads as

$$i_t = (\phi - \alpha\widetilde{\phi}) \cdot x_{t+M}^e + \alpha \cdot i_t^* + \alpha\lambda(i_t^*). \tag{10}$$

To the extent that the risk premium λ_t is not entirely captured by the VIX in our regressions, it enters the regression error and biases upwards the coefficient estimate on the foreign interest rate, potentially above unity. The intuition is that because of risk premia in the UIP condition the SOE policy rate may need to be raised by more than the base-country policy rate in order to hold the exchange rate constant (see also Akinci and Queralto, 2019).

[21]The capital controls indicator Fernandez et al. (2016) is bounded between zero and one, with higher values indicating tighter capital controls. The indicator of macro-prudential policies of Alam et al. (2019) is defined as the cumulative sum of the net tightening measures; hence larger values indicate a looser macro-prudential policy stance.

6 and are very similar to those from the baseline. The sample is somewhat smaller due to data availability restrictions. The coefficient estimates of the interaction terms between the base-country policy rate and the capital controls as well as the macro-prudential measures are not statistically significant.

Second, Davis (2017) examines the role of what may be called "fear-of-capital-flow-retrenchment" for SOE monetary policy in a framework similar to the one we consider in this paper. Specifically, Davis (2017) tests the hypothesis that the sensitivity of SOE to base-country monetary policy is particularly large when it exhibits a current account deficit. The rationale is that when base-country monetary policy is tightened foreign investors may retrench seeking higher returns at home, eliciting harsh adjustments in a SOE's external borrowing; a result of such a retrenchment would also be a large depreciation of the local currency. Tables 7 and 8 report results from regressions in which we additionally include interaction terms between the base-country policy rate and the SOE's current account balance. While the estimates of the coefficients on the interactions with the base-country policy rate and the foreign-currency exposures are generally less precise, the overall pattern is similar to that in the baseline. The coefficient estimates on the interaction term between the current account balance and the base-country policy rate are generally also not precisely estimated, but are negative and hence consistent with the "fear-of-capital-flow-retrenchment" found by Davis (2017).[22] Unfortunately, the positive correlation between flows and stocks prevents sharp estimates; nevertheless, the overall pattern suggests that both seem to be relevant for SOE monetary policy autonomy.

Third, recall that in the baseline we consider all country-month observations featuring a "float" according to the classification of Shambaugh (2004) and Obstfeld et al. (2010). Tables 9 and 10 report the results from regressions in which we additionally require that economies feature a "float" for at least 50% of the sample period. The sample is reduced to only 13 economies, namely Australia, Brazil, Chile, Colombia, Hungary, Indonesia, Israel, South Korea, New Zealand, Poland, Paraguay, Turkey and South Africa. Nevertheless, the results are very similar to those from the baseline.

Fourth, Tables 11 and 12 report results from specifications in which we consider the lagged rather than the contemporaneous base-country policy rate. One rationale for exploring this robustness check is that local policymakers may take some time before they respond to base-country monetary policy changes. Again, the results are very similar to those from the

[22]Davis (2017) also considers the components of the change in SOEs' net external position in terms of instruments and currency denomination. The major differences to our analysis is, first, that we consider stocks rather than flows. Second, Davis (2017) does not distinguish between positive and negative current account balances as well as tightening and loosening of base-country monetary policy. Third, our focus is on the motive of SOE monetary to reduce exchange rate variation in order to avoid valuation effects on the external balance sheet, while that of Davis (2017) is on capital flow reversals.

baseline.

Fifth, recall that in the baseline specification of Equations (7) and (8) we do not consider time fixed effects. The reason for not doing so is that we only consider two base countries—the US and the euro area—whose policy rates have been strongly correlated in our sample period, so that the effect of the base-country on the SOE policy rate would to a large degree be absorbed by the time fixed effects, in particular in case of the results reported in column (1) in Table 3. Keeping this ind mind, Tables 13 and 14 report results from regressions with time fixed effects. As expected, the coefficient estimates on the level of the base-country policy rate are not statistically significant anymore and/or vary widely in terms of point estimate. Nevertheless, the coefficient estimates on the interaction terms between the base-country policy rate and the foreign-currency exposure variables—which remain country-specific and hence are not absorbed into the time fixed effects—are very similar to those from the baseline.

Sixth, notice that the foreign currency-exposures of Lane and Shambaugh (2010a) are expressed in terms of local currency, meaning that, for example, in case of a depreciation the local-currency value of foreign-currency foreign liabilities rises. This introduces mechanical variation in the foreign-currency exposure data that we use in the interactions in Equations (7) and (8). In principle, however, it is not obvious that this mechanical variation is *not* relevant for the trade-offs between financial stability and macroeconomic stabilisation faced by SOE monetary policy. Put differently, for the sustainability of a SOE's net foreign asset position it may be irrelevant whether the magnitude of the foreign-currency exposure arises through a quantity adjustment or a price adjustment.[23] Nevertheless, Tables 15 and 16 report results from regressions in which we use the HP-filtered trend component of the foreign-currency exposure for the interactions. The results are similar to those from the baseline.

Finally, Tables 17 and 18 report results from regressions in which we use the exchange rate regime classification of Ilzetzki et al. (2019) instead of that of Shambaugh (2004) and Obstfeld et al. (2010) in order to identify floating regimes. Specifically, we consider country-month observations which are classified as "freely floating" by Ilzetzki et al. (2019). The sample is somewhat smaller due to data availability restrictions. Nevertheless, the results are very similar to those from the baseline.

[23]Notice also that in the baseline we use foreign-currency exposure data interpolated linearly from annual to monthly frequency, which already limits higher-frequency variation in the data that arise mechanically due to exchange rate movements at the monthly frequency.

4 Conclusion

We estimate dynamic panel data regressions for a broad panel of 21 advanced and emerging SOEs with floating exchange rate regimes for the time period from 2002 to 2012 in order to assess whether local responds to base-country monetary policy over and above what we would expect to observe if macroeconomic stabilisation was the only policy objective. We find that the data are consistent with the hypothesis that SOE monetary policy in floating exchange rate regimes is generally subject to fear-of-floating, and that this is at least in part due to threats to financial stability implied by foreign-currency exposures. We find that the evidence for fear-of-floating due to financial stability considerations is particularly pronounced when the foreign-currency exposures arise through debt rather than non-debt instruments and when base-country monetary policy is tightened. In this context, mimicking base-country monetary policy tightening reduces exchange rate depreciation and thereby prevents negative valuation effects on the economy's external balance sheet from making local borrowers hit borrowing constraints. From a policy perspective our findings are particularly relevant at the current juncture, as many EME corporates have accumulated large foreign-currency—typically US dollar—debt liabilities and US monetary policy is expected to be tightened, at least in the medium term.

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A Tables

Table 1: Economies included in the sample

Advanced	AUS, CAN, NZL, SWE
EM Europe	POL, RUS
EM Asia	BGD, IDN, IND, KOR, MYS, THA
EM Latin America	BRA, CHL, COL, MEX, PRY
EM Middle East and Africa	EGY, ISR, TUR, ZAF

Table 2: Estimation results for (modified) monetary policy reaction functions

	(1)	(2)	(3)	(4)
Real-time real GDP growth forecast	3.16* (0.08)	3.92*** (0.01)	5.23** (0.02)	6.19** (0.04)
Real-time CPI inflation forecast	2.75*** (0.01)	2.49*** (0.01)	3.84** (0.03)	4.13** (0.05)
VIX	0.03 (0.60)	−0.03 (0.37)	−0.07 (0.28)	−0.07 (0.30)
Commodity price inflation	9.00 (0.31)	3.24 (0.66)	10.52 (0.46)	15.70 (0.42)
Base-country policy rate	0.45** (0.04)			
Lagged FX against base-country currency		0.10** (0.02)		
Lagged cumulated FX change against base-country currency			0.21 (0.14)	
Lagged cumulated EMP				0.21* (0.06)
R-squared (within)	0.12	0.14	0.13	0.13
Observations	1060	1050	1020	1008
Countries	21	21	21	20

p-values in parentheses

Driscoll-Kraay robust standard errors.

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

Table 3: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.45** (0.04)	0.43** (0.02)	0.33 (0.16)	0.40** (0.05)	0.47*** (0.01)	0.50*** (0.00)
× FX assets rel. to GDP		−0.41*** (0.01)				
× FX liabilities rel. to GDP		0.47*** (0.01)				
× NFX rel. to GDP			−0.45*** (0.01)			
× NFX rel. to GDP × I(NFX≥ 0)				−0.32*** (0.01)		
× NFX rel. to GDP × I(NFX< 0)				−0.63** (0.02)		
× Non-debt NFX rel. to GDP					−0.04 (0.78)	0.02 (0.89)
× Debt NFX rel. to GDP					−0.40** (0.02)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						−0.16*** (0.01)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.35** (0.02)
× FX reserves rel. to GDP		−0.79*** (0.00)	−0.88*** (0.00)	−0.89*** (0.00)	−0.62*** (0.01)	−0.59*** (0.01)
× ERPT		0.00 (1.00)	−0.31 (0.24)	−0.16 (0.50)	0.05 (0.82)	−0.00 (1.00)
R-squared (within)	0.12	0.16	0.15	0.15	0.16	0.17
Observations	1060	1060	1060	1060	1060	1060
Countries	21	21	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 4: Accounting for asymmetries in the sensitivity of SOE to base-country policy rates

	(1)	(2)	(3)	(4)
Base-country policy rate	0.45** (0.04)			
× $I(\Delta i^p_{b_i,t} \geq 0)$		0.46** (0.04)	0.33 (0.17)	−0.09 (0.76)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			−0.45*** (0.01)	
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.05 (0.75)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−1.51*** (0.00)
× $I(\Delta i^p_{b_i,t} < 0)$		−1.50 (0.37)	−0.97 (0.41)	−0.75 (0.28)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP			−0.40 (0.77)	
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.97 (0.74)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−0.93 (0.48)
× FX reserves rel. to GDP			−0.89*** (0.00)	−0.82*** (0.00)
× ERPT			−0.31 (0.25)	−0.24 (0.27)
R-squared (within)	0.12	0.13	0.15	0.16
Observations	1060	1060	1060	1060
Countries	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 5: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, controlling for macro-prudential and capital control measures

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.39* (0.07)	0.28 (0.14)	0.29 (0.20)	0.31 (0.12)	0.40** (0.03)	0.44** (0.02)
× FX assets rel. to GDP		−0.10 (0.62)				
× FX liabilities rel. to GDP		0.72*** (0.00)				
× NFX rel. to GDP			−0.43*** (0.01)			
× NFX rel. to GDP × I(NFX≥ 0)				−0.25** (0.03)		
× NFX rel. to GDP × I(NFX< 0)				−0.75*** (0.01)		
× Non-debt NFX rel. to GDP					0.15 (0.50)	0.18 (0.46)
× Debt NFX rel. to GDP					−0.46*** (0.01)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						−0.14** (0.02)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.42** (0.02)
× FX reserves rel. to GDP		−0.79*** (0.00)	−0.93*** (0.01)	−1.02*** (0.00)	−0.66*** (0.01)	−0.64*** (0.01)
× ERPT		−0.06 (0.85)	−0.41 (0.20)	−0.35 (0.22)	−0.05 (0.85)	−0.05 (0.83)
R-squared (within)	0.12	0.17	0.15	0.16	0.17	0.17
Observations	1036	1036	1036	1036	1036	1036
Countries	20	20	20	20	20	20

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 6: Accounting for asymmetries in the sensitivity of local to base-country monetary policy, controlling for macro-prudential and capital control measures

	(1)	(2)	(3)	(4)
Base-country policy rate	0.39* (0.07)			
× I($\Delta i^p_{b_i,t} \geq 0$)		0.39* (0.07)	0.29 (0.20)	−0.27 (0.32)
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP			−0.42*** (0.01)	
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP × I(NFX ≥ 0)				0.09 (0.63)
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP × I(NFX < 0)				−1.66*** (0.00)
× I($\Delta i^p_{b_i,t} < 0$)		−1.09 (0.56)	−0.69 (0.61)	−0.38 (0.62)
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP			−0.29 (0.83)	
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP × I(NFX ≥ 0)				−1.13 (0.67)
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP × I(NFX < 0)				−0.74 (0.42)
× FX reserves rel. to GDP			−0.95*** (0.01)	−0.93*** (0.00)
× ERPT			−0.41 (0.22)	−0.45* (0.09)
R-squared (within)	0.12	0.13	0.15	0.17
Observations	1036	1036	1036	1036
Countries	20	20	20	20

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 7: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, controlling for the current account balance

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.46^{**} (0.05)	0.35 (0.12)	0.25 (0.35)	0.31 (0.21)	0.40^{*} (0.07)	0.45^{**} (0.03)
× FX assets rel. to GDP		−0.21 (0.24)				
× FX liabilities rel. to GDP		0.27 (0.13)				
× NFX rel. to GDP			−0.20 (0.25)			
× NFX rel. to GDP × I(NFX≥ 0)				−0.14 (0.34)		
× NFX rel. to GDP × I(NFX< 0)				−0.40 (0.12)		
× Non-debt NFX rel. to GDP					0.00 (0.99)	0.05 (0.80)
× Debt NFX rel. to GDP					−0.24 (0.17)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						-0.13^{**} (0.02)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.25 (0.11)
× FX reserves rel. to GDP		-0.55^{**} (0.02)	-0.55^{**} (0.04)	-0.58^{**} (0.03)	-0.50^{**} (0.03)	-0.51^{**} (0.03)
× ERPT		0.14 (0.64)	−0.10 (0.70)	−0.01 (0.96)	0.12 (0.63)	0.06 (0.82)
R-squared (within)	0.13	0.16	0.16	0.16	0.17	0.17
Observations	1060	1060	1060	1060	1060	1060
Countries	21	21	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 8: Accounting for asymmetries in the sensitivity of local to base-country monetary policy, controlling for the current account balance

	(1)	(2)	(3)	(4)
Base-country policy rate	0.46^{**} (0.05)			
× $I(\Delta i^p_{b_i,t} \geq 0)$		0.47^{**} (0.05)	0.25 (0.37)	−0.07 (0.82)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			−0.20 (0.26)	
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				0.03 (0.86)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				-1.18^{***} (0.00)
× $I(\Delta i^p_{b_i,t} < 0)$		−1.52 (0.38)	−0.98 (0.42)	−0.72 (0.28)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP			0.01 (1.00)	
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.80 (0.80)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−0.51 (0.68)
× FX reserves rel. to GDP			-0.56^{**} (0.04)	-0.63^{***} (0.01)
× ERPT			−0.10 (0.70)	−0.13 (0.55)
R-squared (within)	0.13	0.13	0.16	0.17
Observations	1060	1060	1060	1060
Countries	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 9: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, only economies which had a "float" for at least half of the sample period

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.49** (0.02)	0.48*** (0.00)	0.40* (0.06)	0.47*** (0.01)	0.51*** (0.00)	0.55*** (0.00)
× FX assets rel. to GDP		−0.34** (0.02)				
× FX liabilities rel. to GDP		0.58*** (0.00)				
× NFX rel. to GDP			−0.49*** (0.01)			
× NFX rel. to GDP × I(NFX≥ 0)				−0.35** (0.02)		
× NFX rel. to GDP × I(NFX< 0)				−0.72** (0.02)		
× Non-debt NFX rel. to GDP					−0.07 (0.63)	0.00 (0.98)
× Debt NFX rel. to GDP					−0.43*** (0.01)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						−0.18** (0.02)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.36** (0.02)
× FX reserves rel. to GDP		−0.69*** (0.00)	−0.67*** (0.01)	−0.72*** (0.00)	−0.49*** (0.01)	−0.41** (0.02)
× ERPT		0.04 (0.86)	−0.33 (0.16)	−0.21 (0.35)	−0.01 (0.97)	−0.05 (0.83)
R-squared (within)	0.13	0.17	0.16	0.16	0.17	0.18
Observations	850	850	850	850	850	850
Countries	12	12	12	12	12	12

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 10: Accounting for asymmetries in the sensitivity of SOE to base-country policy rates, only economies which had a "float" for at least half of the sample period

	(1)	(2)	(3)	(4)
Base-country policy rate	0.49** (0.02)			
× $I(\Delta i^p_{b_i,t} \geq 0)$		0.50** (0.02)	0.40* (0.07)	−0.08 (0.79)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			−0.48*** (0.01)	
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.02 (0.91)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−1.56*** (0.00)
× $I(\Delta i^p_{b_i,t} < 0)$		−0.90 (0.60)	−0.41 (0.73)	−0.41 (0.69)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP			−0.32 (0.81)	
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.58 (0.88)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−1.02 (0.26)
× FX reserves rel. to GDP			−0.67*** (0.01)	−0.83*** (0.00)
× ERPT			−0.33 (0.17)	−0.26 (0.19)
R-squared (within)	0.13	0.13	0.16	0.17
Observations	850	850	850	850
Countries	12	12	12	12

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 11: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, lagged base-country policy rate

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.43^{*} (0.06)	0.40^{**} (0.04)	0.31 (0.18)	0.38^{*} (0.08)	0.46^{***} (0.01)	0.48^{***} (0.01)
× FX assets rel. to GDP		-0.42^{***} (0.01)				
× FX liabilities rel. to GDP		0.46^{***} (0.01)				
× NFX rel. to GDP			-0.45^{***} (0.01)			
× NFX rel. to GDP × I(NFX≥ 0)				-0.33^{***} (0.01)		
× NFX rel. to GDP × I(NFX< 0)				-0.61^{**} (0.02)		
× Non-debt NFX rel. to GDP					−0.05 (0.78)	0.02 (0.89)
× Debt NFX rel. to GDP					-0.40^{**} (0.02)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						-0.16^{***} (0.01)
× Debt NFX rel. to GDP × I(NFX< 0)						-0.35^{**} (0.02)
× FX reserves rel. to GDP		-0.82^{***} (0.00)	-0.91^{***} (0.00)	-0.92^{***} (0.00)	-0.65^{***} (0.01)	-0.62^{***} (0.01)
× ERPT		−0.05 (0.88)	−0.34 (0.20)	−0.20 (0.43)	0.03 (0.90)	−0.03 (0.90)
R-squared (within)	0.12	0.15	0.15	0.15	0.16	0.17
Observations	1060	1060	1060	1060	1060	1060
Countries	21	21	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 12: Accounting for asymmetries in the sensitivity of SOE to base-country policy rates, lagged base-country policy rate

	(1)	(2)	(3)	(4)
Base-country policy rate	0.43^{*} (0.06)			
× $I(\Delta i^p_{b_i,t} \geq 0)$		0.45^{**} (0.05)	0.32 (0.18)	−0.09 (0.77)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			-0.46^{***} (0.01)	
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.07 (0.69)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				-1.50^{***} (0.00)
× $I(\Delta i^p_{b_i,t} < 0)$		−1.23 (0.42)	−0.84 (0.42)	−0.70 (0.26)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP			−0.49 (0.67)	
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.84 (0.73)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				−0.99 (0.44)
× FX reserves rel. to GDP			-0.92^{***} (0.00)	-0.85^{***} (0.00)
× ERPT			−0.34 (0.21)	−0.26 (0.23)
R-squared (within)	0.12	0.12	0.15	0.16
Observations	1060	1060	1060	1060
Countries	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 13: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, with time fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	-3.35^{*} (0.06)	-1.36 (0.17)	-1.91^{*} (0.09)	-1.69^{*} (0.10)	-0.48 (0.66)	-0.20 (0.86)
× FX assets rel. to GDP		-0.38^{**} (0.05)				
× FX liabilities rel. to GDP		0.36^{*} (0.08)				
× NFX rel. to GDP			-0.37^{*} (0.06)			
× NFX rel. to GDP × I(NFX≥ 0)				-0.26^{*} (0.09)		
× NFX rel. to GDP × I(NFX< 0)				-0.46^{*} (0.10)		
× Non-debt NFX rel. to GDP					-0.06 (0.73)	0.01 (0.95)
× Debt NFX rel. to GDP					-0.35^{*} (0.09)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						-0.17^{**} (0.02)
× Debt NFX rel. to GDP × I(NFX< 0)						-0.29^{*} (0.10)
× FX reserves rel. to GDP		-0.71^{**} (0.03)	-0.78^{**} (0.03)	-0.79^{**} (0.03)	-0.59^{**} (0.04)	-0.57^{**} (0.04)
× ERPT		0.02 (0.96)	-0.21 (0.51)	-0.10 (0.74)	0.04 (0.88)	-0.06 (0.84)
R-squared (within)	0.22	0.24	0.23	0.23	0.24	0.25
Observations	1060	1060	1060	1060	1060	1060
Countries	21	21	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 14: Accounting for asymmetries in the sensitivity of SOE to base-country policy rates, with time fixed effects

	(1)	(2)	(3)	(4)
Base-country policy rate	-3.35^{*} (0.06)			
× $I(\Delta i^p_{b_i,t} \geq 0)$		-3.44^{*} (0.06)	-2.06^{*} (0.08)	-1.94^{**} (0.05)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			-0.36^{*} (0.07)	
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				-0.03 (0.88)
× $I(\Delta i^p_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				-1.33^{***} (0.01)
× $I(\Delta i^p_{b_i,t} < 0)$		1.72 (0.25)	2.83 (0.25)	3.04 (0.19)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP			0.25 (0.87)	
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				-0.28 (0.93)
× $I(\Delta i^p_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				-0.40 (0.81)
× FX reserves rel. to GDP			-0.78^{**} (0.04)	-0.75^{**} (0.02)
× ERPT			-0.21 (0.52)	-0.17 (0.53)
R-squared (within)	0.22	0.22	0.24	0.24
Observations	1060	1060	1060	1060
Countries	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 15: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, trend foreign-currency exposure

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.38* (0.09)	0.33 (0.15)	0.27 (0.24)	0.35 (0.11)	0.41** (0.03)	0.42** (0.03)
× FX assets rel. to GDP		−0.32** (0.03)				
× FX liabilities rel. to GDP		0.29* (0.07)				
× NFX rel. to GDP			−0.33*** (0.01)			
× NFX rel. to GDP × I(NFX≥ 0)				−0.26*** (0.01)		
× NFX rel. to GDP × I(NFX< 0)				−0.36* (0.09)		
× Non-debt NFX rel. to GDP					−0.03 (0.80)	−0.02 (0.89)
× Debt NFX rel. to GDP					−0.27** (0.05)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						−0.06*** (0.00)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.25* (0.06)
× FX reserves rel. to GDP		−0.72*** (0.00)	−0.78*** (0.00)	−0.76*** (0.00)	−0.55*** (0.00)	−0.54*** (0.00)
× ERPT		−0.06 (0.82)	−0.18 (0.37)	−0.08 (0.67)	0.07 (0.74)	0.06 (0.78)
R-squared (within)	0.13	0.17	0.17	0.17	0.17	0.17
Observations	1060	1060	1060	1060	1060	1060
Countries	21	21	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 16: Accounting for asymmetries in the sensitivity of SOE to base-country policy rates, trend foreign-currency exposure

	(1)	(2)	(3)	(4)
Base-country policy rate	0.38* (0.09)			
× I($\Delta i^p_{b_i,t} \geq 0$)		0.39* (0.09)	0.27 (0.26)	−0.01 (0.98)
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP			−0.33*** (0.01)	
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP × I(NFX ≥ 0)				−0.07 (0.64)
× I($\Delta i^p_{b_i,t} \geq 0$) × NFX exposure rel. to GDP × I(NFX < 0)				−0.95** (0.02)
× I($\Delta i^p_{b_i,t} < 0$)		−1.28 (0.37)	−0.56 (0.56)	−0.78 (0.35)
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP			0.05 (0.97)	
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP × I(NFX ≥ 0)				0.35 (0.91)
× I($\Delta i^p_{b_i,t} < 0$) × NFX exposure rel. to GDP × I(NFX < 0)				−0.60 (0.53)
× FX reserves rel. to GDP			−0.79*** (0.00)	−0.73*** (0.00)
× ERPT			−0.18 (0.37)	−0.17 (0.36)
R-squared (within)	0.13	0.13	0.17	0.17
Observations	1060	1060	1060	1060
Countries	21	21	21	21

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

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

Table 17: Foreign-currency exposures and the sensitivity of SOE to base-country policy rates, IRR exchange rate regime indicator

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.36^{**} (0.03)	0.52^{***} (0.00)	0.47^{***} (0.00)	0.49^{***} (0.00)	0.56^{***} (0.00)	0.59^{***} (0.00)
× FX assets rel. to GDP		−0.21 (0.15)				
× FX liabilities rel. to GDP		0.40^{**} (0.03)				
× NFX rel. to GDP			-0.24^{*} (0.07)			
× NFX rel. to GDP × I(NFX≥ 0)				-0.19^{*} (0.10)		
× NFX rel. to GDP × I(NFX< 0)				-0.32^{*} (0.09)		
× Non-debt NFX rel. to GDP					0.05 (0.70)	0.10 (0.49)
× Debt NFX rel. to GDP					-0.36^{**} (0.03)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						-0.17^{***} (0.01)
× Debt NFX rel. to GDP × I(NFX< 0)						-0.30^{**} (0.04)
× FX reserves rel. to GDP		-0.32^{***} (0.00)	-0.35^{***} (0.00)	-0.34^{***} (0.00)	-0.23^{***} (0.00)	-0.22^{***} (0.00)
× ERPT		0.10 (0.64)	−0.06 (0.74)	−0.02 (0.89)	0.07 (0.68)	−0.01 (0.95)
R-squared (within)	0.12	0.13	0.13	0.13	0.14	0.14
Observations	1364	1364	1364	1364	1364	1364
Countries	19	19	19	19	19	19

p-values in parentheses
Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

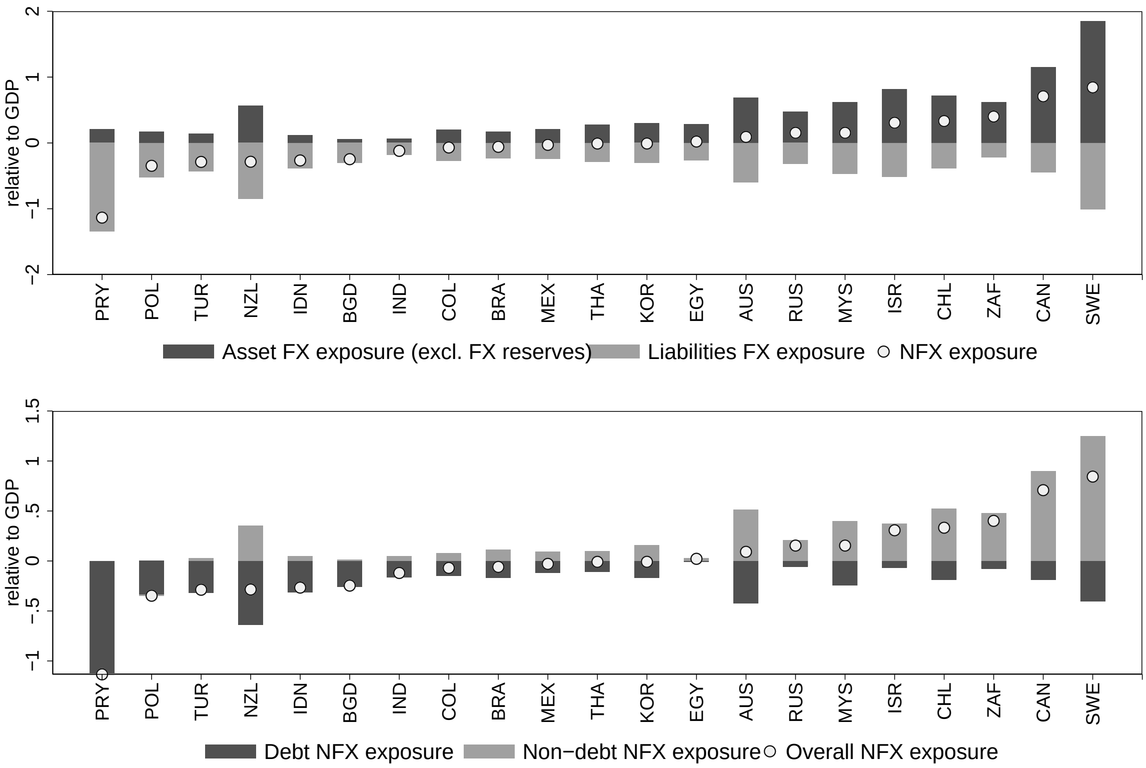
Table 18: Accounting for asymmetries the sensitivity of SOE to base-country policy rates, IRR exchange rate regime indicator

	(1)	(2)	(3)	(4)
Base-country policy rate	0.36^{**} (0.03)			
× $I(\Delta i^{p}_{b_i,t} \geq 0)$		0.37^{**} (0.03)	0.47^{***} (0.00)	0.19 (0.41)
× $I(\Delta i^{p}_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP			-0.24^{*} (0.09)	
× $I(\Delta i^{p}_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				0.06 (0.72)
× $I(\Delta i^{p}_{b_i,t} \geq 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				-0.96^{***} (0.01)
× $I(\Delta i^{p}_{b_i,t} < 0)$		−1.93 (0.33)	−1.22 (0.44)	−0.43 (0.70)
× $I(\Delta i^{p}_{b_i,t} < 0)$ × NFX exposure rel. to GDP			0.13 (0.92)	
× $I(\Delta i^{p}_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX ≥ 0)				−1.06 (0.37)
× $I(\Delta i^{p}_{b_i,t} < 0)$ × NFX exposure rel. to GDP × I(NFX < 0)				0.57 (0.72)
× FX reserves rel. to GDP			-0.35^{***} (0.00)	-0.27^{***} (0.00)
× ERPT			−0.06 (0.75)	−0.04 (0.79)
R-squared (within)	0.12	0.12	0.13	0.14
Observations	1364	1364	1364	1364
Countries	19	19	19	19

p-values in parentheses
Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

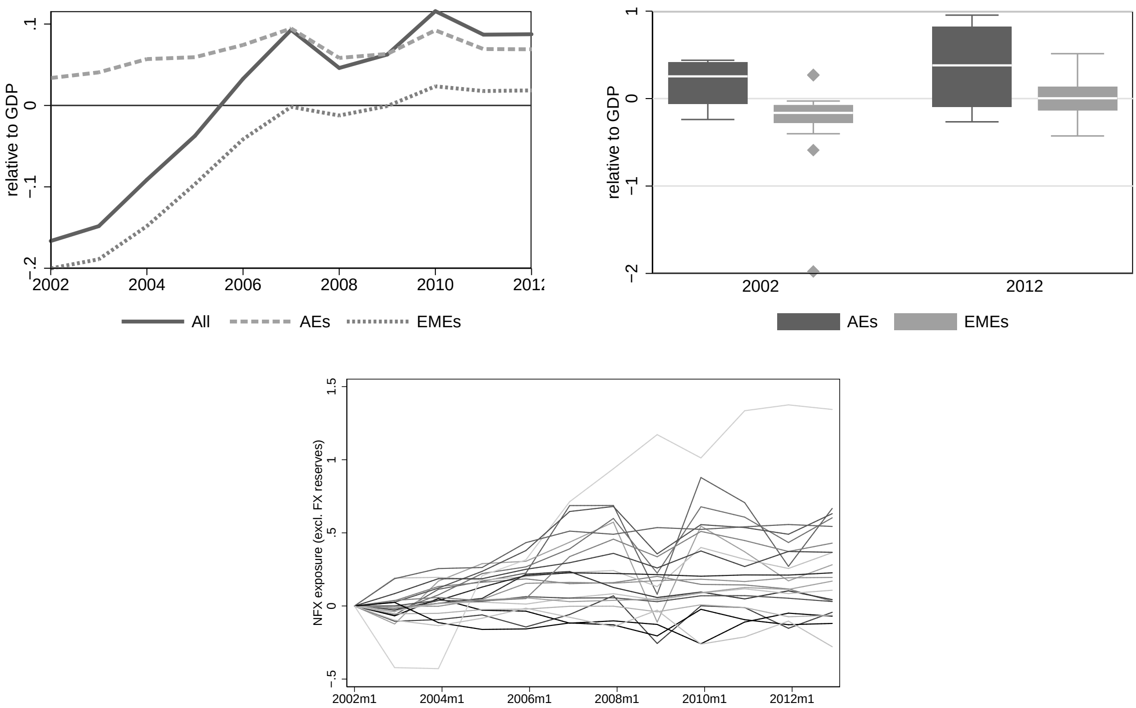
B Figures

Figure 1: Foreign-currency exposures during 2002 to 2012



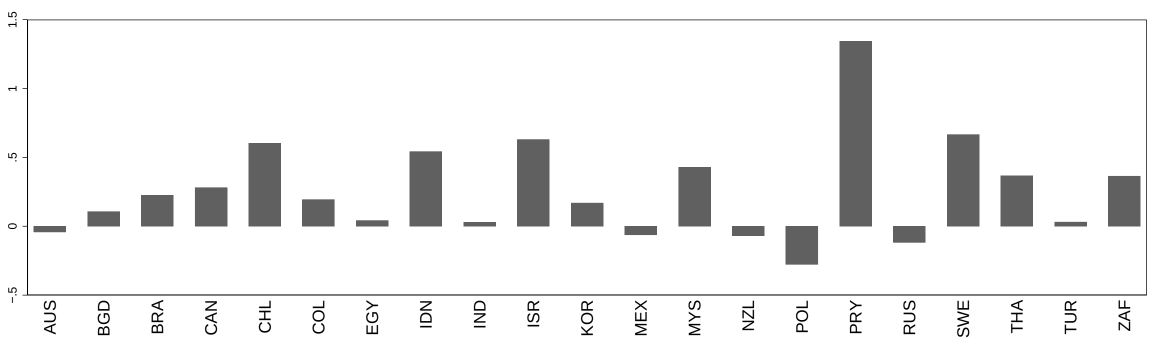
Note: The figure shows the net foreign-currency exposure relative to GDP averaged over the sample period from 2002 to 2012. The data are taken from Lane and Shambaugh (2010a) as well as Benetrix et al. (2015).

Figure 2: Evolution of net foreign-currency exposures



Note: The top left-hand side panel shows the evolution of net foreign-currency exposure relative to GDP averaged over the sample period from 2002 to 2012. The top right-hand side panel shows the corresponding box plots for 2002 and 2012, separately for AEs and EMEs for each year. The bottom panel shows the evolution in individual economies' net foreign currency exposure over the sample period relative to their values in 2002. The data are taken from Lane and Shambaugh (2010a) as well as Benetrix et al. (2015).

Figure 3: Changes in foreign-currency exposures at the country level over 2002 and 2012



Note: The figure shows the changes in net foreign-currency exposure relative to GDP during 2002 and 2012. The data are taken from Lane and Shambaugh (2010a) as well as Benetrix et al. (2015).

C Additional appendix

C.1 Relationship between CE forecasts and actual central bank projections

Because the expectations of future real activity and inflation in Equation (**??**) are critical in order to differentiate between correlated policy rate changes in the local economy and the base country that are either due to common shocks or the lack of monetary policy autonomy, it is important to ensure that the CE forecasts we use are reliable proxies for the unobserved actual central bank expectations. To do so, we compare the CE forecasts with actual central bank projections for those central banks and time periods for which the latter are available. For this exercise, we draw on the dataset of central bank projections set up by Rülke (2012). The data include projections from the Bank of Canada, Bank of England, Bank of Japan, Bank of Mexico, Bundesbank, Central Bank of Argentina, Central Bank of Brazil, Central Bank of Chile, US Federal Reserve, Norges Bank, Reserve Bank of Australia, Reserve Bank of New Zealand, Reserve Bank of South Africa, Sveriges Riksbank, and Swiss National Bank. In order to compare the CE forecasts with the actual central bank projections we run the regression

$$x_{i,t}^{e,cb,h} = a_i^h + b^h \cdot x_{i,t}^{e,ce,h} + e_i^h, \tag{C.1}$$

where $\boldsymbol{x}_{it}^{e,cb,h}$ represents the actual central bank projection and $\boldsymbol{x}_{it}^{e,ce,h}$ the CE forecast; we run the regression in Equation (C.1) for the current-period period-t ($h = 0$) and current-period period-$t+1$ one-year ahead forecast ($h = 1$) of GDP growth and inflation. Table 19 documents that CE forecasts are very closely related to the corresponding central bank projections for CPI inflation and GDP growth which are publicly available.

Table 19: Relationship between central bank projections and CE forecasts

	(1) $y_{it}^{e,cb}$	(2) $y_{i,t+1}^{e,cb}$	(3) $\pi_{it}^{e,cb}$	(4) $\pi_{i,t+1}^{e,cb}$
CE forecast	0.91***	0.96***	0.85***	0.67***
	(0.00)	(0.00)	(0.00)	(0.00)
Fixed effects	Yes	Yes	Yes	Yes
R-squared	0.94	0.83	0.94	0.91
Observations	485	363	516	483

p-values in parentheses

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

C.2 Estimation of exchange-rate pass through to consumer prices

Following Campa and Goldberg (2005), we estimate short-run exchange rate pass-through to consumer prices based on the regression

$$\Delta p_{it} = \chi_i + \sum_{j=1}^{p_i} \sigma_{ij} \Delta s_{it} + \sum_{j=1}^{q_i} \eta_{ij} \Delta p_t^{comm} + \nu_{it}, \tag{C.2}$$

where p_{it} is the logarithm of local CPI, s_{it} is the bilateral exchange rate vis-à-vis the base country, and p_t^{comm} is the logarithm of commodity prices. We then define $\widehat{ERPT}_i^{SR} \equiv \sum_{j=1}^{3} \widehat{\sigma}_{ij}$ as the short-run pass-through estimate. For the long-run exchange rate pass-through to consumer prices we follow Hausmann et al. (2001) and estimate

$$\Delta p_{it} = \chi_i + \rho_i (p_{it} - \gamma_i s_{it} - \eta_i p_t^{comm}) + \sum_{j=1}^{p_i} \boldsymbol{\phi}'_{ij} \Delta \boldsymbol{w}_{it} + \nu_{it} \tag{C.3}$$

where we define $\widehat{ERPT}_i^{LR} \equiv \widehat{\gamma}_i$ as the long-run pass-through estimate.