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Real Exchange Rates and the Global Financial Cycle

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Abstract

We study the effect of fluctuations in the global financial cycle on real exchange rates (RER). On average, a downturn in the global financial cycle leads to RER depreciation relative to the US dollar. However, there is considerable heterogeneity in the RER responses among advanced, emerging, and developing economies; between net creditor and net debtor countries; and over time. When decomposing RER changes into components reflecting the nominal exchange rates and inflation differentials, we again uncover substantial heterogeneity across countries and over time. RER adjustments in advanced economies occurred mostly through nominal exchange rates. However, RER adjustment in emerging and developing economies occurred through both nominal rates and prices early in our sample period, but mostly through nominal rates later in the sample period.

JEL Classification: F3; F4

Keywords: global financial cycle; real exchange rates

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1 Introduction

The global financial cycle, measured as a common component in world risky asset prices by Miranda-Agrippino and Rey (2020), has been shown to be a driver of fluctuations in the U.S. dollar real effective exchange rate, where a downturn in the global financial cycle leads to dollar appreciation.

In this paper we take a systematic look at the effect of the global financial cycle on real exchange rates across countries. We ask two main questions. First, to what extent does the global financial cycle affect real exchange rates in foreign economies? We look at how the effect varies across advanced, emerging market, and developing economies. We look at how it varies with country characteristics, such as net foreign asset positions and current account balances, and how these effects have varied over time. Second, does the effect of the global financial cycle on real exchange rates work through changes in nominal exchange rates or changes in aggregate price levels?

As we discuss later in this introduction, most of the existing literature on the effect of global factors like the global financial cycle on exchange rates focuses on the nominal exchange rate. Here we instead look at the real exchange rate. And in addition to asking how the global financial cycle affects real exchange rates, we also examine if fluctuations in the global financial cycle lead to asymmetric changes in the US and local country aggregate price levels that either amplify or dampen the response of the nominal exchange rate.

In a panel data regression framework, we first regress fluctuations in the real exchange rate on fluctuations in the global financial cycle, with real exchange rates measured relative to the United States, at the annual frequency during 1996-2018. We find that a downturn in the global financial cycle is associated with real depreciation on average in the advanced, emerging, and developing economies relative to the United States. However, we find substantial heterogeneity across countries and over time, with the largest real depreciation occurring in the emerging market countries. In addition, net debtor countries (i.e., those with a negative net foreign asset position) depreciate by more than net creditor countries. There is substantial heterogeneity even within the category of net foreign assets. While the net foreign asset position in safe assets (i.e., debt securities) affects the sensitivity of the exchange rate, with a larger debtor position implying greater real depreciation, the net foreign asset position in risky assets (i.e., equities) does not seem to affect real exchange rate movements.

Comparing the pre- and post-2007 sample periods, we find that the global financial cycle had a greater effect on real exchange rates in the advanced economies in the later sample period than in the early period. In contrast, in the emerging and developing economy samples, the effect is similar in the pre- and post-2007 periods. In fact, the effect of the global financial cycle on real exchange rates was quantitatively similar across the three country groups in the later sample period.

To examine how much of the variance of real exchange rate fluctuations was driven by the global financial cycle, we turn to the law of total variance. As in Crucini and Telmer (2020), this approach allows us to write the variance of a panel of exchange rate fluctuations as the sum of the time series variance of the cross-sectional mean and the average cross-sectional variance around that mean. In other words, with this method we can ask whether the explanatory power of the global financial cycle comes from the ability to explain fluctuations in the cross-country average, or from the ability to explain cross-sectional variation around that average.

Following this approach, we find that accounting for the global financial cycle factor improves our model's ability to explain the time series variation of the common trend in real exchange rate fluctuations. Importantly, adding the global financial cycle factor also increases the model's ability to explain the cross-sectional variation in real exchange rate fluctuations for advanced economies in the post-2007 period. The fact that the global financial cycle had different effects on real exchange rates in net debtor and net creditor countries improves the model's ability to explain the cross-sectional variation in real exchange rate fluctuations.

We then ask whether the effect of the global financial cycle on real exchange rates materializes mostly through adjustments in the nominal exchange rates or in the inflation differentials between the U.S. and foreign economies. We separate changes in real exchange rates into two components, nominal exchange rate changes and the difference between U.S. and foreign inflation rates, and run our analysis separately for each of the two components.

Once again, important differences emerge across both time periods and country groups. In the advanced economy sample the adjustment in the real exchange rate due to a change in the global financial cycle occurs entirely through nominal exchange rate adjustment, and fluctuations in the global financial cycle have little effect on U.S.-local inflation differentials. This is consistent with the findings in Kollmann (2005) and Itskhoki and Mukhin (2025), where financial shocks—like shifts in the global financial cycle factor we use in this paper—result in the real exchange rates adjusting mostly through nominal rates. In contrast, in the sample of emerging and developing economies in the pre-2007 period, a downturn in the global financial cycle led to both a nominal exchange rate depreciation and an increase in the U.S.-local inflation differential, with both components contributing to real exchange rate depreciation. However, in the post-2007 sample, we find that adjustment in real exchange rates in emerging and developing economies occurred mostly through nominal exchange rates.

We next present a brief review of the recent literature looking at the effect of global shocks on the exchange rate. The data and panel data specification are presented in section 2. Here we also discuss the law of total variance and describe the goodness of fit of a panel data regression as the combination of the time-series variance of a central trend and the cross-sectional variation around that trend. Section 3 discusses the results. Finally section

4 concludes.

1.1 Literature

Our paper contributes to three strands of the literature. The first strand of literature examines the effect of macroeconomic shocks on exchange rates. The seminal work of Meese and Rogoff (1983) and Engel and West (2005) showed that advanced economy exchange rates were disconnected from macroeconomic fundamentals. Habib and Stracca (2012), Lilley, Maggiori, Neiman, and Schreger (2022), and Engel and Wu (2024) find that, in early sample periods, measures of global risk had little explanatory power for fluctuations in the U.S. nominal effective exchange rate against advanced countries, but this changed in later sample periods. Lilley et al. (2022) discuss an "exchange rate reconnect", whereby global risk has a significant effect on the value of the dollar in post-2007 data.

Verdelhan (2018) identifies a global dollar factor as the primary driver of co-movement in bilateral exchange rate fluctuations. Lustig, Roussanov, and Verdelhan (2014) describe a dollar carry trade that is based on the fact that the U.S. dollar appreciates in times of heightened global risk. Similarly, Jiang, Krishnamurthy, and Lustig (2021) and Engel and Wu (2023) show that increases in the convenience yield on dollar assets leads to dollar appreciation. Georgiadis, Müller, and Schumann (2021) estimate a Bayesian proxy SVAR model, and find that a positive shock to global risk leads to an appreciation of the U.S. dollar. Davis and Zlate (2023) estimate a global financial cycle using weekly data and document the effect of fluctuations in the global financial cycle on nominal exchange rates during the onset of the Covid-19 pandemic in March 2020.

In the emerging markets, Kalemli-Özcan and Varela (2023) provide evidence of a countercyclical UIP risk premium in emerging market exchange rate fluctuations, and Di Giovanni, Kalemli-Özcan, Ulu, and Baskaya (2022) show the impact of this countercyclical risk premium on emerging market bank lending. Akinci (2013) shows that 20 percent of macroeconomic fluctuations in emerging market economies can be explained by fluctuations in global financial risk.

The U.S. dollar appreciation in a crisis is linked to the idea of a dollar convenience yield and safe haven flows to the U.S. Jiang et al. (2021) and Engel and Wu (2023) show that changes in the liquidity yield (convenience yield) are correlated with the exchange rate. They measure the convenience yield as a deviation from covered interest parity for Treasury bonds, and they show that an increase in the convenience yield on U.S. dollar assets leads to U.S. dollar appreciation.

The second strand of literature to which we contribute examines the drivers of cross-sectional variation in exchange rates across economies. Lustig, Roussanov, and Verdelhan (2011) show that the factor driving much of the cross-sectional variation in exchange rates is highly correlated with global equity market volatility. Habib and Stracca (2012) find that factors like a country's net foreign asset position affect the currency's relative return following an increase in the VIX, with countries with a negative net foreign asset position depreciating relative to those with a positive net foreign asset position. Similarly, Della Corte, Riddiough, and Sarno (2016) find that when the VIX rises, the currencies of net debtor countries depreciate and those of net creditor countries appreciate. Accordingly they find that currencies of debtor nations yield a positive excess return to compensate investors for the risk of depreciation in crisis times.

Catão and Milesi-Ferretti (2014) examine the causes of currency crises in emerging market economies and find that a negative net foreign asset position in safe assets (i.e. debt) is a significant crisis predictor, whereas the position in risky assets (i.e. equity) is not. Aizenman, Binici, and Hutchison (2016) and Ahmed, Coulibaly, and Zlate (2017) both study the performance of emerging market exchange rates during the Taper Tantrum of 2013 and show that country-specific economic fundamentals like current account imbalances and levels of external debt affected relative exchange rate performance during that episode. Fratzscher (2009) finds the same when studying relative exchange rate performance during the 2008 crisis. Cenedese (2015) sorts currencies according to their net external asset position and shows that the correlation between currency returns and global equity markets is higher for the net debtor countries than the net creditor countries. Furthermore, when the sample is divided into "normal" and "crisis" regimes for world equity markets returns, the correlation between currency returns and equity returns in these net debtor countries is substantially larger in crisis regimes.

Finally, our paper contributes to the literature that studies both nominal and real exchange rate adjustments. When presenting our results, we focus on three dependent variables: the change in real exchange rates, the change in nominal exchange rates, and the U.S.-local inflation differential, to analyze whether fluctuations in the global financial cycle affect real exchange rates through their effect on nominal exchange rates or inflation differentials. Eichenbaum, Johannsen, and Rebelo (2021) show that for inflation targeting countries, real exchange rate adjustment occurs through nominal exchange rate adjustment, whereas for non-inflation targeting countries or countries with a fixed exchange rate regime, more of the adjustment occurs through price levels. While they document the real exchange rate adjustments as reversion to a stationary state, we document adjustments in response to fluctuations in the global financial cycle.

We find that in the 1996-2006 period, real exchange rate adjustment in the emerging market and developing economies occurred through adjustments in both nominal exchange rates and aggregate prices, whereas in the post-2007 sample all adjustments in the real exchange rates occurred through adjustments in the nominal exchange rate. Our finding is consistent with shifts in the monetary policy and exchange rate frameworks toward inflation targeting and exchange rate flexibility for many emerging market and developing economies over the past two decades (see e.g., Mehrotra and Schanz, 2020). In contrast, during the pre-2007 period, during downturns, local monetary policy easing was likely constrained by attempts to resist nominal exchange rate depreciation, hence the more moderate nominal exchange rate depreciation and larger declines in foreign inflation.

Kollmann (1995) and Backus and Smith (1993) find a disconnect between real exchange rates and macroeconomic fundamentals, which Itskhoki and Mukhin (2021) attribute to exogenous financial shocks in the UIP condition. Mussa (1986) shows that after the end of Bretton Woods, there was an increase in both nominal and real exchange rate variability. While traditionally taken as sign of price stickiness, Kollmann (2005) and Itskhoki and Mukhin (2025) show this increase in real and nominal rate variability instead reflects the financial shocks mentioned earlier having become more important in the post-Bretton Woods era. Our finding that most of the adjustment in the real exchange rate occurs through changes in the nominal exchange rate echos the findings of financial shocks affecting both real and nominal exchange rates, but having little effect on the domestic economy.

2 Data and Methodology

2.1 Methodology

We run the following panel data regression for 130 advanced, emerging, and developing countries using annual data over the period 1996-2018:

$$\Delta y_{i,t} = \alpha_i + \boldsymbol{\nu \Delta X_{i,t-1}} + \boldsymbol{\theta Z_{i,t-1}} + \beta \Delta f_t + \boldsymbol{\gamma Z_{i,t-1}} \Delta f_t + \epsilon_{i,t} \tag{1}$$

where we consider three dependent variables, $\Delta y_{i,t}$. The first is the year-over-year log change in the real exchange rate, $\Delta rer_{i,t}$, against the U.S. dollar (LCU/USD, so a negative value indicates appreciation in the local currency). To further explore the sources of real exchange rate fluctuations, we present results from regression specifications where the two component parts of the log change in the real exchange rate are considered separately. These are the log change in the nominal exchange rate, $\Delta ner_{i,t}$, and the difference between US inflation and inflation in country i, $\pi_{US,t} - \pi_{i,t}$.

The variables in the vector $\boldsymbol{\Delta X_{i,t-1}}$ include the one-year lags of the log change in the real exchange rate, of inflation in country i, of U.S. inflation, of the real GDP growth rate in country i, and of U.S. real GDP growth. $\boldsymbol{Z_{i,t-1}}$ is a column vector of variables related to the external asset position of country i: the ratio of net foreign assets in safe assets to GDP, nfa^{safe}, the ratio of net foreign assets in risky assets to GDP, nfa^{risky}, and the ratio of the current account to GDP, CA. Safe assets include portfolio debt, banking assets and official reserve assets, while risky assets include FDI and portfolio equity. Finally, Δf_t is the Miranda-Agrippino and Rey (2020) global financial cycle factor, annualized by taking the simple average over the monthly observations in a calendar year and then normalizing so the annual series has a mean of 0 and a standard deviation of 1 over our sample period. The change in the global financial cycle factor, Δf_t, enters the regression as both a stand-alone variable and interacted with the variables in the external asset position vector, $\boldsymbol{Z_{i,t-1}}$. The regression also includes country fixed effects α_i.

In this regression model, the elasticity of the dependent variable with respect to changes in the GFC factor is given by $\beta + \boldsymbol{\gamma Z_{i,t-1}}$, and thus net external asset variables affect each country's real exchange rate response to exogenous fluctuations in the global financial cycle.

When presenting the regression results we will move in steps, with each step adding new variables to the existing regression specification. First, we regress the dependent variable on the country fixed effects and the terms that do not include the global financial cycle factor: $\alpha_i + \boldsymbol{\nu \Delta X_{i,t-1}} + \boldsymbol{\theta Z_{i,t-1}}$. This forces the coefficients in β and $\boldsymbol{\gamma}$ to be zero. Second, we add the GFC factor as a stand-alone variable, $\beta \Delta f_t$. This still forces the coefficients in $\boldsymbol{\gamma}$ to be zero. Third, we add the interaction between the net external asset and current account variables and the GFC factor, $\boldsymbol{\gamma Z_{i,t-1}} \Delta f_t$, but we sum the nfa^{safe} and nfa^{risky} variables into one variable in the regression, nfa. Fourth, we allow the GFC to interact separately with nfa^{safe} and nfa^{risky} and enter the regression specification as separate variables.

2.2 Data

We assemble annual data over the period 1996-2018 on exchange rates against the U.S. dollar and macroeconomic fundamentals for 130 countries: 31 advanced, 58 emerging, and 41 developing. The full list of countries and their division into advanced, emerging, and developing country groups, is found in Table 1.

To convert the nominal exchange rates into real exchange rates, we use data on the level of the Consumer Price Index (CPI) from the World Bank's World Development Indicators. The nominal exchange rate is written as LCU/USD, so the the real exchange rate is simply the nominal exchange rate multiplied by the U.S. CPI divided by the foreign country CPI.[1]

We also include data on real GDP growth, the current account, and the net external asset position. These data, as well as the nominal exchange rate data, are from the Lane and Milesi-Ferretti (2007) External Wealth of Nations database (December 2021 update).

Later in the paper we will consider the role of the exchange rate regime or capital account

[1] We use data from the Ilzetzki, Reinhart, and Rogoff (2020) exchange rate classification system to exclude any county-year observation where the currency is freely falling, or where there is a dual market and parallel data are missing.

Table 1: Countries in the Estimation Sample

Advanced	**Emerging**		**Developing**
Australia	Albania	Paraguay	Bangladesh
Austria	Algeria	Peru	Benin
Belgium	Angola	Philippines	Bhutan
Canada	Argentina	Poland	Burkina Faso
Czech Republic	Armenia	Qatar	Cambodia
Denmark	Azerbaijan	Romania	Cameroon
Estonia	Belarus	Russia	Central African Republic
Finland	Bolivia	Saudi Arabia	Chad
France	Botswana	South Africa	Republic of the Congo
Germany	Brazil	Sri Lanka	Côte d'Ivoire
Greece	Bulgaria	Suriname	Eritrea
Hong Kong SAR	Cabo Verde	Thailand	Ethiopia
Iceland	Chile	Trinidad and Tobago	The Gambia
Ireland	China	Tunisia	Ghana
Israel	Colombia	Turkey	Guinea-Bissau
Italy	Croatia	Turkmenistan	Haiti
Japan	Dominican Republic	Uruguay	Honduras
Korea	Ecuador		Kenya
Latvia	Egypt		Kyrgyz Republic
Lithuania	El Salvador		Lao P.D.R.
Netherlands	Equatorial Guinea		Lesotho
New Zealand	Eswatini		Madagascar
Norway	Fiji		Malawi
Portugal	Gabon		Mali
Singapore	Georgia		Mauritania
Slovak Republic	Guatemala		Moldova
Slovenia	Guyana		Myanmar
Spain	Hungary		Nepal
Sweden	India		Niger
Switzerland	Indonesia		Nigeria
United Kingdom	Iran		Papua New Guinea
	Jamaica		Rwanda
	Jordan		São Tomé and Príncipe
	Kazakhstan		Senegal
	Kuwait		Solomon Islands
	Malaysia		Sudan
	Maldives		Tanzania
	Mexico		Togo
	Mongolia		Uganda
	North Macedonia		Vietnam
	Pakistan		Zambia

openness. To divide the set of country-year observations into those with a fixed and those with a floating exchange rate we use the Shambaugh exchange rate classification system (see e.g., Shambaugh, 2004; Klein and Shambaugh, 2015).[2] To measure capital account openness we use the Chinn and Ito (2008) index, normalized to a 0-1 scale, with 0 indicating a completely closed capital account, and 1 indicating a completely open one.

Table 2 presents descriptive statistics for the dependent and independent variables in the model. Since the data are a panel, we report both the time series and cross-sectional dispersion of the data. For the first 6 columns in the table (mean, median, 25th percentile, 75th percentile, minimum, and maximum), we first compute averages for each variable for each country over the 1996-2018 period, and then we report the cross-country mean and distribution of those averages. For the 7th column (standard deviation), we first compute the standard deviation of the series for each country over the 1996-2018 period, and then report the cross-country means of those standard deviations.

There are a few interesting takeaways from these statistics. First, over the full 1996-2018 period, on average real exchange rates have been fairly stable, with a slight depreciation in the real exchange rate against the U.S. dollar in the advanced countries, no change on average in the emerging markets, and appreciation in the developing countries.

Second, regarding the decomposition of real exchange rate changes, in the advanced economies, the statistics for the real exchange rate are quantitatively similar to those for the nominal exchange rate, while the average inflation differential is relatively small. This is not true for the emerging and developing economies, where on average over the sample period, the nominal exchange rate has depreciated by an average of around 5% per year, but at the same time the US-local inflation differential has averaged about -5% per year.

Third, in the advanced economies, the average standard deviation of the nominal exchange rate is equal to the average standard deviation of the real exchange rate, while the variability of the inflation differential is relatively small. However, in the emerging and developing economies, the standard deviation of the nominal exchange rate is significantly greater than the standard deviation of the real exchange rate, indicating that there is a negative co-movement between fluctuations in the nominal exchange rate and the inflation differential (i.e. the nominal exchange rate depreciates at the same time as domestic inflation is relatively high).

[2] The Shambaugh classification system allows one to observe not only whether a country-year observation has a pegged currency, but the base currency to which it is pegged. Later when dividing observations into pegged and floating regimes, we will only classify an observation as pegged if there is a pegged currency and the base country is the United States. A country like Bulgaria pegs to the euro, so it has a pegged exchange rate. But it pegs to a currency that floats relative to the US dollar, so it floats relative to the US dollar.

Table 2: Descriptive Statistics for Model Variables

	Mean	Median	25th	75th	Min	Max	Standard Deviation
	Advanced Countries						
$\Delta rer_{i,t}$	0.003	0.006	0.001	0.009	-0.027	0.027	0.082
$\Delta ner_{i,t}$	0.004	0.006	-0.001	0.007	-0.014	0.023	0.082
$\pi_{US,t} - \pi^{i,t}$	-0.001	0.002	-0.005	0.006	-0.024	0.020	0.017
$\pi^{i,t}$	0.023	0.020	0.017	0.027	0.002	0.045	0.018
$g_{i,t}$	0.026	0.024	0.016	0.036	0.001	0.059	0.035
$nfa_{i,t}^{safe}$	0.020	-0.192	-0.396	0.180	-2.208	2.356	0.280
$nfa_{i,t}^{risky}$	-0.092	-0.057	-0.207	0.202	-3.105	0.724	0.242
$CA_{i,t}$	0.007	0.002	-0.044	0.036	-0.068	0.200	0.037
	Emerging Countries						
	Mean	**Median**	**25th**	**75th**	**Min**	**Max**	**Standard Deviation**
$\Delta rer_{i,t}$	-0.001	0.002	-0.010	0.008	-0.061	0.077	0.092
$\Delta ner_{i,t}$	0.054	0.036	0.011	0.071	-0.010	0.345	0.120
$\pi_{US,t} - \pi^{i,t}$	-0.054	-0.034	-0.063	-0.013	-0.401	0.003	0.067
$\pi^{i,t}$	0.081	0.058	0.035	0.088	0.019	0.567	0.084
$g_{i,t}$	0.028	0.044	0.030	0.055	-0.400	0.151	0.165
$nfa_{i,t}^{safe}$	0.013	-0.080	-0.242	0.080	-0.867	2.554	0.226
$nfa_{i,t}^{risky}$	-0.293	-0.291	-0.447	-0.164	-1.054	1.369	0.196
$CA_{i,t}$	-0.013	-0.024	-0.049	0.010	-0.248	0.298	0.071
	Developing/Low Income Countries						
	Mean	**Median**	**25th**	**75th**	**Min**	**Max**	**Standard Deviation**
$\Delta rer_{i,t}$	-0.007	-0.003	-0.011	0.004	-0.115	0.038	0.091
$\Delta ner_{i,t}$	0.046	0.039	0.005	0.060	-0.004	0.168	0.099
$\pi_{US,t} - \pi^{i,t}$	-0.054	-0.040	-0.077	-0.011	-0.189	0.006	0.057
$\pi^{i,t}$	0.075	0.061	0.033	0.098	0.015	0.211	0.058
$g_{i,t}$	0.041	0.047	0.027	0.062	-0.254	0.205	0.131
$nfa_{i,t}^{safe}$	-0.340	-0.298	-0.362	-0.164	-1.598	0.350	0.326
$nfa_{i,t}^{risky}$	-0.283	-0.240	-0.401	-0.120	-0.778	0.005	0.146
$CA_{i,t}$	-0.057	-0.057	-0.073	-0.026	-0.330	0.060	0.062

Notes: For the first 6 columns in the table (mean, median, 25th percentile, 75th percentile, minimum, and maximum) a average value of the variable is calculated for each country over the 1996-2018 period and then we report the cross-country mean and distribution of those averages. For the 7th column (standard deviation), the standard deviation of the series is calculated in each country over the 1996-2018 period and the table reports the cross-country mean of those standard deviations.

2.3 Cross-Sectional and Time-Series Goodness of Fit

The R^2 of the regressions in equations 1 tell us how well the GFC factor and additional variables can explain the variance of annual real exchange rate fluctuations in our panel. While the R^2 statistics show the share of the total variance that can be explained by the model, we are also interested in the extent to which the model can explain the time-series variance of the cross-sectional mean exchange rate (i.e. the average exchange rate fluctuation in a given set of countries), or the cross-sectional variance around that mean.

Following Crucini and Telmer (2020), we use the law of total variance, where the unconditional variance of the panel, $y_{i,t}$, can be expressed as the sum of the average cross-sectional variance of $y_{i,t}$, and the cross-time variance of the cross-sectional average value of $y_{i,t}$:

$$var\left(y_{i,t}\right) = \overbrace{var\left(E\left(y_{i,t}|t\right)\right)}^{Time-series} + \overbrace{E\left(var\left(y_{i,t}|t\right)\right)}^{Cross-section} \tag{2}$$

.

The cross-sectional mean of $y_{i,t}$ is the series $E\left(y_{i,t}|t\right)$, and the cross-sectional variation of $y_{i,t}$ around this mean is the series $var\left(y_{i,t}|t\right)$. Thus the variance of the panel is equal to the time series variance of that cross-sectional mean, $var\left(E\left(y_{i,t}|t\right)\right)$, plus the average cross-sectional variance around this mean, $E\left(var\left(y_{i,t}|t\right)\right)$. The cross-sectional goodness-of-fit reflects how well the model can explain the cross-sectional variance of the country specific real exchange rate fluctuations around their cross-sectional mean. The time-series goodness-of-fit reflects how well the model can explain the time-series variance of the cross-sectional mean of real exchange rate fluctuations.

Using this law of total variance, we can then express the goodness of fit, R^2, in the panel data regression as the weighted average of the cross sectional goodness of fit and the time series goodness of fit:

$$R^2 = \frac{var\left(\hat{y}_{i,t}\right)}{var\left(y_{i,t}\right)} = \omega_y R^2_{CS} + \left(1 - \omega_y\right) R^2_{TS} \tag{3}$$

where $\hat{y}_{i,t}$ is the fitted value from the estimated regression, $\omega_y = \frac{E(var(y_{i,t}|t))}{E(var(y_{i,t}|t)) + var(E(y_{i,t}|t))}$, $R^2_{CS} = \frac{E(var(\hat{y}_{i,t}|t))}{E(var(y_{i,t}|t))}$, and $R^2_{TS} = \frac{var(E(\hat{y}_{i,t}|t))}{var(E(y_{i,t}|t))}$.

3 Results

When presenting the results for the effect of the global financial cycle on the real exchange rate, we will start by presenting the results from the regression specifications where the log change in the real exchange rate is the dependent variable. We then separate the log change in the real exchange rate into its two component parts, the log change in the nominal exchange rate and the U.S.-local country inflation differential, and report the results from considering each component separately as the dependent variable.

3.1 Determinants of Real Exchange Rates

The results from the regression of the real exchange rate are presented in Tables 3 and 4. Each table presents the results from the four regression specifications for each of our three country groups, i.e., advanced, emerging, and developing countries. To highlight important differences between the pre- and post-2007 results highlighted by Lilley et al. (2022), Table 3 presents the results for the 1996-2006 period, while Table 4 presents the results for the 2007-2018 period.

3.1.1 Pre-2007 Results

Beginning with the results from the pre-2007 period in Tables 3, the specification in column 1 simply regresses the real exchange rate on our macroeconomic controls and country fixed effects. Moving from column 1 to column 2 in each country group, we add the global financial cycle factor. In all three country groups, the coefficient is negative and statistically significant, indicating that a downturn in the global financial cycle is associated with local currency depreciation. A one standard deviation fall in the global financial cycle factor is associated with 2.6% local currency depreciation in the advanced economies sample, 6% in the emerging markets, and 4.5% in the developing economies.

The three R^2 measures show how important the global financial cycle factor is to explaining both cross time and cross country variation in the real exchange rate. In all three country groups, adding the global financial cycle factor in column 2 does not lead to an increase in the cross-sectional goodness of fit, R^2_{CS}. Interestingly, it leads to a sizable increase in the time series goodness of fit, R^2_{TS}, in the emerging and developing countries, and to a smaller change in the advanced countries. This finding implies that the inclusion of the global financial cycle factor leads to a sharp improvement in the model's ability to explain the variance of the average emerging or developing economy real exchange rate, but it contributes less to explaining the variance of advanced economy exchange rate fluctuations.

Moving to columns 3 and 4, where the regression specification includes the global financial cycle factor interacted with country-specific net external asset and current account variables, we see that only in the emerging economies is the coefficient on the interaction term significant. The coefficient on the interaction between the net foreign asset position and the global financial cycle factor is positive and significant, indicating that net debtor countries (those with a negative net foreign asset position) see greater real exchange rate depreciation during a downturn in the global financial cycle. Furthermore, column 4 shows that this positive and significant coefficient on the interaction with the net foreign asset position is due to the effect of the net foreign asset position in safe assets (debt), not risky assets (equity).

3.1.2 Post-2007 Results

The post-2007 regression results are presented in Table 4. Again, column 1 in each country group establishes a baseline by regressing on macroeconomic controls and country fixed effects only.

In column 2, when the global financial cycle factor is added to the regression specification, the coefficient across all country groups is again negative and significant, indicating that a downturn in the global financial cycle leads to local currency real exchange rate depreciation. Compared to the pre-2007 sample, the quantitative effect of the global financial cycle is larger in the advanced countries and a little smaller in the emerging and developing countries.

One important difference between the pre- and post-2007 results is the effect of adding the global financial cycle factor on the model's goodness-of-fit in the advanced countries. Recall that in the pre-2007 sample, moving from the first to the second regression specification had little effect on the model's goodness-of-fit, as the overall R^2 barely changed and the time-series R^2 only increased by about 3 percentage points. In the post-2007 sample, moving from the first to the second regression specification in the advanced economies more than doubles the overall R^2 and raises the time-series goodness-of-fit R^2_{TS} by over 20 percentage points.

Our result echoes the findings in Lilley et al. (2022) in their study of nominal exchange rate fluctuations in the G10 countries. Measures of global risk like the Miranda-Agrippino and Rey (2020) global financial cycle factor had less explanatory power in the pre-2007 sample, but more in the post-2007 sample. (the results in this table are for real exchange rates, we will show similar results later when studying the drivers of nominal exchange rates). Similarly, Jiang et al. (2021) and Engel and Wu (2023) show that changes in convenience yields had a greater effect on the dollar nominal exchange rate post-2007 than pre-2007.

Another difference between the sample periods is that adding the global financial cycle factor in the second regression specification has about as much effect on the time-series goodness-of-fit, R^2_{TS} in the advanced economies as in the emerging markets. In other words, in the post-2007 sample, the global financial cycle factor is as important for explaining the fluctuations in the average of advanced country real exchange rates as explaining fluctuations in the average of emerging market real exchange rates. However, adding the global financial cycle factor has the smallest effect on the model's goodness-of-fit in the developing countries.

Moving to the third and fourth specifications, where interactions of the global financial cycle with country-specific net foreign asset variables are added to the regression, in the advanced economies and the emerging markets a positive net foreign asset position in safe assets lessens the effect of the global financial cycle factor on the real exchange rate. Adding these country-specific variables raises the model's goodness-of-fit, particularly the cross-sectional goodness-of-fit, R^2_{CS} in the advanced economies, but has little effect on any of the goodness-of-fit measures in the emerging or developing countries.

Table 3: Regression of annual changes in the real exchange rate on the GFC factor over the 1996-2006 period

	Advanced $\Delta rer_{i,t}$				Emerging $\Delta rer_{i,t}$				Developing $\Delta rer_{i,t}$			
	(1a)	(2a)	(3a)	(4a)	(1e)	(2e)	(3e)	(4e)	(1d)	(2d)	(3d)	(4d)
$\Delta rer_{i,t-1}$	0.241***	0.140***	0.138***	0.145***	0.136**	0.058	0.056	0.056	0.143**	0.053	0.054	0.055
	(0.026)	(0.039)	(0.044)	(0.042)	(0.067)	(0.068)	(0.068)	(0.068)	(0.057)	(0.052)	(0.053)	(0.052)
$\pi_{i,t-1}$	-0.076	-0.155	-0.153	-0.135	-0.102**	-0.109**	-0.111**	-0.111**	-0.219***	-0.221***	-0.221***	-0.220***
	(0.120)	(0.117)	(0.117)	(0.121)	(0.048)	(0.044)	(0.045)	(0.045)	(0.083)	(0.083)	(0.084)	(0.084)
$\pi_{USA,t-1}$	4.323***	4.943***	4.952***	4.918***	0.933	1.149	1.177	1.166	0.524	0.893	0.885	0.888
	(0.597)	(0.676)	(0.692)	(0.688)	(0.784)	(0.803)	(0.803)	(0.807)	(0.748)	(0.764)	(0.761)	(0.763)
$g_{i,t-1}$	0.010	-0.045	-0.045	-0.028	-0.105	-0.067	-0.066	-0.064	0.057	0.074*	0.075*	0.076*
	(0.257)	(0.231)	(0.231)	(0.244)	(0.096)	(0.094)	(0.093)	(0.094)	(0.042)	(0.044)	(0.043)	(0.045)
$g_{USA,t-1}$	3.866***	4.031***	4.033***	4.010***	1.461***	1.451**	1.446**	1.381**	2.263***	2.361***	2.363***	2.416***
	(0.421)	(0.424)	(0.426)	(0.435)	(0.543)	(0.567)	(0.569)	(0.587)	(0.421)	(0.441)	(0.440)	(0.427)
$nfa^{safe}_{i,t-1}$	0.001	0.004	0.001	0.002	-0.054***	-0.040**	-0.044**	-0.052**	-0.018	-0.012	-0.012	-0.006
	(0.028)	(0.027)	(0.031)	(0.032)	(0.021)	(0.019)	(0.019)	(0.022)	(0.031)	(0.029)	(0.030)	(0.030)
$nfa^{risky}_{i,t-1}$	0.012	0.016	0.014	0.015	0.090**	0.059*	0.063**	0.073**	0.183***	0.157***	0.156***	0.133**
	(0.023)	(0.022)	(0.025)	(0.027)	(0.035)	(0.031)	(0.031)	(0.033)	(0.059)	(0.055)	(0.056)	(0.059)
$CA_{i,t-1}$	0.037	0.033	0.029	-0.024	-0.081*	-0.054	-0.067	-0.068	-0.055	-0.041	-0.042	-0.052
	(0.063)	(0.061)	(0.071)	(0.126)	(0.045)	(0.041)	(0.044)	(0.055)	(0.073)	(0.067)	(0.067)	(0.092)
Δf_t		-0.026***	-0.026***	-0.026***		-0.060***	-0.056***	-0.062***		-0.045***	-0.043**	-0.040**
		(0.010)	(0.010)	(0.010)		(0.012)	(0.012)	(0.013)		(0.012)	(0.017)	(0.019)
$nfa_{i,t-1} \times \Delta f_t$			0.003				0.011*				0.002	
			(0.013)				(0.006)				(0.016)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				-0.007				0.032*				-0.009
				(0.015)				(0.017)				(0.014)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				-0.010				-0.022				0.038
				(0.019)				(0.024)				(0.081)
$CA_{i,t-1} \times \Delta f_t$				0.142				0.009				0.063
				(0.188)				(0.076)				(0.193)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	338	338	338	614	614	614	614	428	428	428	428
R^2	0.441	0.448	0.449	0.450	0.164	0.211	0.214	0.217	0.337	0.367	0.367	0.369
R^2_{CS}	0.212	0.181	0.181	0.184	0.149	0.126	0.129	0.132	0.319	0.283	0.283	0.286
R^2_{TS}	0.583	0.615	0.615	0.615	0.222	0.660	0.662	0.663	0.365	0.595	0.595	0.594
ω_{CS}	0.388	0.388	0.388	0.388	0.850	0.850	0.850	0.850	0.752	0.752	0.752	0.752
$var(\Delta rer_{i,t})$	0.008	0.008	0.008	0.008	0.013	0.013	0.013	0.013	0.011	0.011	0.011	0.011

Notes: $\Delta rer_{i,t}$ is the year-over-year change in the real exchange rate (LCU/USD) in country i from year t-1 to year t. $pi_{i,t}$ is the year-over-year change in annual CPI inflation in country i from year t-1 to year t. $g_{i,t}$ is the year-over-year change in the annual real GDP growth rate. Δf_t is the year-over-year change in the Miranda-Agrippino and Rey Global Financial Cycle factor. $nfa^{risky}_{i,t}$ is the net foreign asset position in risky assets (FDI and portfolio equity) in country i in year t. $nfa^{safe}_{i,t}$ is the net foreign asset position in safe assets (debt, including central bank reserves). $nfa_{i,t}$=$nfa^{risky}_{i,t}$+$nfa^{safe}_{i,t}$.

Table 4: Regression of annual changes in the real exchange rate on the GFC factor over the 2007-2018 period

	Advanced $\Delta rer_{i,t}$				Emerging $\Delta rer_{i,t}$				Developing $\Delta rer_{i,t}$			
	(1a)	(2a)	(3a)	(4a)	(1e)	(2e)	(3e)	(4e)	(1d)	(2d)	(3d)	(4d)
$\Delta rer_{i,t-1}$	0.158***	0.164***	0.178***	0.160***	0.190***	0.188***	0.190***	0.191***	0.059	0.069	0.067	0.071
	(0.052)	(0.050)	(0.044)	(0.042)	(0.049)	(0.047)	(0.048)	(0.049)	(0.067)	(0.073)	(0.072)	(0.072)
$\pi_{i,t-1}$	-1.233***	-1.399***	-1.333***	-1.143***	-0.259**	-0.300**	-0.300**	-0.289**	-0.209	-0.226	-0.230	-0.235
	(0.344)	(0.289)	(0.260)	(0.311)	(0.123)	(0.127)	(0.127)	(0.126)	(0.148)	(0.146)	(0.153)	(0.152)
$\pi_{USA,t-1}$	1.685***	0.303	0.339	0.086	1.170***	-0.222	-0.220	-0.235	-0.612	-1.259***	-1.295***	-1.303***
	(0.497)	(0.369)	(0.327)	(0.359)	(0.418)	(0.377)	(0.379)	(0.384)	(0.418)	(0.412)	(0.414)	(0.413)
$g_{i,t-1}$	-0.303***	-0.424***	-0.454***	-0.452***	-0.112	-0.096	-0.096	-0.096	-0.196	-0.194	-0.193	-0.196
	(0.083)	(0.098)	(0.104)	(0.104)	(0.071)	(0.072)	(0.073)	(0.073)	(0.159)	(0.162)	(0.161)	(0.162)
$g_{USA,t-1}$	-0.881***	-0.779**	-0.735**	-0.720**	0.018	-0.022	-0.026	-0.031	-0.588**	-0.623**	-0.626**	-0.631**
	(0.299)	(0.307)	(0.309)	(0.310)	(0.207)	(0.210)	(0.211)	(0.213)	(0.270)	(0.282)	(0.285)	(0.279)
$nfa^{safe}_{i,t-1}$	-0.007**	-0.008***	-0.009***	-0.009***	-0.089**	-0.093**	-0.092**	-0.086*	0.013	0.010	0.008	0.007
	(0.003)	(0.002)	(0.002)	(0.003)	(0.045)	(0.045)	(0.045)	(0.046)	(0.024)	(0.024)	(0.022)	(0.023)
$nfa^{risky}_{i,t-1}$	0.001	0.000	-0.001	0.001	0.063*	0.062*	0.062*	0.056	-0.013	-0.009	-0.011	-0.014
	(0.020)	(0.020)	(0.019)	(0.018)	(0.038)	(0.037)	(0.037)	(0.038)	(0.038)	(0.037)	(0.037)	(0.037)
$CA_{i,t-1}$	0.012	0.006	0.083	0.051	-0.074	-0.065	-0.060	-0.054	-0.002	0.008	-0.003	0.023
	(0.137)	(0.134)	(0.110)	(0.091)	(0.067)	(0.071)	(0.073)	(0.070)	(0.092)	(0.089)	(0.094)	(0.102)
Δf_t		-0.043***	-0.041***	-0.041***		-0.035***	-0.034***	-0.043***		-0.017***	-0.024***	-0.027***
		(0.006)	(0.005)	(0.006)		(0.005)	(0.005)	(0.007)		(0.005)	(0.006)	(0.007)
$nfa_{i,t-1} \times \Delta f_t$			0.014***				0.003				-0.013	
			(0.003)				(0.004)				(0.009)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				0.023***				0.017**				-0.014
				(0.005)				(0.008)				(0.014)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				0.018				-0.018*				-0.031
				(0.013)				(0.010)				(0.019)
$CA_{i,t-1} \times \Delta f_t$				-0.127*				-0.002				0.040
				(0.069)				(0.026)				(0.042)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	372	372	372	372	692	692	692	692	486	486	486	486
R^2	0.123	0.271	0.301	0.311	0.145	0.222	0.222	0.226	0.107	0.125	0.129	0.132
R^2_{CS}	0.216	0.283	0.348	0.369	0.192	0.192	0.192	0.198	0.109	0.111	0.115	0.119
R^2_{TS}	0.058	0.263	0.268	0.270	0.046	0.286	0.286	0.286	0.098	0.157	0.157	0.158
ω_{CS}	0.413	0.413	0.413	0.413	0.677	0.677	0.677	0.677	0.720	0.720	0.720	0.720
$var(\Delta rer_{i,t})$	0.006	0.006	0.006	0.006	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008

Notes: See notes to Table 3.

3.2 Determinants of Nominal Exchange Rates and Inflation Differentials

The log change in the real exchange rate can be divided into the log nominal exchange rate and the U.S.-local country inflation differential, $\Delta rer_{i,t} = \Delta ner_{i,t} + \pi_{US,t} - \pi_{i,t}$, where $\Delta ner_{i,t}$ is the log change in the nominal exchange rate and $\pi_{US,t} - \pi_{i,t}$ is the difference between US inflation and inflation in country i. In turn, each of these components can be used separately as dependent variables in our regression specifications.

Table 5 presents the results from the regression of the change in the nominal exchange rate or the inflation differential in the pre-2007 period. The table presents the results from the same four regression specifications as in Tables 3 and 4, but for brevity we are only reporting the regression coefficients that involve the global financial cycle factor, f_t. The full tables with all regression coefficients are presented in the appendix.

The benefit of the truncated reporting is that the results from the regressions of $\Delta ner_{i,t}$ and $\pi_{US,t} - \pi_{i,t}$ can be included in the same table. The results from regressions where $\Delta ner_{i,t}$ is the dependent variable are presented in the top half of the table and the results when from regressions where $\pi_{US,t} - \pi_{i,t}$ is the dependent variable are presented in the bottom half.

First, in the advanced economies, the effect of the global financial cycle on fluctuations in the nominal exchange rate in the top half of Table 5 are nearly identical to those in the regression of the real exchange rate in Table 3. Adjustments in the real exchange rate occur mostly through changes in the nominal exchange rate, while the inflation differential reacts very little to changes in the global financial cycle.

Second, recall that in the emerging market and developing countries prior to 2007, a downturn in the global financial cycle led to significant real exchange rate depreciation. In Table 5 we see that the real depreciation occurs through both nominal exchange rate depreciation and an increase in the inflation differential (prices rise faster in the U.S. than in the local country). Unlike the advanced economy sample, where all of the real exchange rate adjustment happens through nominal exchange rate adjustment, in the emerging and developing economy sample pre-2007, real exchange rate adjustment occurs through both nominal exchange rates and prices.

Third, Table 6 presents the same results for the post-2007 period. In the advanced, emerging, and developing countries, a downturn in the global financial cycle is associated with nominal exchange rate depreciation. A downturn is also associated with a decrease in the inflation differential, which offsets some of the nominal depreciation. In other words, local prices rise faster than U.S. prices, which tempers some of the nominal exchange rate depreciation, instead of enhancing it like in the pre-2007 emerging and developing countries sample. The effect of the global financial cycle on the price differential is greatest in the developing countries and smallest in the advanced countries.

Table 5: Regression of change in nominal exchange rate or U.S.-local country inflation differential on the GFC factor over the 1996-2006 period

	Advanced				Emerging				Developing			
	(1a)	(2a)	(3a)	(4a)	(1e)	(2e)	(3e)	(4e)	(1d)	(2d)	(3d)	(4d)
$\Delta ner_{i,t}$												
Δf_t		-0.029**	-0.029**	-0.029**		-0.037	-0.031	-0.034		-0.021	-0.034	-0.028
		(0.012)	(0.012)	(0.012)		(0.029)	(0.029)	(0.035)		(0.015)	(0.021)	(0.023)
$nfa_{i,t-1} \times \Delta f_t$			0.006				0.020*				-0.014	
			(0.013)				(0.012)				(0.022)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				-0.004				0.030				-0.039**
				(0.013)				(0.032)				(0.017)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				-0.011				-0.006				0.065
				(0.018)				(0.053)				(0.093)
$CA_{i,t-1} \times \Delta f_t$				0.156				0.116				0.113
				(0.193)				(0.116)				(0.225)
R^2	0.413	0.422	0.423	0.424	0.369	0.374	0.376	0.377	0.382	0.386	0.387	0.394
R^2_{CS}	0.187	0.144	0.145	0.148	0.382	0.366	0.368	0.369	0.363	0.340	0.342	0.350
R^2_{TS}	0.531	0.568	0.568	0.569	0.282	0.442	0.447	0.444	0.423	0.526	0.526	0.525
$var(\Delta ner_{i,t})$	0.008	0.008	0.008	0.008	0.049	0.049	0.049	0.049	0.018	0.018	0.018	0.018
$\pi_{US,t} - \pi_{i,t}$												
Δf_t		0.003	0.003	0.003		-0.023	-0.026	-0.028		-0.023***	-0.010	-0.013
		(0.003)	(0.003)	(0.003)		(0.025)	(0.026)	(0.031)		(0.008)	(0.009)	(0.009)
$nfa_{i,t-1} \times \Delta f_t$			-0.003				-0.009				0.016*	
			(0.003)				(0.008)				(0.010)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				-0.003				0.002				0.030***
				(0.004)				(0.023)				(0.008)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				0.001				-0.016				-0.026
				(0.004)				(0.041)				(0.043)
$CA_{i,t-1} \times \Delta f_t$				-0.014				-0.107*				-0.050
				(0.035)				(0.060)				(0.085)
R^2	0.819	0.819	0.820	0.821	0.550	0.552	0.553	0.554	0.593	0.602	0.604	0.608
R^2_{CS}	0.798	0.796	0.798	0.798	0.533	0.542	0.543	0.544	0.569	0.588	0.591	0.594
R^2_{TS}	0.890	0.912	0.903	0.908	0.379	0.248	0.253	0.249	0.689	0.519	0.522	0.522
$var(\pi_{US,t} - \pi I, t)$	0.001	0.001	0.001	0.001	0.035	0.035	0.035	0.035	0.010	0.010	0.010	0.010

Notes: See notes to Table 3. $\Delta ner_{i,t}$ is the yearly log change in the nominal exchange rate, and $\pi_{US,t} - \pi_{i,t}$ is the difference between U.S. year-over-year inflation rate and the country i year-over-year inflation rate.

Table 6: Regression of change in nominal exchange rate or U.S.-local country inflation differential on the GFC factor over the 2007-2018 period

	Advanced				Emerging				Developing			
	(1a)	(2a)	(3a)	(4a)	(1e)	(2e)	(3e)	(4e)	(1d)	(2d)	(3d)	(4d)
$\Delta ner_{i,t}$												
Δf_t		-0.045***	-0.044***	-0.043***		-0.041***	-0.041***	-0.050***		-0.030***	-0.037***	-0.038***
		(0.007)	(0.006)	(0.006)		(0.005)	(0.006)	(0.007)		(0.005)	(0.006)	(0.007)
$nfa_{i,t-1} \times \Delta f_t$			0.015***				0.000				-0.015**	
			(0.005)				(0.005)				(0.007)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				0.025***				0.013				-0.017**
				(0.005)				(0.009)				(0.009)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				0.015				-0.023**				-0.020
				(0.014)				(0.010)				(0.016)
$CA_{i,t-1} \times \Delta f_t$				-0.133*				0.003				0.012
				(0.071)				(0.027)				(0.023)
R^2	0.108	0.264	0.295	0.309	0.238	0.316	0.316	0.319	0.236	0.277	0.280	0.281
R^2_{CS}	0.146	0.192	0.263	0.293	0.292	0.285	0.285	0.289	0.274	0.271	0.275	0.275
R^2_{TS}	0.081	0.314	0.318	0.320	0.046	0.424	0.424	0.425	0.068	0.284	0.284	0.284
$var(\Delta ner_{i,t})$	0.006	0.006	0.006	0.006	0.010	0.010	0.010	0.010	0.011	0.011	0.011	0.011
$\pi_{US,t} - \pi_{i,t}$												
Δf_t		0.002*	0.002**	0.002**		0.006***	0.006***	0.007***		0.012***	0.013***	0.011**
		(0.001)	(0.001)	(0.001)		(0.002)	(0.002)	(0.002)		(0.003)	(0.003)	(0.004)
$nfa_{i,t-1} \times \Delta f_t$			-0.001				0.003**				0.002	
			(0.002)				(0.001)				(0.005)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				-0.002				0.004				0.003
				(0.002)				(0.003)				(0.009)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				0.003**				0.004				-0.011
				(0.001)				(0.003)				(0.017)
$CA_{i,t-1} \times \Delta f_t$				0.006				-0.004				0.028
				(0.015)				(0.011)				(0.044)
R^2	0.656	0.665	0.667	0.685	0.502	0.509	0.510	0.510	0.574	0.594	0.594	0.596
R^2_{CS}	0.631	0.619	0.622	0.644	0.518	0.515	0.516	0.516	0.593	0.588	0.588	0.591
R^2_{TS}	0.795	0.914	0.911	0.908	0.218	0.394	0.395	0.395	0.373	0.690	0.690	0.690
$var(\pi_{US,t} - \pi I, t)$	0.000	0.000	0.000	0.000	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004

Notes: See notes to Table 5.

4 Policy Choices and Exchange Rate Responses

We now ask how the effect of the global financial cycle on the real exchange rate depends on a country's policy choices, such as whether they have a fixed or floating currency rate regime, or an open or closed capital account.

Following Davis and Zlate (2019), we divide the sample of emerging and developing countries into 4 groups: those with a fixed exchange rate and a closed capital account, those with a floating exchange rate and a closed capital account, those with a fixed exchange rate and an open capital account, and those with a floating exchange rate and an open capital account.

To divide country-year observations according to the exchange rate regime, a country-year observation is classified as having a fixed exchange rate if it has a pegged currency in the Shambaugh classification system *with* the United States as the base country. To divide observations according to capital account openness, we use the Chinn and Ito (2008) capital account openness index renormalized on a 0-1 scale (with 0 representing closed and 1 representing open capital account), and classify a country-year observation as closed if the renormalized score is less that 0.5.

In Table 7 we present the results from regressing the real exchange rate, nominal exchange rate, and the inflation differential in each of our four regression specifications

The coefficients on the global financial cycle are close to zero for the group of countries with pegged exchange rates and closed capital accounts, as expected, reflecting little sensitivity for their real exchange rates to the global financial cycle amid exchange rate and capital account restrictions. In contrast, the coefficients are negative and statistically significant in the sample of countries with pegged exchange rates and open capital accounts. Furthermore, they are negative, statistically significant, and even larger in absolute terms for countries with floating exchange rates. Moreover, comparing the results from floating exchange rate countries with either a closed or open capital account, the coefficients on the global financial cycle factor are larger for the countries with an open capital account.

Interestingly, the coefficient of the interaction term between the global financial cycle and the nfa^{safe} position only matters in the samples with countries with an open capital account.

5 Conclusion

We look at the effect of fluctuations in the global financial cycle on real exchange rates. We also document the distinct roles of nominal exchange rates and price levels in driving real exchange rate adjustments.

Table 7: Results from regressions over 1996-2018 period where country-year observations are divided into those with a fixed or floating exchange rate.

		Pegged and Closed				Float and Closed		
	(1p)	(2p)	(3p)	(4p)	(1f)	(2f)	(3f)	(4f)
$\Delta rer_{i,t}$								
Δf_t		-0.012	-0.006	0.005		-0.029***	-0.032***	-0.033***
		(0.012)	(0.014)	(0.011)		(0.004)	(0.005)	(0.006)
$nfa_{i,t-1} \times \Delta f_t$			0.022				-0.008	
			(0.015)				(0.006)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				0.022				-0.013
				(0.023)				(0.008)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				0.061***				-0.012
				(0.017)				(0.018)
$CA_{i,t-1} \times \Delta f_t$				-0.023				0.024
				(0.026)				(0.027)
R^2	0.457	0.467	0.473	0.487	0.146	0.177	0.178	0.178
R^2_{CS}	0.417	0.399	0.404	0.418	0.169	0.164	0.165	0.167
R^2_{TS}	0.426	0.495	0.504	0.519	0.081	0.198	0.197	0.195
$var(\Delta rer_{i,t})$	0.005	0.005	0.005	0.005	0.011	0.011	0.011	0.011
		Pegged and Open				Float and Open		
	(1c)	(2c)	(3c)	(4c)	(1o)	(2o)	(3o)	(4o)
$\Delta rer_{i,t}$								
Δf_t		-0.011*	-0.011*	-0.017**		-0.036***	-0.030***	-0.046***
		(0.006)	(0.007)	(0.008)		(0.006)	(0.006)	(0.009)
$nfa_{i,t-1} \times \Delta f_t$			0.002				0.013**	
			(0.003)				(0.006)	
$nfa^{safe}_{i,t-1} \times \Delta f_t$				0.008*				0.038***
				(0.005)				(0.012)
$nfa^{risky}_{i,t-1} \times \Delta f_t$				-0.012**				-0.040
				(0.005)				(0.026)
$CA_{i,t-1} \times \Delta f_t$				0.024				0.020
				(0.034)				(0.049)
R^2	0.307	0.326	0.327	0.336	0.219	0.270	0.275	0.288
R^2_{CS}	0.317	0.326	0.329	0.338	0.270	0.259	0.263	0.269
R^2_{TS}	0.251	0.283	0.281	0.288	0.129	0.328	0.337	0.370
$var(\Delta rer_{i,t})$	0.003	0.003	0.003	0.003	0.012	0.012	0.012	0.012

Notes: Regression of fluctuations in the real exchange rate for the sample of emerging and developing countries. A country-year observation is classified having a fixed exchange rate if classified as pegged currency in the Shambaugh exchange rate classification system with a base country of the United States. See notes to Table 3.

We show that, first, downturns in the global financial cycle, measured as a common component in world risky asset prices, lead to real exchange rate depreciation against the U.S. dollar in a large sample of advanced, emerging, and developing economies. We also uncover important differences across countries and over time. While the global financial cycle had less effect on advanced than on emerging/developing economies' exchange rates pre-2007, the effect was about equal among country types post-2007. In addition, countries with a negative net foreign asset position depreciated more than net creditor countries, especially those with negative net foreign asset positions in safe assets (debt) rather than in risky assets (equity).

Our first set of results adds to the literature documenting an increased sensitivity of nominal exchange rates in advanced economies to global financial cycle shocks in the post-2007 period (Lilley et al., 2022). We show this regularity also holds for real exchange rates.

Second, we find that in advanced economies, most of the real exchange rate adjustments occurred through nominal exchange rates throughout the sample period. In contrast, in the emerging and developing countries, changes in the real exchange rates occurred through both nominal exchange rates and price level adjustments in the pre-2007 period, while the nominal exchange rate adjustments dominated in the post-2007 period.

Our second set of results contributes to the literature showing that in inflation targeting countries, real exchange rate adjustments occur mostly through changes in the nominal exchange rate, not through the inflation differential (Eichenbaum et al., 2021). By highlighting important differences between advanced and emerging/developing economies and between the pre- and post-2007 sample periods, our results are consistent with the shift in the monetary policy and exchange rate frameworks in emerging/developing economies toward inflation targeting and exchange rate flexibility over the past two decades.

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