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# Quantitative Easing and United States Investor Portfolio Rebalancing Towards Foreign Assets

João Barata R. B. Barroso*

## Abstract



We show robust evidence that quantitative easing policies by the Federal Reserve cause portfolio rebalancing by US investors towards foreign assets in emerging market economies. These effects are on top of any effects such polices might have through global or specific conditions of the recipient economies. To control for such conditions, we use capital flows from the rest of the world to the same recipient economy as a proxy variable. We gather a comprehensive dataset for Brazilian capital flows and a smaller dataset for other emerging market economies from completely independent sources. Both datasets show that more than 50% of US flows to the recipient economies in the period is accounted for by quantitative easing policies. We use the detailed datasets to break down this overall effect on the specific asset categories and sectors of the recipient economies.

**Keywords**: Quantitative easing, Capital flows, Portfolio balance, US investor
**JEL Classification:** E52, F42, G11, G15

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## 1. Introduction

Does quantitative easing policies cause portfolio rebalancing by American investors towards riskier foreign asses? If so, towards what assets and through which intermediaries? These are important question to assess the transmission channels and the potential financial stability risks of unconventional monetary policies implemented by the Federal Reserve ("Fed")[1]. We address these questions with a novel methodology that allows one to proxy for common determinants of American and rest of the world capital flows to the same recipient economy in order to isolate the additional causal effects from quantitative easing policies. This methodology bypasses possible problems from omitted variables in regression specifications, confounding events in event study frameworks and untested assumptions in arbitrage models[2].

The paper considers a proxy variable methodology to estimate the partial effect of quantitative easing on United States (US) flows after controlling for unobserved global conditions and local conditions on the recipient economy. We argue that the corresponding flows from the rest of the world (ROW) for each capital flow category are a good proxy for such unobserved conditions. We show formally that the proxy variable estimator reduces the bias in the estimation of the parameter of interest. The crucial assumption for the result is that quantitative easing should drive US flows directly, but ROW flows only indirectly.

To support this assumption, we argue that flows resulting from relaxed liquidity conditions at home should follow the shortest path to the final destination. To further support the assumption, we add controls that capture differences in the environment of ROW investors, including differences in the returns of the respective home assets, such as long-term treasuries and US. This is unlike the usual regression that controls for differences between source and recipient economies. We also include capital flow taxes when they affect source economies differently. Under this assumption and with this set of controls, the estimated partial effect of quantitative easing should reflect factors affecting exclusively United States-based investors and financial intermediaries. Since their portfolio and wealth are disproportionally affected (*vis a vis* foreign investors) by

[1] This is a controversial topic. The Federal Reserve supports the view that portfolio rebalancing contributes to the transmission of such policies, but is not as assertive on collateral effects. See, e.g., Ben Bernanke's Speech at the Jackson Hole Symposium, August 31, 2012.
[2] See the next section for the related literature.

the operationalization of the policies, it is natural to expect they rebalance their portfolio in distinctive manners, and therefore our interpretation of a rebalancing effect.

The main dataset of the paper consists of monthly capital flows with Brazil as the recipient economy and the US and ROW as the sources. This is a unique dataset constructed for this paper. The data construction follows the exact same methodology of the balance of payments statistics of the country. It is worth highlighting that balance of payments statistics in Brazil (and our dataset in particular) are of above average quality due to the legal requirement of filing electronic contracts in all transactions with foreigners. The dataset is comprehensive in terms of categories of flows and distinguishes flows to the banking sector from flows to other sectors.

As a secondary dataset, we use quarterly data from the Treasury International Capital (TIC) System for US-based portfolio flows jointly with data from the International Financial Statistics's (IFS) net capital flows for imputing ROW flows. Relative to Brazilian data, this has a lower frequency, covers a smaller subset of flow categories, and may have problems due to the differences in methodology between TIC and IFS sources. Nonetheless, by pooling the information from different capital flow recipients, it allows one to check if the results obtained with the main dataset generalize.

Our results show significant US investor portfolio rebalancing towards emerging economies assets in response to quantitative easing policies as measured by the monthly change in the balance sheet of the Federal Reserve. This effect is on top of any effect such polices might have through improved push or pull factors, since our strategy controls for such local and global factors.

In the case of the Brazilian dataset, the estimated effect runs mostly through the flows into portfolio assets, particularly debt. Direct investment, including equity capital and affiliated enterprise loans, do not respond; this is also the case for cross border credit flows. Regarding capital flows to the banking sector, only portfolio assets are affected, and debt flows drive the results as before. Results are robust to the inclusion of controls and to measurement in real or nominal terms. They are about the same when partitioning quantitative easing into three different periods, corresponding to the first, second and third round of balance sheet expansion (QE1, QE2 and QE3).

The magnitudes are economically significant. Across different specifications, additional flows due to quantitative easing range from 54 to 58 USD bn. This corresponds to around 54% of the US flows to Brazil accumulated over the period of the

policies or 10% of foreign flows to the country over the same period. The effect on portfolio flow range from 41 to 48 USD bn, and portfolio debt flows from 28 to 31 USD bn. Regarding the banking sector, the effect on portfolio flow range from 10 to 12 USD bn (83% of US, or 24% of total) and portfolio debt flow range from 6 to 7 USD bn. Additional bank portfolio flows are therefore 26% of additional total portfolio flows, and additional bank debt flows are 23% of additional total debt flows. This is consistent with the view that, after the financial crisis, market based instruments are more important.

Results for TIC-IFS dataset on portfolio flows are also consistent with a significant effect from quantitative easing on US flows to emerging markets. The effect is economically significant and interestingly is of the same order of magnitude as obtained in the Brazilian dataset: between 55% and 65% of US flows to emerging markets in the sample. The effect of quantitative easing on global portfolio flows ranges from 111 to 130 USD bn. In contrast with the results using Brazilian data, most of the effect comes from portfolio equity flows (up to 102 USD bn), and debt flow effects are actually not significant.

The paper is structured as follows. The next section presents the related literature. It is followed by the methodology section, that introduces the proxy variable approach, and by the data section, that describes both the primary and secondary capital flow datasets. Results for the two datasets are presented in turn in the next section, along with a complementary appendix for additional results. The last section summarizes results and conclusions.

### 1.1. Related Literature

There is a growing literature that applies regression or event study approaches to document international spillovers from quantitative easing. As mentioned in the introduction, the omitted variables problem and confounding events are important shortcomings of this literature. Fratzscher et al. (2013) use panel regressions and show that flows into US equity and bond funds go in the opposite direction of flows into funds dedicated to emerging markets conditional on the policies. There are corresponding movements in equity returns, bond yields and exchange rate returns. According to the same study, the first round of quantitative easing apparently triggered inflows into US funds and the second round into emerging market funds. Ahmed and

Zlate (2013) also use panel regressions to show that net portfolio flows (that is, including domestic resident flows) to emerging markets shift in composition but not in levels in response to quantitative easing, and that such change seems to be towards bonds and equities. Gagnon et al. (2011) use event study methods and document that large-scale asset purchase programs led to a reduction in US long-term interest rates for a range of securities, including those not included in the purchase programs. With a similar approach, Neely (2015) shows that unconventional monetary policy by the Fed influences long-term interest abroad as well as bilateral exchange rates. For Brazil, Barroso et.al (2015) show that quantitative easing influences capital inflows and, through this channel, the overall economic outlook and financial stability. However, the argument is only qualitative and refers to total flows. In this paper, we quantify the effect operating on US investors on top of any effect operating on global investors.

This paper also relates to limits to arbitrage arguments. Gromb and Vayanos (2010) survey the literature; Greenwood and Vayanos (2014) apply the insights to term structure models; Hamilton and Wu (2012) extend the argument to quantitative easing and show it contributes to lower long term rates. Bruno and Shin (2014) argue that monetary easing in US improves funding conditions of foreign banks and puts in motion a feedback loop between bank cross border lending, foreign currency appreciation and balance sheet improvement that eases constraints. They argue banks drive the cycle up to the financial crisis, with the market for debt securities taking a similar role afterwards. Plantin and Shin (2014) argue that interest rate differential may lead carry traders to coordinate on the supply of excessive capital to the targeted economy. It is interesting to compare this with the traditional portfolio rebalancing literature (e.g. Gohn and Tesar (1996), Hau and Rey (2008)), which documents return chasing behavior and rebalancing to keep investment shares constant, so that, in particular, foreign currency appreciation would be a disincentive to further inflows. The limits to arbitrage literature emphasizes the risk bearing capacity of financial intermediaries. As a result, any evidence of quantitative easing leading to portfolio rebalancing towards foreign assets would be indirect evidence of a channel operating through such financial constraints.

## 2. Methodology

The structural regression of interest is the following:

$$\text{usflow}_t = \beta \text{qe}_t + \gamma w_t + e_t \tag{1}$$

where $\text{usflow}_t$ refers to the capital flows from the United States to Brazil in period t, $\text{qe}_t$ measures the quantitative easing policies affecting flows in this period[3], $w_t$ stands for unobserved variables and $e_t$ is the innovation to the process relative to this information set. The coefficient of interest is $\beta$ which measures the partial effect of quantitative easing policies on US flows.

The OLS estimator of $\beta$ in a regression omitting the unobserved variable $w_t$ converges to the true parameter plus a bias term. For example, if global conditions affect flows positively and correlate with quantitative easing, omitting them may overestimate the effect of quantitative easing. Similarly, if prudential regulation in the recipient economy correlates with quantitative easing this may bias downward the coefficient of interest. It is convenient to express the bias in the context of the following auxiliary regressions:

$$\begin{aligned} \text{rowflow}_t &= \delta w_t + v_t, \\ \text{qe}_t &= \alpha w_t + u_t, \end{aligned} \tag{2}$$

where $\text{rowflow}_t$ refers to capital flows from rest of the world to Brazil in period t, and $E(w_t v_t) = E(w_t u_t) = 0$. Notice, in particular, that quantitative easing may be associated with the unobserved variables, such as global conditions or domestic prudential policies. Notice that the auxiliary regressions are only linear projections, that only capture the correlation structure in the data. In particular, we make no assumption regarding causal relations or direction or causality in the auxiliary equations. In this framework, the probability limit of the omitted variable regression coefficient is:

[3] We measure this by the change in the Fed's balance sheet, possibly forwarded a few months if suggested by information criteria. See the data and result sections for details.

$$plim\ \hat{\beta} = \beta + \frac{\gamma\alpha E(w_t^2)}{\alpha^2 E(w_t^2) + E(u_t)} \tag{3}$$

The challenge is to minimize the omitted variable bias. Controlling for some observable factors ameliorates the problem, but does not rule out still unobserved ones. The solution proposed here is to use capital flows from the rest of the world to the same recipient economy as a proxy for omitted factors. The fact that both variables are capital flows to the same recipient economy hopefully adds credibility to the estimator. We argue that it necessarily reduces the asymptotic bias.

Formally, we propose to estimate the proxy-variable regression:

$$usflow_t = \beta^p qe_t + \gamma^p rowflow_t + \varepsilon_t \tag{4}$$

In the context of the auxiliary regressions defined in (2), the proxy variable assumption is introduced by requiring (i) $\delta \neq 0$ and (ii) $u_t \perp v_t$. The first assumption ensures that rest of the world flows is related to the unobserved factors it should proxy. The second assumption, which is the crucial assumption in the paper, means that, beyond indirect effects driven by the unobserved factors, quantitative easing does not impact ROW flows to the recipient economy. Substantively, this means capital flows follow the shortest path to the recipient economy and therefore do not move from the US to the rest of the world just before reaching their final destination. It may also mean that US investors and intermediaries portfolios are disproportionally affected by the operationalization of the US unconventional policies. Finally, one may simply interpret the assumption as a definition or methodological device that allows identifying factors associated with QE that affect exclusively the US investor. The credibility of such interpretation of a QE effect depends on properly controlling for other local factors affecting investor behavior in the US and abroad, and we show bellow how to extend the framework to this case.

Following Sheehan-Connor (2010), substituting the structural equations into the equation for OLS proxy variable estimator $\hat{\beta}^p$, it is simple to show that

$$plim\ \hat{\beta}^p = \beta + \frac{\gamma\alpha E(w_t)}{\alpha^2 E(w_t{}^2) + E(u_t)/R^2_{rw,v}} \tag{5}$$

where $R^2_{rw,v}$ is the $R^2$ from regressing $rowflow_t$ on $v_t$. Intuitively, if most of the variation in the proxy variable is associated with the unobservable variable, then there is a large reduction in the asymptotic bias. An alternative observable indicator is the difference between the proxy variable estimator and the naïve estimator. It is a consistent estimator of presence and direction of the bias. The main message is that, even if the proposed estimator might still be inconsistent, we at least have indicators of the size and direction of the asymptotic bias.

So far results suppose a scalar unobserved variable $w_t$. It is simple to generalize this to a scalar 'index function' of several unobserved variables, as long as the function is the same in all structural equations of the model.

It is also simple to introduce the additional controls. Indeed, with such controls, the exact same results as before follows from a simple application of the Frisch-Waugh theorem. For our application, differences in the environment between United States and rest of the world investors are observable controls, while local conditions to the recipient economy and global conditions enter in the unobserved index function. The introduction of local controls to the source economies is important if one is to interpret the results as additional effect of QE affecting exclusively the American investor.

Another variation of the methodology may use the residual from the candidate proxy variable regressed on quantitative easing policies as the proxy variable, with an adjustment for generated regressor. We consider this variation when using data for jurisdictions other than the Brazilian economy to control for data quality issues.

## 3. Data

The data consists of (i) indicators of capital flows from the US and ROW with Brazil as the recipient economy, (ii) capital flows from the US and ROW to other economies, (iii) unconventional monetary policy by the Federal Reserve, and (iv) additional control variables. For the Brazilian data, the frequency is monthly and the sample runs from January 2003 to March 2014. For other recipient economies, the data is quarterly from the first 2005Q1 to 2014Q1. The other time series are set to monthly or quarterly accordingly.

### 3.1. Capital flows for Brazil

For historical reasons, the monitoring of capital flows in Brazil is uniquely comprehensive. It relies on a system of mandatory electronic contracts for all transactions with foreigners. Based on this, the Central Bank of Brazil can maintain a data warehouse that allows, among other features, breaking capital flows according to the nationality of the counterparty[4]. This is true for any capital flow category up to the full level of detail of balance of payments statistics. It is also possible to assign flows directed to the banking sector. All these different views of foreign capital flows to the country add up to the official balance of payments statistics because the data warehouse is the basis for its compilation. Except when made explicit in the text, all capital flows variables are in billions of dollars.

The dataset covers all gross capital flows categories, including foreign direct investment, foreign portfolio investment and foreign credit investment. Direct investment is discriminated into equity capital investment and affiliated enterprise loans.[5] Portfolio investment is decomposed into equities and debt securities, and then into debt issued in the country and debt issued abroad. Foreign credit investment is composed exclusively of direct loans.[6] The corresponding aggregated series are available at the Central Bank of Brazil online time series system with detailed metadata descriptions. The break up by nationality used in this paper was custom-made to this study with extensive checks for data quality performed by the staff responsible for balance of payments compilation.

Flows directed to the Brazilian banking sector are also available for the same categories (except affiliated enterprise loans which are treated as credit flows), both from the United States and from the rest of the world. There are two caveats here. First, we must impute portfolio equity flows and portfolio debt flows towards banks from the relative size of the banking sector in the equity and debt market respectively (but debt issued abroad is from actual transactions). Second, we cannot assure full coverage of bank credit flows. Indeed, lines of credit between banks are exempt from electronic

[4] For the record, another feature is the very fast compilation of balance of payments statistics; preliminary numbers for all the major accounts are available and monitored in almost real time.

[5] In the case of foreign direct investment, we include inflows of national corporations borrowing abroad through foreign affiliates and exclude outflows of direct investors lending to headquarters abroad. This way, we keep track of changes in liabilities of corporations with domestic residency, in line with the latest edition of the balance of payments manual.

[6] In the case of credit flows, we choose to exclude trade credit flows because they follow trade in goods and are uninformative of portfolio decisions by foreign investors.

contracts that are the base for our dataset. For aggregate balance of payment statistics, accounting data can complement the information available in the data warehouse, but the same solution is not available when discriminating by the nationality of the counterparty. This second caveat applies to total flows as well, since banks are a subset of the full dataset.

The correlation between ROW flows and US flows is a first rough indicator of the credibility of the proxy variable assumption. A strong correlation is a signal of common drivers. Yet, if the correlation is too strong, it can signal there is little room for additional effects from quantitative easing. Figure 1, panels (a)-(j), shows the corresponding flows to the recipient economy: total flows have a correlation coefficient of 0.37, portfolio flows 0.36, portfolio equity 0.15, portfolio debt 0.17, portfolio debt in the country 0.14, portfolio debt abroad -0.11, foreign direct investment 0.46, credit 0.13, foreign equity capital investment 0.31 and affiliated enterprise loans 0.49. Figure 2, panels (a)-(h), shows the corresponding flows to the banking sector: total flows to banks have a correlation coefficient of 0.24, portfolio flows 0.32, portfolio equity 0.42, portfolio debt 0.16, portfolio debt in the country 0.21, portfolio debt abroad 0.04, foreign direct investment 0.09 and credit flows 0.03.

We may also compare the behavior of moving averages of ROW flows and US flows, particularly for periods of quantitative easing policies. A distinct behavior of US flows during policy periods is a signal of possible effects. Figures 3 and 4 show the six months moving average of ROW and US flows to Brazil, respectively. To get a clearer picture of the other flows, we exclude foreign direct investment due to large scale and volatility differentials between ROW and US flows. There are pronounced differences between total flows during each of the quantitative easy policy rounds, with subcategories of flows apparently reacting more strongly to certain rounds. For example, the first and third policy rounds show up more clearly in the US flows. Debt flows respond relatively more in the third round and credit flows in the second. The general picture is consistent with the results summarized in the introduction. Figures 5 and 6 show the corresponding moving averages of ROW and US flows to the banking sector of the recipient economy. Again, there are pronounced differences, including the relatively stronger behavior of US flows around the first and third rounds of quantitative easing and a role for credit flows during the second round. The exact definition of the policy rounds considered in the paper are presented in the following section.

### 3.2. Capital flows for other jurisdictions

The Treasury International Capital (TIC) System is the source of portfolio debt and equity flows from the US to other countries. The International Financial Statistics (IFS) database maintained by the IMF is the source of total gross debt and equity flows to the same countries. The frequency of this IFS source is quarterly and so we aggregated the monthly TIC data. The sample includes 17 emerging markets: Argentina, Brazil, Chile, China, Colombia, Hungary, Indonesia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, and Uruguay. Notice there is no guarantee the two datasets align smoothly as the Brazilian dataset. For example, comparing the TIC flows data for Brazil, there are large discrepancies. On the other hand, the IFS data aligns smoothly with our dataset since it is just balance of payment statistics. Therefore, it is not recommended to subtract TIC data from IFS data to get ROW flows. Instead, we use the residuals of IFS total flows (TOT) regressed on quantitative easing policies as our proxy variable as suggested in the last paragraph of the methodology section.

### 3.3. Quantitative easing

The indicator for unconventional monetary policy by the Federal Reserve is the monthly change in securities held outright in its balance sheet. As the capital flow variables, it is in billions of dollars unless stated otherwise. The source of the series is the Federal Reserve Economic Data (FRED). We censored the monthly change series to be zero before the start of the quantitative easing policies, that is, before November 2008. Figure 7 shows the resulting indicator. The main advantage of using this indicator is the transparent interpretation of its coefficient in the baseline regressions, which relates dollar amounts of policy to dollar amounts of capital flows. In some specifications, for robustness, we normalize both variables by the aggregate Brazilian import price index, but with the average of the index over the policy period normalized to one so that a similar interpretation applies.

Another robustness check is to interact the balance sheet variable with dummy variables indicating the policy round. For this paper, we consider three policy rounds of balance sheet expansion: QE1, QE2 and QE3. We use dates where the policy begins (in the case of QE1) or the policy is hinted to the public (in the case of QE2 and QE3).

Following the dates of Fawley and Neeley (2013), QE1 begins in November 2008, QE2 in August 2010 and QE3 in August 2013. We stipulate the policy rounds end just before another round begins. This means we count the extension of QE1 as a phase of QE1, Operation Twist as a phase of QE2 and the tapering as a phase of QE3. In principle, it is possible to increase the granularity and capture these as separate policy rounds. However, the resulting periods would be too short, so that essentially we would run regressions with dummy variables for the policy. There are important inferential problems associated with such dummy variable regressions, so we have a strong preference for using a continuous policy variable.

### 3.4. Additional controls

The trust of the paper is that ROW flows proxy for unobserved common determinants of US flows. In principle, the index function representing the common determinants may control for observables as well, as long as the homogeneity assumption for the index function holds. For robustness, we also study regression with observable controls. For parsimony, we introduce the controls as differences between United States variables and the corresponding average values for Euro Area, Great Britain and Japan, which are representative for the rest of the world capital flows to Brazil. The specific control variables are 10-year government bond yields, CITI economic surprise indexes, and monthly stock returns, all obtained from the Bloomberg terminal. We also introduced a crisis dummy variable in all regressions to avoid attributing the strong first round of negative effects from the crisis to the unconventional policies designed to address them. It is an indicator variable of the months from October 2009 to March 2009. In the appendix, we run regressions including capital flow taxes in Brazil as controls.

## 4. Results

### 4.1. Brazil dataset

All results are in Tables 1-12. They have a similar structure, so we take some time to describe it. We always present four regressions for each capital flow category, all based in the minimal equation (4), distributed in columns of the table with the following roman labels and meaning: (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls, and (iv) normalizes dollar variables by import price indexes. Notice the price indexes used to normalize the series gave unit average during the policy period, so that the scale of the coefficients is still comparable.

All regressions include a constant to capture average monthly flows. They also include a crisis dummy, introduced in the previous section, to avoid confounding it with unconventional policies. Regressions may include dummy variables to capture outliers in the US flows. We identify an outlier automatically whenever the absolute deviation from the mean is greater than four standard deviations. This results in a couple of outliers for some capital flow categories. To save space in the tables, we do not report some coefficients. This includes the dummy variables for outliers and the additional controls.

The *baseline regressions* include the quantitative easing policy indicator described in the previous section. The *extended regressions* contain separate quantitative easing indicators for each policy round of balance sheet expansion. The last row of each reported regression brings the point estimate for the accumulated effect of quantitative easing - or, in the case of extended regression the accumulated effect for each policy round. For each baseline and extended regressions, we present separate results for *economy-wide flows* and for *banking sector flows*. For extended regressions we also perform additional regressions including own lag of US flow and capital flow taxes as additional controls.

It is important to recall that the quantitative easing policy indicator refers to monthly balance sheet expansions by the Federal Reserve. To allow for anticipation of balance sheet expansion by market participants, all regressions include a lead of the policy indicator. In accordance with information criteria, we use *three months lead* of the policy indicator in all regressions.

#### 4.1.1. Baseline regressions: economy-wide

Table 1 summarizes the results for aggregated concepts of US flows, such as total flows, portfolio flows, direct investment flows, and credit flows. Table 2 presents results for disaggregated concepts, such as direct investment in equity capital or in affiliated enterprise loans and portfolio investment in equity, debt, debt issued in the country and debt issued abroad.

There are some common results. First, the coefficient on the quantitative easing policy is always positive and it is lower when including the proxy variable (colum ii) than when omitting it (column i). This points to a positive bias from omitting unobservable determinants of US flows. When considering the implied accumulated effects of the policy (last row), the bias is economically significant.

Second, the crisis dummy is always significant, which points to an economically important reduction in flows from the US in the most acute phase of the crisis (e.g., multiply the crisis coefficient by its duration of six months and compare this with the accumulated effect of the policy in the last row). Third, the ROW proxy is strongly statistically significant except for credit, debt and debt issued abroad.

Forth, including the proxy variable improves the fit significantly as judged by the adjusted $R^2$, but the inclusion of additional controls provides only marginal if any improvement (and coefficients are stable between the two specifications). This signals that the proxy variable is capturing most of the relevant information of the common drivers of capital flows to Brazil from different source economies.

Focusing now on Table 1, the coefficient on the QE policy indicator for the total flows regression (upper left panel) shows that each 1 billion USD balance sheet expansion leads to additional capital flows into Brazil in the order of 0.015 billion USD. Considering the total size of the balance sheet expansion in the period, this corresponds to additional flows in the range of 54 to 58 billion USD, or 54% of the US flows to Brazil accumulated over the period. The flows are ***additional*** in the sense that they are on top of any effect quantitative easing might have through the common drivers of US and ROW flows that are controlled for in the regression.

The analogous coefficient for the portfolio flows regression (upper right panel) shows that each 1 USD billion balance sheet expansion implies additional portfolio flows into Brazil in the order of 0.11 or 0.12 USD billion. This represents additional portfolio flows in the range of 40 to 48 USD billion in the period, or 140% of portfolio

flows from the US in the period (recall from Figure 1, panel c, that portfolio flows from the US fall significantly during this period). The effects on direct investment and credit flows (lower panels) are not statistically significant. For direct investment, ROW flows is significant and therefore the result is conclusive for no additional effect. For credit flows, the proxy variable is not significant and so the result is less conclusive.

Table 2 has detailed results. As in aggregate direct investment, both equity capital and affiliated enterprise loans (upper panels) show no additional effect from quantitative easing. Portfolio equity is also not significant (middle left panel). Things change for portfolio debt (middle right panel). For each 1 USD billion of quantitative easing, portfolio debt flows increase by 0.008 USD billion, which represents 28 to 30 billion USD during the period, or 62% of US debt flows to the country in the period. Further decomposing portfolio debt, only debt issued abroad (lower right panel) shows significant additional effects from quantitative easing. For the same 1 billion USD of policy easing, debt issued abroad increases by 0.003 billion USD, between 11 and 13 billion USD during the period, or 96% of US investment in Brazilian debt issued abroad.

#### 4.1.2. Baseline regressions: banking sector

Mimicking the same structure of the economy-wide flows, Table 3 summarizes the results for aggregated concepts of US flows to the Brazilian banking sector, while Table 4 reports the results for disaggregated concepts.

There are some broad results. First, as in the case of economy-wide regressions, the coefficient on the quantitative easing policy is always positive and it is lower when including the proxy variable than when omitting it. This points to a positive bias from omitting unobservable determinants of US flows. Second, the crisis dummy is significant in some cases, but less son than in the corresponding economy-wide regressions. Third, the ROW proxy is statistically significant only for total flows, portfolio flows, equity flows and debt issued in the country. Forth, including the proxy variable and additional controls improves the adjusted fit.

According to Table 3, only portfolio flows (upper right panel) show significant effects from quantitative easing. In this case, a 1 billion USD balance sheet expansion leads to additional portfolio flows into the Brazilian banking sector in the order of 0.003

billion USD. This corresponds to additional flows in the range of from 10 to 12 billion USD, or 83% of the US portfolio flows to the Brazilian banking sector over the period.

Table 4 shows that US investment in Brazilian banks debt (upper right panel) and, in particular, debt issued abroad (lower right panel) respond to quantitative easing. Each 1 billion USD balance sheet expansion is responsible for additional 0.002 billion USD of flows into debt and 0.001 USD billion of flows into debt issued abroad by Brazilian banks. This corresponds, respectively, to 7 billion USD and 3 billion USD, or 50% of US flows into bank debt and 73% of US flows into bank debt issued abroad. The effects of quantitative easing on portfolio equity (upper left panel) and debt issued in the country (lower left panel) are not significant.

#### 4.1.3. Extended regressions: economy-wide

Table 5 and 6 summarizes the results[7]. The common features of the regressions are broadly in line with the corresponding baseline regressions. That is, we observe lower QE coefficients once including the proxy variable, generally significant proxy variables when included, gains in the adjusted fit of including the proxy variable, marginal gains if any from including other variables and significant crisis effects.

One common feature present only in the extended regression is that sometimes the sum of the effect of all quantitative easing episodes is significant even if some of them do not appear significant individually, which is possible given the correlation between the different parameter estimates. Another feature is that, relative to the estimated effects from the baseline regressions, the sum of the effects in the extended regression is of similar scale (except for affiliated enterprise loans, which is larger in the extended regression).

Table 5 shows results for aggregated flows. There is robust evidence that total flows are affected by QE2 (around 26 bn USD of accumulated additional effect, 46% of the flows in the period) and some evidence that they are affected by QE3 (around 16 bn USD effect, 42% of the flows). There is some evidence across specifications that portfolio flows are affected by QE1 (around 22 bn USD). There is some evidence that

[7] To check for robustness, Table A.5 and A.6 show the same regressions but with own lag of US capital flows and control for capital flow taxes.

foreign direct investment by the US is affected by QE3, and that credit flows respond to QE2[8].

Table 6 explores flows in detail. Contrary to the baseline, for direct investment, both equity capital and affiliated enterprise loans are affected by QE3. [9] Again, in contrast with the baseline, the behavior of US investors on foreign equity markets and debt issued abroad responds to QE2 (around 8 and 2.5 bn USD, respectively, or 300% and 50% of the corresponding US flows). Similarly to the baseline, portfolio debt and portfolio debt issued abroad are affected by QE1 (around 14 and 4.5 bn USD, respectively, or 75% and 115% of the flows) and by QE3 (around 14.5 and 7 bn USD, respectively, or 57% and 83% of the US flows in the period of the policy).

#### 4.1.4. Extended regressions: banking sector

The common features of the banking sector extended regressions (Table 7 and 8) are broadly in line with the corresponding baseline regressions. In the appendix, we show this is also the case when including own lag of US capital flows and capital flow taxes as controls (Table A.7 and A.8). That is, we observe lower QE coefficients once including the proxy variable, some significant proxy variables when included, gains in the adjusted fit of including the proxy variable, and generally significant crisis effects.

Table 7 shows aggregate flows to the banking sector. Contrary to the baseline regression, total flows are now affected. Portfolio flows to the banking sector respond mostly to QE1 (around 7 bn USD or 108% of the flows). Results are similar when adding capital flow tax and own lag as controls (Table A.7).

Table 8 shows further details. Portfolio equity and portfolio debt issued abroad by Brazilian banks are affected by QE2 (around 2 and 0.7 bn USD, respectively, or 80% and 100% of the corresponding flows). Portfolio debt is affected by QE1 (around 3 bn USD or 65% or the flow). However, the proxy variable is not significant for the portfolio debt regressions. Results are again broadly similar when adding capital flow tax and own lag as controls (Table A.8).

[8] Result is different when including additional controls (Table A.5), in which case total flows and portfolio flows show a substantially larger effect from QE3, and FDI and credit flows are no longer affected. Results from Table A.5 also suggest significant negative effects of capital flow taxes on portfolio flows, and the order of magnitude is similar to the overall effect of QE policies, which is a bit surprising given the likely bias of the tax coefficient. Most of the tax effect comes from portfolio debt flows (Table A.6).

[9] Yet, the result is not robust to the inclusion of additional controls (Table A.2).

### 4.2. Global dataset

Table 9 shows the results for the TIC-IFS dataset. The columns in the table follow the same structure as before, except for column (iv) that reports the regression with heterogeneous coefficients for each country in the sample.

Since TIC and IFS data do not allow deducing ROW flows with a consistent methodology, we consider a variation of our main method[10]. We use total capital flows (TOT) from the IFS as a candidate proxy variable. This candidate is regressed on quantitative easing policy (on a country-by-country basis) and the residual from this first stage regression is used as the actual proxy variable in the regressions. Of course, this introduces a possible generated regressor bias. We bootstrapped the first stage regression and the difference in the results are in the order of magnitude of numerical errors, and are therefore dismissed in the following.

Results suggest that quantitative easing affects US flows to emerging markets. Including the proxy variable lowers the estimated effect, which is consistent with an upward bias from omitted variables. The effect of quantitative easing on global portfolio flows range from 111 to 130 bn USD, and this represents from 55% to 65% of US flows to emerging markets in the sample. Indeed, it is a bit surprising (and reassuring) that the percentage figure is so close to the corresponding Brazilian result given the very different dataset and the adjustments to the methodology. In contrast with the results using Brazilian data, most of the effect comes from portfolio equity flows, and debt flow effects are actually not significant. Results are robust to the inclusion of controls for differences in the environment of US and other advanced economies that may originate capital flows to emerging markets, including differences in return and economic activity. Results are also robust to allowing for heterogeneous coefficients in recipients economies.

[10] We tried just subtracting TIC from IFS but the coefficient on the implied ROW flows as negative, which is counterintuitive and suggests a problem. With our procedure, the total flow (TOT) proxy has the expected positive sign.

## 5. Conclusion

There is robust evidence that quantitative easing policies by the Federal Reserve cause portfolio rebalancing by US investors towards foreign assets in emerging market economies. These effects are on top of any effects such polices might have through global or local conditions, since they are controlled for in the regressions.

According to our main dataset, which focuses on capital flows to Brazil, the effects are concentrated into portfolio assets, particularly debt, both for economy-wide and banking sector flows. There is less evidence of effects on direct investment and credit flows, except for extended regressions partitioning quantitative easing into different policy rounds. The magnitudes are economically significant and correspond to sizable shares of the accumulated US flows during the policy period. Additional flows directed at the banking sector in response to the policy are a quarter of the economy-wide flows. This is consistent with the view that market-based instruments are more important than banks in the direct cross-border transmission in these particular events of quantitative easing. The recent reversal of fortunes of economies employing large-scale quantitative easing measures and economies receiving the resulting capital flows shows that portfolio rebalance mechanisms operating during such periods involve significant risks.

Regarding the global dataset, there is also evidence that quantitative easing causes portfolio rebalancing to emerging market economies. In contrast to the result for Brazil, most of the effect seems to be concentrated on equity flows. The magnitudes are economically significant as well, with up to 65% of total US portfolio flows to the countries in our sample accounted for by quantitative easing. This is surprisingly similar to the 54% figure for total flows to Brazil. That is, even though flows are small relative to the overall balance sheet expansion in the US, they are considerably large relative to the recipient economies.

The results obtained with our methodology complement other alternatives reviewed in the introduction, such as event studies or arbitrage models. By construction, our methodology isolates the effect of quantitative easing affecting exclusively the US investor, that is, an effect on top on any factor that also affects global investors. It is natural to interpret such effect as resulting from portfolio rebalancing under the assumption that operationalization of US unconventional monetary policies affects

disproportionally the portfolio and wealth of US based investors and financial intermediaries. Further work using similar data may consider other estimation strategies, such as system methods or the inclusion of several of the available proxies in each regression. The strategy proposed here is relevant for other jurisdictions if data is available, as may be the case for other economies that closely monitor capital flows for historical or other reasons. After the accumulation of pertinent data, it applies to recent episodes of quantitative easing in the EuroZone and Japan. For periods where the policy rate is not near the zero lower bound, it also applies for monetary policy in general.

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Figure 1. Capital flows from the US and ROW to Brazil (USD bn)

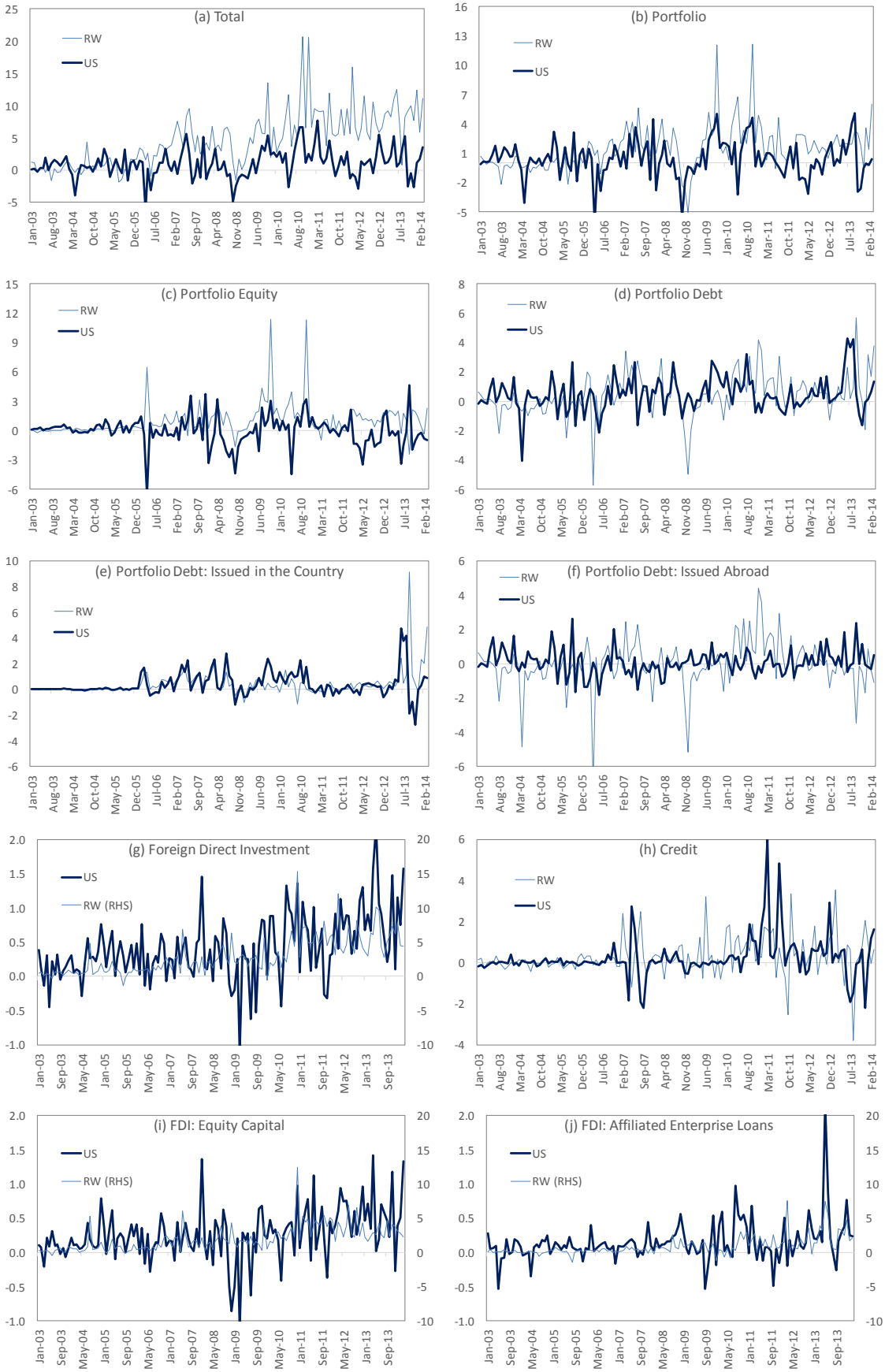

Figure 2. Capital flows from the US and ROW to Brazil's banking sector (USD bn)

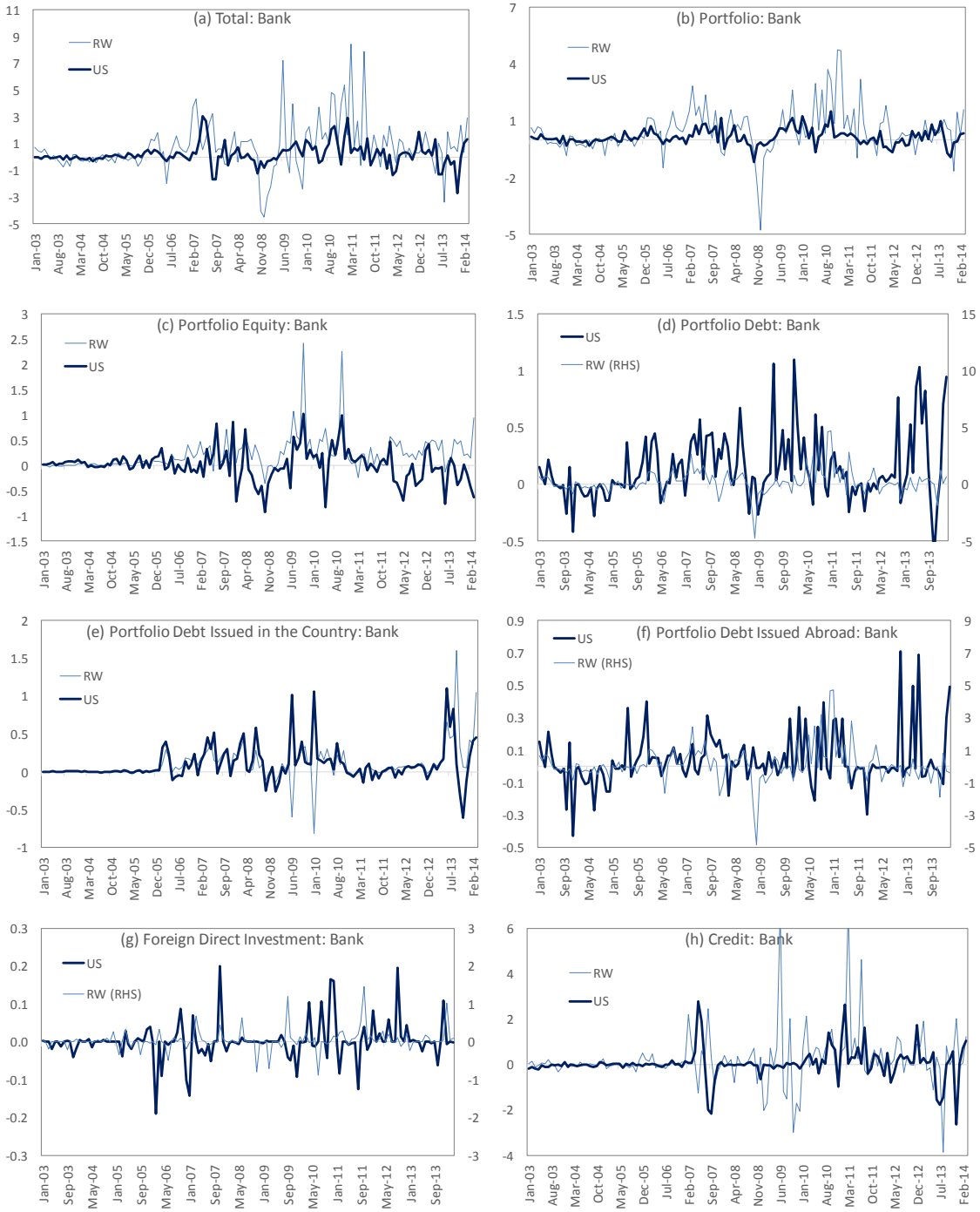

Figure 3. Capital Flows from ROW to Brazil and QE periods

(USD bn, 6 months moving average)

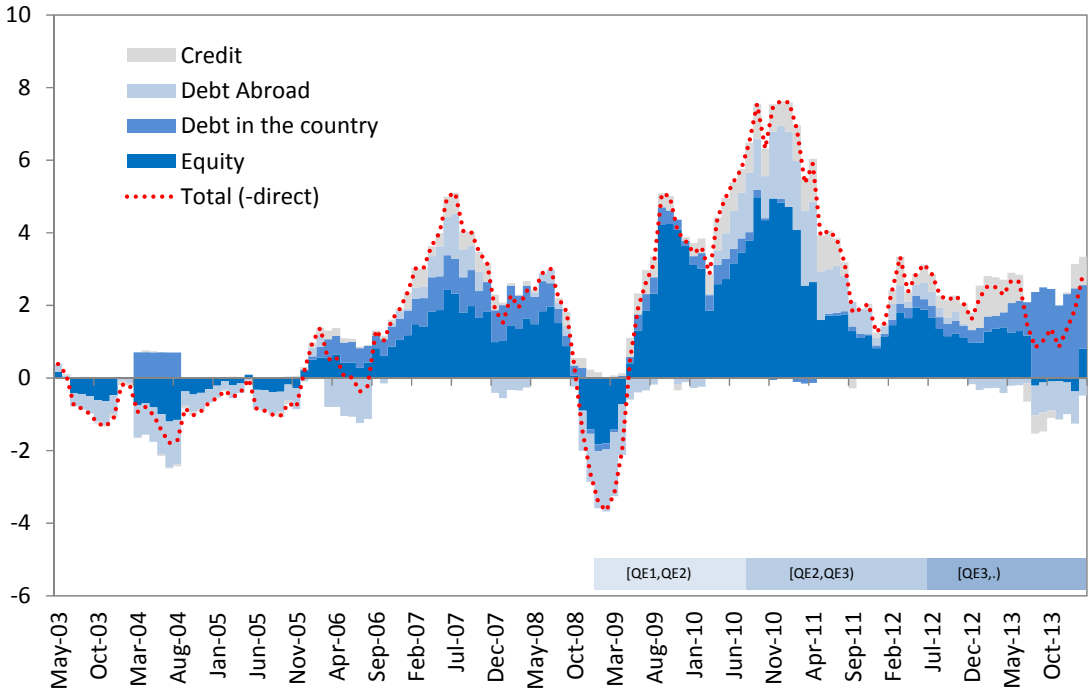


Figure 4. Capital Flows from US to Brazil and QE periods

(USD bn, 6 months moving average)

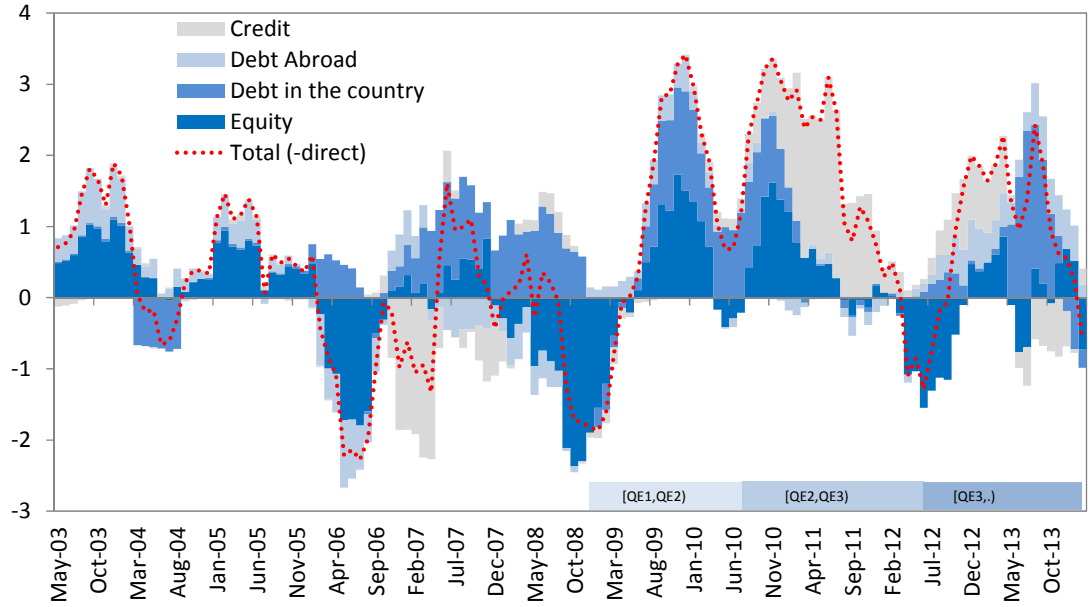

Figure 5. Capital Flows from ROW to Brazil's banking sector and QE periods
(USD bn, 6 months moving average)

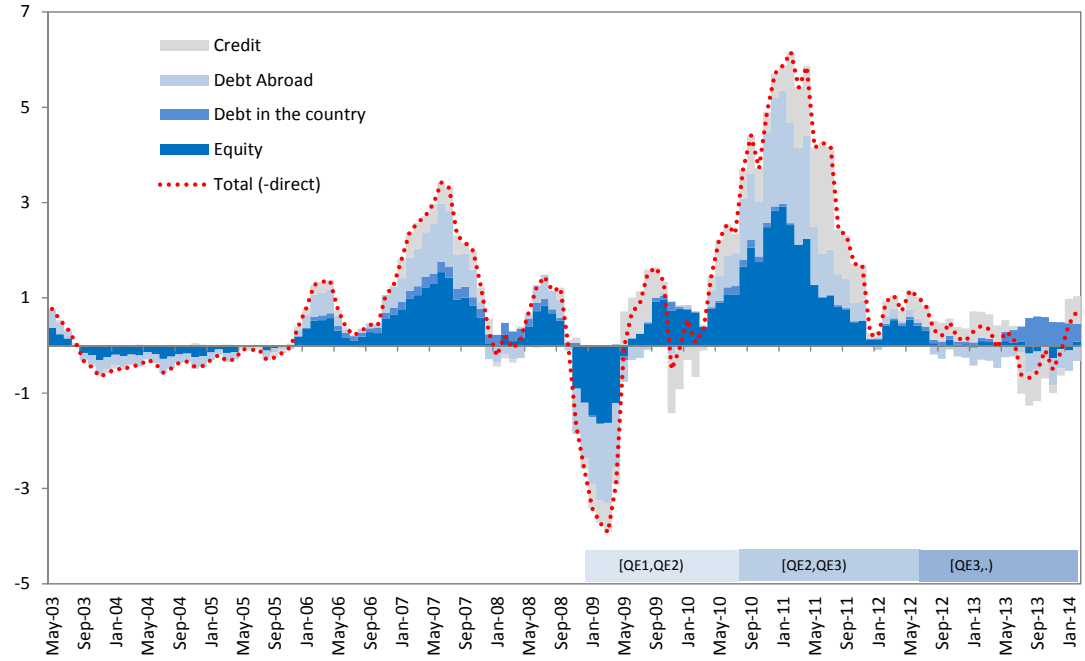


Figure 6. Capital Flows from US to Brazil's Banking Sector and QE periods
(USD bn, 6 months moving average)

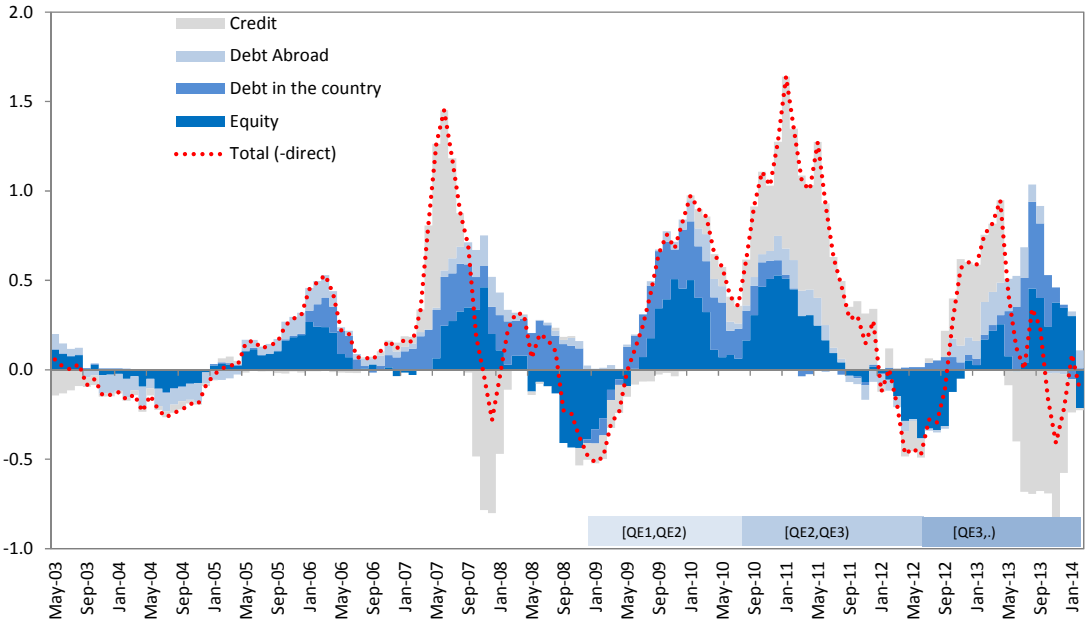

Figure 5. Quantitative Easing Indicator

(USD bn, monthly change in securities held outright in the Fed's balance sheet)

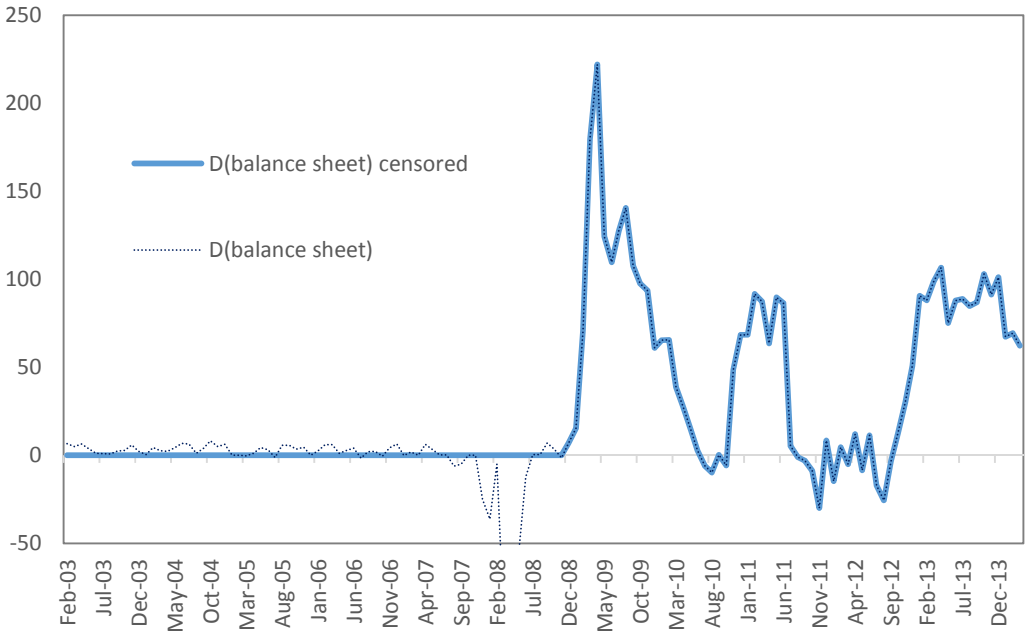

Table 1. Foreign Capital Flows from the US

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.6843 *** | 0.1325 | 0.2495 | 0.2965 | 0.2265 | -0.0814 | -0.2185 | -0.0817 |
| | 2.8955 | 0.4589 | 0.8153 | 0.9605 | 1.1589 | -0.3662 | -0.9837 | -0.3932 |
| QE | 0.0214 *** | 0.0151 *** | 0.0156 *** | 0.0145 ** | 0.0136 *** | 0.0108 ** | 0.0129 *** | 0.0120 *** |
| | 3.6901 | 2.7831 | 2.7776 | 2.4327 | 2.9492 | 2.4763 | 2.8816 | 2.6682 |
| CRISIS | -5.1565 *** | -3.9954 *** | -4.3873 *** | -3.6481 *** | -3.4387 *** | -2.3473 *** | -2.3836 *** | -2.0137 *** |
| | -6.3940 | -4.7710 | -4.3906 | -4.2863 | -4.0237 | -2.8161 | -2.6613 | -2.8297 |
| ROW | | 0.1469 *** | 0.1266 * | 0.1188 | | 0.2286 *** | 0.2356 *** | 0.2266 *** |
| | | 2.7643 | 1.8905 | 1.5909 | | 2.9716 | 3.0691 | 2.8029 |
| R2 | 0.348 | 0.385 | 0.392 | 0.387 | 0.142 | 0.205 | 0.228 | 0.186 |
| AdjR2 | 0.332 | 0.366 | 0.363 | 0.357 | 0.129 | 0.186 | 0.198 | 0.153 |
| QE (USD) | 79.90 *** | 56.64 *** | 58.19 *** | 54.23 ** | 50.92 *** | 40.54 ** | 48.34 *** | 45.01 *** |

| | Direct | | | | Credit | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.3442 *** | 0.1719 *** | 0.1394 * | 0.1568 *** | 0.0469 | 0.0074 | 0.1710 | 0.1091 |
| | 7.2261 | 3.9746 | 1.9783 | 2.8810 | 0.2862 | 0.0429 | 1.1675 | 0.8458 |
| QE | 0.0033 * | 0.0011 | 0.0012 | 0.0008 | 0.0035 | 0.0030 | 0.0007 | 0.0010 |
| | 1.7764 | 0.8224 | 0.8900 | 0.6429 | 0.8690 | 0.8075 | 0.2067 | 0.3008 |
| CRISIS | -0.8755 *** | -0.6728 ** | -0.6512 ** | -0.5339 ** | -0.6631 | -0.5587 | -0.7230 * | -0.5996 * |
| | -2.6774 | -2.3579 | -2.1673 | -2.0675 | -1.3886 | -1.3577 | -1.7795 | -1.8319 |
| ROW | | 0.0797 *** | 0.0869 *** | 0.0778 *** | | 0.1725 | 0.1253 | 0.1054 |
| | | 4.1335 | 4.3737 | 4.2142 | | 1.3348 | 1.0618 | 0.7891 |
| R2 | 0.752 | 0.796 | 0.797 | 0.730 | 0.472 | 0.480 | 0.515 | 0.571 |
| AdjR2 | 0.744 | 0.788 | 0.786 | 0.715 | 0.460 | 0.464 | 0.491 | 0.550 |
| QE (USD) | 12.21 * | 4.08 | 4.34 | 2.83 | 13.28 | 11.19 | 2.77 | 3.64 |

Results from US flows to Brazil regressions for aggregate flow categories. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy in the period. *** 1%, **5% *10%.

Table 2. Foreign Capital Flows from the US, detail

| | Direct: Equity capital | | | | Direct: Affiliated enterprise loans | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.2572 *** | 0.1502 *** | 0.1743 *** | 0.1735 *** | 0.0866 *** | 0.0533 ** | 0.0353 | 0.0379 |
| | 7.8396 | 5.1422 | 3.5710 | 4.2557 | 4.4405 | 2.5210 | 1.2856 | 1.5360 |
| QE | 0.0011 | 0.0004 | 0.0003 | 0.0000 | 0.0015 ** | 0.0006 | 0.0007 | 0.0006 |
| | 1.2476 | 0.3942 | 0.2718 | -0.0525 | 2.1804 | 0.7476 | 0.9192 | 0.8452 |
| CRISIS | -0.7886 *** | -0.7043 *** | -0.7176 *** | -0.5836 *** | -0.0098 | 0.0604 | 0.0621 | 0.0494 |
| | -3.3126 | -3.1336 | -3.1220 | -3.3270 | -0.0774 | 0.5190 | 0.5092 | 0.5021 |
| ROW | | 0.0626 *** | 0.0556 *** | 0.0459 *** | | 0.0714 *** | 0.0802 *** | 0.0762 *** |
| | | 4.8891 | 3.9783 | 3.0437 | | 2.6375 | 3.3323 | 3.3051 |
| R2 | 0.575 | 0.619 | 0.620 | 0.557 | 0.899 | 0.908 | 0.910 | 0.861 |
| AdjR2 | 0.565 | 0.607 | 0.602 | 0.536 | 0.896 | 0.904 | 0.905 | 0.853 |
| QE (USD) | 4.26 | 1.33 | 0.95 | -0.17 | 5.56 ** | 2.13 | 2.57 | 2.30 |

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | -0.0385 | -0.2592 | -0.4174 * | -0.2968 * | 0.3286 *** | 0.2474 * | 0.2376 * | 0.2354 * |
| | -0.2451 | -1.5357 | -1.8884 | -1.8329 | 2.6753 | 1.8690 | 1.7172 | 1.7650 |
| QE | 0.0034 | 0.0001 | 0.0019 | 0.0018 | 0.0077 ** | 0.0077 ** | 0.0082 ** | 0.0076 ** |
| | 0.8103 | 0.0191 | 0.3865 | 0.4141 | 2.2044 | 2.1656 | 2.1431 | 2.0084 |
| CRISIS | -1.7413 ** | -1.0964 | -0.9199 | -0.7623 | -1.4559 *** | -1.0772 *** | -1.3072 *** | -1.0891 *** |
| | -2.0416 | -1.3025 | -1.0064 | -1.1015 | -3.6483 | -3.0952 | -3.3361 | -3.0537 |
| ROW | | 0.2617 *** | 0.2866 *** | 0.2902 *** | | 0.1619 | 0.1314 | 0.1274 |
| | | 3.1099 | 3.4900 | 3.7293 | | 1.4623 | 1.2038 | 1.2413 |
| R2 | 0.059 | 0.149 | 0.193 | 0.205 | 0.347 | 0.365 | 0.381 | 0.347 |
| AdjR2 | 0.044 | 0.129 | 0.161 | 0.173 | 0.327 | 0.340 | 0.346 | 0.310 |
| QE (USD) | 12.77 | 0.32 | 7.15 | 6.62 | 28.65 ** | 28.84 ** | 30.81 ** | 28.49 ** |

| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.3637 *** | 0.0930 | 0.0913 | 0.0796 | 0.0033 | 0.0171 | 0.0339 | 0.0605 |
| | 4.2247 | 1.0846 | 0.9683 | 1.0025 | 0.0441 | 0.2259 | 0.5004 | 0.8592 |
| QE | 0.0029 | 0.0019 | 0.0021 | 0.0024 | 0.0038 *** | 0.0037 *** | 0.0034 *** | 0.0028 ** |
| | 1.0951 | 0.7786 | 0.8115 | 0.9605 | 2.8598 | 2.9740 | 2.8313 | 2.2451 |
| CRISIS | -1.0738 *** | -0.5401 * | -0.6411 * | -0.5680 ** | -0.3073 * | -0.4160 ** | -0.4425 ** | -0.3631 * |
| | -3.0301 | -1.7346 | -1.8866 | -2.0705 | -1.8878 | -2.1836 | -2.0212 | -1.9499 |
| ROW | | 0.8754 *** | 0.8670 *** | 0.8620 *** | | -0.0682 | -0.0736 | -0.0738 |
| | | 7.1249 | 6.8665 | 7.0339 | | -1.0383 | -1.0971 | -0.9863 |
| R2 | 0.295 | 0.503 | 0.511 | 0.497 | 0.494 | 0.499 | 0.500 | 0.531 |
| AdjR2 | 0.273 | 0.483 | 0.484 | 0.469 | 0.478 | 0.479 | 0.472 | 0.505 |
| QE (USD) | 10.74 | 7.18 | 8.01 | 8.93 | 14.39 *** | 13.72 *** | 12.75 *** | 10.62 ** |

Results from US flows to Brazil regressions for disaggregate flow categories. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy in the period. *** 1%, **5% *10%.

Table 3. Foreign Capital Flows from the US to Banks

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.1970 * | 0.0999 | 0.1190 | 0.1008 | 0.1052 ** | 0.0634 | 0.0285 | 0.0316 |
| | 1.8482 | 1.1464 | 1.1347 | 1.1840 | 2.1707 | 1.5440 | 0.6611 | 0.8999 |
| QE | 0.0035 | 0.0034 | 0.0032 | 0.0032 | 0.0029 *** | 0.0028 *** | 0.0033 *** | 0.0032 *** |
| | 1.5202 | 1.4378 | 1.2147 | 1.3635 | 2.7287 | 2.7965 | 3.2424 | 3.2558 |
| CRISIS | -1.3658 *** | -0.9679 *** | -0.9768 *** | -0.8105 *** | -0.8244 *** | -0.6254 *** | -0.6027 *** | -0.4663 *** |
| | -4.8145 | -3.0069 | -3.1698 | -3.6033 | -4.6951 | -3.5257 | -3.1260 | -3.0441 |
| ROW | | 0.1364 ** | 0.1343 ** | 0.1293 ** | | 0.0830 ** | 0.0838 ** | 0.0998 ** |
| | | 2.3376 | 2.4062 | 2.5968 | | 2.1669 | 2.1286 | 2.5306 |
| R2 | 0.278 | 0.319 | 0.321 | 0.294 | 0.377 | 0.410 | 0.431 | 0.397 |
| AdjR2 | 0.261 | 0.298 | 0.288 | 0.260 | 0.363 | 0.392 | 0.404 | 0.368 |
| QE (USD) | 13.24 | 12.86 | 11.81 | 11.94 | 10.99 *** | 10.37 *** | 12.39 *** | 12.05 *** |

| | Direct | | | | Credit/4 | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | -0.0017 | -0.0027 | 0.0000 | -0.0006 | 0.0432 | 0.0409 | 0.0783 | 0.0565 |
| | -0.3462 | -0.5506 | -0.0082 | -0.1299 | 0.5961 | 0.5519 | 1.0599 | 0.9022 |
| QE | 0.0001 | 0.0001 | 0.0001 | 0.0001 | -0.0001 | -0.0001 | -0.0007 | -0.0005 |
| | 1.2867 | 1.2655 | 0.8807 | 0.8006 | -0.0558 | -0.0559 | -0.3283 | -0.2564 |
| CRISIS | -0.0190 | -0.0183 | -0.0240 | -0.0193 | -0.1604 | -0.1514 | -0.1301 | -0.1226 |
| | -1.1947 | -1.1494 | -1.3923 | -1.2980 | -0.6254 | -0.5839 | -0.4909 | -0.5977 |
| ROW | | 0.0256 | 0.0228 | 0.0241 | | 0.0143 | 0.0055 | -0.0113 |
| | | 1.2314 | 1.0762 | 1.0642 | | 0.1752 | 0.0681 | -0.1497 |
| R2 | 0.836 | 0.838 | 0.842 | 0.819 | 0.408 | 0.409 | 0.418 | 0.363 |
| AdjR2 | 0.825 | 0.826 | 0.827 | 0.802 | 0.390 | 0.385 | 0.385 | 0.327 |
| QE (USD) | 0.55 | 0.56 | 0.43 | 0.38 | -0.45 | -0.45 | -2.72 | -1.86 |

Results from US flows to Brazilian banking sector regression for aggregate flow categories. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy in the period. *** 1%, **5% *10%.

Table 4. Foreign Capital Flows from the US to Banks, detail

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0016 | -0.0669 * | -0.1037 ** | -0.0755 ** | 0.1036 *** | 0.0937 *** | 0.0838 *** | 0.0690 *** |
| | 0.0461 | -1.7444 | -2.0506 | -1.9879 | 3.8071 | 3.4979 | 2.9765 | 3.0231 |
| QE | 0.0012 | 0.0002 | 0.0006 | 0.0006 | 0.0016 ** | 0.0016 ** | 0.0018 ** | 0.0017 ** |
| | 1.2461 | 0.2125 | 0.6266 | 0.6339 | 2.0912 | 2.1055 | 2.1868 | 2.2594 |
| CRISIS | -0.4247 ** | -0.2287 | -0.1956 | -0.1643 | -0.3843 *** | -0.3265 ** | -0.3352 ** | -0.2448 ** |
| | -2.3793 | -1.4143 | -1.1043 | -1.2033 | -3.3609 | -2.5489 | -2.4094 | -2.1792 |
| ROW | | 0.3783 *** | 0.4049 *** | 0.4106 *** | | 0.0305 | 0.0278 | 0.0447 |
| | | 4.2291 | 4.8070 | 5.3168 | | 1.1075 | 0.9866 | 1.5632 |
| R2 | 0.067 | 0.226 | 0.269 | 0.287 | 0.526 | 0.532 | 0.536 | 0.469 |
| AdjR2 | 0.052 | 0.207 | 0.240 | 0.258 | 0.515 | 0.518 | 0.514 | 0.443 |
| QE (USD) | 4.39 | 0.73 | 2.38 | 2.21 | 6.11 ** | 6.17 ** | 6.84 ** | 6.54 ** |

| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0732 *** | -0.0162 | -0.0165 | -0.0122 | 0.0228 | 0.0205 | 0.0171 | 0.0129 |
| | 3.3508 | -1.3674 | -1.3538 | -1.2512 | 1.4887 | 1.2760 | 1.0192 | 0.8155 |
| QE | 0.0002 | -0.0004 | -0.0003 | -0.0003 | 0.0007 ** | 0.0007 ** | 0.0008 ** | 0.0007 * |
| | 0.4318 | -1.2547 | -1.1020 | -1.1249 | 1.9820 | 2.0267 | 2.0664 | 1.9325 |
| CRISIS | -0.1976 *** | -0.0065 | -0.0114 | -0.0151 | -0.0990 * | -0.0820 | -0.0572 | -0.0246 |
| | -2.8363 | -0.1739 | -0.3099 | -0.5296 | -1.7998 | -1.3325 | -0.8850 | -0.4611 |
| ROW | | 1.1151 *** | 1.1083 *** | 1.0837 *** | | 0.0099 | 0.0131 | 0.0245 * |
| | | 11.4810 | 10.6037 | 12.2958 | | 0.8408 | 1.1485 | 1.7168 |
| R2 | 0.330 | 0.688 | 0.689 | 0.683 | 0.695 | 0.697 | 0.701 | 0.627 |
| AdjR2 | 0.309 | 0.676 | 0.671 | 0.665 | 0.683 | 0.682 | 0.682 | 0.603 |
| QE (USD) | 0.90 | -1.37 | -1.29 | -1.18 | 2.72 ** | 2.76 ** | 2.86 ** | 2.56 * |

Results from US flows to Brazilian banking sector regressions for disaggregate flow categories. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy in the period. *** 1%, **5% *10%.

Table 5. Foreign Capital Flows from the US, each episode

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.6640 *** | 0.2581 | 0.4590 | 0.4583 | 0.2436 | -0.0544 | -0.1891 | -0.0542 |
| | 2.7590 | 0.8913 | 1.4707 | 1.4337 | 1.2525 | -0.2410 | -0.8337 | -0.2507 |
| QE1 | 0.0143 * | 0.0125 * | 0.0124 | 0.0115 | 0.0170 ** | 0.0144 * | 0.0164 ** | 0.0146 ** |
| | 1.8157 | 1.6653 | 1.6002 | 1.5276 | 2.0797 | 1.9520 | 2.1553 | 2.0257 |
| QE2 | 0.0477 *** | 0.0375 *** | 0.0387 *** | 0.0378 ** | 0.0188 * | 0.0125 | 0.0138 | 0.0126 |
| | 4.1059 | 2.9966 | 2.6222 | 2.4072 | 1.7041 | 1.3076 | 1.5571 | 1.3959 |
| QE3 | 0.0171 *** | 0.0121 * | 0.0122 * | 0.0109 | 0.0081 | 0.0069 | 0.0093 | 0.0082 |
| | 2.8227 | 1.7925 | 1.8166 | 1.5610 | 1.2306 | 1.1569 | 1.5129 | 1.2455 |
| CRISIS | -4.2571 *** | -3.7359 *** | -4.1898 *** | -3.4622 *** | -3.8162 *** | -2.7865 ** | -2.8188 ** | -2.2949 ** |
| | -3.7291 | -3.3791 | -3.4649 | -3.5807 | -3.0560 | -2.4100 | -2.2760 | -2.3819 |
| ROW | | 0.1106 * | 0.0786 | 0.0721 | | 0.2199 *** | 0.2275 *** | 0.2192 *** |
| | | 1.9259 | 1.0510 | 0.8621 | | 2.8229 | 2.9385 | 2.6453 |
| R2 | 0.392 | 0.411 | 0.419 | 0.407 | 0.159 | 0.215 | 0.237 | 0.191 |
| AdjR2 | 0.368 | 0.383 | 0.381 | 0.369 | 0.132 | 0.184 | 0.194 | 0.146 |
| QE1 (USD) | 22.46 * | 19.54 * | 19.45 | 18.00 | 26.55 ** | 22.58 * | 25.71 ** | 22.82 ** |
| QE2 (USD) | 25.87 *** | 20.34 *** | 20.96 *** | 20.48 ** | 10.180 * | 6.792 | 7.455 | 6.843 |
| QE3 (USD) | 23.40 *** | 16.47 * | 16.62 * | 14.93 | 11.05 | 9.43 | 12.67 | 11.15 |
| QE (USD) | 71.72 *** | 56.34 *** | 57.03 *** | 53.41 *** | 47.787 *** | 38.799 ** | 45.832 *** | 40.817 ** |

| | Direct | | | | Credit | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.3249 *** | 0.2023 *** | 0.1961 *** | 0.1928 *** | 0.0354 | 0.0126 | 0.1876 | 0.1177 |
| | 7.1759 | 4.7755 | 2.8603 | 3.4604 | 0.2044 | 0.0692 | 1.2245 | 0.8649 |
| QE1 | -0.0015 | -0.0017 | -0.0017 | -0.0016 | -0.0007 | -0.0008 | -0.0029 ** | -0.0024 ** |
| | -1.2376 | -1.3973 | -1.2811 | -1.2732 | -0.5270 | -0.6242 | -2.4187 | -2.1451 |
| QE2 | 0.0063 *** | 0.0032 | 0.0031 | 0.0035 | 0.0216 ** | 0.0206 ** | 0.0187 * | 0.0186 ** |
| | 4.3707 | 1.3699 | 1.3981 | 1.5748 | 2.3318 | 2.1382 | 1.8799 | 1.9895 |
| QE3 | 0.0069 *** | 0.0045 *** | 0.0045 *** | 0.0042 ** | 0.0000 | -0.0001 | -0.0030 | -0.0028 |
| | 3.6840 | 2.6512 | 2.7058 | 2.5006 | 0.0064 | -0.0285 | -0.6361 | -0.5856 |
| CRISIS | -0.2878 | -0.3081 | -0.3092 | -0.2802 | -0.1450 ** | -0.1075 | -0.2878 | -0.2464 * |
| | -1.0574 | -1.1765 | -1.1232 | -1.2233 | -2.1092 | -1.0386 | -1.6221 | -1.6649 |
| ROW | | 0.0592 *** | 0.0607 *** | 0.0540 *** | | 0.1011 | 0.0468 | 0.0335 |
| | | 3.1106 | 3.2939 | 3.0813 | | 0.9439 | 0.4529 | 0.2754 |
| R2 | 0.795 | 0.816 | 0.816 | 0.751 | 0.522 | 0.525 | 0.561 | 0.602 |
| AdjR2 | 0.785 | 0.805 | 0.802 | 0.732 | 0.503 | 0.502 | 0.533 | 0.576 |
| QE1 (USD) | -2.34 | -2.72 | -2.65 | -2.48 | -1.06 | -1.28 | -4.57 ** | -3.77 ** |
| QE2 (USD) | 3.42 *** | 1.71 | 1.69 | 1.89 | 11.727 ** | 11.144 ** | 10.110 * | 10.061 ** |
| QE3 (USD) | 9.45 *** | 6.19 *** | 6.19 *** | 5.80 ** | 0.05 | -0.19 | -4.14 | -3.86 |
| QE (USD) | 10.52 *** | 5.19 | 5.22 | 5.21 | 10.711 | 9.677 | 1.397 | 2.437 |

Results from US flows to Brazil regressions for aggregate flow categories and each policy round. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 6. Foreign Capital Flows from the US, each episode, detail

| | Direct: Equity capital | | | | Direct: Affiliated enterprise loans | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.2469 *** | 0.1518 *** | 0.1811 *** | 0.1723 *** | 0.0005 | 0.0086 | 0.0222 | 0.0525 |
| | 7.2137 | 4.8430 | 3.4531 | 4.0105 | 0.0066 | 0.1078 | 0.3186 | 0.7209 |
| QE1 | -0.0014 | -0.0014 | -0.0016 | -0.0015 | 0.0034 *** | 0.0032 *** | 0.0030 *** | 0.0027 ** |
| | -1.2106 | -1.1669 | -1.2776 | -1.2427 | 3.7234 | 3.0371 | 2.7980 | 2.3873 |
| QE2 | 0.0017 * | -0.0003 | -0.0002 | 0.0000 | -0.0001 | 0.0006 | 0.0005 | 0.0001 |
| | 1.9263 | -0.2229 | -0.1337 | 0.0331 | -0.0519 | 0.2086 | 0.1695 | 0.0220 |
| QE3 | 0.0035 *** | 0.0026 *** | 0.0025 *** | 0.0022 *** | 0.0059 *** | 0.0056 *** | 0.0053 *** | 0.0047 ** |
| | 5.4086 | 3.4301 | 3.1957 | 2.8279 | 3.3748 | 3.0086 | 2.6897 | 2.0722 |
| CRISIS | -0.4787 ** | -0.4889 ** | -0.4931 ** | -0.4308 ** | -0.2440 * | -0.2938 * | -0.3198 * | -0.2993 * |
| | -2.3817 | -2.3596 | -2.2378 | -2.2948 | -1.9496 | -1.8951 | -1.7068 | -1.8420 |
| ROW | | 0.0572 *** | 0.0481 *** | 0.0408 ** | | -0.0410 | -0.0462 | -0.0523 |
| | | 3.6359 | 2.7474 | 2.2826 | | -0.5581 | -0.6170 | -0.6170 |
| R2 | 0.610 | 0.643 | 0.645 | 0.578 | 0.503 | 0.505 | 0.505 | 0.534 |
| AdjR2 | 0.595 | 0.626 | 0.622 | 0.550 | 0.479 | 0.477 | 0.469 | 0.500 |
| QE1 (USD) | -2.16 | -2.18 | -2.50 | -2.28 | 5.35 *** | 4.97 *** | 4.68 *** | 4.20 ** |
| QE2 (USD) | 0.93 * | -0.15 | -0.08 | 0.02 | -0.08 | 0.35 | 0.29 | 0.04 |
| QE3 (USD) | 4.78 *** | 3.56 *** | 3.41 *** | 3.02 *** | 8.09 *** | 7.60 *** | 7.23 *** | 6.39 ** |
| QE (USD) | 3.55 | 1.23 | 0.82 | 0.76 | 13.36 *** | 12.92 *** | 12.20 *** | 10.63 ** |

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | -0.0115 | -0.2172 | -0.3687 * | -0.2512 | 0.3279 ** | 0.2246 * | 0.2099 | 0.2211 |
| | -0.0773 | -1.3392 | -1.7078 | -1.5417 | 2.4714 | 1.6675 | 1.4176 | 1.5548 |
| QE1 | 0.0087 | 0.0046 | 0.0058 | 0.0042 | 0.0078 *** | 0.0089 *** | 0.0097 *** | 0.0091 *** |
| | 1.6433 | 0.8843 | 1.0454 | 0.8719 | 2.7615 | 2.9920 | 2.9232 | 2.6725 |
| QE2 | 0.0161 ** | 0.0131 *** | 0.0149 *** | 0.0140 *** | 0.0019 | -0.0015 | -0.0011 | -0.0015 |
| | 2.4807 | 2.7168 | 3.1661 | 3.3266 | 0.6369 | -0.5224 | -0.3741 | -0.4355 |
| QE3 | -0.0071 | -0.0090 | -0.0069 | -0.0074 | 0.0101 ** | 0.0106 ** | 0.0111 ** | 0.0103 * |
| | -1.3128 | -1.6097 | -1.0869 | -1.1818 | 2.0946 | 2.2536 | 2.1734 | 1.8128 |
| CRISIS | -2.3760 ** | -1.6745 * | -1.4266 | -1.0540 | -1.4499 *** | -1.0829 *** | -1.3201 *** | -1.1489 *** |
| | -2.4327 | -1.7516 | -1.3858 | -1.3704 | -4.4390 | -3.1063 | -3.3580 | -3.4223 |
| ROW | | 0.2372 *** | 0.2626 *** | 0.2659 *** | | 0.2128 ** | 0.1844 ** | 0.1684 * |
| | | 2.9519 | 3.3343 | 3.4777 | | 2.1948 | 2.0336 | 1.9339 |
| R2 | 0.163 | 0.236 | 0.275 | 0.271 | 0.356 | 0.384 | 0.401 | 0.361 |
| AdjR2 | 0.136 | 0.205 | 0.234 | 0.230 | 0.326 | 0.349 | 0.356 | 0.314 |
| QE1 (USD) | 13.54 | 7.24 | 9.07 | 6.61 | 12.17 *** | 13.98 *** | 15.11 *** | 14.30 *** |
| QE2 (USD) | 8.716 ** | 7.105 *** | 8.058 *** | 7.611 *** | 1.039 | -0.799 | -0.597 | -0.795 |
| QE3 (USD) | -9.69 | -12.33 | -9.45 | -10.13 | 13.80 ** | 14.48 ** | 15.22 ** | 14.05 * |
| QE (USD) | 12.562 | 2.007 | 7.671 | 4.096 | 27.015 *** | 27.653 *** | 29.737 *** | 27.550 *** |

(Continues on the next page)

Table 6. (Continuation) Foreign Capital Flows from the US, each episode, detail

| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.3691 *** | 0.0865 | 0.0910 | 0.0855 | 0.0005 | 0.0086 | 0.0222 | 0.0525 |
| | 4.3887 | 0.8655 | 0.8565 | 0.9343 | 0.0066 | 0.1078 | 0.3186 | 0.7209 |
| QE1 | 0.0041 | 0.0037 | 0.0040 | 0.0037 | 0.0034 *** | 0.0032 *** | 0.0030 *** | 0.0027 ** |
| | 1.5777 | 1.3092 | 1.3002 | 1.2468 | 3.7234 | 3.0371 | 2.7980 | 2.3873 |
| QE2 | 0.0016 | 0.0048 ** | 0.0045 ** | 0.0044 ** | -0.0001 | 0.0006 | 0.0005 | 0.0001 |
| | 0.4756 | 2.4654 | 2.4707 | 2.4584 | -0.0519 | 0.2086 | 0.1695 | 0.0220 |
| QE3 | 0.0021 | -0.0019 | -0.0016 | -0.0017 | 0.0059 *** | 0.0056 *** | 0.0053 *** | 0.0047 ** |
| | 0.3620 | -0.4719 | -0.3580 | -0.3781 | 3.3748 | 3.0086 | 2.6897 | 2.0722 |
| CRISIS | -1.2115 *** | -0.7328 ** | -0.8423 ** | -0.7029 ** | -0.2440 * | -0.2938 * | -0.3198 * | -0.2993 * |
| | -3.4594 | -2.1334 | -2.2086 | -2.1885 | -1.9496 | -1.8951 | -1.7068 | -1.8420 |
| ROW | | 0.9321 *** | 0.9221 *** | 0.9032 *** | | -0.0410 | -0.0462 | -0.0523 |
| | | 6.3642 | 6.2798 | 6.3200 | | -0.5581 | -0.6170 | -0.6170 |
| R2 | 0.298 | 0.519 | 0.527 | 0.511 | 0.503 | 0.505 | 0.505 | 0.534 |
| AdjR2 | 0.264 | 0.492 | 0.492 | 0.475 | 0.479 | 0.477 | 0.469 | 0.500 |
| QE1 (USD) | 6.35 | 5.84 | 6.20 | 5.84 | 5.35 *** | 4.97 *** | 4.68 *** | 4.20 ** |
| QE2 (USD) | 0.871 | 2.579 ** | 2.417 ** | 2.386 ** | -0.077 | 0.348 | 0.288 | 0.041 |
| QE3 (USD) | 2.84 | -2.53 | -2.24 | -2.33 | 8.09 *** | 7.60 *** | 7.23 *** | 6.39 ** |
| QE (USD) | 10.059 | 5.890 | 6.376 | 5.900 | 13.362 *** | 12.921 *** | 12.199 *** | 10.631 ** |

Results from US flows to Brazil regressions for disaggregate flow categories and each policy round. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 7. Foreign Capital Flows from the US to Banks, each episode

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.1992 * | 0.1343 | 0.1620 | 0.1328 | 0.1115 ** | 0.0750 * | 0.0410 | 0.0427 |
| | 1.8246 | 1.6412 | 1.4873 | 1.4737 | 2.2984 | 1.7961 | 0.9317 | 1.1839 |
| QE1 | 0.0029 * | 0.0031 | 0.0027 | 0.0025 | 0.0040 ** | 0.0041 ** | 0.0046 *** | 0.0043 *** |
| | 1.6606 | 1.4657 | 1.1818 | 1.1931 | 2.3588 | 2.5502 | 2.7986 | 2.8284 |
| QE2 | 0.0150 *** | 0.0123 *** | 0.0122 ** | 0.0123 *** | 0.0053 ** | 0.0036 | 0.0041 * | 0.0034 |
| | 2.6263 | 2.6839 | 2.2821 | 2.8213 | 2.2961 | 1.5131 | 1.8059 | 1.4637 |
| QE3 | 0.0000 | 0.0006 | 0.0001 | -0.0001 | 0.0007 | 0.0010 | 0.0016 | 0.0014 |
| | -0.0113 | 0.2660 | 0.0477 | -0.0194 | 0.3652 | 0.5451 | 0.8744 | 0.7298 |
| CRISIS | -1.2835 *** | -1.0469 *** | -1.0606 *** | -0.8446 *** | -0.9473 *** | -0.8039 *** | -0.7754 *** | -0.5882 *** |
| | -5.3645 | -3.5177 | -3.7858 | -3.9288 | -3.8637 | -3.5463 | -3.1953 | -3.1564 |
| ROW | | 0.0909 | 0.0870 | 0.0874 ** | | 0.0732 * | 0.0740 * | 0.0941 ** |
| | | 1.4664 | 1.5274 | 1.9973 | | 1.9742 | 1.8930 | 2.3697 |
| R2 | 0.331 | 0.347 | 0.350 | 0.324 | 0.409 | 0.431 | 0.450 | 0.413 |
| AdjR2 | 0.305 | 0.316 | 0.308 | 0.280 | 0.386 | 0.403 | 0.414 | 0.375 |
| QE1 (USD) | 4.53 * | 4.81 | 4.20 | 3.98 | 6.25 ** | 6.44 ** | 7.15 *** | 6.68 *** |
| QE2 (USD) | 8.13 *** | 6.67 *** | 6.59 ** | 6.65 *** | 2.861 ** | 1.943 | 2.203 * | 1.868 |
| QE3 (USD) | -0.05 | 0.87 | 0.19 | -0.08 | 0.91 | 1.32 | 2.16 | 1.85 |
| QE (USD) | 12.61 * | 12.35 ** | 10.98 | 10.56 | 10.020 ** | 9.696 ** | 11.518 *** | 10.397 *** |

| | Direct | | | | Credit/4 | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | -0.0025 | -0.0036 | -0.0009 | -0.0016 | 0.0420 | 0.0425 | 0.0843 | 0.0613 |
| | -0.5087 | -0.7553 | -0.1899 | -0.4013 | 0.6047 | 0.5975 | 1.1210 | 0.9643 |
| QE1 | -0.0001 | -0.0001 | -0.0001 | -0.0001 | -0.0011 ** | -0.0011 * | -0.0018 *** | -0.0016 ** |
| | -0.7875 | -0.7599 | -0.9597 | -0.9284 | -1.9853 | -1.9653 | -2.6534 | -2.4263 |
| QE2 | 0.0007 | 0.0007 * | 0.0006 | 0.0006 | 0.0097 *** | 0.0097 *** | 0.0095 *** | 0.0097 *** |
| | 1.5837 | 1.7393 | 1.3995 | 1.3919 | 2.9381 | 2.9182 | 2.9220 | 3.2024 |
| QE3 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | -0.0028 | -0.0028 | -0.0036 | -0.0036 |
| | 1.3055 | 1.3390 | 1.0179 | 1.0722 | -0.6820 | -0.6781 | -0.8659 | -0.8618 |
| CRISIS | 0.0106 | 0.0126 | 0.0060 | 0.0047 | -0.0500 | -0.0519 | -0.0107 | -0.0126 |
| | 0.9549 | 0.9487 | 0.4544 | 0.4200 | -1.2455 | -0.8981 | -0.1145 | -0.1692 |
| ROW | | 0.0278 | 0.0245 | 0.0256 | | -0.0032 | -0.0146 | -0.0291 |
| | | 1.3572 | 1.2114 | 1.1892 | | -0.0439 | -0.1988 | -0.3961 |
| R2 | 0.844 | 0.847 | 0.850 | 0.827 | 0.459 | 0.459 | 0.473 | 0.420 |
| AdjR2 | 0.831 | 0.833 | 0.833 | 0.808 | 0.433 | 0.429 | 0.434 | 0.377 |
| QE1 (USD) | -0.10 | -0.12 | -0.15 | -0.14 | -1.64 ** | -1.65 ** | -2.80 *** | -2.51 ** |
| QE2 (USD) | 0.37 | 0.37 * | 0.34 | 0.35 | 5.263 *** | 5.270 *** | 5.164 *** | 5.258 *** |
| QE3 (USD) | 0.23 | 0.24 | 0.18 | 0.20 | -3.76 | -3.77 | -4.87 | -4.93 |
| QE (USD) | 0.49 | 0.50 | 0.38 | 0.40 | -0.142 | -0.143 | -2.510 | -2.185 |

Results from US flows to Brazilian banking sector regressions for aggregate flow categories and each policy round. Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 8. Foreign Capital Flows from the US to Banks, each episode, detail

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0084 | -0.0579 * | -0.0932 ** | -0.0659 * | 0.1033 *** | 0.0894 ** | 0.0793 ** | 0.0657 ** |
| | 0.2709 | -1.7169 | -1.9924 | -1.8284 | 2.8893 | 2.5504 | 2.1951 | 2.0894 |
| QE1 | 0.0024 * | 0.0011 | 0.0014 | 0.0011 | 0.0016 ** | 0.0018 ** | 0.0019 ** | 0.0020 *** |
| | 1.7632 | 0.9375 | 1.1117 | 0.8801 | 2.2172 | 2.3853 | 2.5625 | 2.8106 |
| QE2 | 0.0041 ** | 0.0033 *** | 0.0037 *** | 0.0035 *** | 0.0012 | 0.0002 | 0.0004 | 0.0000 |
| | 2.4926 | 3.2607 | 3.6908 | 3.8418 | 1.3619 | 0.1805 | 0.3322 | -0.0297 |
| QE3 | -0.0013 | -0.0019 ** | -0.0014 | -0.0015 | 0.0019 | 0.0022 | 0.0023 | 0.0023 |
| | -1.3513 | -1.9948 | -1.3142 | -1.3737 | 1.0215 | 1.1770 | 1.2280 | 1.1753 |
| CRISIS | -0.5768 *** | -0.3491 * | -0.3000 | -0.2199 | -0.3704 *** | -0.3114 *** | -0.3163 *** | -0.2455 *** |
| | -2.7746 | -1.8276 | -1.4339 | -1.3532 | -5.2557 | -4.4273 | -4.1900 | -3.8082 |
| ROW | | 0.3555 *** | 0.3824 *** | 0.3878 *** | | 0.0448 | 0.0421 | 0.0607 |
| | | 4.6118 | 5.1763 | 5.3988 | | 1.2748 | 1.1732 | 1.6291 |
| R2 | 0.175 | 0.313 | 0.351 | 0.352 | 0.527 | 0.538 | 0.541 | 0.477 |
| AdjR2 | 0.149 | 0.286 | 0.315 | 0.316 | 0.509 | 0.516 | 0.511 | 0.443 |
| QE1 (USD) | 3.81 * | 1.79 | 2.25 | 1.66 | 2.43 ** | 2.80 ** | 3.05 ** | 3.19 *** |
| QE2 (USD) | 2.231 ** | 1.803 *** | 2.022 *** | 1.915 *** | 0.628 | 0.120 | 0.226 | -0.021 |
| QE3 (USD) | -1.83 | -2.61 ** | -1.92 | -2.04 | 2.62 | 2.95 | 3.21 | 3.10 |
| QE (USD) | 4.212 | 0.980 | 2.352 | 1.533 | 5.685 * | 5.871 ** | 6.484 ** | 6.269 ** |



| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0739 *** | -0.0169 | -0.0169 | -0.0120 | 0.0202 | 0.0195 | 0.0155 | 0.0103 |
| | 2.8766 | -1.2961 | -1.2732 | -1.1300 | 1.2891 | 1.1674 | 0.9085 | 0.6479 |
| QE1 | 0.0004 | -0.0002 | -0.0002 | -0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0002 |
| | 1.2008 | -1.2864 | -1.1995 | -1.3992 | 0.4674 | 0.4937 | 0.4479 | 0.7538 |
| QE2 | -0.0002 | 0.0001 | 0.0001 | 0.0000 | 0.0015 *** | 0.0014 ** | 0.0014 ** | 0.0011 |
| | -0.3728 | 0.3825 | 0.3162 | 0.1245 | 3.0436 | 2.3822 | 2.3145 | 1.4364 |
| QE3 | 0.0002 | -0.0007 | -0.0007 | -0.0007 | 0.0010 | 0.0010 | 0.0011 | 0.0011 |
| | 0.2251 | -1.0035 | -0.9404 | -0.8763 | 1.4884 | 1.4820 | 1.5737 | 1.5183 |
| CRISIS | -0.2221 *** | -0.0211 | -0.0255 | -0.0240 | -0.0222 | -0.0184 | 0.0119 | 0.0220 |
| | -4.7935 | -0.7677 | -0.9502 | -1.1672 | -0.6032 | -0.4521 | 0.2553 | 0.5030 |
| ROW | | 1.1323 *** | 1.1270 *** | 1.0953 *** | | 0.0034 | 0.0068 | 0.0213 |
| | | 10.586 | 9.784 | 11.392 | | 0.2298 | 0.4707 | 1.2323 |
| R2 | 0.332 | 0.693 | 0.693 | 0.686 | 0.702 | 0.702 | 0.708 | 0.632 |
| AdjR2 | 0.300 | 0.675 | 0.670 | 0.663 | 0.685 | 0.683 | 0.684 | 0.601 |
| QE1 (USD) | 0.70 | -0.38 | -0.35 | -0.37 | 0.18 | 0.21 | 0.21 | 0.36 |
| QE2 (USD) | -0.110 | 0.040 | 0.038 | 0.015 | 0.792 *** | 0.753 ** | 0.769 ** | 0.597 |
| QE3 (USD) | 0.31 | -1.02 | -1.00 | -0.95 | 1.36 | 1.39 | 1.49 | 1.55 |
| QE (USD) | 0.899 | -1.354 | -1.309 | -1.299 | 2.332 ** | 2.356 ** | 2.470 ** | 2.511 ** |

Results from US flows to Brazilian banking sector regressions for disaggregate flow categories and each policy round.column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last row shows the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 9. Foreign Capital Flows from the US (Panel Data: 17 EME)

| | Portfolio: Total | | | | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv | i | ii | iii | iv |
| QE | 0.0025 *** | 0.0017 *** | 0.0021 *** | 0.0020 *** | 0.0016 *** | 0.0013 ** | 0.0015 *** | 0.0016 *** | 0.0008 * | 0.0003 | 0.0005 | 0.0053 |
| | 3.9116 | 2.8019 | 3.1814 | 3.5073 | 3.3868 | 2.8259 | 3.1434 | 3.5192 | 1.8660 | 0.8119 | 1.0248 | 1.3171 |
| CRISIS | -1.4386 *** | -0.5167 | -0.5402 | -0.6239 | -0.833 *** | -0.4464 | -0.5392 * | -0.5184 | -0.6191 ** | 0.0085 | 0.0807 | -0.0484 |
| | -3.8858 | -1.2941 | -1.3008 | median | -2.9605 | -1.6007 | -1.8620 | median | -2.3337 | 0.0334 | 0.3117 | median |
| TOT | | 0.1279 *** | 0.1291 *** | 0.0716 | | 0.1400 *** | 0.1381 *** | 0.0426 | | 0.1340 *** | 0.1377 *** | 0.1521 |
| | | 3.9539 | 4.0068 | median | | 3.1002 | 3.0592 | median | | 4.8664 | 5.0090 | median |
| R2 | 0.052 | 0.132 | 0.137 | 0.312 | 0.027 | 0.094 | 0.099 | 0.194 | 0.044 | 0.138 | 0.141 | 0.299 |
| AdjR2 | 0.050 | 0.127 | 0.131 | 0.269 | 0.026 | 0.090 | 0.095 | 0.167 | 0.042 | 0.133 | 0.136 | 0.257 |
| QE (%) | 79.92 *** | 55.57 *** | 65.60 *** | 64.69 *** | 74.15 *** | 60.05 *** | 70.10 *** | 74.32 *** | 85.59 ** | 35.38 | 46.54 | 54.28 |
| QE (USD) | 158.64 *** | 111.22 *** | 131.29 *** | 129.47 *** | 102.39 *** | 82.93 ** | 96.81 *** | 102.62 *** | 53.10 ** | 21.95 | 28.87 | 33.67 |

Results from US portfolio flows (TIC data) to 17 Emerging Market Economies. Proxy variable TOT is the country specific residual of total flows (IFS data) regressed on QE policy. QE policy is the change in Fed balance sheet. All regressions allow for heterogeneous intercepts. Column (i) omits the TOT proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown) and (iv) allows heterogeneity in all coefficients except QE effect. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from White robust standard errors. All results robust to generated regressors, as verified by bootsrapping the TOT regression. The last rows shows the total global effect of QE policy in the period as a percentage of US portfolio flows to the countries in the sample and in dollars. *** 1%, **5% *10%.

## Appendix

This appendix reports additional results for Brazil's capital flow dataset. The tables here follow the same structure as Tables 5-8. The only difference is that we now include own lag of the dependent variable as control, as well as dummy variables representing the duration of the capital flow taxes on debt flow, equity flows except american depositary receipts (ADR) and ADR flows. To facilitate cross-referencing with the tables in the main text, we number the tables here from A-5 to A-8. As mentioned in the results section of the main text, results with the additional controls are broadly consistent with the ones without such controls. Yet, some effects are no longer significant, particularly for foreign direct investment and credit flows. For portfolio flows, QE3 gains importance relative to the QE1, particularly for portfolio flows.

Table 9. Foreign Capital Flows from the US, each episode, with own lag and IOF controls

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.3564 | 0.2071 | 0.4707 | 0.5206 | 0.3173 | 0.1152 | 0.3009 | 0.3987 |
| | 1.2373 | 0.6807 | 1.3311 | 1.4772 | 1.4932 | 0.4728 | 0.9140 | 1.2272 |
| QE1 | 0.0138 ** | 0.0125 ** | 0.0110 * | 0.0092 | 0.0141 ** | 0.0122 * | 0.0116 | 0.0095 |
| | 2.2512 | 1.9840 | 1.6605 | 1.4642 | 2.0345 | 1.7330 | 1.5153 | 1.3467 |
| QE2 | 0.0327 ** | 0.0296 ** | 0.0320 ** | 0.0314 * | 0.0152 * | 0.0128 | 0.0146 * | 0.0144 * |
| | 2.3509 | 2.2148 | 2.0807 | 1.9304 | 1.7125 | 1.6549 | 1.8267 | 1.7308 |
| QE3 | 0.0221 *** | 0.0209 ** | 0.0235 ** | 0.0240 ** | 0.0245 *** | 0.0236 *** | 0.0257 *** | 0.0260 *** |
| | 2.7160 | 2.4512 | 2.4376 | 2.3092 | 3.1547 | 3.3681 | 3.5590 | 3.4131 |
| CRISIS | -3.7014 *** | -3.4682 *** | -3.8327 *** | -3.1277 *** | -3.4654 *** | -2.7112 ** | -3.1155 ** | -2.5519 ** |
| | -3.8967 | -3.4711 | -3.4508 | -3.6900 | -2.9659 | -2.2938 | -2.4355 | -2.5623 |
| ROW | | 0.0622 | 0.0542 | 0.0512 | | 0.2078 *** | 0.1959 *** | 0.1893 ** |
| | | 0.8861 | 0.7234 | 0.6649 | | 2.8846 | 2.6466 | 2.5244 |
| R2 | 0.433 | 0.437 | 0.442 | 0.434 | 0.235 | 0.279 | 0.289 | 0.235 |
| AdjR2 | 0.391 | 0.390 | 0.385 | 0.377 | 0.184 | 0.226 | 0.223 | 0.165 |
| QE1 (USD) | 21.61 ** | 19.57 ** | 17.23 * | 14.35 | 22.08 ** | 19.08 * | 18.08 | 14.91 |
| QE2 (USD) | 17.70 ** | 16.02 ** | 17.33 ** | 17.01 * | 8.219 * | 6.942 * | 7.920 * | 7.792 * |
| QE3 (USD) | 30.16 *** | 28.59 ** | 32.13 ** | 32.85 ** | 33.48 *** | 32.30 *** | 35.16 *** | 35.52 *** |
| QE (USD) | 69.46 *** | 64.18 *** | 66.68 *** | 64.21 *** | 63.784 *** | 58.322 *** | 61.163 *** | 58.221 *** |
| IOF (USD) | 23.98 | 11.43 | -11.22 | -27.55 | -30.57 * | -40.23 ** | -58.00 ** | -71.48 ** |

| | Direct | | | | Credit | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.2482 *** | 0.1842 *** | 0.1184 | 0.1251 * | -0.1759 | -0.1795 | 0.0112 | -0.0069 |
| | 6.6048 | 4.7608 | 1.4605 | 1.7637 | -0.9569 | -0.9416 | 0.1093 | -0.0767 |
| QE1 | -0.0009 | -0.0013 | -0.0008 | -0.0008 | 0.0004 | 0.0004 | -0.0015 | -0.0013 |
| | -0.6962 | -0.9854 | -0.5190 | -0.5421 | 0.3206 | 0.2972 | -1.3467 | -1.1885 |
| QE2 | 0.0051 *** | 0.0037 | 0.0032 | 0.0034 | 0.0117 | 0.0115 | 0.0129 | 0.0130 |
| | 2.8463 | 1.6084 | 1.3254 | 1.3554 | 1.0814 | 1.0434 | 1.2089 | 1.3339 |
| QE3 | 0.0032 | 0.0025 | 0.0018 | 0.0013 | 0.0007 | 0.0008 | 0.0023 | 0.0026 |
| | 1.3789 | 1.1836 | 0.8563 | 0.5565 | 0.1893 | 0.2016 | 0.5192 | 0.5479 |
| CRISIS | -0.2917 | -0.3221 | -0.2730 | -0.2375 | -0.0390 | -0.0297 | -0.1126 | -0.1037 |
| | -1.0499 | -1.2001 | -0.9647 | -1.0103 | -0.3617 | -0.2497 | -0.6809 | -0.6895 |
| ROW | | 0.0488 ** | 0.0521 *** | 0.0478 *** | | 0.0282 | 0.0178 | 0.0136 |
| | | 2.4306 | 2.7296 | 2.7274 | | 0.2925 | 0.1801 | 0.1064 |
| R2 | 0.813 | 0.821 | 0.823 | 0.759 | 0.604 | 0.604 | 0.610 | 0.643 |
| AdjR2 | 0.797 | 0.805 | 0.803 | 0.732 | 0.575 | 0.571 | 0.570 | 0.607 |
| QE1 (USD) | -1.38 | -2.01 | -1.21 | -1.20 | 0.68 | 0.60 | -2.34 | -2.10 |
| QE2 (USD) | 2.77 *** | 2.01 | 1.71 | 1.82 | 6.330 | 6.209 | 6.965 | 7.023 |
| QE3 (USD) | 4.34 | 3.37 | 2.48 | 1.71 | 0.98 | 1.04 | 3.09 | 3.55 |
| QE (USD) | 5.73 | 3.37 | 2.98 | 2.33 | 7.996 | 7.851 | 7.711 | 8.470 |
| IOF (USD) | 12.35 *** | 5.12 | 10.94 | 12.97 | 24.88 ** | 24.41 ** | 7.15 | 5.72 |

**TABLE A5.** Results from US flows to Brazil regressions for aggregate flow categories and each policy round. All regressions include own lag of US flows and dummy variables indicating a tax on capital flow tax (coefficients not shown; total effect of IOF last row). Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. t-values below coefficient estimates are from HAC standard errors. The last rows show the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 10. Foreign Capital Flows from the US, each episode, detail, with own lag and IOF controls

| | Direct: Equity capital | | | | Direct: Affiliated enterprise loans | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.2200 *** | 0.1791 *** | 0.1679 ** | 0.1665 *** | 0.0631 *** | 0.0466 ** | 0.0050 | 0.0056 |
| | 6.4059 | 4.9433 | 2.5224 | 2.9584 | 3.1774 | 2.2303 | 0.0910 | 0.1086 |
| QE1 | -0.0015 | -0.0016 | -0.0015 | -0.0015 | 0.0000 | -0.0003 | 0.0001 | 0.0001 |
| | -1.1789 | -1.2161 | -1.0807 | -1.1161 | -0.0134 | -0.7649 | 0.1744 | 0.2613 |
| QE2 | 0.0002 | -0.0003 | -0.0004 | -0.0003 | 0.0050 *** | 0.0041 *** | 0.0038 ** | 0.0039 ** |
| | 0.2062 | -0.2726 | -0.3521 | -0.2372 | 4.2143 | 2.9652 | 2.5882 | 2.5186 |
| QE3 | 0.0018 | 0.0019 | 0.0018 | 0.0017 | 0.0000 | -0.0008 | -0.0012 | -0.0014 |
| | 1.0096 | 1.0587 | 0.9778 | 0.9075 | 0.0074 | -0.5871 | -0.8882 | -1.0713 |
| CRISIS | -0.4497 * | -0.4678 ** | -0.4477 * | -0.3998 ** | 0.1830 * | 0.1723 ** | 0.1935 ** | 0.1649 * |
| | -1.9699 | -2.0484 | -1.8886 | -2.0251 | 1.6681 | 2.1568 | 2.1568 | 1.9614 |
| ROW | | 0.0372 ** | 0.0374 * | 0.0337 * | | 0.0612 ** | 0.0636 ** | 0.0557 * |
| | | 1.9822 | 1.9698 | 1.8447 | | 2.0106 | 2.1294 | 1.7961 |
| R2 | 0.650 | 0.658 | 0.659 | 0.592 | 0.919 | 0.923 | 0.925 | 0.882 |
| AdjR2 | 0.623 | 0.630 | 0.624 | 0.550 | 0.912 | 0.916 | 0.916 | 0.869 |
| QE1 (USD) | -2.38 | -2.50 | -2.41 | -2.31 | -0.01 | -0.49 | 0.13 | 0.19 |
| QE2 (USD) | 0.12 | -0.19 | -0.24 | -0.16 | 2.69 *** | 2.24 *** | 2.07 *** | 2.13 ** |
| QE3 (USD) | 2.46 | 2.60 | 2.45 | 2.31 | 0.01 | -1.04 | -1.61 | -1.93 |
| QE (USD) | 0.21 | -0.09 | -0.20 | -0.16 | 2.69 | 0.71 | 0.59 | 0.39 |
| IOF (USD) | 11.88 *** | 7.43 | 8.56 | 7.65 | 3.49 * | 1.42 | 5.31 | 6.70 |

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0812 | -0.0803 | -0.3884 | -0.2567 | 0.3007 ** | 0.2421 * | 0.4635 *** | 0.4627 ** |
| | 0.5317 | -0.4858 | -1.1271 | -0.8839 | 2.4815 | 1.9636 | 2.6746 | 2.4824 |
| QE1 | 0.0070 | 0.0034 | 0.0058 | 0.0044 | 0.0063 *** | 0.0074 *** | 0.0063 ** | 0.0057 * |
| | 1.4774 | 0.6755 | 1.0399 | 0.8544 | 2.8057 | 2.8823 | 2.1223 | 1.7494 |
| QE2 | 0.0128 ** | 0.0120 *** | 0.0100 * | 0.0103 * | 0.0013 | -0.0006 | 0.0015 | 0.0015 |
| | 2.0086 | 2.7003 | 1.8602 | 1.8525 | 0.4027 | -0.1785 | 0.3828 | 0.3469 |
| QE3 | 0.0085 | 0.0056 | 0.0029 | 0.0023 | 0.0106 | 0.0118 * | 0.0145 ** | 0.0150 ** |
| | 1.0789 | 0.7042 | 0.3576 | 0.2823 | 1.4979 | 1.7045 | 2.2641 | 2.2648 |
| CRISIS | -2.2171 ** | -1.6209 * | -1.3817 | -1.0818 | -1.2233 *** | -0.9367 *** | -1.3452 *** | -1.1974 *** |
| | -2.3757 | -1.7823 | -1.4529 | -1.4390 | -4.6689 | -3.3151 | -4.0735 | -3.8036 |
| ROW | | 0.2303 *** | 0.2461 *** | 0.2520 *** | | 0.1944 ** | 0.1772 ** | 0.1676 * |
| | | 3.0173 | 3.0292 | 3.1898 | | 2.0280 | 1.9998 | 1.8451 |
| R2 | 0.235 | 0.299 | 0.316 | 0.304 | 0.401 | 0.422 | 0.440 | 0.395 |
| AdjR2 | 0.185 | 0.247 | 0.253 | 0.239 | 0.351 | 0.369 | 0.378 | 0.328 |
| QE1 (USD) | 11.01 | 5.25 | 9.02 | 6.81 | 9.84 *** | 11.59 *** | 9.80 ** | 8.94 * |
| QE2 (USD) | 6.949 ** | 6.517 *** | 5.442 * | 5.563 * | 0.729 | -0.342 | 0.820 | 0.817 |
| QE3 (USD) | 11.64 | 7.67 | 3.92 | 3.17 | 14.48 | 16.14 * | 19.85 ** | 20.54 ** |
| QE (USD) | 29.601 ** | 19.434 | 18.380 | 15.545 | 25.048 ** | 27.389 *** | 30.471 *** | 30.295 *** |
| IOF (USD) | -30.42 ** | -35.20 ** | -7.43 | -9.29 | -3.58 | -7.95 | -29.16 ** | -37.09 ** |

(Continues on the next page)

Table 10. (Continuation) Foreign Capital Flows from the US, each episode, detail, with own lag and IOF controls

| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.2308 *** | 0.0466 | 0.1925 * | 0.1511 | -0.0053 | -0.0056 | 0.0644 | 0.1465 |
| | 3.0514 | 0.8189 | 1.6589 | 1.6009 | -0.0493 | -0.0539 | 0.4430 | 0.9233 |
| QE1 | 0.0025 | 0.0026 | 0.0018 | 0.0018 | 0.0034 *** | 0.0032 *** | 0.0026 * | 0.0018 |
| | 1.1975 | 1.1134 | 0.7103 | 0.7297 | 3.3976 | 2.9565 | 1.7562 | 1.0419 |
| QE2 | -0.0005 | 0.0010 | 0.0022 | 0.0020 | 0.0006 | 0.0010 | 0.0015 | 0.0018 |
| | -0.2240 | 0.5172 | 1.0366 | 0.9143 | 0.2148 | 0.3597 | 0.5059 | 0.5788 |
| QE3 | 0.0023 | 0.0014 | 0.0030 | 0.0030 | 0.0042 ** | 0.0038 * | 0.0045 * | 0.0047 |
| | 0.7894 | 0.4331 | 0.8892 | 0.8456 | 2.1698 | 1.8493 | 1.7675 | 1.6447 |
| CRISIS | -0.7750 ** | -0.5265 * | -0.7300 ** | -0.5940 ** | -0.2388 * | -0.2805 * | -0.3343 | -0.3388 * |
| | -2.0235 | -1.6849 | -2.0837 | -2.0586 | -1.7968 | -1.7768 | -1.5984 | -1.8237 |
| ROW | | 0.7062 *** | 0.6893 *** | 0.6908 *** | | -0.0382 | -0.0363 | -0.0350 |
| | | 4.0659 | 4.1426 | 4.6242 | | -0.4875 | -0.4655 | -0.3944 |
| R2 | 0.507 | 0.607 | 0.616 | 0.599 | 0.508 | 0.509 | 0.511 | 0.540 |
| AdjR2 | 0.465 | 0.570 | 0.573 | 0.555 | 0.467 | 0.464 | 0.456 | 0.488 |
| QE1 (USD) | 3.98 | 4.14 | 2.76 | 2.75 | 5.36 *** | 5.06 *** | 4.11 * | 2.81 |
| QE2 (USD) | -0.262 | 0.547 | 1.184 | 1.075 | 0.299 | 0.538 | 0.807 | 0.971 |
| QE3 (USD) | 3.18 | 1.89 | 4.04 | 4.10 | 5.71 ** | 5.22 * | 6.11 * | 6.49 |
| QE (USD) | 6.899 | 6.574 | 7.982 | 7.929 | 11.371 *** | 10.816 *** | 11.028 *** | 10.273 ** |
| IOF (USD) | -6.361 | -3.466 | -16.984 | -16.804 | 2.925 | 4.048 | -2.691 | -11.850 |

**TABLE A6.** Results from US flows to Brazil regressions for disaggregate flow categories and each policy round. All regressions include own lag of US flows and dummy variables indicating a tax on capital flow tax for some category, including American Depositary Receipts (coefficients not shown; total effect of IOF last row). Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. Outlier dummy variable included for US flows greater than four standard deviations (coefficients not shown). t-values below coefficient estimates are from HAC standard errors. The last rows show the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 11. Foreign Capital Flows from the US to Banks, each episode, with own lag and IOF controls

| | Total | | | | Portfolio | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0975 | 0.0617 | 0.0378 | 0.0210 | 0.1321 *** | 0.1096 ** | 0.0800 | 0.0684 |
| | 1.1284 | 0.7733 | 0.3461 | 0.2429 | 2.7792 | 2.5146 | 1.2371 | 1.2249 |
| QE1 | 0.0026 ** | 0.0027 ** | 0.0028 * | 0.0028 * | 0.0034 ** | 0.0035 ** | 0.0038 ** | 0.0036 ** |
| | 2.3541 | 2.0056 | 1.7407 | 1.9435 | 2.3787 | 2.5101 | 2.5082 | 2.5292 |
| QE2 | 0.0081 | 0.0065 | 0.0063 | 0.0063 | 0.0043 * | 0.0032 | 0.0030 | 0.0023 |
| | 1.2013 | 0.9878 | 0.8734 | 0.9273 | 1.9286 | 1.3934 | 1.2531 | 0.9265 |
| QE3 | 0.0066 | 0.0075 * | 0.0073 * | 0.0066 | 0.0056 *** | 0.0058 *** | 0.0056 *** | 0.0052 *** |
| | 1.6270 | 1.9479 | 1.6728 | 1.4848 | 3.0071 | 3.2397 | 2.9859 | 2.7231 |
| CRISIS | -1.0249 *** | -0.8622 *** | -0.8161 *** | -0.6352 *** | -0.8867 *** | -0.7878 *** | -0.7711 *** | -0.5729 *** |
| | -5.6101 | -3.6229 | -3.4114 | -3.7707 | -3.7323 | -3.2983 | -3.0414 | -2.9468 |
| ROW | | 0.0672 | 0.0686 | 0.0654 | | 0.0635 * | 0.0620 * | 0.0819 ** |
| | | 1.1804 | 1.2428 | 1.3718 | | 1.8504 | 1.7111 | 2.2425 |
| R2 | 0.436 | 0.444 | 0.445 | 0.428 | 0.478 | 0.493 | 0.494 | 0.450 |
| AdjR2 | 0.394 | 0.398 | 0.388 | 0.369 | 0.439 | 0.450 | 0.442 | 0.394 |
| QE1 (USD) | 4.14 ** | 4.24 ** | 4.42 * | 4.41 * | 5.26 ** | 5.52 ** | 5.95 ** | 5.58 ** |
| QE2 (USD) | 4.41 | 3.51 | 3.39 | 3.40 | 2.305 * | 1.733 | 1.630 | 1.264 |
| QE3 (USD) | 9.03 | 10.24 * | 9.96 * | 8.96 | 7.70 *** | 7.99 *** | 7.61 *** | 7.15 *** |
| QE (USD) | 17.57 *** | 17.99 *** | 17.77 *** | 16.77 ** | 15.261 *** | 15.236 *** | 15.188 *** | 13.999 *** |
| IOF (USD) | -0.06 | -1.80 | 0.76 | 1.25 | -8.66 ** | -9.49 ** | -6.63 | -6.64 |

| | Direct | | | | Credit/4 | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | -0.0048 | -0.0055 | 0.0003 | 0.0003 | -0.0049 | -0.0021 | -0.0345 | -0.0338 |
| | -0.8065 | -0.9688 | 0.0468 | 0.0521 | -0.0674 | -0.0292 | -0.4270 | -0.4909 |
| QE1 | 0.0000 | 0.0000 | -0.0001 | -0.0001 | -0.0005 | -0.0005 | -0.0005 | -0.0003 |
| | -0.2099 | -0.5297 | -0.7296 | -0.8483 | -0.8523 | -0.8157 | -0.5508 | -0.3090 |
| QE2 | 0.0008 | 0.0008 | 0.0008 | 0.0008 | 0.0068 | 0.0070 | 0.0068 | 0.0070 |
| | 1.4965 | 1.6041 | 1.6338 | 1.5527 | 1.1043 | 1.0881 | 1.0770 | 1.1491 |
| QE3 | -0.0003 ** | -0.0003 ** | -0.0002 | -0.0002 | -0.0004 | -0.0006 | -0.0010 | -0.0015 |
| | -2.4596 | -2.4740 | -1.6358 | -1.3387 | -0.1195 | -0.1692 | -0.2911 | -0.4296 |
| CRISIS | 0.0070 | 0.0087 | -0.0001 | -0.0003 | -0.0382 | -0.0520 | 0.0451 | 0.0202 |
| | 0.9949 | 0.9221 | -0.0087 | -0.0278 | -0.5849 | -0.6041 | 0.3939 | 0.1964 |
| ROW | | 0.0318 | 0.0309 | 0.0309 | | -0.0211 | -0.0219 | -0.0421 |
| | | 1.3612 | 1.3492 | 1.3551 | | -0.2835 | -0.2923 | -0.5590 |
| R2 | 0.852 | 0.855 | 0.857 | 0.833 | 0.539 | 0.539 | 0.544 | 0.507 |
| AdjR2 | 0.834 | 0.836 | 0.835 | 0.808 | 0.500 | 0.497 | 0.493 | 0.452 |
| QE1 (USD) | -0.03 | -0.08 | -0.12 | -0.15 | -0.83 | -0.81 | -0.77 | -0.44 |
| QE2 (USD) | 0.41 | 0.43 | 0.45 | 0.46 | 3.712 | 3.794 | 3.669 | 3.817 |
| QE3 (USD) | -0.42 ** | -0.43 ** | -0.34 | -0.31 | -0.55 | -0.81 | -1.38 | -2.10 |
| QE (USD) | -0.04 | -0.08 | -0.01 | -0.01 | 2.337 | 2.173 | 1.525 | 1.278 |
| IOF (USD) | 0.88 * | 0.85 * | 0.24 | 0.14 | 1.03 | 1.24 | 5.11 | 5.72 |

**TABLE A7.** Results from US flows to Brazil bank sector for aggregate flow categories and each policy round. All regressions include own lag of US flows and dummy variables indicating a tax on capital flow tax (coefficients not shown; total effect of IOF last row). Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. t-values below coefficient estimates are from HAC standard errors. The last rows show the total effect of QE policy round in the period. *** 1%, **5% *10%.

Table 12. Foreign Capital Flows from the US to Banks, each episode, detail, with own lag and IOF controls

| | Portfolio: Equity | | | | Portfolio: Debt | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0230 | -0.0296 | -0.0875 | -0.0599 | 0.1065 *** | 0.0980 ** | 0.1000 | 0.0738 |
| | 0.7150 | -0.8678 | -1.1478 | -0.9419 | 2.6425 | 2.5216 | 1.5981 | 1.3980 |
| QE1 | 0.0020 * | 0.0008 | 0.0013 | 0.0010 | 0.0013 ** | 0.0016 ** | 0.0016 * | 0.0018 ** |
| | 1.6904 | 0.6960 | 0.9637 | 0.7629 | 2.0376 | 2.1785 | 1.8291 | 2.0629 |
| QE2 | 0.0031 * | 0.0029 *** | 0.0026 ** | 0.0026 ** | 0.0011 | 0.0003 | 0.0004 | -0.0001 |
| | 1.9692 | 3.2207 | 2.3793 | 2.3584 | 0.9143 | 0.2271 | 0.2536 | -0.0679 |
| QE3 | 0.0025 | 0.0016 | 0.0011 | 0.0010 | 0.0029 | 0.0032 * | 0.0032 * | 0.0029 |
| | 1.3805 | 1.0211 | 0.7024 | 0.6393 | 1.5795 | 1.7180 | 1.7990 | 1.6572 |
| CRISIS | -0.5262 *** | -0.3341 * | -0.2898 | -0.2230 | -0.3469 *** | -0.2996 *** | -0.3140 *** | -0.2379 *** |
| | -2.6853 | -1.7201 | -1.3996 | -1.3425 | -5.4730 | -4.6269 | -4.2729 | -3.5064 |
| ROW | | 0.3378 *** | 0.3505 *** | 0.3579 *** | | 0.0420 | 0.0403 | 0.0572 |
| | | 4.4667 | 4.5680 | 4.8113 | | 1.2012 | 1.1380 | 1.5568 |
| R2 | 0.264 | 0.383 | 0.395 | 0.386 | 0.538 | 0.547 | 0.547 | 0.483 |
| AdjR2 | 0.216 | 0.338 | 0.339 | 0.330 | 0.504 | 0.509 | 0.501 | 0.430 |
| QE1 (USD) | 3.10 * | 1.27 | 2.00 | 1.50 | 2.11 ** | 2.49 ** | 2.51 * | 2.77 ** |
| QE2 (USD) | 1.663 ** | 1.597 *** | 1.400 ** | 1.397 ** | 0.577 | 0.185 | 0.215 | -0.061 |
| QE3 (USD) | 3.35 | 2.21 | 1.52 | 1.40 | 4.00 | 4.31 * | 4.34 * | 3.93 * |
| QE (USD) | 8.113 ** | 5.075 * | 4.917 | 4.301 | 6.692 ** | 6.982 ** | 7.063 ** | 6.631 ** |
| IOF (USD) | -6.26 * | -7.54 ** | -2.28 | -2.66 | -2.26 | -2.60 | -2.86 | -1.90 |

| | Portfolio: Debt in the country | | | | Portfolio: Debt abroad | | | |
|---|---|---|---|---|---|---|---|---|
| | i | ii | iii | iv | i | ii | iii | iv |
| C | 0.0551 *** | -0.0112 | 0.0093 | 0.0084 | 0.0198 | 0.0195 | -0.0127 | -0.0164 |
| | 2.9278 | -0.7224 | 0.3057 | 0.3546 | 1.0406 | 0.9900 | -0.4592 | -0.6057 |
| QE1 | 0.0003 | -0.0003 | -0.0004 | -0.0004 | 0.0001 | 0.0001 | 0.0003 | 0.0004 |
| | 0.7206 | -1.1221 | -1.3090 | -1.3970 | 0.4718 | 0.4646 | 0.9202 | 1.1080 |
| QE2 | 0.0000 | 0.0001 | 0.0003 | 0.0003 | 0.0013 * | 0.0013 * | 0.0010 | 0.0007 |
| | -0.0064 | 0.4319 | 0.7591 | 0.7352 | 1.8575 | 1.6854 | 1.2570 | 0.7316 |
| QE3 | 0.0002 | -0.0003 | 0.0000 | -0.0001 | 0.0014 * | 0.0014 * | 0.0011 | 0.0010 |
| | 0.3551 | -0.4164 | -0.0565 | -0.0672 | 1.8631 | 1.8549 | 1.4584 | 1.1651 |
| CRISIS | -0.1524 ** | -0.0198 | -0.0453 | -0.0402 | -0.0224 | -0.0204 | 0.0296 | 0.0395 |
| | -2.1315 | -0.5646 | -1.0036 | -1.1627 | -0.6092 | -0.5034 | 0.6339 | 0.8666 |
| ROW | | 1.1020 *** | 1.0890 *** | 1.0541 *** | | 0.0019 | 0.0027 | 0.0166 |
| | | 8.125 | 7.839 | 9.645 | | 0.1271 | 0.1839 | 0.9603 |
| R2 | 0.478 | 0.706 | 0.709 | 0.700 | 0.706 | 0.706 | 0.715 | 0.640 |
| AdjR2 | 0.434 | 0.679 | 0.677 | 0.666 | 0.678 | 0.676 | 0.680 | 0.596 |
| QE1 (USD) | 0.43 | -0.40 | -0.60 | -0.59 | 0.19 | 0.20 | 0.52 | 0.67 |
| QE2 (USD) | -0.001 | 0.071 | 0.155 | 0.150 | 0.717 * | 0.698 * | 0.543 | 0.364 |
| QE3 (USD) | 0.31 | -0.35 | -0.05 | -0.07 | 1.96 * | 1.97 * | 1.53 | 1.37 |
| QE (USD) | 0.748 | -0.672 | -0.502 | -0.504 | 2.860 ** | 2.874 ** | 2.595 ** | 2.407 * |
| IOF (F) | -1.779 | -1.935 | -3.805 | -3.728 | -0.466 | -0.482 | 2.858 | 3.529 |

**TABLE A8.** Results from US flows to Brazil bank sector for aggregate flow categories and each policy round. All regressions include own lag of US flows and dummy variables indicating a tax on capital flow tax (coefficients not shown; total effect of IOF last row). Column (i) omits the ROW flows proxy, (ii) includes the proxy, (iii) includes the proxy and additional controls (coefficients not shown to save space) and (iv) normalizes dollar variables by import price indexes. t-values below coefficient estimates are from HAC standard errors. The last rows show the total effect of QE policy round in the period. *** 1%, **5% *10%.