Monetary Surprises and Global Financial Flows:

A Case Study of Latin America [*]

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Abstract

This paper examines the effect of Federal Reserve announcements on global financial flows to Latin America since the Global Financial Crisis. The Federal Reserve announcements are classified using daily measures of expectations from a shadow rate term structure model as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). This classification is then used for an event study on daily global financial flows classified by asset class (debt, equity), currency (all currencies, hard currency, local currency), and region (Latin America, Brazil, Mexico). The results suggest easing (unexpected) and tightening (unexpected) announcements cause debt outflows but have no effect on equity flows to Latin America. Local currency debt flows to Latin America are more sensitive than the hard currency debt flows and Brazil is the country in Latin America that responds most to these announcements.

Keywords: International Financial Flows, Unconventional Monetary Policy, Latin America
JEL Classification: F32, G14, G15, N26

1 Introduction

This paper examines the effects of Federal Reserve announcements since the Global Financial Crisis (GFC) on portfolio flows to Latin America. The combination of unconventional monetary policies by the Federal Reserve and other central banks in advanced economies as well as new banking regulations after the GFC has coincided with an increase in market based funding to emerging market economies in Latin America. The search for yield among international investors, and the global interconnectedness of emerging economies with the advanced economies, has generated massive portfolio inflows from advanced to emerging economies. While capital flows provide benefits in terms of financing for emerging economies they also present vulnerabilities in the form of asset price misalignment, macroeconomic distortions, and increased financial volatility. As the Federal Reserve has started its policy normalization from the zero lower bound these capital flows have become more volatile and uncertain for emerging market economies. These spillover effects of unconventional monetary policy is of particular concern to central banks and policymakers in Latin America.

Movements in foreign portfolio flows to Latin America since the 2008 Global Financial Crisis can be explained by a combination of factors including Federal Reserve unconventional monetary policy. One relevant example of the global spillover effects of Federal Reserve unconventional monetary policy occurred when Federal Reserve Chairman Ben Bernanke eventually hinted at ending unconventional monetary policy, in May and June of 2013, and the markets revised their expectations of future Federal Reserve rate hikes. This event, later termed the "taper tantrum", led to revisions in emerging market asset prices and portfolio outflows from emerging markets and Latin America. In Brazil, policymakers have responded to capital flow volatility with a combination of capital controls and foreign exchange intervention. In Mexico, policymakers have not used currency intervention nor have they used capital controls.[1] Nonetheless, the Bank of Mexico adjusted its policy rate

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[1] According to a speech by Ben Bernanke at the Bank of Mexico on October 14, 2013: "When the recent financial crisis in the United States and other advanced economies threatened to spill over to Mexico, the inflation credibility enjoyed by the Bank of Mexico allowed it to counter economic weakness by easing

in step with the Federal Reserve to stem movements in capital flows and to stabilize the exchange rate between the dollar and the peso. The authorities in Mexico have the greatest tolerance for volatility and, while concerned about exchange rate overshooting, show little inclination to intervene in foreign exchange markets.[2]

This paper addresses several related research questions. What are the effects of Federal Reserve announcements on portfolio equity and debt flows to Latin America since the Global Financial Crisis? Do these effects differ for debt flows and equity flows? Do these effects differ for debt flows in hard currency and and in local currency? Do these effects differ for Brazil and Mexico? To what degree can these effects explained by changes in global uncertainty, market liquidity, and economic fundamentals?

This paper answers these research questions in two parts. First, the paper classifies all of the Federal Reserve announcements since the GFC using daily measures of interest rate expectations. This classification allows the announcements to be classified as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). Second, the paper uses the announcement classification to conduct an event study to examine the effect of announcements on daily frequency data for equity flows and debt flows for funds dedicated to investing in Latin America, Brazil and Mexico. Brazil and Mexico receive the largest fraction of portfolio flows in Latin America and have globally domiciled funds dedicated to investing in their countries. Robustness checks include using intra-day data on interest rate expectations to classify announcements and controlling for daily frequency measures of the liquidity of the U.S. treasury market, uncertainty as measured by the VIX, global oil and commodity prices, and country fundamentals. This paper contributes to the literature by

monetary conditions, even though headline inflation was running above its target range at the time. The Bank's rate cuts helped stabilize the economy, and Mexican output returned to its pre-crisis level by late 2010. Strong countercyclical policy actions of this type were unlikely to have been feasible in Mexico a few decades ago; with little in the way of inflation-fighting credibility and an immature financial sector, the monetary authority in earlier years was often forced to respond to a crisis by tightening monetary conditions, rather than loosening them, in an effort to limit capital flight, exchange rate depreciation, and increases in inflation." Source: http://www.federalreserve.gov/newsevents/speech/bernanke20131014a.htm

[2]Jude Webber. "Fed Lift-off is Mexico's rate rise dilemma" Financial Times December 15, 2015.; Jonathan Wheatley "Mexico bank chief calls for EM Policy Action" Financial Times January 17, 2016.

using market expectations to classify the Federal Reserve announcements and by explaining their effects on portfolio equity and debt flows to Latin America. The empirical results indicate that easing (unexpected) and tightening (unexpected) Federal Reserve announcements cause debt outflows but have no effect on equity flows to Latin America. Local currency debt flows to Latin America are more sensitive than the hard currency debt flows and Brazil is the country in Latin America that responds most to these announcements.

This paper proceeds in the following manner. Section 2 motivates the paper by explaining its relation to the literature on classifying announcements at the zero lower bound, the effect of monetary policy on international portfolio flows, and financial stability in Latin America. Section 3 presents the daily data used to classify the Federal Reserve announcement days and the portfolio flow data from EPFR Global. Section 4 explains the methodology used to classify Federal Reserve announcements from October 8, 2008 until October 29, 2014 and to estimate the effect of Federal Reserve announcements on portfolio flows to Latin America. Section 5 presents the results from the Federal Reserve announcement classification and from the event study on the effects of Federal Reserve announcements on portfolio flows to Latin America. Section 6 conducts a robustness check by including liquidity measures, uncertainty measures, commodity prices, and country fundamentals into the analysis. Section 7 concludes with policy implications and future research.

2   Related Literature

This paper relates to the unconventional monetary policy literature by classifying all regularly scheduled Federal Reserve announcements using daily data on interest rate expectations. During times when monetary policy is conducted using the federal funds rate, Federal Reserve announcements are classified using thirty day federal fund futures contracts (Kuttner (2001), Bernanke and Kuttner (2005), Gürkaynak et. al. (2007)). However, when interest rates hit the zero lower bound the Federal Reserve used unconventional policies (Gagnon

et al (2011), D'Amico et.al. (2012), Krishnamurthy Vissing-Jorgensen (2013), Christensen and Rudebusch (2013), and Walsh (2014)) and these short term measures of expectations do not capture these effects. Furthermore, long term measures of these asset prices suffer from term premia and liquidity issues (Gürkaynak et al. (2007), Christensen and Kwan (2014).[3] For these reasons, this paper classifies announcements using daily frequency short rate expectations from a shadow rate term structure model developed by Christensen and Rudebusch (2014) which overcomes the liquidity and term premia issues from using federal fund futures contracts and eurodollar futures contracts at longer horizons and zero lower bound issues when using standard term structure models (Kim and Wright (2005), Piazzesi and Swanson (2008), Piazzesi (2010), Christensen and Rudebusch (2013), Adrian et. al. (2013), Christensen and Rudebusch (2014), Andreasen and Meldrum (2014), Lombardi and Zhu (2014), Krippner (2015)). This paper also conducts a robustness check using intra-day changes in U.S. bond yields the fifteen minutes before until 105 minutes after to classify Federal Reserve announcements (Rogers et.al. 2014 and 2015).

This paper also relates to the literature on the global effects of unconventional monetary by examining the international spillovers on daily frequency flows of globally domiciled and regulated mutual funds and exchange traded funds. Several empirical studies have examined the global effects of conventional and unconventional U.S. monetary policy (Edwards (2012), Rey (2013), Berge and Cao (2014), Rogers et.al. (2014), Gilchrist et.al. (2014), McCauley

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[3]In December 2008, the Federal Reserve lowered the target for its key monetary policy rate, the overnight federal funds rate, to a range between zero and 25 basis points. As shown in Figure 1 the Federal Reserve provided additional stimulus through large scale asset purchases that expanded its balance sheet. The first large balance sheet expansion occurred with LSAP 1 from November 2008 until March 2010 and led to the purchase of $300 billion in U.S. Treasuries, $1.25 trillion in agency mortgage backed securities and $170 billion of agency debt. This LSAP 1 program was followed by a brief pause in asset purchases until the Fed launched its LSAP 2 program from November 2010 until June 2011. The LSAP 2 program involved purchases of long-term U.S. Treasuries. From July 2011 until December 2012, the total balance sheet remained at a somewhat constant level of around $2.8 to 2.9 trillion. During this time, the Federal Reserve altered its balance sheet by purchasing long-term Treasuries with financing from its sale of short-term Treasuries referred to as the maturity extension program (MEP). The Federal Reserve launched the start of LSAP 3 in September 2012 which, unlike previous programs, did not include a fixed mount of purchases but instead included purchases of $45 billion of U.S. Treasuries and $40 billion of MBS per month with no end date. The LSAP 3 asset purchasing program was reduced or "tapered" until the program was completed in October 2014 with the Fed balance sheet of around $4.3 trillion.

Federal Reserve Balance Sheet
(Weekly 1/7/2004 to 10/29/2014)

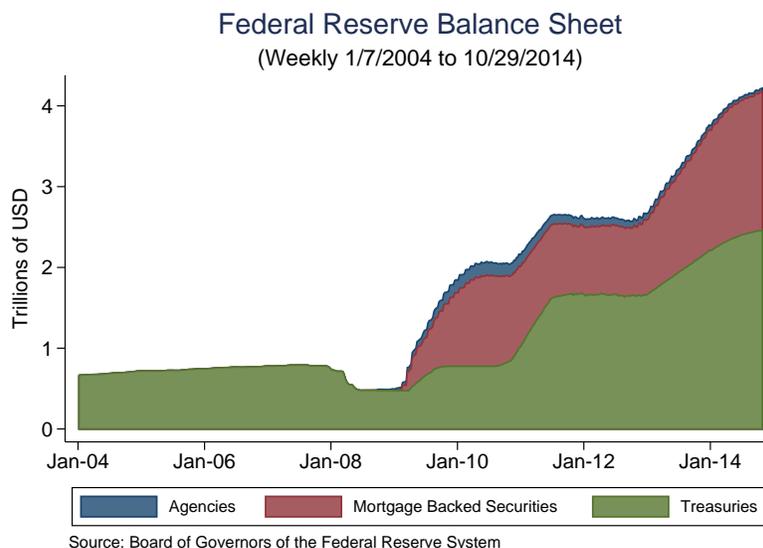Source: Board of Governors of the Federal Reserve System

Figure 1: Federal Reserve Balance Sheet from January 7, 2004 until October 29, 2014.

et.al. (2015)), the response of emerging market asset prices to U.S. monetary policy (Moore et.al. (2013), Bowman et.al.(2014), Rogers et. al. (2014)), and the effect of tapering news on emerging market financial markets (Eichengreen and Gupta (2013), Aizenman et.al. (2014)). Other papers have studied the effect of monetary policy on portfolio flows to emerging market economies using quarterly IMF balance of payments data (Ahmed and Zlate (2013), Lim et.al. (2014))[4] as well as daily, weekly, and monthly frequency portfolio flow data from Emerging Portfolio Funds Research (EPFR) Global (Fratzscher et.al. (2013), Koepke (2014), Rai and Suchanek (2014), Dahlhaus and Vasishtha (2014), and Curcuru et.al. (2015)).[5] This paper builds upon work by Fischer (2016), which found that Federal Reserve announcements had the greatest effect on portfolio debt flows to Latin America of all the emerging market regions (Asia excluding Japan, Europe Middle East and Africa (EMEA), Latin America, Global Emerging Market (Global EM)) and examines the effects of announcements on both

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[4]Ahmed and Zlate (2013) use quarterly IMF data from 2002Q1 to 2012Q2 for twelve countries (India, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand, Argentina, Brazil, Chile, Colombia, Mexico) and show that net private capital inflows to emerging market countries are driven by a combination of interest rate differentials and global risk appetite.

[5]Fratzscher et al. (2013) uses daily EPFR Global data from January 2007 until December 2010 for 42 emerging markets and 21 advanced economies and find that Quantitative Easing 1 lowered sovereign yields and raised equity markets; Quantitative Easing 2 raised equity markets and had no effect on bond yields.

portfolio equity and debt flows to Latin America, Brazil, and Mexico.

This paper also contributes to the literature on the financial stability of the Latin America region by examining portfolio flows to Latin America as a region and to Brazil and Mexico. The financial crises that occurred in Latin America in the 1990s prompted the monetary authorities in this region to move from a system of fixed exchange rates to ones with their own independent monetary policy (Mishkin (2000), BIS (2009), BIS (2015), Edwards (2016)). Although Brazil and Mexico have been successful in their transitions from fixed exchange rates to inflation targeting monetary regimes (Bernanke (2013), DePooter et. al. (2014)) the GFC and monetary policies in advanced economies have had spillovers to Latin America. These spillovers have shown up in the form of capital flows (Christensen et. al. (2019), Fratzscher et. al. (2013), Ahmed and Zlate (2014), and Curcuru et. al. (2015)), increased credit in banking systems in Mexico (Morais et. al. 2015), and the implementation of capital controls in Brazil (Forbes et. al. (2012), Jinjarak et. al. (2013)). Other research has examined the behavior of foreign and domestic mutual funds to Mexico (Zhou et. al. (2014), Xiao (2015)) as well as bond flows and liquidity to Mexico (Christensen et. al. 2019).

3   Data

This paper uses all the Federal Reserve announcement dates between October 8, 2008 and October 29, 2014. These announcements include all of the regularly scheduled Federal Reserve Open Market Committee (FOMC) announcement days and a few important announcements related to large scale asset purchases that were not part of the regularly scheduled FOMC announcement days. All of the FOMC announcement days are made publicly available and were obtained from the Federal Reserve Board of Governors website.[6] Any additional days were taken from Rogers et. al. (2014) examining the effect of Federal Reserve announcements on asset prices. However, unlike Rogers et. al. (2014) which include announcement days until early 2014, this paper includes FOMC announcement days until the end of large scale

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[6]The Federal Reserve Board of Governors website: http://www.federalreserve.gov

asset purchases in October 2014. In total, there are 54 announcements of which ten were Tuesday announcements, forty one were Wednesday announcements, one was a Thursday announcement, and two were Friday announcements.
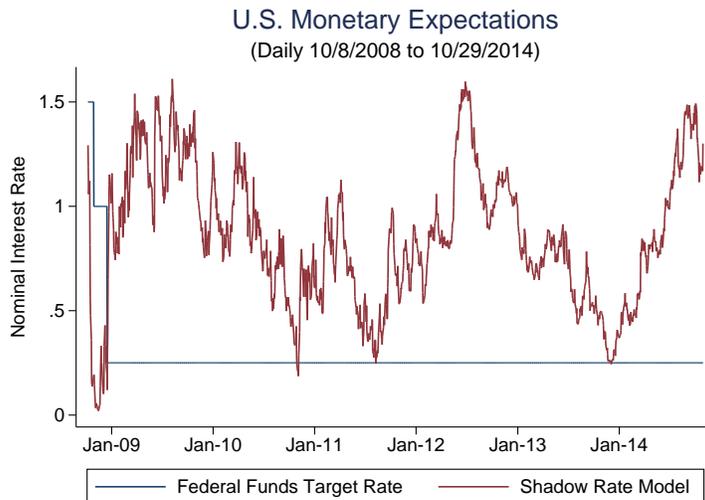

Figure 2: Federal Fund Funds Rate and Shadow Rate Model two year short rate expectations.

This paper uses daily interest rate expectations to classify these Federal Reserve announcements. This paper uses the daily two-year short rate expectations from a shadow rate Arbitrage-Free Nelson-Siegel model developed by Christensen and Rudebusch (2013) that assumes interest rates have a lower bound of zero.[7] Term structure models are widely used by financial market practitioners and central banks to examine the dynamic evolution of the yield curve using observed prices and estimating the slope, level and curvature of the yield curve. The Nelson-Siegel (1987) term structure model is the most widely used as it provides good yield curve fit for a cross section of yields (Kim and Wright (2005)).

This paper uses daily frequency portfolio equity and debt flow data collected and distributed by Emerging Portfolio Funds Research (EPFR) Global. Headquartered in Cambridge, MA, EPFR Global was founded in 1995 and tracks regulated mutual fund and exchange traded fund (ETF) flows that it collects from its direct relationships with fund man-

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[7]More details on the Arbitrage-Free Nelson-Siegel (AFNS) model and the shadow rate Arbitrage-Free Nelson-Siegel (B-AFNS) model for estimating expectations and are included in the appendix. Please refer to Christensen and Rudebusch (2013) for even more detail.

agers and administrators. EPFR Global then uses this information to produce indicators for fund flows, country allocations, sector allocations and industry allocations and together with an allocation data series is able to estimate the flow data for country flows, sector flows, and industry flows. EPFR Global reports this data at the daily, weekly, and monthly frequencies.[8] EPFR Global currently tracks around 15,000 funds with investments across 130 countries and that cover $23.5 trillion worth of globally domiciled funds primarily domiciled in the United States and Europe. Of the $23.5 trillion of assets covered, approximately $16.2 trillion are from funds domiciled in the United States and $5.6 trillion in Europe.[9] The data covers 93 countries for equity flows, 100 countries for debt flows, and regional flows.

The flow data provided by EPFR Global is widely used among market participants and economic policymakers because of its timely release and its high frequency but has only recently been used by academic researchers.[10] The daily frequency flows are made available at 5pm EST for the previous day, the weekly fund fund flows data are made available at 5pm EST each Thursday for the previous 7 days, and the monthly data is reported at 5pm EST on the 23rd for the previous month. EPFR Global provides historical data for equity flows since January 1995 (monthly), October 2000 (weekly), and May 2007 (daily) and debt flows since January 2004 (monthly), April 2004 (weekly) and May 2007 (daily). The fund flows data includes daily flows in U.S. dollars, cumulative flows in U.S. dollars, daily percentage change in flows, daily percentage change in cumulative flows, total net assets, valuation change due to exchange rate, net asset value percentage change, and the percentage change

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[8]Personal correspondence with EPFR Global indicates that many of the funds already report this data to regulators and to Bloomberg at these frequencies and so reporting to EPFR Global does not incur much cost. In addition, funds may receive some marketing value by reporting their activities to EPFR Global as they are included among other funds included in the data.

[9]To put this in perspective, the Investment Company Institute estimates in their Annual Report for 2015 that there are $33.5 trillion invested in mutual funds and ETFs worldwide. Therefore, EPFR Global covers roughly 75-80 percent of these funds.

[10]Emerging Portfolio Funds Research (EPFR) Global data has been used in 18 papers in topics related to political economy (Pepinsky (2014), Frot and Santiso (2012), capital flows (Miao and Pant (2012), Lo Duca (2012), Fratzscher et al. (2013), Fratzscher et.al. (2014), Curcuru et al. (2015), Jinjarak et al. (2011), Jotikasthira et al. (2012), Wei et al. (2010)), captial controls (Forbes et al. (2012), Jinjarak et al. (2013)), financial stability (Gelos (2011), Raddatz and Schmukler (2012), Yeyati and Williams (2012), Jones (2014), Xiao (2015), Puy (2016)), and international economic policy.

in cumulative net asset value. As shown in Appendix Table B2 and B3, almost all of the funds that report at the weekly frequency also report at the daily frequency. However, not all funds that report at the monthly frequency also report at the daily and weekly frequencies.
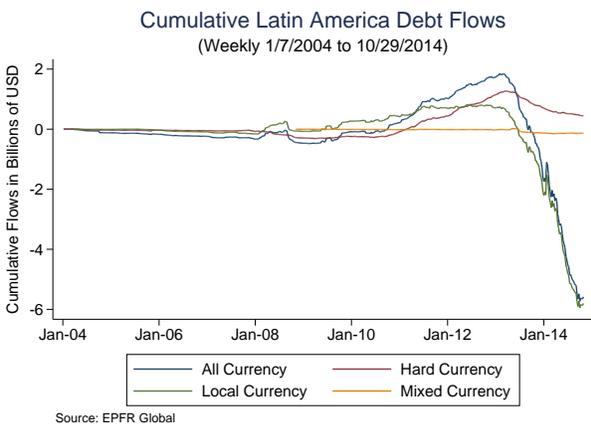
Figure 3: Latin America Debt Flows.
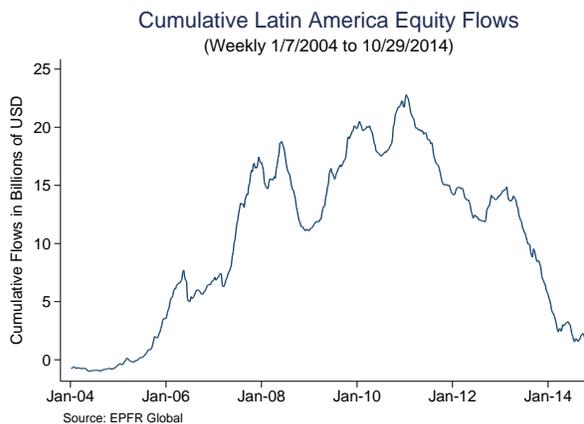
Figure 4: Latin America Equity Flows.

The flow data from EPFR Global and flow data IMF Balance of Payments differ in several ways. The IMF Balance of Payments data tracks cross-border capital flows but is only available on a quarterly basis and with a significant lag. Debt flows in the Balance of Payments are located in the financial account under portfolio investments and under liabilities. This portfolio liabilities line in the Balance of Payments covers all the cross border debt held by non-residents in that particular country. EPFR Global data is available at a much higher frequency than IMF Balance of Payments data and is released on a timely basis but covers a slightly different type of flows. The flow data provided by EPFR Global includes investment by residents and non-residents whereas the Balance of Payments data separates the debt flows by residency. EPFR Global data tracks fund flows that are domiciled globally but the vast majority of them are in the United States and Europe. In addition, EPFR Global portfolio flow data accounts for approximately 60 percent of total portfolio flows into emerging market funds. The EPFR Global data only tracks regulated managed funds and so does not track hedge funds, proprietary trading desks, foreign insurance companies investing in excess cash, and wealthy individuals and individual companies unless they invest in reg-

ulated managed funds. Miao and Pant (2012) find that the debt and equity data released by EPFR Global data closely matches quarterly IMF data on debt and equities that are released at 3 to 6 month lags. These authors conclude that because 80 percent of the funds in the EPFR Global are U.S. domiciled these investors can be considered foreign investors in emerging markets. Nonetheless, the EPFR Global data and IMF Balance of Payments data are different in the sense that the Balance of Payments data by definition captures the transactions between residents and non-residents whereas fund flows cover inflows in and out of mutual funds and exchange traded funds.

This paper uses the daily frequency EPFR Global data for debt and equity fund flows for Latin America, Brazil, and Mexico.[11] The cumulative debt and equity flows to Latin America, shown in Figure 3 and 4, both show gradual inflows starting in 2008 but equity flows start to decline starting in 2011 and debt flows decline starting in 2013.[12] The decline in debt flows shown in Figure 3 starting in 2013 is evident in the local currency debt flows but not in the hard currency debt flows and mixed currency debt flows to Latin America.[13]

[11]The EPFR Global regional classification for equity and debt flows is Asia excluding-Japan, Europe Middle East and Africa (EMEA) funds, Latin America, and Global Emerging Markets (Global EM). The hard currency debt is grouped as Asia ex-Japan Regional Funds (Asia ex-Japan Regional Funds, Philippines Funds), EMEA Funds (Africa Regional Funds, Emerging Europe Regional Funds, Middle East Regional Funds, Russia Funds, Slovak Republic Funds), GEM Funds (Global Emerging Markets Funds), Latin America Funds (Brazil Funds, Latin America Regional Funds, Mexico Funds). The local currency debt is grouped as: Asia ex-Japan Regional Funds (Asia ex-Japan Regional Funds, China Funds, Greater China Funds, India Funds, Indonesia Funds, Korea (South) Funds, Malaysia Funds, Taiwan Funds, Thailand Funds), EMEA Funds (Czech Republic Funds, Emerging Europe Regional Funds, Hungary Funds, Israel Funds, Poland Funds, Romania Funds, Russia Funds, South Africa Funds, Turkey Funds), GEM Funds (BRIC Funds, Global Emerging Markets Funds), Latin America Funds (Brazil Funds, Colombia Funds, Latin America Regional Funds, Mexico Funds). The mixed currency debt flows are grouped as Asia ex-Japan Funds, EMEA Funds (Africa Regional Funds, Emerging Europe Regional Funds, Europe Middle East and Africa Regional Funds, Middle East and Africa Regional Funds, Middle East Regional Funds, Poland Funds, Russia Funds, Turkey Funds), GEM Funds (BRIC Funds, Global Emerging Market Funds), Latin America Funds (Latin America Regional Funds).

[12]Figure 3 indicates that cumulative Latin America debt flows in all currency and local currency, but not hard currency or mixed currency, are negative after the summer of 2013. This could be due to a combination of factors including changes in exchange rates, outflows, and EPFR data coverage.

[13]The hard currency debt flows includes funds that invest 75 percent or more of their investment in traditional currency debt. These hard currency debt securities are denominated in U.S. dollars, Euros, British pound, Swiss franc, Japanese yen, Canadian dollar, Australian dollar, and Swedish krona. The local currency debt flows includes funds that invest 75 percent or more of their overall investment in local currency debt. These currencies include the Brazilian real, Polish zloty, Indian rupee, Chinese yuan and any currency other than the ones listed under hard currencies.

Figure 5 shows the rapid decline in local currency debt flows to Brazil after 2013 while hard currency debt flows remained around the same and shows that hard and local currency debt flows to Mexico remained small throughout the sample.[14]   The equity flows to Brazil and Mexico, shown in Figure 6, are not separated by currency and indicate a decline for Mexico and Brazil in 2013.   Previous papers using EPFR Global data on portfolio flows to Latin America by Forbes et. al. (2012) using monthly EPFR Global data for bonds and equities between January 2006 and July 2011 found that the imposition or relaxation of controls in Brazil leads to reallocation of portfolio shares to Russia, India, and China. Jinjarak et. al. (2013) used weekly EPFR Global data for Brazil from December 2007 until December 2011 to create a synthetic control and measure how capital controls impact the inflow surge. More recently, Xiao (2015) compared domestic and foreign mutual funds in Mexico and found that foreign mutual funds to Mexico respond to global financial conditions and engage in more herding than domestic funds, that debt funds are more sensitive than equity funds, and that domestic funds mitigate domestic market stress.
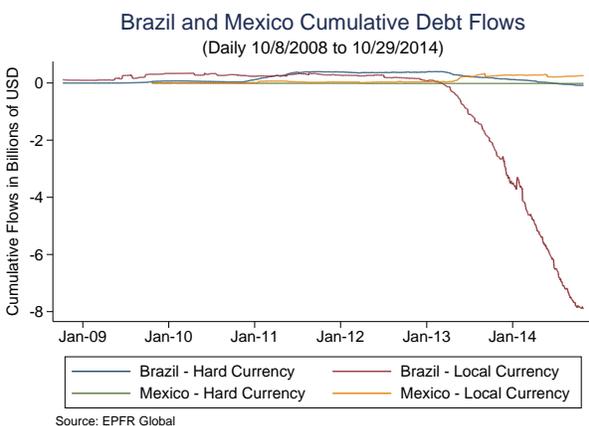
Figure 5: Brazil and Mexico Debt Flows.
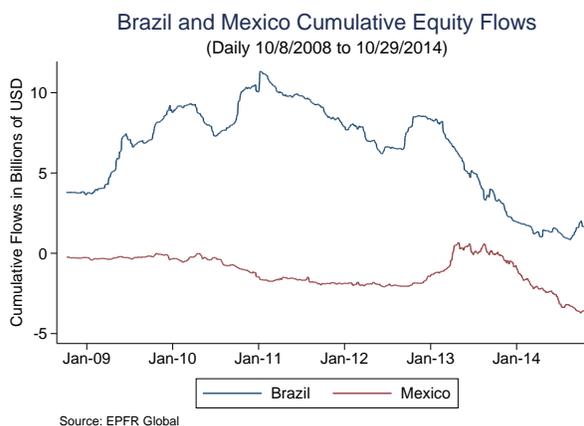
Figure 6: Brazil and Mexico Equity Flows.

[14]The funds included in Brazil hard currency debt flows include Banco Pactual, Bradesco Asset Management, Deutsche Asset & Wealth Management, Santander Asset Management, UBS Global Asset Management. The funds included in Brazil local currency debt flows include Aberdeen Asset Management, Ashmore Investment Management, Banco Multiplo, Bradesco Asset Management, BTG Pactual Asset Management, Credit Suisse Asset Management, Deutsche Asset & Wealth Management, HSBC Asset Management, Itau Asset Management Unibanco Asset Management, Western Asset Management. The fund included in the Mexico hard currency debt flows is BlackRock.

The robustness checks include using intra-day monetary surprises to classify announcements and controls for volatility, liquidity, commodity prices, and fundamentals. The intraday monetary surprises are constructed using the first principal component of the change in future yields for 2 year, 5 year, 10 year, and 30 year Treasury futures in the 15 minutes before and 105 minutes after a Federal Reserve announcement (Rogers et. al. (2014 and 2015), Curcuru et. al. (2015)). The volatility data is the VIX, which measures the implied volatility of the S&P 500 index options calculated by the Chicago Board Options Exchange (CBOE) that measures the stock market's expectations of stock market volatility over the next 30 day period. The liquidity measure tracks the U.S. Treasury market and was developed by Hu et. al. (2013) based on the spread between seasoned and recently issued comparable Treasury securities, and weekly average trading volume in the secondary market for Treasury Inflation-Protected Securities (TIPS) as reported by the Federal Reserve Bank of New York.[15] The commodity price is the West Texas Instruments (WTI) Cushing crude oil price, which is the most commonly used benchmark for global oil prices. WTI Cushing oil price measures the price of crude at Cushing, OK and trades in pipeline lots of 1,000 to 5,000 barrels a day for delivery between the 25th of one month to the 25th of the next month. A second commodity price used is the Bloomberg Commodity Index, which is a diversified group of commodities that relies on liquidity data and U.S. dollar weighted production data to determine the weights for commodities. The fundamentals data includes the J.P. Morgan EMBI and the MSCI equity index for Latin America, Brazil, and Mexico.

4 Methodology

This section describes the methodology used for estimating the effect of changes to U.S. monetary expectations on Latin American debt and equity flows in two parts. First, this section explains the methodology used for classifying the Federal Reserve announcements as

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[15]Hu, Grace Xing and Jun Pan, Jian Wang. 2013. Noise as a Measure of Illiquidity. Journal of Finance. Vol. LXVIII, No. 6. http://www.mit.edu/~junpan/Noise_Measure.xlsx

easing (unexpected), tightening (unexpected), easing (expected) and tightening (expected) using changes to monetary expectations measured by the shadow rate model. Second, this section explains the methodology for estimating the effects of Federal Reserve announcements on portfolio flows to Latin America and to Brazil and Mexico.[16]

4.1 Classifying Federal Reserve Announcements

Federal Reserve announcements are classified by measuring the changes in interest rate expectations around announcement days. As described in the previous section these market expectations of the future short rate are measured using daily measures from a shadow rate term structure model. This measure of market expectations of the future short rate can change even when the actual short term policy rate remains unchanged. This measure of expectations is used to classify Federal Reserve announcements into one of the following four categories: easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). An announcement is unclassified if the measure of expectations does not change on the announcement day.

The Federal Reserve announcements between October 8, 2008 and October 29, 2014 are classified in the following manner. First, the daily expectations are converted into a daily percentage change in expectations. This daily percentage change measure is then converted into positive values by taking the absolute value of all the daily percentage change observations. Second, the mean change in the absolute value of all the daily percentage changes is calculated to find the average level of daily change in expectations over the entire sample period. Third, each of the Federal Reserve announcements are classified by comparing the percentage change in expectations on that day relative to mean absolute value of the change in that measure of expectations on all the other days in the sample period. If the change in expectations on an announcement day is above an average change in expectations on all

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[16]Previous approaches to understanding the response of portfolio fund flows to Federal Reserve monetary policy have relied on VAR methods (Feroli et. al. (2014), Rai and Suchanek (2014), Dahlhaus and Vasishtha (2014), Global Financial Stability Report IMF (2014), McCauley et. al. (2014), Plantier (2015)), OLS regressions (Edwards (2012), Koepke (2014)), and an event study (Curcuru et. al. (2015).

the other days in the sample period then it is unexpected. Conversely, if the change expectations on an announcement day is less than an average change in expectations on all other days, then it is expected. The announcements are also classified as easing if the change in expectations is negative and tightening if the change in expectations is positive.

4.2 Effects on Portfolio Flows to Latin America, Brazil, Mexico

The event study methodology used to estimate the effect of Federal Reserve announcements on portfolio flows uses the announcements classified by the shadow rate model together with the EPFR Global data. Equation (1) is the specification used to understand the effect of announcements on portfolio flows to Latin America.

$$Flows_{ijrt} = \widehat{\beta}_0 + \widehat{\beta}_1(Shadow\ Rate\ Announcements_{kt}) + \varepsilon_{ijrt} \tag{1}$$

The *Flows* variable on the left hand side of (1) is the data on daily frequency flows to Latin America from EPFR Global. This variable is classified by asset class subscript i for whether these portfolio fund flows are for debt flows or equity flows. The subscript j denotes whether debt flows are all currencies, hard currencies, local currencies, or mixed currencies. The subscript r specifies whether the investment focus is Latin America, Brazil, or Mexico. Finally, the subscript t denotes the day of the announcement to indicate the precise day for the flows around that announcement day. On the right hand side of equation (1) is the *Shadow Rate Announcements* variable that categorized using expectations from the shadow rate model. These announcements are denoted by subscript k to denote announcements as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). Furthermore, the subscript t denotes the announcement day.

This event study methodology is used to test the differences in the seven day average flows before and after each of the four Federal Reserve announcement classifications.[17] All

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[17]The seven day window size is large enough to capture the time that portfolio investors take to respond to events while at the same time is small enough so that it captures effects from Federal Reserve announcements.

four announcement classifications k are analyzed for both equity and debt i, currencies j, and regions r. Recall, the Federal Reserve announcements were classified using the daily expectations from the shadow rate model. Therefore, to study the effect of easing (unexpected) announcements on all currency j debt flows i to Latin America r we examine only the debt flows that occur around the seven days before and after those 14 announcements. The first step in this event study methodology is to check that each Federal Reserve announcement occurs at time t equals zero. Next, a dummy variable for the seven days after each of the announcements after each of the 14 easing (unexpected) announcements . Then, an ordinary least squares regression is used to examine the difference in the average flows before and after all of the easing (unexpected) announcements. This difference estimate for the effect of easing (unexpected) announcements on debt flows to Latin America is reported in the upper left of Figure 8 with the average flows in each day represented by the blue dots. This same event study methodology is repeated for tightening (unexpected), easing (expected), and tightening (expected) Federal Reserve announcements. The results for each event study is standardized to the mean and standard deviation to compare the coefficients and significance across each of the announcement classifications.

This same event study methodology is used to explore the effects of all four announcement classifications on debt flows and equity flows to Latin America, Brazil, and Mexico. The Latin America flows are analyzed separately for debt and equity flows. The Latin America debt flows are further separated into all currencies, hard currencies, local currencies and mixed currencies while the equity flows to Latin America are studied as all currencies. The Brazil flows are studied separately for debt flows, separated into hard currency and local currency debt flows, as well was for equity flows. The Mexico flows are analyzed only for equity flows due to data limitations for debt flows to Mexico.

$$Flows_{ijrt} = \widehat{\beta}_0 + \widehat{\beta}_1(Shadow\ Rate\ Announcements_{kt}) + Control_{mt} + \varepsilon_{ijrt} \qquad (2)$$

The robustness checks include an intra-day monetary surprise measure to classify Federal

15

Reserve announcements and using additional control variables in the event study. The intra-day monetary surprise measure is used to classify announcements as easing if the expectations went down and tightening if the interest rate expectations went up. The *Flows* variable and the *Shadow Rate Announcements* variables in (2) are the same as those variables in (1). The *Control* variables are introduced into the regression equation (2) to make sure that the changes in flows before and after Federal Reserve are not the result of changes in other domestic or international factors. These controls are denoted by subscript m at time t to specify VIX, market liquidity in the U.S. Treasury market, commodity prices, as well as J.P Morgan Emerging Market Bond Indices (EMBI) and MSCI equity indices. These results from these robustness checks are reported in Appendix Table B7 to Appendix Table B16.

5   Results

The results are separated into a section for classifying Federal Reserve announcements using expectations from a shadow rate model and a section for the effects of Federal Reserve announcements on portfolio flows to Latin America. The results for the effects of Federal Reserve announcements on portfolio flows to Latin America are grouped into a subsection for overall Latin America flows and into a subsection for Brazil and Mexico.

5.1   Classifying Federal Reserve Announcements

The shadow rate model classifies all of the Federal Reserve announcements from October 8, 2008 and October 29, 2014. Table 1 and Figure 7 show that the shadow rate model classifies the 54 announcements during this time period as 14 easing (unexpected) events, 9 tightening (unexpected) events, 16 easing (expected) events, and 15 tightening (expected) events.

The mean absolute value change in expectations for the shadow rate model is 5.40 percent with a standard deviation of 10.25 percent. The minimum change in expectations was 0 percent and the maximum change in expectation was 191.49 percent. A significance

Table 1: Daily Classification of Federal Reserve Announcements

	Shadow Rate Model
Easing (Unexpected)	14
Tightening (Unexpected)	9
Easing (Expected)	16
Tightening (Expected)	15
Unclassified	0
Total	54
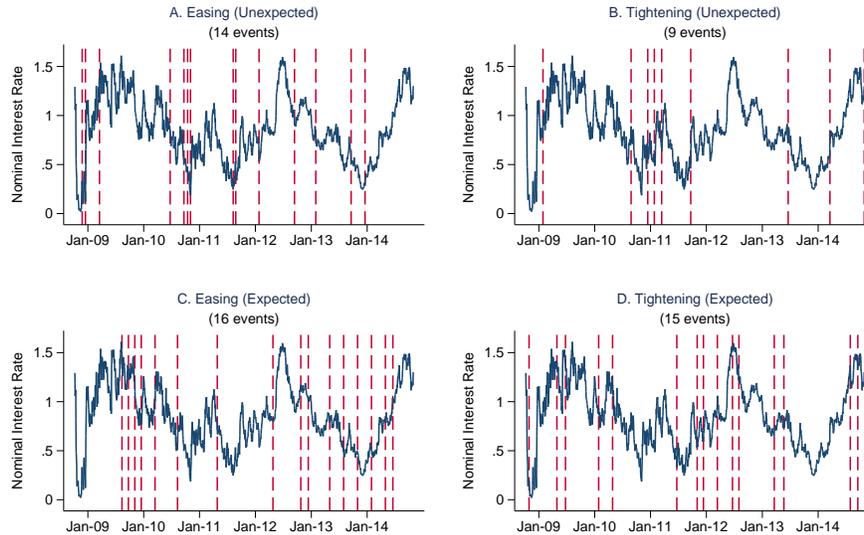
Figure 7: Classification of Federal Reserve announcements by the Shadow Rate Model as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected).

test of the daily percentage change in shadow rate model measure of expectations on the announcement day relative to the previous seven days is shown in Appendix Figure B3.

5.2 Effects on Portfolio Flows to Latin America, Brazil, Mexico

This section explains the event study results of Federal Reserve announcements on portfolio flows to Latin America, Brazil, and Mexico. The main result from this analysis is that both easing (unexpected) and tightening (unexpected) announcements have a statistically significant effect on debt flows but not for equity flows to Latin America. Both easing

17

(unexpected) and tightening (unexpected) announcements cause Latin America all currency debt outflows and local currency debt outflows but have no effect on hard currency debt flows. Similarly, the announcements affect debt flows but not equity flows for Brazil and Mexico. Finally, easing (unexpected) and tightening (unexpected) announcements cause local currency debt outflows but have no effect on hard currency debt flows to Brazil.

5.2.1 Portfolio Flows to Latin America

The main result, as seen in Figure 8, is that both easing (unexpected) and tightening (unexpected) announcements have a statistically significant effect on portfolio debt flows to Latin America within a seven day event window for all currencies. The easing (unexpected) announcements reduce all debt flows to Latin America by .32 standard deviations or $11.01 million less per week in flows the week after than the week before an easing (unexpected) Federal Reserve announcement. The tightening (unexpected) announcements reduce all debt flows to Latin America by .38 standard deviations or $12.54 million less per week in flows the week after than the week before a tightening (unexpected) Federal Reserve announcement.

An analysis of debt flows to Latin America by currency indicates that there is no effect for hard currency debt flows but there is an effect for local currency debt flows and mixed currency debt flows. As seen in Appendix Figure B5, the easing (unexpected) announcements reduce local currency debt flows to Latin America by .34 standard deviations or $11.66 million less per week in flows the week after than the week before an easing (unexpected) Federal Reserve announcement. The tightening (unexpected) announcements reduce local currency debt flows to Latin America by .41 standard deviations or $12.64 less per week in flows the week after than the week before a tightening (unexpected) Federal Reserve announcement. In Appendix Figure B6, easing (unexpected) announcements reduce mixed currency debt flows to Latin America by .29 standard deviations or $100 thousand less flows the week after from the week before an easing (unexpected) Federal Reserve announcement. Tightening (unexpected) announcements do not affect mixed currency debt flows.

18

Shadow Rate Announcements and Latin America Debt Flows
(All Currencies, 54 events)

Figure 8: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America debt flows.

Shadow Rate Announcements and Latin America Equity Flows
(All Currencies, 54 events)
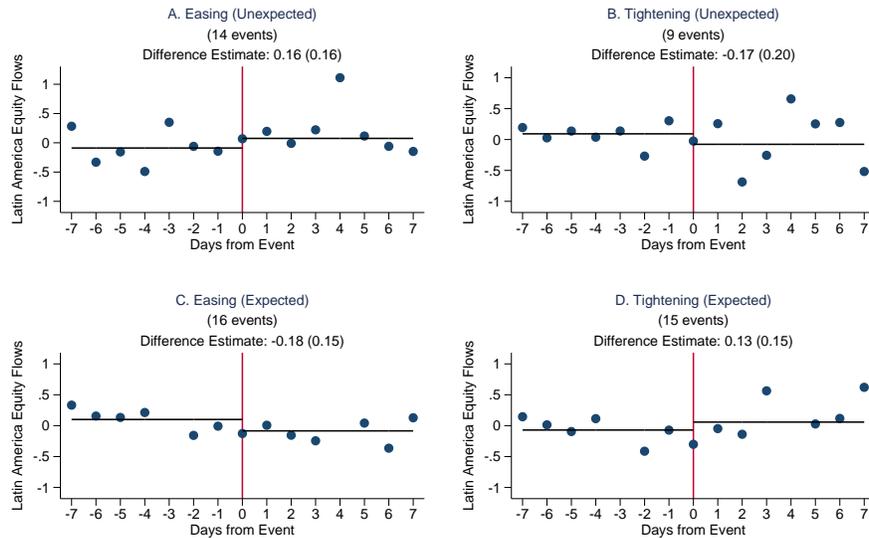
Figure 9: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America equity flows.

As shown in Figure 9, the event study results indicate the Federal Reserve announcements do not have a statistically significant effect on equity flows to Latin America within the seven days before and seven day after event windows. This no result for equity flows to Latin America is in contrast to the statistically significant results for easing (unexpected) and tightening (unexpected) results for debt flows to Latin America.

5.2.2 Portfolio Flows to Brazil and Mexico

The same event study methodology is used to analyze the debt flows and equity flows to Brazil and equity flows to Mexico. The debt flows to Brazil are in hard currency and local currency and the hard currency debt flows to Mexico are too small for empirical analysis. The equity flows to Brazil and Mexico are not classified by currency.

Figure 10: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on hard currency debt flows to Brazil.

The event study results indicate that Federal Reserve announcements have an effect on debt flows to Brazil and inconclusive effects on debt flows to Mexico. As seen in Figure 11 and Figure 10, the easing (unexpected) announcements have an effect on local currency
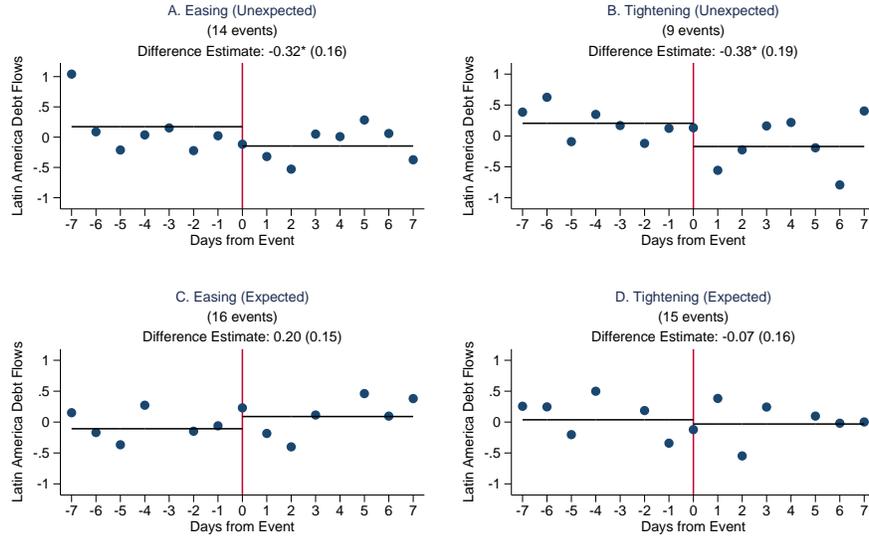
Figure 11: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on local currency debt flows to Brazil.

debt flows to Brazil but do not have an effect on hard currency debt flows. The easing (unexpected) announcements reduce local currency debt flows to Brazil by .30 standard deviations or $5.44 million less per week in flows the week after than the week before an easing (unexpected) Federal Reserve announcement. As seen in Figure 10, the tightening (unexpected), easing (expected), and tightening (expected) announcements do not have a statistically significant effect on hard currency debt flows to Brazil. Data limitations prevent an estimation of the effect of Federal Reserve announcements on debt flows to Mexico.

The Federal Reserve announcements do not affect equity flows to Brazil or Mexico. As seen in Figure 12, the Federal Reserve announcements do not affect equity flows to Brazil within the seven days before and after a Federal Reserve announcement. Similarly, as seen in Figure 13, the equity flows to Mexico do not respond to Federal Reserve announcements.

As mentioned in the introduction, Brazil and Mexico used different set of policy response since the Global Financial Crisis. While authorities in Brazil have used capital controls and foreign exchange intervention the authorities in Mexico have followed a more market
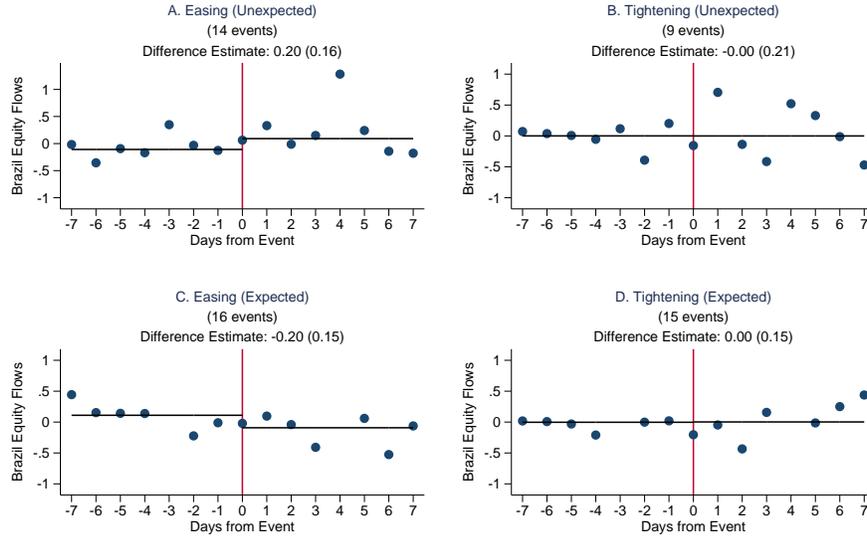
Figure 12: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on equity flows to Brazil.

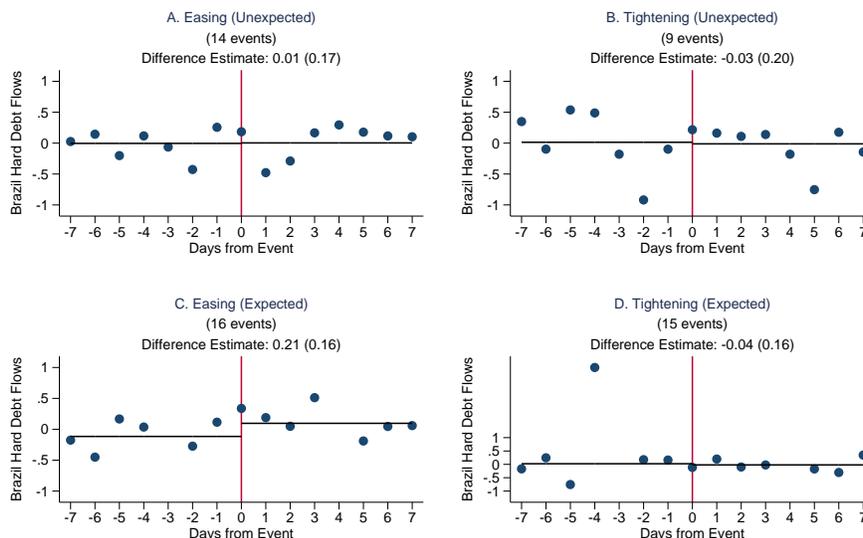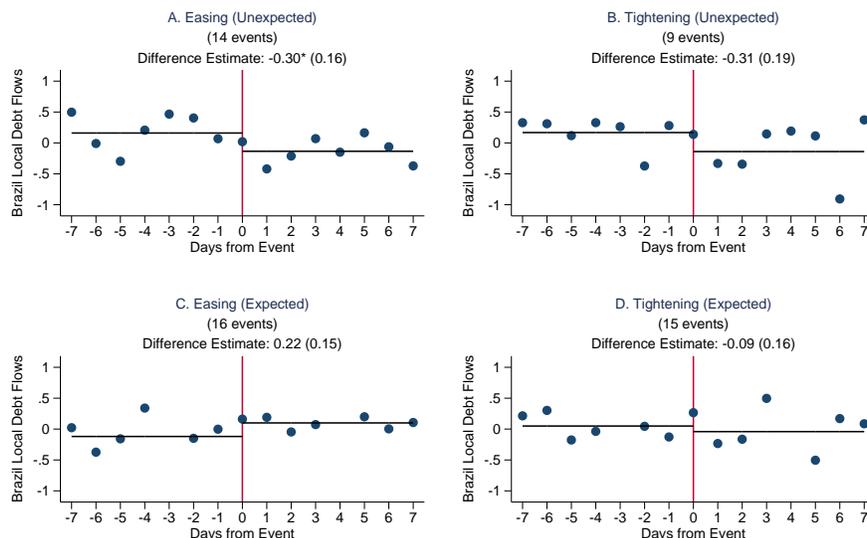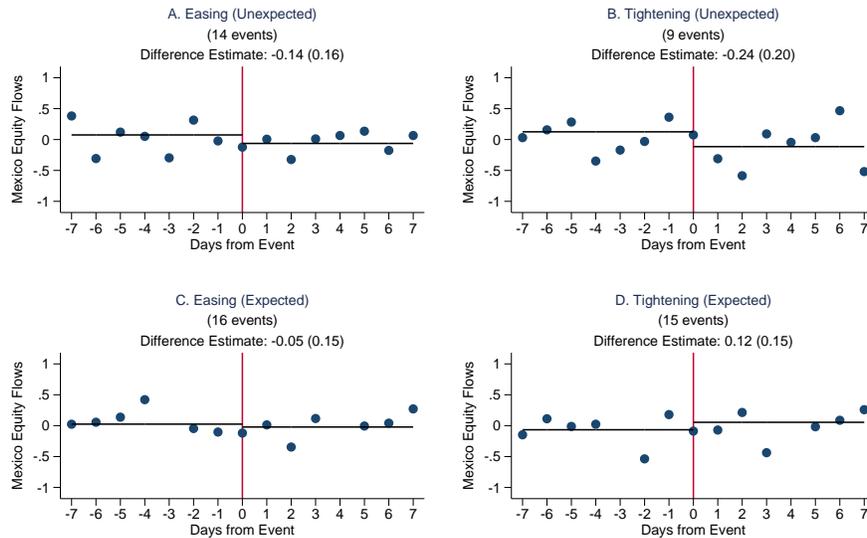Figure 13: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on equity flows to Mexico.

driven approach and have not intervened in financial markets. In these empirical results, we see that the easing (unexpected) Federal Reserve announcements cause local currency debt outflows to Brazil and had no effect on hard currency debt flows to Brazil. We also observe that the Federal Reserve announcements have no effect on equity flows to Brazil or Mexico.

6   Robustness

The robustness checks include an announcement classification using intra-day monetary surprises as well as controls for volatility, liquidity, global commodity prices, and fundamentals in the regressions. The first robustness check compares the announcement classification using intra-day monetary surprises. The second set of checks introduce control variables into the regressions for uncertainty measured by the VIX, liquidity in the U.S. Treasury market, oil and commodity prices measured from Bloomberg, and fundamentals measured by J.P. Morgan EMBI and the MSCI equity index.

6.1   Intra-day Monetary Surprise Announcement Classification

In the first robustness check the Federal Reserve announcements are classified using intra-day monetary surprises instead of daily changes in interest rate expectations. Recall, this paper used daily frequency expectations from a shadow rate term structure model to classify the Federal Reserve announcements as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). However, this classification could be biased if other events occur on Federal Reserve announcement days that systematically influence the market expectations. Intra-day monetary surprises are calculated by taking the first principal component of the change in future yields for 2 year, 5 year, 10 year, and 30 year Treasury futures in the 15 minutes before and 105 minutes after a Federal Reserve announcement (Rogers et. al. (2014 and 2015), Curcuru et. al. (2015)).

The intra-day monetary surprises are used to classify announcements where there is a

Table 2: Intra-day Classification of Federal Reserve Announcements

	Rogers et. al. (2014)
Easing	27
Tightening	25
Unclassified	2
Total	54

positive interest rate change as a tightening announcement, announcements where there is a negative interest rate change as an easing announcement, and announcements where there is no change as unclassified. As seen in Table 2 the intra-day data on monetary surprises classifies 27 announcements as easing, 25 announcements as tightening, and leaves 2 announcements unclassified. Appendix Table B4 shows a complete list and comparison of all 54 Federal Reserve announcements from October 2008 until October 2014 using the shadow rate model and the intra-day monetary surprises. The intra-day monetary surprise announcement classification matches the daily shadow rate model classification for most of the Federal Reserve announcements during this period. The only other differences between the intra-day announcement classification and the shadow rate model announcement classification are that the intra-day classification leaves two announcements unclassified and the intra-day classification cannot be used to determine if it is expected or unexpected.

6.2 Control Variables

Another set of robustness checks introduces control variables into regression specification (1) to see whether this changes the statistical significance for the coefficient for the shadow rate announcements. For both the debt flows and the equity flows this includes uncertainty as measured by the VIX, market liquidity in the U.S. Treasury market as measured by Hu, Pan, Wang (2013), and commodity prices from Bloomberg are included in the regression specifications. For the debt flow regressions a control for the J.P. Morgan Emerging Market Bond Index is included as a proxy for fundamentals and for the equity flow regressions a control for the MSCI as proxy for fundamentals.

6.2.1 VIX

Previous literature has shown that global risk aversion, measured by the VIX, may explain portfolio flows to emerging markets (Ahmed and Zlate (2013), Nier, Sedik, and Mondino (2014), Rey (2014), Ananchotikul and Zhang (2014), Koepke (2014)). When global risk aversion is high, for example, global investors are more likely to invest into "safe" assets such as U.S. Treasuries and less likely to invest in emerging markets. The VIX measures the implied volatility of the S&P 500 index options calculated by the Chicago Board Options Exchange (CBOE) and measures the stock market's expectations of stock market volatility over the next 30 day period. The results from this robustness check, shown in Appendix Table B5 and Appendix Table B6, indicate that adding the VIX to the specification does not change the results for portfolio flows to Latin America or to Brazil and Mexico.

6.2.2 Liquidity

A measure of market liquidity developed by Hu, Pan, Wang (2013) is included as a control variable to explain global financial flows to Latin America. This market liquidity measure, available at daily frequency, captures the spread between seasoned and recently issued comparable Treasury securities and weekly average trading volume in the secondary market for Treasury Inflation Protected Securities (TIPS) as reported by the Federal Reserve Bank of New York. When this market is illiquid there is a shortage of arbitrage capital and tightening of liquidity in the overall market. This liquidity measure has been shown to capture major financial events such as the 1987 stock market crash, the near collapse of LTCM, 9/11, the GM credit crisis, and the fall of Bear Sterns and Lehman Brothers. When this measure is low, this suggests there is sufficient arbitrage capital. Including a market liquidity variable tests to see that the Federal Reserve announcements are driving these portfolio flows to Latin America despite changes in overall market liquidity. The results from this robustness check, in Table B8 and Table B13, indicate this measure does not change the results for portfolio flows to Latin America, Brazil, or Mexico.

6.2.3 Commodity Prices

The oil price measured by West Texas Instruments (WTI) is included as a control variable that may explain portfolio flows to Latin America. The results from this robustness check, shown in Appendix Table B9 and Appendix Table B14, indicate that oil price does not change the results for portfolio flows to Latin America, Brazil or Mexico. The Bloomberg Commodity Index, is added as a control variable that may explain portfolio flows to Latin America. The result from this robustness check, shown in Appendix Table B10 and Appendix Table B15 indicate that adding commodity prices to the specification does not change the results for portfolio flows to Latin America, Brazil or Mexico.

6.2.4 Fundamentals

The debt market fundamentals, measured by the J.P. Morgan Emerging Market Bond Index (EMBI) Global, is used as a control variable to explain portfolio debt flows to Latin America. The EMBI Global covers 32 countries and is the most comprehensive emerging markets debt benchmark covering U.S. dollar denominated Brady bonds, Eurobonds, traded loans and local market debt instruments issued by sovereign and quasi-sovereign entities. Instead of selecting countries according to a sovereign-credit rating level, this index defines emerging markets with a combination of World Bank defined per capita income brackets and each country's debt-restructuring history. The EMBI Global only considers emerging markets issues denominated in U.S. dollars with a minimum current face outstanding of $500 million and at least 2.5 years to maturity but relaxes some of the EMBI+ limits on secondary market trading.[18] The exact ticker symbol for EMBI Global Latin America is JPMGLAT, for EMBI

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[18]The EMBI Global is more commonly used than the EMBI Global Diversified and the EMBI+. The EMBI Global Diversified is a uniquely-weighted version of the EMBI Global that limits the weights of those index countries with larger debt stocks by only including specified portions of these countries' eligible current face amounts of debt outstanding. It also applies larger weights to less liquid issues from countries with smaller debt stocks. The EMBI+ covers 17 countries (including Brazil and Mexico) and comprises a set of broker-traded external debt instruments widely followed and quoted by several market makers. However, the EMBI+ only considers emerging markets issues denominated in U.S. dollars with a minimum current face outstanding of $500 million and at least 2.5 years to maturity and must meet strict criteria for secondary market trading liquidity.

Global Brazil is JPMGBRA, and for EMBI Global Mexico is JPMGMEX.

The equity market market fundamentals, proxied by the MSCI EM Latin America Index with Bloomberg ticker symbol MXLA, is used as a control variable to explain portfolio equity flows to Latin America. This variable is a free-float weighted index that captures large and mid cap representation across five emerging market countries in Latin America: Brazil, Chile, Colombia, Mexico, and Peru. The index covers 85 percent of the free float-adjusted market capitalization in each country. The MSCI Brazil Index, with Bloomberg ticker symbol MXBR Index, measures the performance of 61 large and mid cap Brazilian companies and covers approximately 85 percent of the equity market in Brazil. The MSCI Mexico Index, with Bloomberg ticker symbol MXMX Index, tracks 27 large and mid cap companies in Mexico and covers 85 percent of the equity market in Mexico.

The results from including the EMBI and the MSCI in the regression (1) as a robustness check, shown in Appendix Table B11 and Appendix Table B16, indicate these variables do not change the results. The only exception is that both the easing (unexpected) and tightening (unexpected) announcements become statistically significant for the specification that includes the EMBI a control variable whereas only the easing (unexpected) announcements were statistically significant without the EMBI.

7   Conclusion

This paper examined the effects of Federal Reserve announcements on portfolio flows to Latin America since the Global Financial Crisis. First, the paper classified all the Federal Reserve announcements from October 8, 2008 until October 29, 2014 as either easing (unexpected), tightening (unexpected), easing (expected), or tightening (expected). Second, this Federal Reserve announcement classification using the shadow rate model was used for an event study on debt flows and equity flows to Latin America as well as to Brazil and Mexico. The results showed that both easing (unexpected) and tightening (unexpected) announcements

27

cause debt outflows from Latin America but only had an effect on local currency and not hard currency debt flows. These announcements did not have a statistically significant effect on equity flows. The easing (unexpected) Federal Reserve announcements had an effect on local currency debt flows to Brazil but had no effect on hard currency debt flows to Brazil or to equity flows to Brazil. There was no effect of Federal Reserve announcements on equity flows to Mexico and data limitations for debt flows to Mexico made it impossible to estimate the effect of announcements on these flows using EPFR Global data.[19] These results were robust to controlling for uncertainty measured by the VIX, liquidity measured from lack of arbitrage in the U.S. Treasury debt market, oil and commodity prices, and fundamentals measured by the J.P. Morgan EMBI bond index and the MSCI equity index.

These results have tentative policy implications for both the Federal Reserve and for the authorities in Latin America. The paper showed that Federal Reserve unexpected announcements, regardless of whether they were classified as easing or tightening, led to portfolio outflows from Latin America. This suggests that Federal Reserve communication that reduces the surprise component to markets may help reduce the volatility associated with portfolio outflows from Latin America. Furthermore, because the volatility showed up in the debt flows but not the equity flows this suggests Latin American may want to support local bond market development or to consider policies that support markets when the Federal Reserve makes announcements. The differences in policies towards foreign exchange intervention and capital controls in Brazil and in Mexico may play a role. Future research could explore the behavior of these foreign mutual fund and exchange traded fund investors as the Federal Reserve moves away from the zero lower bound and the implications this may have for the financial stability policies of the Bank of Mexico and Bank of Brazil.

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[19]One possibility would be to use daily frequency foreign portfolio data series released by the Banco de Mexico called GUBERNAMENTAL, Residentes en el Extranjero (II) as in Christensen et. al. (2019).

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Appendix A

A.1 Arbitrage-Free Nelson Siegel (AFNS) Model

Term structure models decompose the debt yields into the average expected future short-term rate and the term premium for a given maturity. The yield curve at time t for a given maturity τ debt can be written to be the sum of the average market expectations of the short-rate and a term premium at time time for a given maturity τ bond:

$$y_t(\tau) = \frac{1}{\tau} \int_t^{t+\tau} E_t^P[r_s] ds + TP_t(\tau)$$

the average expectations of the short rate is sometimes referred to as the risk neutral yield and written as $RN_t(\tau) = \frac{1}{\tau} \int_t^{t+\tau} E_t^P[r_s] ds$ and is identical for all debt of that maturity. The term premium, $TP_t(\tau)$ is a residual term that captures information about growth and inflation, changes in overall risk aversion, credit risk, and liquidity risk of the bond. The term premium $TP_t(\tau)$ can also be expressed in terms of the model $TP_t(\tau) = y_t(\tau) - \frac{1}{\tau} \int_t^{t+\tau} E_t^P[r_s] ds$. The forward short rates and forward term premia can be estimated from the the term structure model and will be compared to asset price measures of the short-rate.

The arbitrage-free Nelson-Siegel model (AFNS) by Christensen and Rudebusch (2012) is an affine Gaussian term structure model that builds off a representation introduced in Christensen et al. (2011) and contributes to a growing literature of dynamic term structure models.[20] Gaussian term structure models have risk-neutral Q-measure that captures factors in the short-term rate and a real world P-measure that captures factors in the term premium. This AFNS model has three latent state variables that represent the slope, level, and curvature of the yield curve $X_t = (L_t, S_t, C_t)$. The risk-neutral Q-measure is described by the following stochastic differential

---

[20]Other examples of term structures include Hamilton and Wu (2012), Andreasen and Christensen (2015).

equations (SDEs):

$$
\begin{pmatrix} dL_t \\ dS_t \\ dC_t \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & \lambda & -\lambda \\ 0 & 0 & \lambda \end{pmatrix} \left[\begin{pmatrix} \theta_1^Q \\ \theta_2^Q \\ \theta_3^Q \end{pmatrix} - \begin{pmatrix} L_t \\ S_t \\ C_t \end{pmatrix} \right] dt + \sum \begin{pmatrix} dW_t^{L,Q} \\ dW_t^{S,Q} \\ dW_t^{C,Q} \end{pmatrix}, \quad \lambda > 0 \quad (1)
$$

The short-term rate is described by

$$
r_t = L_t + S_t \tag{2}
$$

This specification implies that zero-coupon bond yields are given by

$$
y_t(\tau) = L_t + \left(\frac{1 - e^{-\lambda\tau}}{\lambda\tau} \right) S_t + \left(\frac{1 - e^{-\lambda\tau}}{\lambda\tau} - e^{-\lambda\tau} \right) C_t - \frac{A(\tau)}{\tau} \tag{3}
$$

The factor loadings in the yield function are the level, slope, and curvature loadings introduced in Nelson and Siegel (1987). The $A(\tau)/\tau$ is a yield-adjustment term, which captures the convexity effects due to Jensen's inequality and ensures the absence of arbitrage. Diebold and Rudebusch (2011) explain that this adjustment term makes sure that the Nelson-Siegel bond prices are arbitrage-free and thus are not subject to the critique by Filipović (1999) that Nelson-Siegel models contain arbitrage opportunities.

The AFNS model is completed with a term premium specification that connects the measure of risk-free Q-factor dynamics with the measure of risk P-factor dynamics. The term premium is affine and implemented as in Duffee (2002). The factor dynamics of the maximally flexible

specification of the AFNS model are then given by:

$$
\begin{pmatrix} dL_t \\ dS_t \\ dC_t \end{pmatrix} = \begin{pmatrix} \kappa_{11}^P & \kappa_{12}^P & \kappa_{13}^P \\ \kappa_{21}^P & \kappa_{23}^P & \kappa_{23}^P \\ \kappa_{31}^P & \kappa_{32}^P & \kappa_{33}^P \end{pmatrix} \left[\begin{pmatrix} \theta_1^P \\ \theta_2^P \\ \theta_3^P \end{pmatrix} - \begin{pmatrix} L_t \\ S_t \\ C_t \end{pmatrix} \right] dt + \sum \begin{pmatrix} dW_t^{L,P} \\ dW_t^{S,P} \\ dW_t^{C,P} \end{pmatrix}, \quad \lambda > 0 \tag{4}
$$

The AFNS forward rate is described by the following equation:

$$
f_t(\tau) = L_t + e^{-\lambda\tau} S_t + \lambda\tau e^{-\lambda\tau} C_t + A^f(\tau) \tag{5}
$$

The yield data used to estimate the shadow rate model includes a large sample of nominal U.S. Treasury zero-coupon yields from January 4, 1985 until March 5, 2015. The yields consist of three- and six-month Treasury bill yields from the H.15 series from the Federal Reserve Board as well as the one year, two years, three years, five years, seven years, and ten years data from Gurkaynak et al. (2007). The longest maturity Treasury yields are not available prior to November 25, 1985 and so that is why the sample is restricted to starting at that time. A standard Kalman filter is used to analyze the data.

The AFNS model is used to estimate the standard zero-coupon yield and forward rate decompositions as described in Christensen and Rudebusch (2012) for the time period October 8, 2008 until October 29, 2014. The estimated yield curve data includes fitted zero-coupon yields, average expected short rates, and zero-coupon yield term premiums. The estimated forward rate curve data includes the fitted forward rates, expected short-rates, and forward rate term premiums. The maturities for this includes six months as well as the one year, two years, three years, four years, five years, six years, seven years, eight years, nine years, and ten years.

The standard Gaussian and AFNS term structure models are unable to capture two features of the term structure that arise at the zero lower bound. First, as a Gaussian model, the AFNS model assigns positive probabilities of negative interest rates when the economy is near the zero

lower bound. When the interest rate is negative, a loan is to be repaid with a lower amount than the original proceeds (Munk (2011)). This assumption does not stand up to economic theory (Black (1995)) nor does it stand up to empirical observation. Second, the AFNS model assumes that yields have constant volatility over time. This second assumption does not stand up to empirical reality because yields are less volatile when constrained at the zero lower bound (Christensen and Rudebusch (2014)).

A.2 Shadow Rate Arbitrage-Free Nelson-Siegel (B-AFNS) Model

The shadow rate (B-AFNS) model developed by Christensen and Rudebusch (2013) is an AFNS model except that it replaces the short-rate with a shadow rate that is truncated at zero and it also allows yields to become less volatile as the economy gets closer to the zero lower bound (Christensen and Rudebusch (2014)).[21] Otherwise, the B-AFNS model is the same as the standard three factor AFNS model.

The state variables follow the same risk neutral dynamic process for the Q-measure as the popular Nelson and Siegel (1987) model:

$$
\begin{pmatrix} dL_t \\ dS_t \\ dC_t \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & \lambda & -\lambda \\ 0 & 0 & \lambda \end{pmatrix} \left[\begin{pmatrix} \theta_1^Q \\ \theta_2^Q \\ \theta_3^Q \end{pmatrix} - \begin{pmatrix} L_t \\ S_t \\ C_t \end{pmatrix} \right] dt + \sum \begin{pmatrix} dW_t^{L,Q} \\ dW_t^{S,Q} \\ dW_t^{C,Q} \end{pmatrix}, \quad \lambda > 0 \quad (6)
$$

where $\sum$ is the constant covariance (or volatility) matrix.

The short-rate in the B-AFNS model is still the sum of the level and slope but constrained to be a non-negative process of the AFNS model:

$$
s_t = L_t + S_t, \qquad r_t = \max\{0, s_t\} \tag{7}
$$

---

[21]Christensen and Rudebusch (2014) follow Kim and Singleton (2012) and refer to a world without physical currency by using the "B-" prefix in recognition of the work by Black (1995).

The estimated bond yields in the B-AFNS models are allowed to be negative and follow the same popular level, slope and curvature factor loading Q-dynamics as the Nelson and Siegel (1987):

$$y_t(\tau) = L_t + \left(\frac{1 - e^{-\lambda\tau}}{\lambda\tau} \right) S_t + \left(\frac{1 - e^{-\lambda\tau}}{\lambda\tau} - e^{-\lambda\tau} \right) C_t - \frac{A(\tau)}{\tau} \tag{8}$$

where $A(\tau)/\tau$ is a maturity-dependent yield-adjustment term because of Jensen's inequality.

The risk factor P-measure dynamics of the B-AFNS follow the same process as in the AFNS model:

$$\begin{pmatrix} dL_t \\ dS_t \\ dC_t \end{pmatrix} = \begin{pmatrix} \kappa_{11}^P & \kappa_{12}^P & \kappa_{13}^P \\ \kappa_{21}^P & \kappa_{23}^P & \kappa_{23}^P \\ \kappa_{31}^P & \kappa_{32}^P & \kappa_{33}^P \end{pmatrix} \left[\begin{pmatrix} \theta_1^P \\ \theta_2^P \\ \theta_3^P \end{pmatrix} - \begin{pmatrix} L_t \\ S_t \\ C_t \end{pmatrix} \right] dt + \sum \begin{pmatrix} dW_t^{L,P} \\ dW_t^{S,P} \\ dW_t^{C,P} \end{pmatrix}, \quad \lambda > 0 \tag{9}$$

The B-AFNS shadow forward rate equation is the same as the AFNS forward rate:

$$f_t(\tau) = L_t + e^{-\lambda\tau} S_t + \lambda\tau e^{-\lambda\tau} C_t + A^f(\tau) \tag{10}$$

where the final term is another maturity dependent yield-adjustment term due to Jensen's inequality.

The shadow-rate AFNS model is as flexible and empirically tractable as the standard AFNS model and is used to estimate the daily standard zero-coupon yield and forward rate decompositions as described in Christensen and Rudebusch (2013) for the time period October 8, 2008 until October 29, 2014. Similar to the AFNS model, the yield data used for the estimations comes the daily H.15 database and from Gürkaynak et.al. (2007). The model is estimated for fitted zero-coupon yields, average expected short rates, zero-coupon yield term premiums, fitted forward rates, expected short-rates, and forward rate term premiums at daily frequency. The expected short rates are estimated for 6 months to 10 year durations. This paper uses the B-AFNS model expected short rate at two year durations.

Appendix B
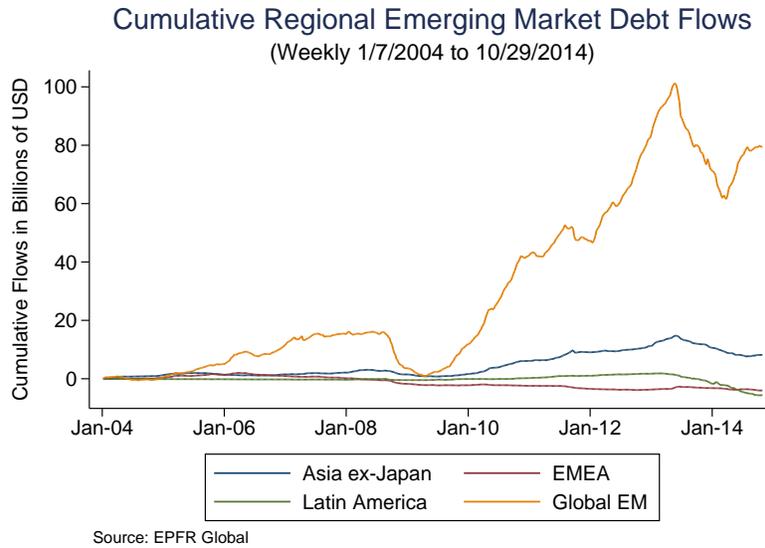
Figure B1: Cumulative Regional Emerging Market Debt Flows.
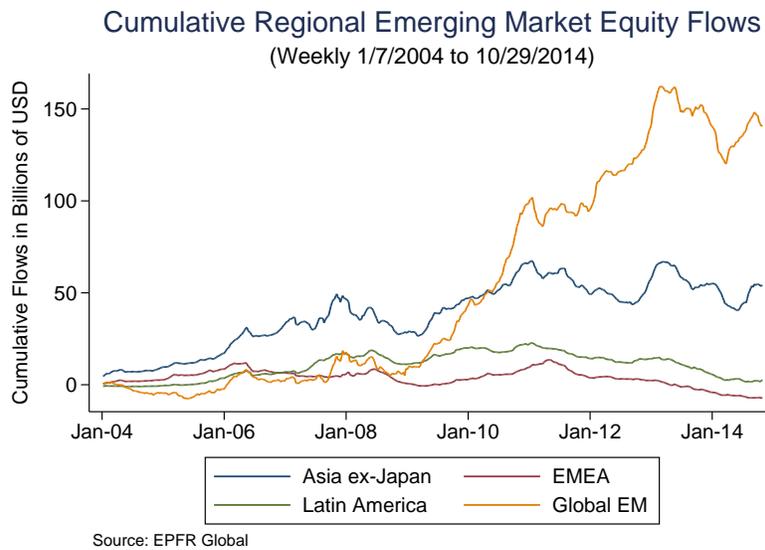
Figure B2: Cumulative Regional Emerging Market Equity Flows.

38

Table B1: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Latin America, Debt (All Currencies)	1573	-3.49	39.61	-420.60	458.93
Latin America, Debt (Hard Currency)	1573	0.37	5.26	-36.96	33.66
Latin America, Debt (Local Currency)	1573	-3.80	38.73	-418.31	458.21
Latin America, Debt (Mixed Currency)	1554	-0.07	1.29	-32.72	18.50
Brazil, Debt (Hard Currency)	1573	-0.05	2.91	-33.20	14.96
Brazil, Debt (Local Currency)	1305	0.20	4.36	-92.39	42.26
Mexico, Debt (Local Currency)	1573	-5.55	80.39	-603.10	644.36
Latin America, Equity	1573	-5.55	80.39	-603.10	644.36
Brazil, Equity	1573	-0.96	60.88	-363.55	629.91
Mexico, Equity	1573	-2.02	32.68	-247.83	231.78
VIX Index	1581	22.37	11.22	10.32	80.86
Liquidity	1516	3.39	3.77	0.72	20.47
WTI Oil Price	1581	86.25	16.76	31.41	113.93
Bloomberg Commodity Index	1581	136.16	14.08	102.00	175.42
JP Morgan EMBI Latin America	1581	499.91	94.96	265.62	642.00
JP Morgan EMBI Brazil	1581	870.10	127.87	495.63	1049.96
JP Morgan EMBI Mexico	1581	506.81	78.68	296.65	627.31
MSCI Latin America	1581	3579.76	647.87	1659.16	4729.96
MSCI Brazil	1581	2803.30	609.47	1286.54	3923.12
MSCI Mexico	1581	5826.92	1237.14	2335.10	7771.69

Shadow Rate Model and Fed Announcements
(54 events)
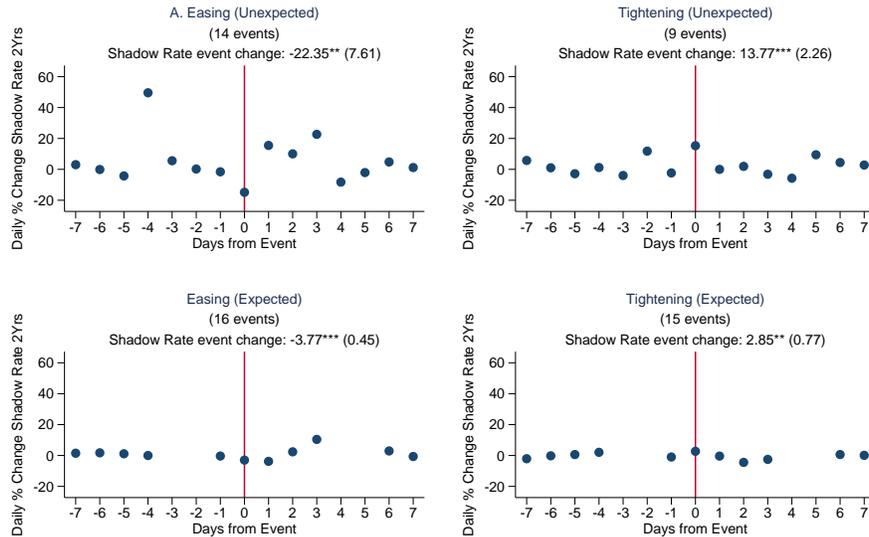
Figure B3: Significance test of the daily percentage change in Shadow Rate Model two year short rate expectations on the Fed announcement day relative to the previous seven days.

Shadow Rate Announcements and Latin America Debt Flows
(Hard Currency, 54 events)
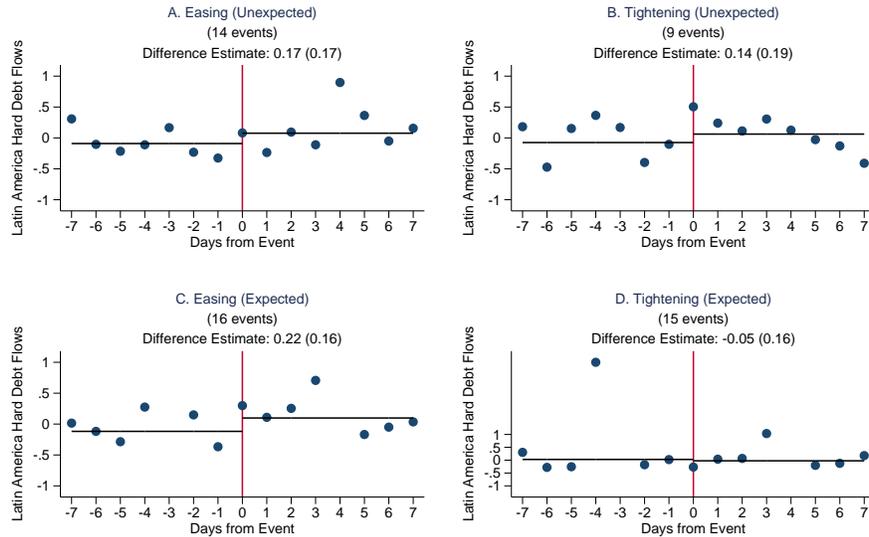
Figure B4: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America debt flows in hard currency.

Shadow Rate Announcements and Latin America Debt Flows
(Local Currency, 54 events)
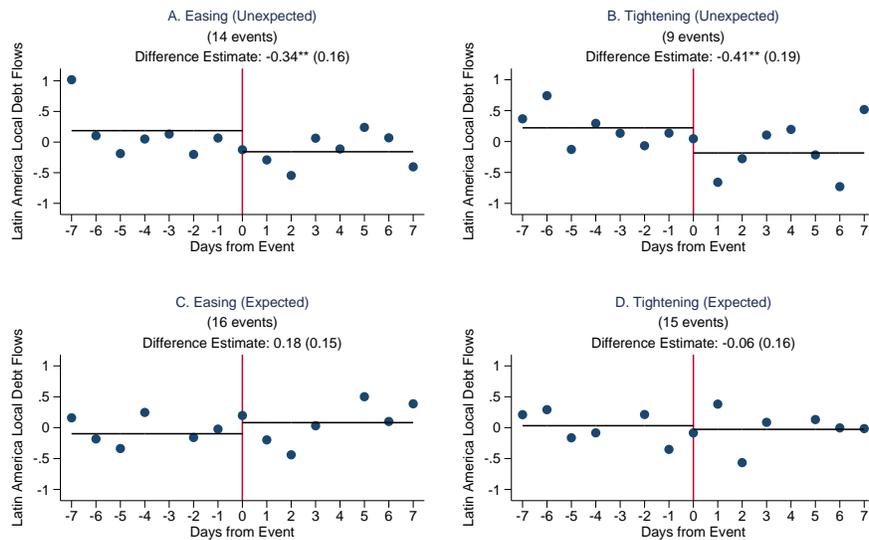
Figure B5: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America debt flows in local currency.
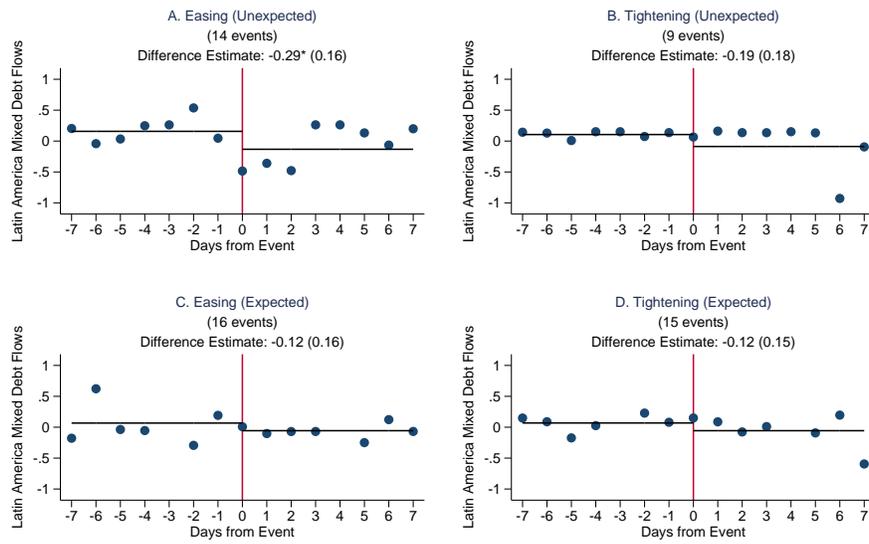
Figure B6: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America debt flows in mixed currency.

Table B2: EPFR Global Equity Flow Coverage

Fund Group	Daily Frequency		Weekly Frequency		Monthly Frequency	
	# of Funds	$US Billions	# of Funds	$US Billions	# of Funds	$US billions
	(1)	(2)	(3)	(4)	(5)	(6)
Asia ex-Japan	2,486	304	2,500	303	2,932	375
EMEA	691	40	693	40	803	51
GEM	1,878	405	1,897	414	2,241	537
Global	7,194	1,675	7,278	1,702	9,591	3,323
Japan	1,001	206	1,005	207	1,081	213
Latin America	471	34	472	48	465	77
Pacific	367	48	366	48	465	77
USA	8,801	3,333	9,057	3,404	11,022	6,676
Western Europe	4,672	970	4,669	974	5,074	1,091
Total	27,561	7,015	27,937	7,125	33,735	12,396

Source: EPFR Global

Table B3: EPFR Global Debt Flow Coverage

Fund Group	Daily Frequency		Weekly Frequency		Monthly Frequency	
	# of Funds	$US Billions	# of Funds	$US Billions	# of Funds	$US billions
	(1)	(2)	(3)	(4)	(5)	(6)
Balanced	1,657	590	1,676	591	2,354	1,321
Emerging Markets	2,728	227	2,735	228	3,029	314
Global	5,030	923	5,051	930	6,045	1,458
High Yield	2,112	451	2,134	461	2,437	627
Money Market	2,400	3,505	2,411	3,528	2,650	3,793
USA	3,935	1,305	4,174	1,358	5,201	2,653
Total	17,862	7,001	18,181	7,096	21,716	10,166

Source: EPFR Global

Table B4: Federal Reserve Announcements Classification Results

Date	Event	Shadow Rate Model (1)	Rogers et.al. (2014) (2)	Shadow Rate Model (3)	Rogers et. al. (2014) (4)
10/8/2008	FOMC/Joint CB Statement				
10/29/2008	FOMC Meeting	Tightening (Expected)	Easing	1.72	-0.009
LSAP 1					
11/25/2008	Fed MBS/Agency Purchases	Easing (Unexpected)	Easing	-23.48	-0.061
12/16/2008	FOMC Meeting	Easing (Unexpected)	Easing	-38.97	-0.270
1/28/2009	FOMC Meeting	Tightening (Unexpected)	Tightening	14.27	0.020
3/18/2009	FOMC Meeting	Easing (Unexpected)	Easing	-17.90	-0.370
4/29/2009	FOMC Meeting	Tightening (Expected)	Tightening	0.56	0.053
6/24/2009	FOMC Meeting	Tightening (Expected)	Tightening	3.02	0.109
8/12/2009	FOMC Meeting	Easing (Expected)	Easing	-2.83	-0.026
9/23/2009	FOMC Meeting	Easing (Expected)	Easing	-3.89	-0.099
11/4/2009	FOMC Meeting	Easing (Expected)	Easing	-3.93	-0.024
12/16/2009	FOMC Meeting	Easing (Expected)	Tightening	-2.70	0.028
1/27/2010	FOMC Meeting	Tightening (Expected)	Tightening	5.34	0.064
3/16/2010	FOMC Meeting	Easing (Expected)	Easing	-2.58	-0.043
4/28/2010	FOMC Meeting	Tightening (Expected)	Easing	4.01	-0.009
6/23/2010	FOMC Meeting	Easing (Unexpected)	Easing	-6.93	-0.025
LSAP 2					
8/10/2010	FOMC Meeting	Easing (Expected)	Easing	-3.63	-0.085
8/27/2010	Bernanke at Jackson Hole	Tightening (Unexpected)	Tightening	13.20	0.086
9/21/2010	FOMC Meeting	Easing (Unexpected)	Easing	-10.53	-0.071
10/15/2010	Bernanke at Boston Fed	Easing (Unexpected)	Unclassified	-6.66	0.000
11/3/2010	FOMC Meeting	Easing (Unexpected)	Easing	-11.46	-0.057
12/14/2010	FOMC Meeting	Tightening (Unexpected)	Tightening	6.49	0.032
1/26/2011	FOMC Meeting	Tightening (Unexpected)	Easing	6.87	-0.019
3/15/2011	FOMC Meeting	Tightening (Unexpected)	Tightening	5.82	0.068
4/27/2011	FOMC Meeting	Easing (Expected)	Easing	-1.53	-0.034
6/22/2011	FOMC Meeting	Tightening (Expected)	Tightening	0.12	0.037
MEP					
8/9/2011	FOMC Meeting	Easing (Unexpected)	Easing	-31.48	-0.142
8/26/2011	Bernanke at Jackson Hole	Easing (Unexpected)	Easing	-14.39	-0.008
9/21/2011	FOMC Meeting	Tightening (Unexpected)	Tightening	31.38	0.032
11/2/2011	FOMC Meeting	Tightening (Expected)	Unclassified	0.31	0.000
12/13/2011	FOMC Meeting	Tightening (Expected)	Tightening	1.06	0.007
1/25/2012	FOMC Meeting	Easing (Unexpected)	Easing	-14.76	-0.057
3/13/2012	FOMC Meeting	Tightening (Unexpected)	Tightening	4.42	0.047
4/25/2012	FOMC Meeting	Easing (Expected)	Tightening	-2.37	0.015
6/20/2012	FOMC Meeting	Tightening (Expected)	Tightening	3.18	0.015
8/1/2012	FOMC Meeting	Tightening (Expected)	Tightening	2.33	0.053
LSAP 3					
9/13/2012	FOMC Meeting	Easing (Unexpected)	Tightening	-6.51	0.016
10/24/2012	FOMC Meeting	Easing (Expected)	Easing	-2.04	-0.002
12/12/2012	FOMC Meeting	Easing (Expected)	Tightening	-1.46	0.005
1/30/2013	FOMC Meeting	Easing (Unexpected)	Easing	-5.91	-0.024
3/20/2013	FOMC Meeting	Tightening (Expected)	Tightening	4.30	0.011
5/1/2013	FOMC Meeting	Easing (Expected)	Tightening	-2.00	0.003
5/22/2013	Bernanke Testimony	Tightening (Expected)	Tightening	4.96	0.031
6/19/2013	FOMC Meeting	Tightening (Unexpected)	Tightening	16.29	0.198
7/31/2013	FOMC Meeting	Easing (Expected)	Easing	-3.16	-0.054
9/18/2013	FOMC Meeting	Easing (Unexpected)	Easing	-13.56	-0.223
10/30/2013	FOMC Meeting	Easing (Expected)	Tightening	-1.13	0.048
12/18/2013	FOMC Meeting	Easing (Unexpected)	Easing	-5.53	-0.020
1/29/2014	FOMC Meeting	Easing (Expected)	Easing	-3.50	-0.013
3/19/2014	FOMC Meeting	Tightening (Unexpected)	Tightening	32.20	0.147
4/30/2014	FOMC Meeting	Easing (Expected)	Easing	-4.21	-0.017
6/18/2014	FOMC Meeting	Easing (Expected)	Easing	-1.70	-0.022
7/30/2014	FOMC Meeting	Tightening (Expected)	Easing	2.89	-0.012
9/17/2014	FOMC Meeting	Tightening (Expected)	Tightening	2.80	0.078
10/29/2014	FOMC Meeting	Tightening (Unexpected)	Tightening	11.12	0.055

Table B5: Shadow Rate Announcements and Latin America Flows

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.32*	0.17	-0.34*	-0.29*	0.16
	(0.16)	(0.17)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153	153
Tightening (Unexpected)	-0.41**	0.19	-0.46**	-0.22	-0.15
	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Observations	94	94	94	94	94
Easing (Expected)	0.20	0.22	0.18	-0.12	-0.18
	(0.15)	(0.16)	(0.15)	(0.16)	(0.15)
Observations	176	176	176	176	176
Tightening (Expected)	-0.07	-0.05	-0.06	-0.12	0.13
	(0.16)	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	156	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B6: Shadow Rate Announcements and Brazil and Mexico Flows

	Brazil Debt Flows		Brazil Equity Flows	Mexico Equity Flows
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	0.01	-0.30*	0.2	-0.14
	(0.17)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153
Tightening (Unexpected)	0.09	-0.31	0	-0.24
	(0.21)	(0.20)	(0.21)	(0.20)
Observations	94	94	94	94
Easing (Expected)	0.21	0.22	-0.2	-0.05
	(0.16)	(0.15)	(0.15)	(0.15)
Observations	176	176	176	176
Tightening (Expected)	-0.04	-0.09	0.00	0.12
	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B7: Latin America Flows Controlling for the VIX

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.32*	0.16	-0.34*	-0.27*	0.15
	(0.16)	(0.17)	(0.16)	(0.15)	(0.16)
Observations	153	153	153	153	153
Tightening (Unexpected)	-0.42*	0.20	-0.47*	-0.23	-0.16
	(0.21)	(0.21)	(0.20)	(0.21)	(0.21)
Observations	94	94	94	94	94
Easing (Expected)	0.20	0.22	0.18	-0.12	-0.19
	(0.15)	(0.16)	(0.15)	(0.16)	(0.15)
Observations	176	176	176	176	176
Tightening (Expected)	-0.07	-0.06	-0.05	-0.12	0.13
	(0.16)	(0.16)	(0.16)	(0.15)	(0.16)
Observations	165	165	165	156	165

Robust standard errors in parentheses ***$p<0.01$, **$p<0.05$,*$p<0.1$

Table B8: Latin America Flows Controlling for Liquidity

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.32*	0.19	-0.35*	-0.29*	0.16
	(0.17)	(0.17)	(0.17)	(0.16)	(0.16)
Observations	151	151	151	151	151
Tightening (Unexpected)	-0.41*	0.19	-0.46*	-0.22	-0.16
	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Observations	94	94	94	94	94
Easing (Expected)	0.20	0.22	0.18	-0.12	-0.2
	(0.15)	(0.16)	(0.15)	(0.17)	(0.15)
Observations	173	173	173	173	173
Tightening (Expected)	-0.04	-0.03	-0.03	-0.10	0.13
	(0.15)	(0.16)	(0.16)	(0.16)	(0.15)
Observations	164	164	164	155	164

Robust standard errors in parentheses ***$p<0.01$, **$p<0.05$,*$p<0.1$

Table B9: Latin America Flows Controlling for the Oil Price

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.32*	0.17	-0.34*	-0.30*	0.16
	(0.16)	(0.17)	(0.16)	(0.15)	(0.16)
Observations	153	153	153	153	153
Tightening (Unexpected)	-0.41*	0.19	-0.46*	-0.22	-0.16
	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Observations	94	94	94	94	94
Easing (Expected)	0.19	0.22	0.17	-0.12	-0.19
	0.15	(0.16)	(0.15)	(0.16)	(0.15)
Observations	176	176	176	176	176
Tightening (Expected)	-0.07	-0.05	-0.06	-0.12	0.13
	0.16	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	156	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B10: Latin America Flows Controlling for Commodity Prices

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.33*	0.14	-0.35*	-0.30*	0.16
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153	153
Tightening (Unexpected)	-0.42*	0.18	-0.46*	-0.22	-0.14
	(0.20)	(0.19)	(0.20)	(0.20)	(0.19)
Observations	94	94	94	94	94
Easing (Expected)	0.20	0.23	0.18	-0.12	-0.18
	0.15	(0.15)	(0.15)	(0.17)	(0.15)
Observations	176	176	176	176	176
Tightening (Expected)	-0.07	-0.05	-0.06	-0.13	0.12
	(0.16)	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	156	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B11: Latin America Flows Controlling for the EMBI and MSCI

	Debt Flows				Equity Flows
	All	Hard	Local	Mixed	All
	(1)	(2)	(3)	(4)	(5)
Easing (Unexpected)	-0.32*	0.17	-0.34*	-0.29*	0.15
	(0.16)	(0.17)	(0.16)	(0.15)	(0.16)
Observations	153	153	153	153	94
Tightening (Unexpected)	-0.44*	0.16	-0.48*	-0.25	-0.15
	(0.21)	(0.21)	(0.21)	(0.22)	(0.20)
Observations	94	94	94	94	94
Easing (Expected)	0.20	0.22	0.18	-0.12	-0.18
	(0.14)	(0.16)	(0.14)	(0.16)	(0.15)
Observations	176	176	176	176	176
Tightening (Expected)	-0.07	-0.06	-0.06	-0.12	0.13
	(0.16)	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	156	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B12: Brazil and Mexico Flows Controlling for the VIX

	Brazil Debt Flows		Brazil Equity Flows	Mexico Equity Flows
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	0.02	-0.28*	0.19	-0.13
	(0.17)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153
Tightening (Unexpected)	0.11	-0.32	-0.01	-0.25
	(0.21)	(0.21)	(0.21)	(0.21)
Observations	94	94	94	94
Easing (Expected)	0.21	0.22	-0.20	-0.05
	(0.15)	(0.15)	(0.15)	(0.15)
Observations	176	176	176	176
Tightening (Expected)	-0.03	-0.07	0.01	0.11
	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B13: Brazil and Mexico Flows Controlling for Liquidity

	Brazil Debt Flows		Brazil Equity Flows	Mexico Equity Flows
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	0.01	-0.30*	0.2	-0.13
	(0.17)	(0.16)	(0.16)	(0.17)
Observations	151	151	151	151
Tightening (Unexpected)	0.09	-0.31	-0.01	-0.24
	(0.21)	(0.20)	(0.21)	(0.20)
Observations	94	94	94	94
Easing (Expected)	0.21	0.22	-0.21	-0.25
	(0.16)	(0.15)	(0.15)	(0.21)
Observations	173	173	173	94
Tightening (Expected)	-0.03	-0.04	0.00	0.12
	(0.16)	(0.15)	(0.15)	(0.15)
Observations	164	164	164	164

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B14: Brazil and Mexico Flows Controlling for the Oil Price

	Brazil Debt Flows		Brazil Equity Flows	Mexico Equity Flows
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	0	-0.30*	0.2	-0.14
	(0.17)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153
Tightening (Unexpected)	0.09	-0.31	-0.01	-0.24
	(0.21)	(0.20)	(0.20)	(0.20)
Observations	94	94	94	94
Easing (Expected)	0.21	0.21	-0.21	-0.05
	(0.16)	(0.15)	(0.15)	(0.15)
Observations	176	176	173	176
Tightening (Expected)	-0.05	-0.10	0.00	0.11
	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B15: Brazil and Mexico Flows Controlling for Commodity Prices

| | Brazil Debt Flows | | Brazil Equity Flows | Mexico Equity Flows |
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	-0.01	-0.30*	0.18	-0.13
	(0.17)	(0.16)	(0.15)	(0.17)
Observations	153	153	153	153
Tightening (Unexpected)	0.07	-0.31	0.01	-0.24
	(0.19)	(0.20)	(0.20)	(0.20)
Observations	94	94	94	94
Easing (Expected)	0.23	0.23	-0.2	-0.05
	(0.16)	(0.15)	(0.15)	(0.15)
Observations	176	176	176	176
Tightening (Expected)	-0.04	-0.09	0.00	0.12
	(0.16)	(0.16)	(0.15)	(0.15)
Observations	165	165	165	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1

Table B16: Brazil and Mexico Flows Controlling for the EMBI and MSCI

| | Brazil Debt Flows | | Brazil Equity Flows | Mexico Equity Flows |
	Hard	Local	All	All
	(1)	(2)	(3)	(4)
Easing (Unexpected)	0.01	-0.30*	0.19	-0.13
	(0.17)	(0.16)	(0.16)	(0.16)
Observations	153	153	153	153
Tightening (Unexpected)	0.03	-0.35*	0.01	-0.25
	(0.20)	(0.21)	(0.20)	(0.21)
Observations	94	94	94	94
Easing (Expected)	0.22	0.22	-0.2	-0.05
	(0.15)	(0.15)	(0.15)	(0.15)
Observations	176	176	176	176
Tightening (Expected)	-0.04	-0.08	0.00	0.12
	(0.16)	(0.15)	(0.15)	(0.15)
Observations	165	165	165	165

Robust standard errors in parentheses ***p<0.01, **p<0.05,*p<0.1