

# U.S. Monetary Expectations and Emerging Market Debt Flows\*

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## Abstract

This paper examines the effects that changes to U.S. monetary expectations have on debt flows to emerging markets since the Global Financial Crisis. First, daily interest rate expectations measured by federal fund futures and a shadow rate model are used to classify Federal Reserve announcements as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). Second, the announcements classified by the shadow rate model are used for an event study on daily emerging market debt flows classified by currency (all currencies, hard currency, local currency, mixed currency), investor (all investors, active investors, passive investors), and region (Asia excluding Japan, Europe Middle East and Africa (EMEA), Latin America, and Global Emerging Markets (Global EM)). The results show that tightening (unexpected) announcements cause emerging market debt outflows, hard currency debt flows respond more to announcements than local currency debt flows, and that passive investors respond more than active investors. Debt flows to Latin America respond more to announcements than debt flows to Asia ex-Japan, EMEA, and Global EM.

**Keywords:** International Financial Flows, Unconventional Monetary Policy, Debt

**JEL Classification:** E43, F21, F32, F34, G23

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# 1 Introduction

What are the effects of Federal Reserve announcements on U.S. monetary expectations and on emerging market debt flows since the Global Financial Crisis? Does it matter if the debt flows are in hard or local currency? If the debt flows are through active investor or passive investor funds? And are there differences in the effects of that the Federal Reserve announcements across regions? History has shown that while foreign debt inflows have allowed emerging economies to finance current account deficits the hot money component later also presented macroeconomic financial stability challenges. The 1990s were a prescient example in which emerging countries in Latin America and Asia defaulted on their hard currency debt. As the Federal Reserve raised interest rates in the 1990s, and the U.S. dollar appreciated, emerging economies experienced foreign debt outflows and in some cases were forced to abandon their fixed exchange rate and even default on their debt. In early 2000, emerging economies had issued approximately \$1.3 trillion in hard currency debt. Fifteen years later, emerging economies have issued approximately \$6.3 trillion in hard currency and local currency debt outstanding. Of this total, hard currency debt has increased from \$576 billion to \$1 trillion and local currency debt has increased from \$716 billion to \$5.2 trillion. Even though short term interest rates in the United States have remained near zero since the global financial crisis, short term interest rate expectations have changed throughout the period, causing massive swings in foreign debt flows invested in hard and local currency debt and affecting financial stability in emerging economies.

This paper examines the effect that changes to U.S. monetary expectations around Federal Reserve announcement days have on foreign debt flows to emerging markets using a new measure of monetary expectations and a novel data set on foreign debt flows that has not yet been explored in the literature. The expectations measure used in this paper is derived from a shadow rate term structure model estimated at daily frequency of short rate expectations in two years. This measure of expectations is used to classify announcements. Previous literature has used 30 day expectations using federal fund futures contracts but is

unable to accurately classify announcements since the global financial crisis when interest rates have been near zero. The emerging market debt flow data used in this paper is measured at the daily frequency and analyzed by currency denomination (all currencies, hard currency, local currency, mixed currency), investor (all investors, active investors, passive investors), and region (all regions, Asia excluding Japan, Europe Middle East and Africa (EMEA), Latin America, and Global Emerging Markets (Global EM)). Although previous literature has examined the effects of monetary policy on portfolio flows to emerging markets it has not done so by using expectations to classify all announcements nor has it explored the specific effects on debt flows by currency denomination, investor category, and region. The type of announcement, currency denomination of the emerging market debt, investor type, and their regional focus should all influence the effect of announcements on foreign debt flows. Announcements should have a greater impact if they are unexpected than if they are expected. The response of hard currency debt flows and local currency debt flows should differ depending on the degree of investor perception of default risk and foreign currency risk. Announcements may also have different effects on passive investors that follow a benchmark and on active investors trade according to a strategy. Finally, the effects of announcements on emerging market debt flows may depend on regional characteristics, size and level of debt flows, and the composition of hard currency and local currency debt.

This paper analyzes the effect of changes to U.S. monetary expectations on foreign debt flows to emerging markets in two stages. First, the paper presents two daily measures of expectations of short term interest rates, federal fund futures and a shadow rate model, and uses them to classify all Federal Reserve announcements since the global financial crisis as easing (unexpected), tightening (unexpected), easing (expected) and tightening (expected). The classification results show that the shadow rate model provides a better measure than federal funds futures for classifying Federal Reserve announcements. Second, the paper presents the daily emerging market debt flows data from EPFR Global that tracks regulated funds and estimates the effect that the announcements classified by the shadow rate model

have on these emerging market debt flows. The debt flows are analyzed by whether they are in hard currency or local currency and whether they are traded by active or passive investors. The debt flows are also classified and analyzed by whether the fund invests in Asia excluding Japan, Europe Middle East and Africa (EMEA), Latin America, or invest across multiple regions and classified as Global Emerging Markets (Global EM). The results show that tightening (unexpected) announcements affect debt flows more than any other announcement category and that hard currency debt flows respond more to this category of announcements than local currency debt flows. The results also show that active investors respond more to tightening (unexpected) announcements in local currency debt while passive investors respond more to tightening (unexpected) announcements in hard currency debt. The easing (unexpected) announcements and tightening (unexpected) announcements have a significant effect on hard currency debt flows but not all currency debt flows or local currency debt flows to Asia excluding Japan. On the other hand, easing (unexpected) and tightening (unexpected) announcements affect local currency debt flows but not hard currency debt flows to Latin America. The tightening (unexpected) announcements affect all currency debt flows and hard currency debt flows but not local currency debt flows to the EMEA region and to Global EM.

This paper proceeds in the following manner. Section 2 motivates the paper by explaining its relation to the literature on the classifying announcements at the zero lower bound, the financial stability of emerging market hard currency debt and local currency debt, and the effect of monetary policy on international portfolio flows. Section 3 presents the expectations data from federal funds futures and shadow rate model, the Federal Reserve announcement days, the portfolio flow data from EPFR Global. Section 4 explains the methodology for classifying Federal Reserve announcements from October 8, 2008 until October 29, 2014 and for estimating the effect of Federal Reserve announcements on emerging market debt flows. Section 5 presents the results from the Federal Reserve announcement classification and from the event study on the effects of Federal Reserve announcements on emerging market debt

flows. Section 6 conducts a robustness check by adding the VIX and oil prices as control variables into the analysis. Section 7 concludes with suggestions for future work.

## 2 Related Literature

This paper relates to the monetary policy literature by classifying all Federal Reserve announcements since the global financial crisis until the end of quantitative easing as either easing (unexpected), tightening (unexpected), easing (expected), tightening (expected) using a shadow rate model of expectations of the short term interest rate. Thirty day federal fund futures contracts is the best measure of expectations to categorize announcements when monetary policy is conducted by setting the federal funds rate (Kuttner (2001), Bernanke and Kuttner (2005), Gürkaynak et. al. (2007)). However, several authors have shown that the Federal Reserve has used methods other than the federal funds rate to conduct monetary policy since the global financial crisis and monetary policy reached the zero lower bound (Gagnon et al (2011), D’Amico et.al. (2012), Krishnamurthy Vissing-Jorgensen (2013), Christensen and Rudebusch (2013), and Walsh (2014)).<sup>1</sup> During this time period, thirty day federal fund futures contracts do not capture the effect that announcements have on expectations and Eurodollar contracts, which measure the london interbank offer rate (LIBOR), are also not able to capture these effects (Gürkaynak et al. (2007), Christensen and Kwan (2014)). This paper classifies announcements using short rate expectations from a

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<sup>1</sup>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.

shadow rate term structure model estimated at the daily frequency and developed by Christensen and Rudebusch (2014). This measure 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)).

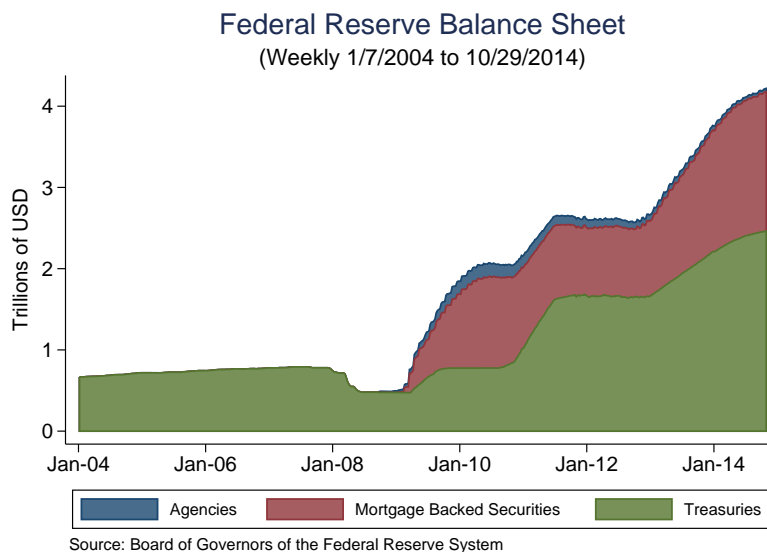


Figure 1: Federal Reserve Balance Sheet from January 7, 2004 until October 29, 2014.

This paper also relates and contributes to the literature on financial stability of emerging market debt markets by examining the effect of Federal Reserve announcements on all currency debt flows, hard currency debt flows, and local currency debt flows since the global financial crisis. During the 1980s, 1990s, and early 2000s, a number of sovereign debt crises engulfed emerging markets in which governments borrowed from foreign investors in foreign currency during good times only to later default on their external debt as economic conditions deteriorated.<sup>2</sup> Eichengreen and Hausmann (1999) described the scenario as “original

<sup>2</sup>See Roubini and Setser (2004) for more detailed discussion of financial crises in Latin America in the 1980s and Asia in the 1990s driven by massive debt financed by foreign portfolio flows in hard currency. These portfolio inflows brought currency appreciation, lower domestic policy rates, and credit expansion to

sin” in which emerging markets issued debt denominated in hard currencies, such as the dollar, instead of their own local currency. International financial institutions (World Bank and IMF (2001), Bank for International Settlements (2007)) supported local debt market development in emerging economies following the foreign currency debt problems in these economies the mid-1990s (Eichengreen and Hausmann (2003)). Local currency debt now accounts for 90 percent of all sovereign debt, compared to 70 percent a decade ago, and trading volumes for local currency debt are five times higher than hard currency debt (Hale et.al. (2014), LCBM (2014)). Local currency debt markets now exceed \$4 trillion compared with only \$1 trillion in the mid-1990s (Burger and Warnock (2006), Burger and Warnock (2012)). In fact, since the financial crisis, emerging market debt has increasingly become seen as a “safe” asset class by foreign investors (Miyajima et.al. (2012)). Some studies have shown that foreign investors reduce long-term local currency government debt yields and volatility (Peiris (2010)) while others have shown that they also increase volatility since the post-Lehman period (Ebeke and Lu (2014)). Foreign investors in emerging markets can trigger sudden stops and this paper examines the effect of announcements on hard currency and local currency debt flows (Miyajima et.al. (2012), IMF Global Financial Stability Report (2014)).<sup>3</sup>

This paper also contributes to the literature on the effect of monetary policy on international portfolio flows by using announcements classified by expectations for an event study on debt flows, focusing on the debt flow currency denomination, differentiating between investors, and exploring regional debt flow differences. Several papers have examined transmission channel through which changes to expectations can affect portfolio investment by

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the private sector. However, portfolio debt outflows also brought currency depreciation and higher interest payments on domestic debt can even trigger a default and a full blown financial crisis. The crises in Mexico (1994), Korea (1996), Thailand (1996), Indonesia (1996), Malaysia (1996), Russia (1997), Brazil (1998), Ecuador (1998), Pakistan (1998), Ukraine (1998), Turkey (2000), Argentina (2000), Uruguay (2001), and Brazil (2002) demonstrated that unsustainable foreign currency denominated debt levels have the potential to trigger contagion, massive portfolio outflows, currency depreciation, higher domestic policy rates.

<sup>3</sup>Countries that issue the largest quantity of local currency debt include Argentina, Brazil, Chile, China, Colombia, Croatia, Hungary, Indonesia, India, Lebanon, Malaysia, Mexico, Pakistan, Peru, Philippines, Russia, Saudi Arabia, South Africa, Thailand, and Turkey (LCBM, 2014).

market participants (Morris and Shin (2014), Feroli et. al. (2014), Stein (2014), Global Financial Stability Report IMF (2014), Plantier (2015)). This paper classifies all Fed announcements using measures of expectations from October 2008 until October 2014 and uses this classification to examine the response of emerging market debt flows by heterogeneous investors (Turner (2013), Shin (2013), Haldane (2014), Elliott (2014), Office of Financial Research (2013)).<sup>4</sup> 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 et.al. (2015)), the response of emerging market asset prices to U.S. monetary policy (Moore et.al. (2013), Bowman 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))<sup>5</sup> 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)).<sup>6</sup>

There are two papers that are closest to this one and for which it is worth highlighting similarities and differences. A paper by Koepke (2014) uses monthly EPFR data and federal funds futures in an OLS regression and examines the sign and statistical significance of federal funds futures to explain the change in flows. He finds that changes in federal funds futures are a statistically significant factor for emerging market portfolio flows. A working paper by Curcuru et. al. (2015) examines the effects of unconventional monetary policies by

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<sup>4</sup>The five largest asset managers (BlackRock, Vanguard, State Street, Fidelity, and PIMCO) had combined assets of \$12 trillion under management and the ten largest asset managers had \$18 trillion (Office of Financial Research (2013)).

<sup>5</sup>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.

<sup>6</sup>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.



the Federal Reserve, Bank of England, European Central Bank, and Bank of Japan and on international capital flows. The focus of their paper is on developed market bond and equity funds as well as emerging market bond and equity funds. They classify announcements using monetary policy shocks (Rogers et.al. 2014) and find that the flows do not respond to the Federal Reserve or Bank of Japan but they do respond to the Bank of England and the European Central Bank. This paper classifies announcements using a shadow rate model estimated daily and conducts an event study on daily frequency debt flows from EPFR Global to differentiate between the effects of announcements on hard currency and local currency debt flows, between active and passive investors, and by the regional composition of the debt flows.

### 3 Data

Federal fund futures contracts are used as one measure of monetary expectations in this paper. Federal funds futures contracts are traded on the Chicago Board of Trade and have a payout at maturity based on the average effective federal funds rate that is realized for the calendar month in the contract. In this way, the price of these federal funds futures contract is closely related to the expectations of the average federal funds rate for the month studied. In normal times, 30 day federal fund futures contracts are used to estimate monetary expectations for the next meeting and for categorizing announcements. However, this measure of expectations does not change after the global financial crisis when the short-term policy rate reached the zero lower bound. These federal funds futures contracts are liquid up to five or six months but decrease dramatically after five or six months.<sup>7</sup> The federal fund futures measure used in this paper is obtained through Bloomberg which gets its data

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<sup>7</sup>Several asset prices can be used to measure monetary policy expectations of the short term rate. Kuttner (2001) uses the current month federal fund futures contract, Bomfim (2003) uses the month-ahead federal fund futures contract, Cochrane and Piazzesi (2002) use the one-month eurodollar deposit rate, Rigobon and Sack (2002) use the three-month ahead eurodollar futures rate. Although Gürkaynak et al. (2007) finds that federal funds futures is the best measure of monetary expectations for up to six months the Eurodollar futures contracts may be better measures of monetary expectations at longer horizons.

from the Chicago Mercantile Exchange (CME) and sorts it into a moving time series for many different time periods. This paper uses the two-year federal fund futures rate that has the Bloomberg ticker symbol FF24 Comdty.<sup>8</sup> This is the 24 month ahead futures contract through 2010 and the weighted average of the rates on the 24- and 25-month contracts thereafter (Christensen (2015)). After downloading this ticker symbol from Bloomberg, the variable is then converted into an interest rate by subtracting from 100. Figure 2 shows U.S. monetary expectations and includes the time series for federal funds futures 2 years.

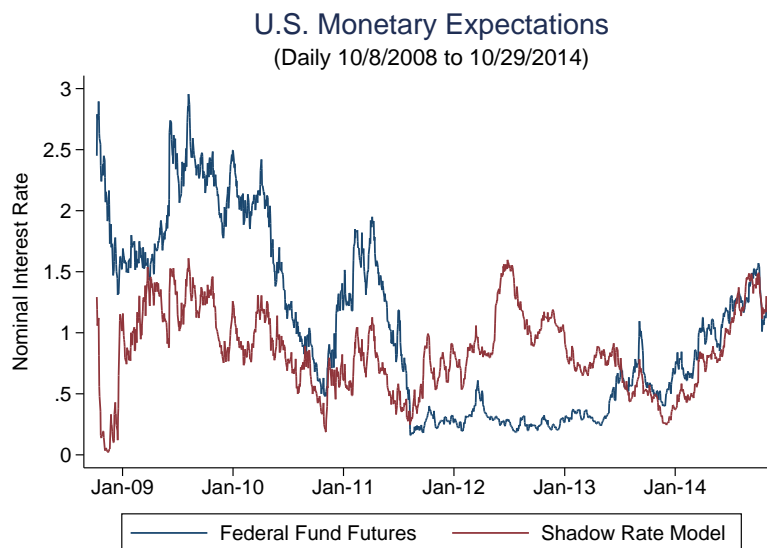


Figure 2: Federal Fund Futures and Shadow Rate Model two year short rate expectations.

The other measure of monetary expectations used in this paper are the expected short rates from a shadow rate term structure model. 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 most widely used term structure model is the one developed by Nelson-Siegel (1987) that provides a good yield curve fit for a cross section of yields (Kim and Wright (2005)). This paper uses the short rate expectations from a shadow rate Arbitrage-Free Nelson-Siegel model developed by Christensen and Rudebusch (2013) that assumes interest

<sup>8</sup>The Bloomberg function FFIP can be used to extract probabilities derived from options markets.

rates have a lower bound of zero.<sup>9</sup> As shown in Figure 2, this paper uses the estimates of the two year expectations from the shadow rate model in order to compare with the federal fund futures measure of expectations.

The Federal Reserve announcement dates included in the analysis in this paper are listed in Appendix Table B3 and all occurred between October 8, 2008 and October 29, 2014. The announcements that happened during this time period 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.<sup>10</sup> All of the additional days were taken from Rogers, Scotti, and Wright (2014) examining the effect of Federal Reserve announcements on asset prices. However, unlike Rogers, Scotti, and Wright (2014) which include announcement days until early 2014, this paper includes FOMC announcement days until the end of large scale 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.

The proprietary emerging market debt flow data used in this paper is 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 managers 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 fre-

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<sup>9</sup>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.

<sup>10</sup>The Federal Reserve Board of Governors website: <http://www.federalreserve.gov>

quencies.<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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 in cumulative net asset value. As shown in Appendix Table B1, almost all of the funds that report at the weekly frequency also report at the daily frequency. However, not all of the funds that report at the monthly frequency also report at the daily and weekly frequencies.

The flow data from EPFR Global and flow data IMF Balance of Payments are differ-

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<sup>11</sup>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.

<sup>12</sup>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.

<sup>13</sup>Emerging Portfolio Funds Research (EPFR) Global data has been used in 16 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), Jinjara et al. (2011), Jotikasthira et al. (2012), Wei et al. (2010)), captial controls (Forbes et al. (2012), Jinjara et al. (2013)), financial stability (Gelos (2011), Raddatz and Schmukler (2012), Yeyati and Williams (2012), Jones (2014), Puy (2016)), and international economic policy.

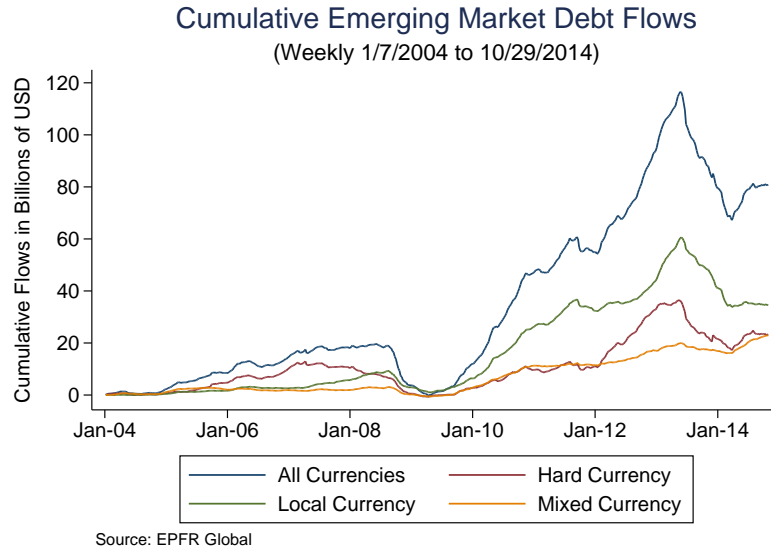


Figure 3: Shows emerging market debt flows by currency denomination.

ent 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 which 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 regulated 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 also find that because 80 percent of the funds in the EPFR Global are U.S. domiciled and U.S. investors and 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.

The EPFR Global data can also be classified by the currency denomination of the debt flow. As shown in Figure 3, debt flows can be classified by whether the funds invest in hard currency, local currency debt, or mixed currency debt. 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. The mixed currency debt funds invest in a combination of both such that they are less than 75 percent of either local currency debt and hard currency debt. The mixed currency debt flows are another category group in EPFR Global data and represent flows that are neither 75 local currency debt nor 75 hard currency debt. The sum of local currency, hard currency, and mixed currency debt flows is the equivalent to all the debt fund flows to emerging markets.

The EPFR Global data for emerging market debt flows can be classified into active and passive investor categories.<sup>14</sup> The categorization as active or passive is made by EPFR Global based on information provided by each fund. The active investor category includes funds that use discretion because their allocations and investment decisions are not tied

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<sup>14</sup>EPFR Global defines the retail investor category as including funds that are marketed towards and have a primary focus for retail investors. Funds with less than \$100,000 in assets are classified as a retail funds. The institutional investor category includes funds that are marketed towards and have a primary focus for institutional investors. Funds with more than \$100,000 in assets are classified as an institutional fund. The sum of the retail and institutional investor categories for every asset class of debt funds is the same as the all investor category.

to an index or to a performance benchmark. An active fund is actively managed by an individual manager or team of managers.<sup>15</sup> The active fund managers build and maintain a portfolio and use discretion to make decisions about securities to buy, sell, or hold as part of their investment portfolio. The active fund managers make investments based on research and judgments about fundamentals, economic trends and cycles for industries or asset classes. The passive investor category do not have discretion to make these independent strategic decisions because their investment strategy tied to an index or benchmark. The passively managed funds must match the holdings and returns of a particular market index or benchmark such as the MSCI or the EMBI.<sup>16</sup> Mutual funds are usually categorized as active funds because the fund manager makes strategic decisions about the portfolio whereas exchange traded funds (ETFs) are typically considered passive funds because the manager does not have the ability to make strategic decisions.

The EPFR Global debt flows data can also be classified into regions. These regional classifications include Asia excluding Japan, EMEA, Latin America, and Global Emerging Markets (Global EM).<sup>17</sup> The Global EM classification includes funds that may invest across a number of regions. For example, a fund that invests in Brazil, Russia, India and China

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<sup>15</sup>Large active managers include Franklin Templeton, Fidelity, and Capital Group.

<sup>16</sup>MSCI has provided equity index products since 1969 and became a public company in November 2007 by its only two shareholders Morgan Stanley and Capital Group International Inc. ("Capital Group International"). EMBI was set up in 1992 to track external debt instruments in emerging markets and originally only covered Brady bonds, loans, and Eurobonds. J.P. Morgan has since introduced EMBI+ to track debt in emerging markets with a minimum face value of \$500 million and that meet strict criteria as well as the less strict Emerging Market Global Index (EMBIG) to track local currency and hard currency denominated debt in emerging markets with a face value of at least \$500 million.

<sup>17</sup>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).

would fall under the Global EM category since it invests in Latin America, Europe Middle East and Africa, and Asia excluding Japan. Although EPFR Global also provides the allocation data for Global EM funds, and estimates the regional flows based on the flow and allocations data it receives from fund managers and administrators, this data does not have information on the currency denomination of the investments. By analyzing Global EM as its own regional group this paper is able to focus on the hard currency debt flows, local currency debt flows, and mixed currency debt flows.

The robustness checks in this paper use volatility and oil price measures obtained from Bloomberg. The VIX is a commonly used indicator of volatility and 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 West Texas Instruments (WTI) Cushing crude oil price is the most commonly used benchmark for global oil prices. The WTI Cushing crude 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.

## 4 Methodology

This section describes the methodology used for estimating the effect of changes to U.S. monetary expectations on emerging market debt flows in two parts. First, this section explains the methodology used for classifying the Federal Reserve announcement as easing (unexpected), tightening (unexpected), easing (expected) and tightening (expected) using changes to monetary expectations measured by federal funds futures and a shadow rate model. Second, this section explains the methodology for estimating the effects of expectations of the short-term rate have on emerging market debt flows.<sup>18</sup>

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<sup>18</sup>Previous approaches to understanding the reaction of portfolio fund flows to Federal Reserve monetary policy have relied on VAR methods (Feroi 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 (Curcuro et. al. (2015)).



## 4.1 Classifying Federal Reserve Announcements

Federal Reserve announcements are classified by measuring the changes in expectations around announcement days. As described in the previous section these market expectations of the future short rate used in this paper include federal funds futures and the shadow rate term structure model. These measures of market expectations of the future short rate can change even if the actual short term policy rate remains unchanged. Both of these measures of expectations are used to classify Federal Reserve announcements into one of the following four categories: easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). An announcement cannot be classified 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, each daily measure of expectations is converted into the daily percentage change of that measure of 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 change observations 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 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 further classified as easing if the change in expectations is negative and tightening if the change in expectations is positive.

## 4.2 Effects of Federal Reserve Announcements on EM Debt Flows

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

$$Debt\ Flows_{ijrt} = \hat{\beta}_0 + \hat{\beta}_1(Shadow\ Rate\ Announcements_{kt}) + \varepsilon_{ijrt} \quad (1)$$

The *Debt Flows* variable on the left hand side of (1) is the daily frequency debt fund data on flows to emerging markets from EPFR Global. This variable is categorized by investor subscript  $i$  for whether these portfolio debt fund flows are from all investors, active investors, or passive investors. The subscript  $j$  denotes whether they are all currency flows, hard currency flows or local currency flows. The subscript  $r$  specifies the regional focus of the debt flows as either Asia excluding Japan, EMEA, Latin America, or Global EM. Finally, the subscript  $t$  denotes the time of the announcement to indicate the precise time for the debt flows around that announcement day. On the right hand side of equation (1) is the *Shadow Rate Announcements* variable that are categorized using market expectations from the shadow rate model. These announcements are denoted by subscript  $k$  to specify the announcements as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected). Furthermore, the subscript  $t$  emphasizes the announcement day.

The event study uses announcements classified by the shadow rate model and seven day event windows.<sup>19</sup> All four measures of flows  $i$  are examined across all four announcement categories  $k$  for each of the investor categories  $i$ , asset classes  $j$ , and regions  $r$ . For example, to understand the response of all emerging debt flows  $j$  by all investors  $i$  to all announcements  $k$  we take all the announcements that are classified as easing (unexpected) announcements

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<sup>19</sup>The seven day window size is large enough to capture the time that portfolio investors can take to respond to events while at the same time is small enough so that it captures effects from Federal Reserve announcements.

and examine the effect of these announcements on emerging market debt flows the seven days before and after these announcements. This process is repeated for every other announcement classification tightening (unexpected), easing (expected), tightening (expected). Once all four announcement classifications have been examined on all flows, for all investors, and all regions, the procedure is repeated for each of the other currency classifications  $j$  (hard currency, local currency, mixed currency), investors classifications  $i$  (active investors, passive investors), and regional classifications (Asia excluding Japan, EMEA, Latin America, Global EM). Each event study is standardized according to the mean and standard deviation of the flows in that group in order to be able to compare the coefficients and significance across each of the announcement classifications.

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

The robustness checks used in the paper involves including additional control variables into the event study regressions. The *Debt Flows* variable and the *Shadow Rate Announcements* variables in equation (2) are the same as those variables in Equation (1). The control variables *Control* 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 factors. These control factors denoted by subscript  $m$  at time  $t$  are introduced separately into the regressions and include a measure of uncertainty the VIX and commodity prices. The robustness checks including these control variables for regional emerging market debt flows (Asia excluding Japan, EMEA, Latin America, and Global EM) are reported in Appendix Table B6 to Appendix Table B9.

## 5 Results

The results are separated into a section for classifying Federal Reserve announcements and a section for the effects of Federal Reserve announcements on emerging market debt flows. The results for the effects of Federal Reserve announcements on emerging market debt flows are grouped into a subsection for overall emerging debt flows and into a subsection for regional emerging market debt flows.

### 5.1 Classifying Federal Reserve Announcements

As shown in Table 1, the two measures of U.S. monetary expectations classify the 54 Federal Reserve announcements between October 8, 2008 and October 29, 2014 differently. The federal fund futures 2 years ahead measure classifies 47 announcements and the shadow rate model classifies 54 announcements. The following analysis will show that the shadow rate model classifies the announcements during this time period the best and will be used for analyzing the effect of announcements on debt flows to emerging markets.

Table 1: Federal Reserve Announcements Classification Results

	Federal Fund Futures	Shadow Rate Model
	(1)	(2)
Easing (Unexpected)	15	14
Tightening (Unexpected)	10	9
Easing (Expected)	9	16
Tightening (Expected)	13	15
Unclassified	7	0
Total	47	54

The federal fund futures 2 years ahead measure of expectations classifies 47 announcements in the sample: 15 easing (unexpected) events, 10 tightening (unexpected) events, 9 easing (expected) events, and 13 tightening (expected) events. These events are shown graphically in Figure 4. The absolute value mean daily percentage change in the fed futures over the sample period, and the threshold for being an unexpected announcement was 3.96 percent with a standard deviation of 4.32 percent. The smallest change was 0 and the

largest change in federal fund futures was 49.39 percent. The federal fund futures measure of expectations could not classify 7 of the announcements in the period because it remained unchanged on those days. A significance test of the daily percentage change in federal fund futures measure of expectations on the announcement day relative to the previous seven days is shown in Appendix Figure B4.

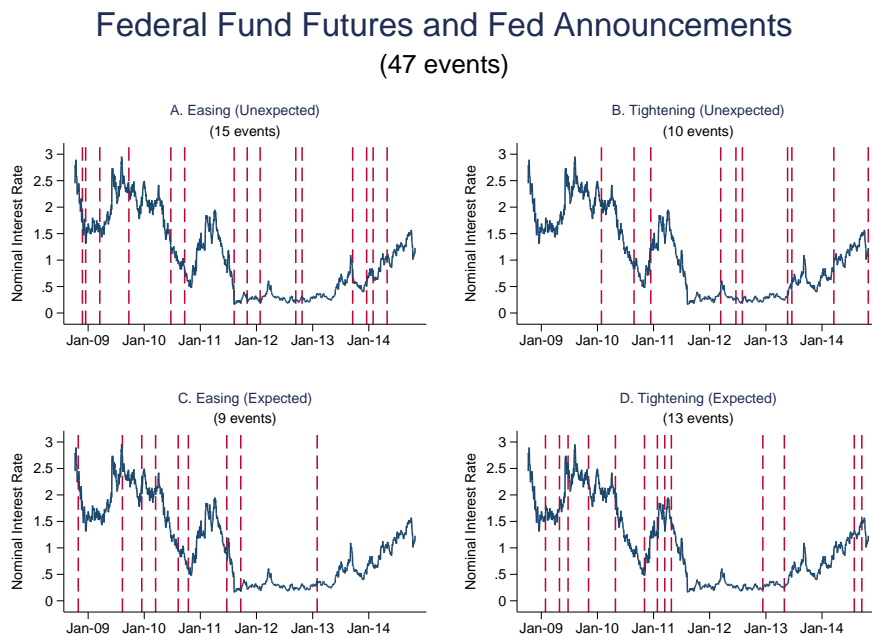


Figure 4: Classification of Federal Reserve announcements by Federal Fund Futures as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected).

There are two main criticisms for using the federal fund futures 2 years ahead measure of expectations of monetary policy. First, although federal fund futures may be the best measure of Fed monetary policy at shorter duration of up to 6 months they are not actively traded at longer horizons. The lack of liquidity in federal fund futures contracts at duration beyond six months helps explain why this measure of expectations did not change on seven of the announcement days. Second, federal fund futures contracts at longer duration have term premia that bias their measure of expectations. If term premia change during the sample period then changes in federal fund futures may not reflect changes in expectations of Fed policy but instead reflect changes in market risk and overall financial conditions.

## Shadow Rate Model and Fed Announcements (54 events)

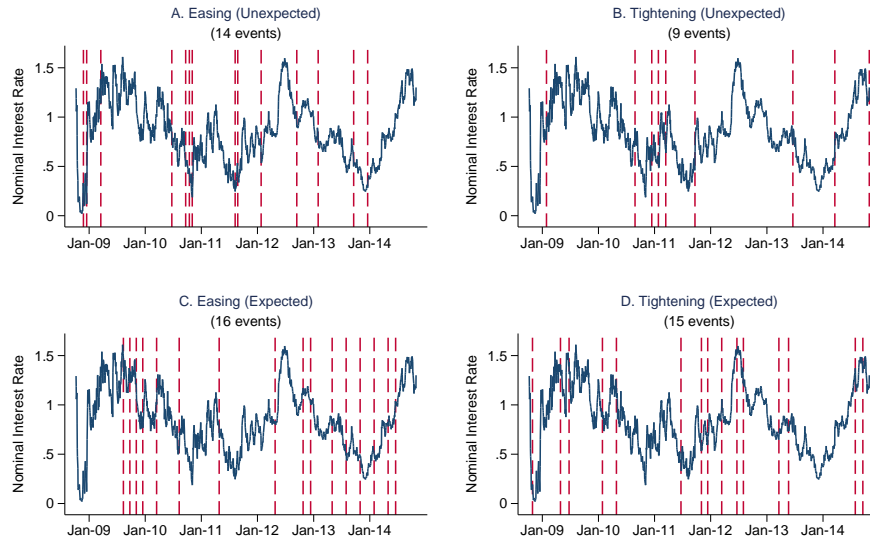


Figure 5: Classification of Federal Reserve announcements by the Shadow Rate Model as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected).

The shadow rate model classifies all 54 announcements over the sample period: 14 easing (unexpected) events, 9 tightening (unexpected) events, 16 easing (expected) events, and 15 tightening (expected) events. These events are shown graphically in Figure 5. The mean absolute value change in expectations for the shadow rate model is 5.40 percent and 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. Indeed, this is because the shadow rate model imposes a zero lower bound on the expectations for the short rate, which makes the model and the expectations for the short rate much more stable. A significance 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 B5.

In conclusion, this section showed that the expected short rate estimations from the shadow rate model provides the best measure of short rate expectations at the two year horizon for classifying Fed announcements. The shadow rate model classifies all of the announcements and overcomes the issues with liquidity, term premia, and stability that

make the other measures unable to properly classify monetary announcements. The comprehensive results of the Federal Reserve announcement classification is shown in Appendix Table B3. In the next section, the announcements classified as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected) by the shadow rate model will be used in an event study to examine their effect on emerging market debt flows.

## **5.2 Effects of Federal Reserve Announcements on EM Debt Flows**

This section explains the event study results of Federal Reserve announcements on emerging market debt flows. The main result from this analysis will show that announcements classified as tightening (unexpected) announcements have a statistically significant effect on emerging market debt flows, leading to outflows from emerging markets. An examination of these tightening (unexpected) announcements on emerging market debt classified by currency shows that hard currency debt flows respond more to announcements than local currency debt flows. Furthermore, active investors respond more to local currency debt flows and passive investors respond more to hard currency debt flows. The regional event study results are used to explain differences across regions in addition to their currency and investor categories. The event study using regional emerging market debt flows indicates that flows to Asia excluding Japan respond to both easing (unexpected) and tightening (unexpected) in hard currency flows but not in local currency flows. However, easing (unexpected) and tightening (unexpected) announcement affect local currency debt flows to Latin America but not hard currency debt flows.

### **5.2.1 Overall EM Debt Flows**

As shown in Figure 6, the main result is that tightening (unexpected) announcements are the only announcement classification that has an effect on all emerging market debt flows within a seven day event window for all emerging market debt flows. The tightening (unexpected) announcements reduce all debt flows by all investors by 0.47 standard deviations or \$177.64

million less per week in flows the week after than the week before a tightening (unexpected) Federal Reserve announcement.<sup>20</sup> These tightening (unexpected) announcements reduce hard currency debt flows by .46 standard deviations the week following an announcement from the mean level of flows before a tightening (unexpected) announcement or the equivalent of \$72.31 million. The tightening (unexpected) announcements do not have a statistically significant effect on local currency debt flows. The tightening (unexpected) announcements reduce mixed currency debt flows by 0.47 standard deviations the week following an announcement from the mean level of flows before a tightening (unexpected) announcement or the equivalent of \$30.19 million.

### Shadow Rate Announcements and All EM Debt Flows (All investors, 54 events)

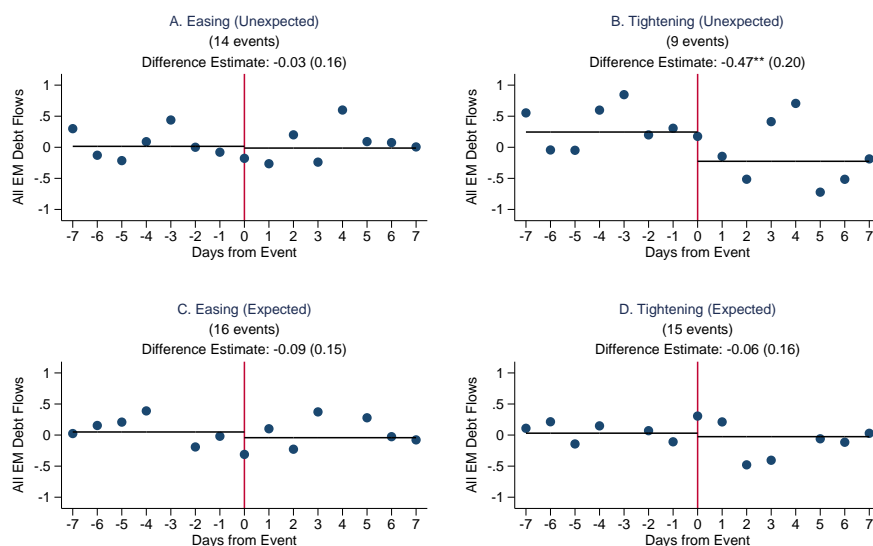


Figure 6: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on all emerging market debt flows by all investors.

The event study results for active investors tell a similar story. As shown in Figure 7, active investors respond only to the tightening (unexpected) announcements and not to the other announcement classifications in a significant manner. However, active investors respond to tightening (unexpected) announcements regardless if they are invested in hard or

<sup>20</sup>To obtain a dollar figure the same regression is used without standardizing to the mean and standard deviation of flows.



local currency debt. Tightening (unexpected) announcements reduce all flows to emerging markets by .44 standard deviations, or approximately \$194.44 million, the week after an announcement. The tightening (unexpected) announcements reduce hard currency flows by .37 standard deviations or \$47.07 million and local currency flows .36 standard deviations or \$72.37 million. The tightening (unexpected) announcements reduce mixed currency debt flows by active investors by 0.47 standard deviations or \$29.99 million in the week after these announcements.

### Shadow Rate Announcements and All EM Debt Flows (Active investors, 54 events)

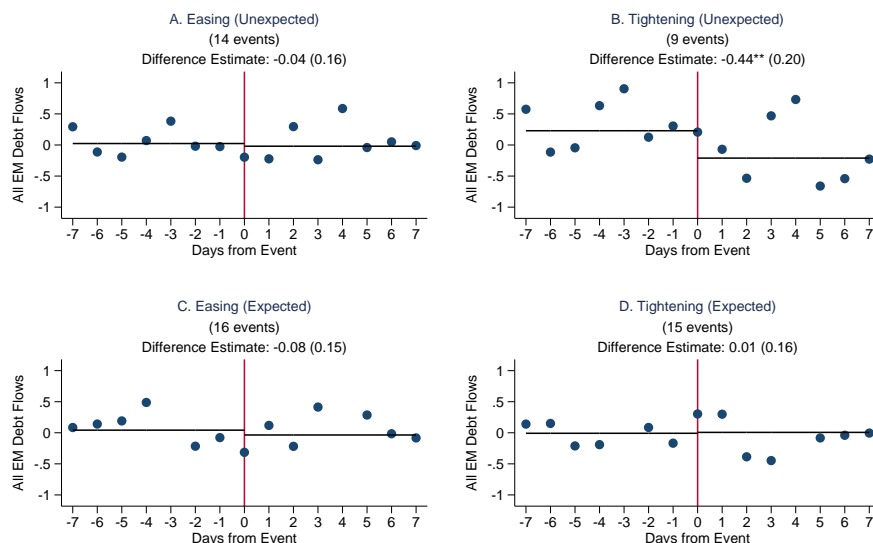


Figure 7: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on all emerging market debt flows by active investors.

The passive investors behave differently from active investors. Passive investors only respond to tightening (unexpected) announcements all currency debt flows and for hard currency flows but not for local currency debt flows. The tightening (unexpected) announcements reduce flows by .49 standard deviations and hard currency flows, as shown in Figure 8, by .51 standard deviations. This is equal to \$28.20 million for all currency debt flows and \$25.24 million for hard currency debt flows. There is not sufficient data for mixed currency debt flows by passive investors to be able to analyze their response to

announcements.

### Shadow Rate Announcements and Hard EM Debt Flows (Passive investors, 54 events)

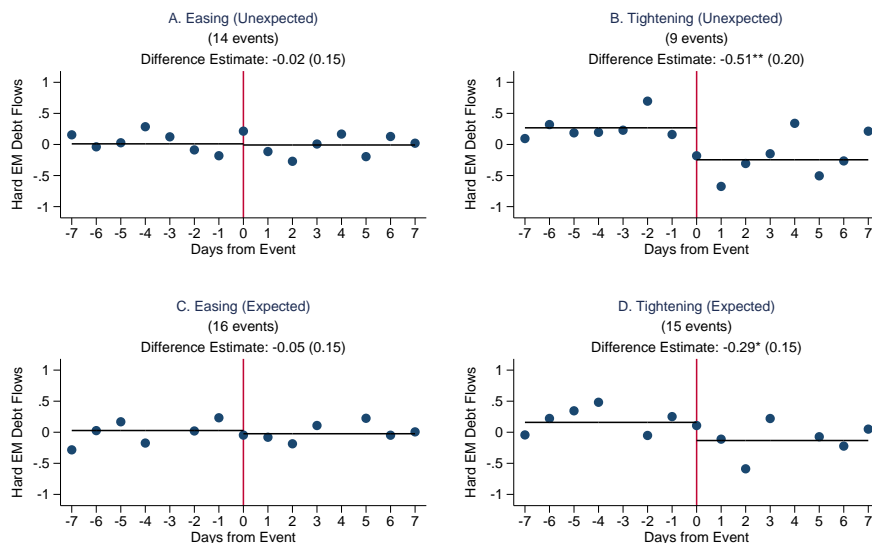


Figure 8: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on hard currency emerging market debt flows by passive investors.

Overall, these results suggest that announcements classified as tightening (unexpected) affect emerging market debt flows more than any other kind of announcement category and cause outflows from emerging markets. These overall results are available in Appendix Table B4. Hard currency debt flows respond more to these tightening (unexpected) announcements than the local currency debt flows. In addition, while the active investors respond to tightening (unexpected) announcements in all currency debt flows, hard currency debt flows, and local currency debt flows the passive investors only exhibit a strong reaction in all currency debt flows, hard currency debt flows but not the local currency debt flows. There is not sufficient data for passive investors and mixed flows to be able to include their response to announcements in this analysis.

## 5.2.2 Regional EM Debt Flows

The same methodology for examining overall debt flows to emerging markets is used to analyze the regional debt flows to emerging markets by all investors and by whether the flows are classified as all currency debt flows, hard currency debt flows, local currency debt flows, or mixed currency debt flows. EPFR Global data classifies the debt flows into Asia excluding Japan, EMEA, Latin America, and Global Emerging Markets (Global EM). The emerging market debt funds that are classified as Global EM do not invest in one region but may have investments across regions.

### Shadow Rate Announcements and Asia ex-Japan Debt Flows (All investors, 54 events)

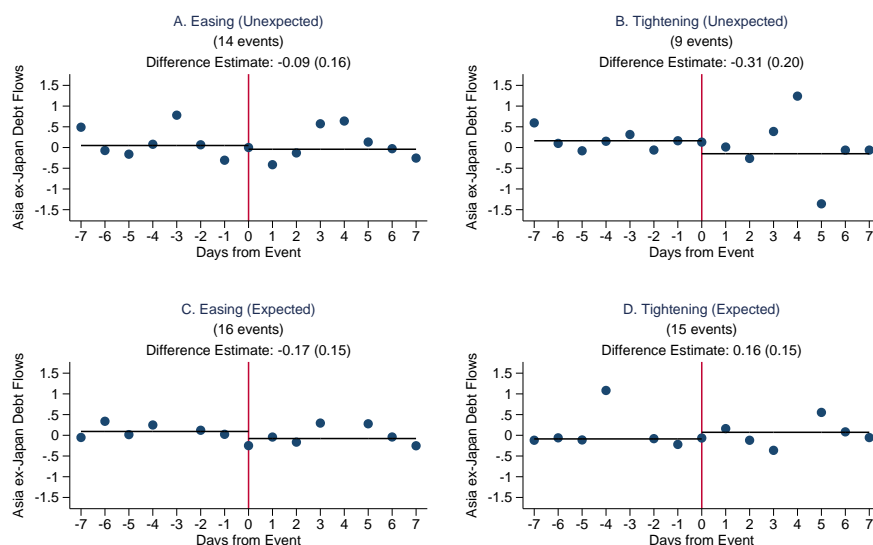


Figure 9: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Asia excluding Japan debt flows by all investors.

The emerging market debt flows to Asia respond the least among all the regions to Federal Reserve announcements. As seen from Figure 9, debt flows to Asia excluding Japan show no significant response to any announcement classification. The hard currency debt flows to Asia excluding Japan respond to both the easing (unexpected) announcements and the tightening (unexpected) announcements. An easing (unexpected) announcement increases hard currency debt flows to the region by .29 standard deviations compared to before the an-

nouncement, which is the equivalent of \$1.24 million. A tightening (unexpected) announcement has almost twice the size and a negative effect on flows of .43 standard deviations, which is the equivalent of \$2.36 million. Interestingly, neither the local currency debt flows nor the mixed currency debt flows to Asia excluding Japan respond to any announcement.

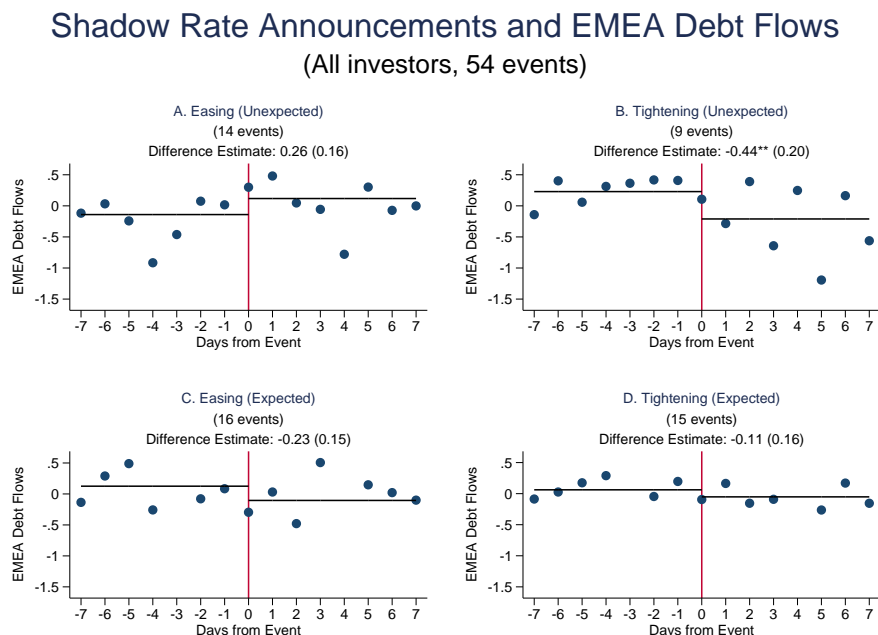


Figure 10: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on EMEA debt flows by all investors.

The emerging market debt flows to the EMEA region respond to tightening (unexpected) announcements for all flows but not for hard currency debt flows or for local currency debt flows. As seen from Figure 10, the tightening (unexpected) announcement classification reduces all flows by .44 standard deviations, which is the equivalent of \$5.01 million. The hard currency and local currency debt flows to the EMEA region do not show a statistically significant response to any classification of announcement. The mixed currency debt flows reduce to the EMEA region reduce by -.41 standard deviations, which is equal to \$2.28 million.

The emerging market debt flows classified as going to Latin America respond the most to announcements compared to emerging market debt flows to any the other region. The

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

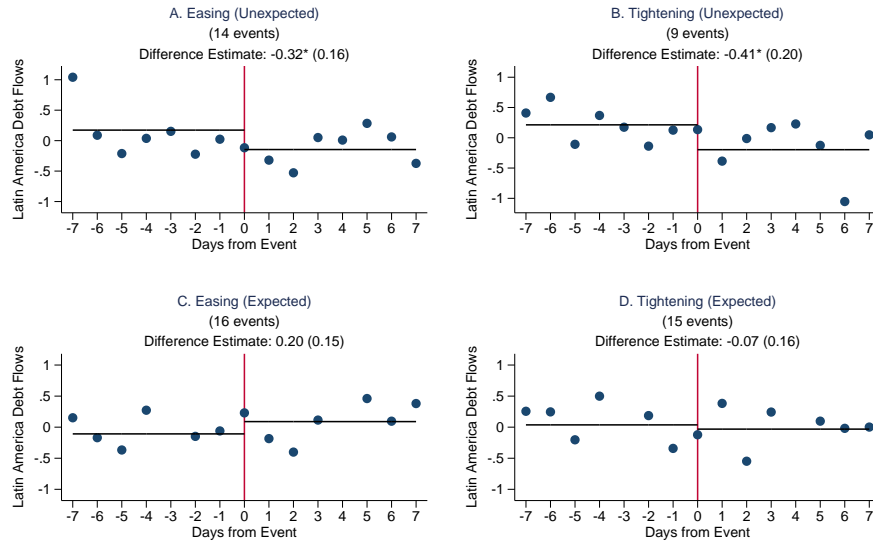


Figure 11: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Latin America debt flows by all investors.

debt flows to Latin America, in contrast to the debt flows to Asia excluding Japan, respond to announcements in all currency debt flows and local currency debt flows but not the hard currency debt flows category. From Figure 11, all currency debt flows for Latin America respond negatively to easing (unexpected) announcements by .32 standard deviations or \$11.01 million and negatively to tightening (unexpected) announcements by .41 standard deviations or \$12.69 million. The hard currency debt flows to Latin America do not respond to announcements, including tightening (unexpected) announcements. The local currency debt flows to Latin America reduce by .34 standard deviations or \$11.66 million following an easing (unexpected) announcement or by .46 or \$12.98 million following a tightening (unexpected) announcement. The mixed currency debt flows only respond positively to easing (unexpected) announcements and increase by 0.29 standard deviations, or \$.10 million.

The emerging market debt flows classified as going to Global Emerging Markets (Global EM) respond to tightening (unexpected) announcements. As seen from Figure 12, the Global EM debt flows respond negatively by .44 standard deviations or \$143.56 million after

## Shadow Rate Announcements and Global EM Debt Flows (All investors, 54 events)

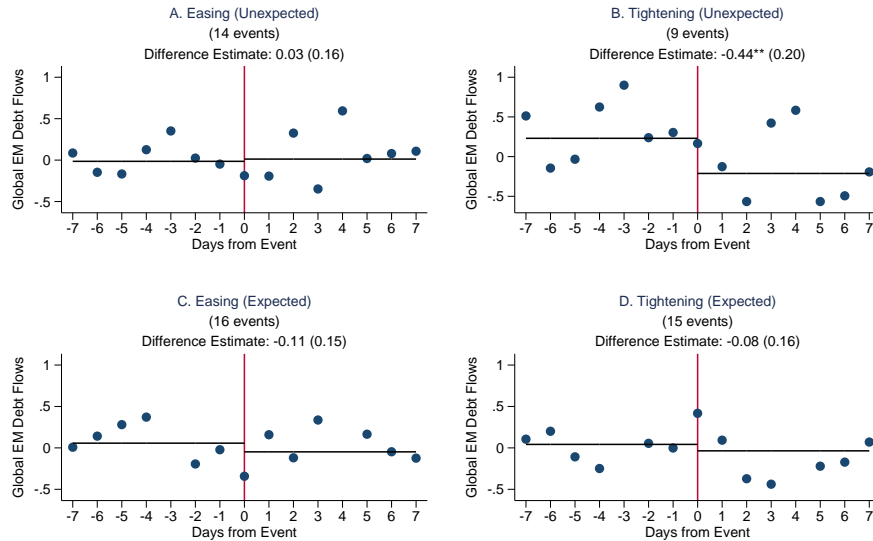


Figure 12: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on Global EM debt flows by all investors.

an tightening (unexpected) announcement but not to any other announcement classification. The hard currency debt flows to Global EM respond negatively by .46 standard deviations or \$70.04 million in the week after tightening (unexpected) announcement compared to before a tightening (unexpected) announcement. The local currency debt flows to Global EM do not show a significant response to any announcement classification, including tightening (unexpected) announcements. The mixed currency debt flows to Global EM respond negatively by .47 standard deviations or \$27.65 million to tightening (unexpected) announcements.

In summary, the results from analyzing the emerging market debt flows by region suggest that Latin America is the most responsive to Federal Reserve announcements and that the Asia excluding Japan region is the least responsive to these same announcements. These comprehensive regional emerging market debt flow results are also shown in Appendix Table B5. An analysis of debt flows by currency indicates that hard currency debt flows to Asia respond to announcements whereas the hard currency debt flows to Latin America do not respond to announcements. The emerging market debt flows in local currency do not

respond to any announcement category in local currency to Asia excluding Japan, which suggest that the debt flows in local currency are relatively more stable than the hard currency debt flows to this region. For the Latin America region, however, local currency debt flows respond to the announcements but the hard currency debt flows do not respond to the announcements. The EMEA debt flows only respond to tightening (unexpected) announcements for all currency debt flows but not separately for hard currency debt flows or for local currency debt flows. The debt flows in the Global EM category behave similar to the Asia excluding Japan regional debt flows except that the tightening (unexpected) announcements also affect all currency debt flows. The local currency debt flows in the Global EM category do not respond to tightening (unexpected) announcements as they do in the debt flows to Latin America. The mixed currency debt flows to the EMEA region and Global EM respond to tightening (unexpected) announcements but otherwise do not respond to announcements any statistically significant way.

## 6 Robustness

The first robustness check uses the VIX as a control in regression equation (1) to check for whether changes to debt flows is due to the announcements and not to changes in the VIX on debt flows. The second robustness check uses oil price as a control in regression equation (1) to see whether the changes to debt flows can be explained by the change in oil prices in the week before and after the announcements.

### 6.1 VIX

Previous literature has shown that global risk aversion, measured by the VIX, may help 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 put their money

into “safe” assets such as U.S. Treasuries and less likely to put their money into emerging market debt. The VIX is added to the regression in order to make sure that the emerging market debt flows are responding to Federal Reserve announcements and not to changes in global risk aversion as measured by the VIX. The VIX control variable is a popular measure of 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 B6 and Appendix Table B7, indicate that adding the VIX to the specification does not change the results for either overall emerging market debt flows nor does it change the results for regional emerging market debt flows.

## **6.2 Oil Price**

The oil price, West Texas Intermediate (WTI) is used another separate control variable that may affect emerging market debt flows. Emerging economies that are net oil exporters reliant on petroleum export receipts will be negatively affected by lower oil prices while emerging economies that are net oil importers benefit from decline in oil price. Adding a control for oil prices before and after Federal Reserve announcements ensures that the debt flows are responding to the announcements and not the oil prices. The results from the robustness check, shown in Appendix Table B8 and Appendix Table B9, indicate that adding the oil price into the specification does not invalidate the results for overall emerging market debt flows and for regional emerging market debt flows.

## **7 Conclusion**

The purpose of this paper was to examine the effect of Federal Reserve announcements on emerging market debt flows since the Global Financial Crisis. First, the paper provided two ways to measure expectations, federal fund futures and a shadow rate model, and used them



to classify all the Federal Reserve announcements from October 8, 2008 until October 29, 2014 as either easing (unexpected), tightening (unexpected), easing (expected), or tightening (expected). The shadow rate model measure of expectations was better able to classify the announcements than the federal fund futures measure. Second, the paper used the announcements classified by the shadow rate model for an event study on emerging market debt flows classified by currency denomination, investor, and region. The results showed that tightening (unexpected) announcements had an effect on emerging market debt flows but that the effect differed depending on whether the debt was denominated in hard or local currency and whether the debt flow was by an active or passive investor. Furthermore, an examination of the debt flows by region showed that Asia excluding Japan, Europe Middle East and Africa (EMEA), Latin America, and Global Emerging Markets (Global EM) differed in their response to tightening (unexpected) announcements. Although Asia excluding Japan responded the least to announcements, especially in local currency debt, the hard currency debt flows to Asia excluding Japan were sensitive to easing (unexpected) and tightening (unexpected) announcements. In contrast, Latin America responded the most to announcements. The emerging market debt flows to Latin America responded to easing (unexpected) and tightening (unexpected) announcements in all currencies and in local currencies but not in hard currencies.

Consistent with the literature on the transmission of monetary policy to financial markets this paper found that the effect of Federal Reserve announcements on financial markets depends on whether the information content in these announcements is expected or unexpected. The conventional way of classifying Federal Reserve announcements as expected or unexpected or as easing or tightening uses a 30 day measure of monetary expectations from federal funds futures. This 30 day measure of expectations is not a useful measure of expectations for classifying announcements since the Global Financial Crisis because expectations in 30 days did not change substantially at the zero lower bound. Changes to the two year expectations of the short rate using federal fund futures and a shadow rate

model were used to classify the Federal Reserve announcements during this time period. The shadow rate model was better able to classify all of the announcements than federal fund futures because it was more actively traded and did not have term premia. Therefore, the announcements classified by the shadow rate model as easing (unexpected), tightening (unexpected), easing (expected), and tightening (expected) were used for an event study to estimate the effect of announcements on emerging market debt flows.

The paper then used the four announcement classifications to estimate their effect on daily frequency emerging market debt flows by their currency denomination and their investor. The results showed that tightening (unexpected) announcements had the most significant effect on emerging market debt flows. Furthermore, these tightening (unexpected) announcements were significant for all debt flows and hard currency debt flows for all investors, active investors, and passive investors. Tightening (unexpected) announcements had a greater effect on hard currency debt flows than for local currency debt flows. The local currency debt flows category by all investors did not respond to tightening (unexpected) announcements and neither did the local currency debt flows by passive investors. However, active investors were equally responsive to tightening (unexpected) announcements regardless of whether the emerging market debt was in hard currency or local currency. This analysis of overall debt flows suggests that local currency debt flows are less volatile to announcements than hard currency debt flows.

After finding that announcements affect overall emerging market debt flows the paper then turned towards an examination of whether certain regions were more affected by announcements than other regions. The emerging market debt flows were classified into four regions and analyzed separately for Asia excluding Japan, EMEA, Latin America and Global EM. Consistent with the analysis on overall debt flows, the regional analysis showed that tightening (unexpected) announcements had the most significant on emerging market debt flows. Furthermore, these tightening (unexpected) announcements had the smallest effect on debt flows to the Asia excluding Japan region showed the largest effect on debt

flows to Latin America. Emerging market debt flows Asia excluding Japan denominated in hard currency, however, did respond to easing (unexpected) and tightening (unexpected) announcements even though the debt flows to this region in local currency did not respond to these announcements. On the other hand, debt flows denominated in hard currency to Latin America did not respond to announcements while they did respond to easing (unexpected) and tightening (unexpected) announcements in local currency. Finally, an examination of the regional debt flows by whether they were by an active or passive investor showed that the active investors respond similarly to all investors. Due to limited data available for passive investors by region, the analysis was only able to show that passive investors respond to tightening (unexpected) announcements by reducing their emerging market debt flows to Global EM in all and hard currency.

This paper provides insights on the effects of Federal Reserve announcement days on emerging market debt flows. Future work could focus on additional issues related to the currency, investor, and region of emerging market debt flows. This paper found that tightening (unexpected) announcements matter for debt flows and that hard currency debt flows are more sensitive to tightening (unexpected) announcements than local currency debt flows. Interestingly, the paper found that passive investors are more sensitive to Federal Reserve announcements than active investors. Future work could explore whether these differential responses are driven by strategic moves by active investors, by the slow response of active investors, or the specific nature of passive investors. In addition, this research could explore whether these differences between active and passive investors are unique to debt flows or if they also show up for equity flows. This paper found that Latin America is the region most sensitive to the tightening (unexpected) Federal Reserve announcements. It would be interesting to explore which countries in Latin America are most sensitive to Federal Reserve announcements and to determine whether these differences are due to fundamentals or to liquidity conditions. Finally, this methodology and data could be used to examine effects of announcements by other central banks on international financial flows.

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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  $\tau$  debt can be written to be the sum of the average market expectations of the short-rate and a term premium at time  $t$  for a given maturity  $\tau$  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.<sup>21</sup> 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

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<sup>21</sup>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

$$r_t = L_t + S_t \quad (2)$$

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

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

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:

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

The AFNS forward rate is described by the following equation:

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

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)).<sup>22</sup> 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:

$$s_t = L_t + S_t, \quad r_t = \max \{0, s_t\} \quad (7)$$

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<sup>22</sup>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):

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

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:

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

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

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

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

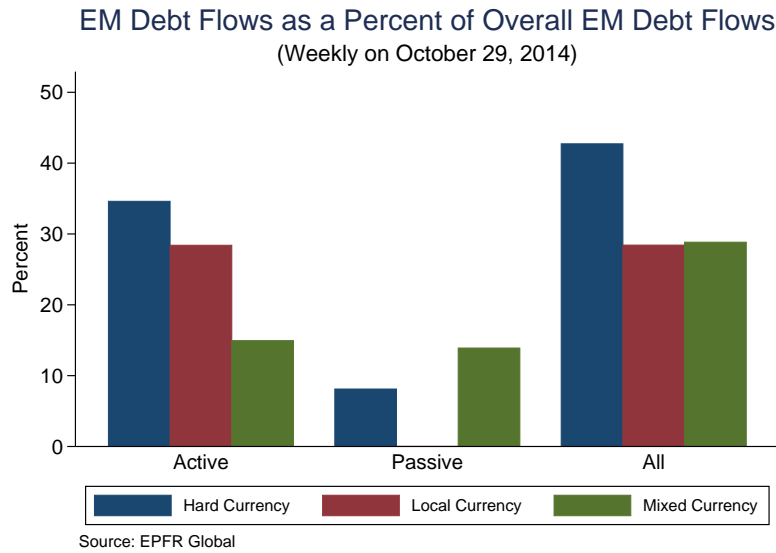


Figure B1: Cumulative emerging market debt flows by investor and region.

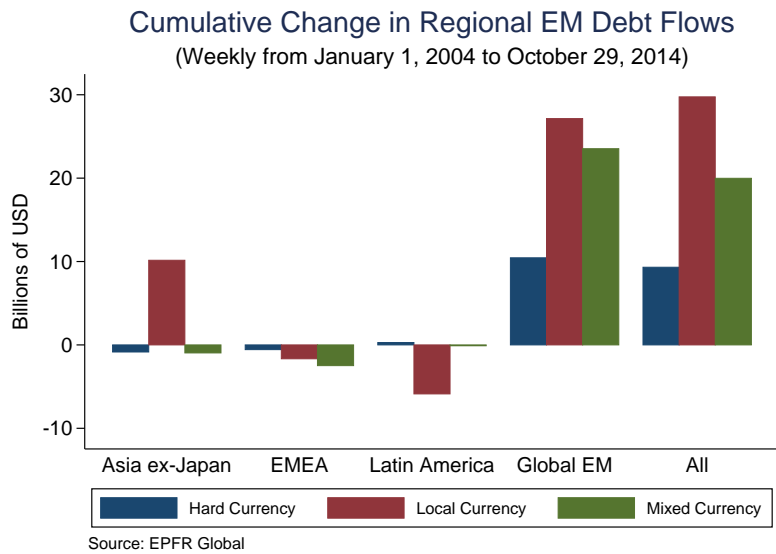


Figure B2: Cumulative change in emerging market debt flows by region and currency.

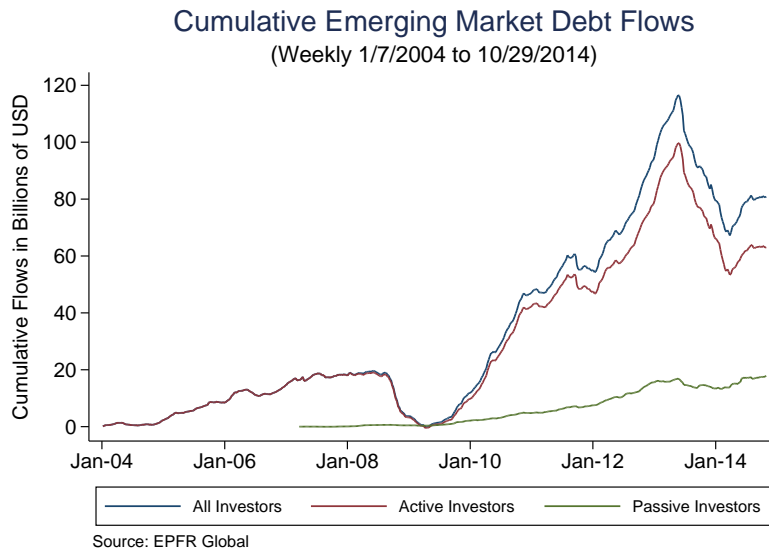


Figure B3: Cumulative emerging market debt flows by investor.

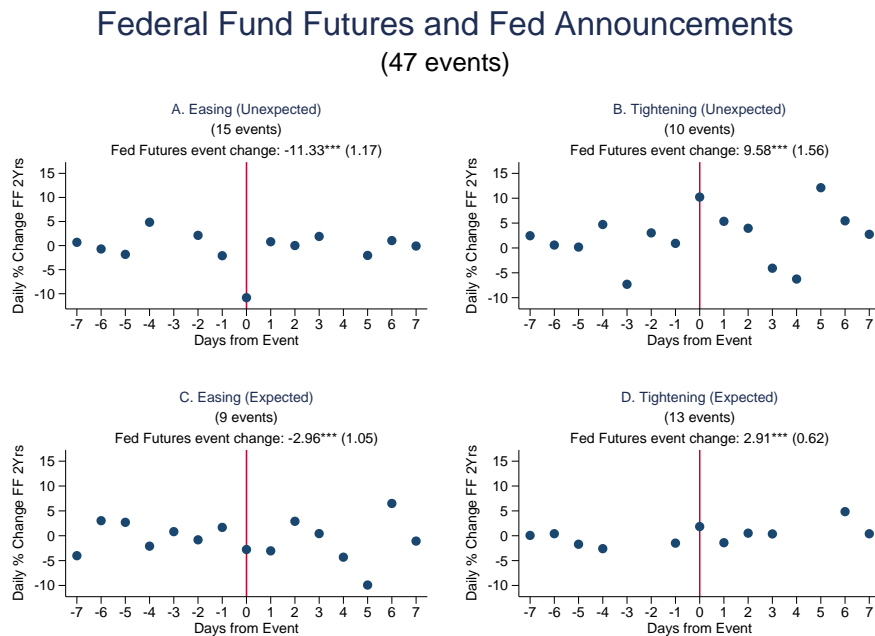


Figure B4: Significance test of the daily percentage change in Federal Fund Futures two year short rate expectations on the Fed announcement day relative to the previous seven days.



## Shadow Rate Model and Fed Announcements (54 events)

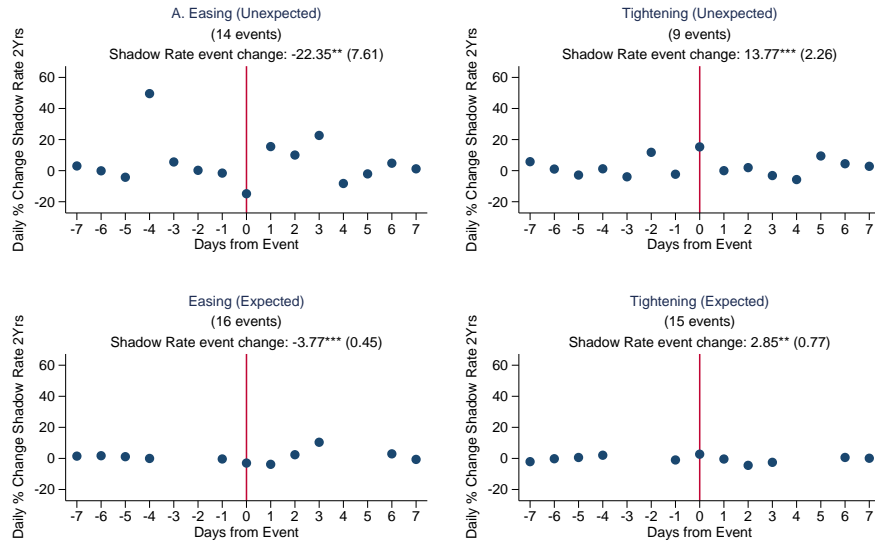


Figure B5: Significance test of the daily percentage change in Shadow Rate Model two year short rate expectations on the Fed announcement day relative to the previous seven days.

## Shadow Rate Announcements and Hard EM Debt Flows (All investors, 54 events)

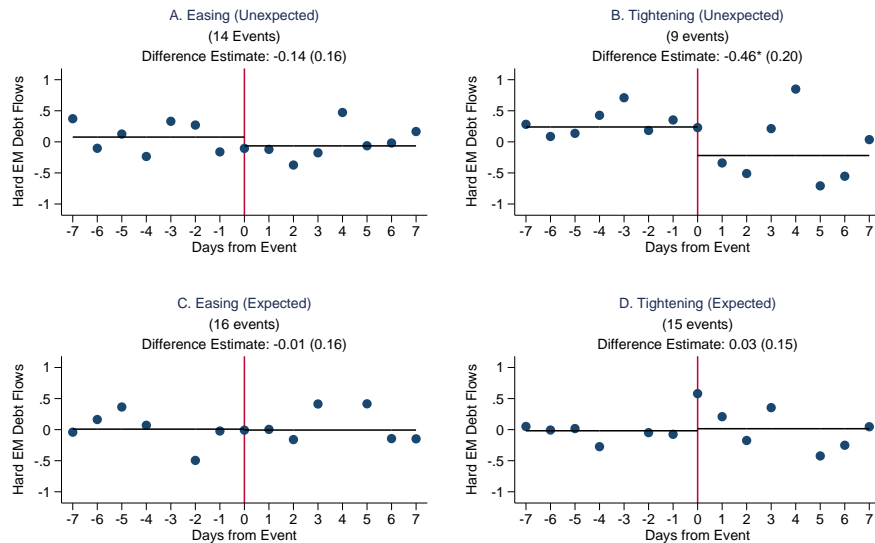


Figure B6: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on hard currency emerging market debt flows by all investors.

## Shadow Rate Announcements and Local EM Debt Flows (All investors, 54 events)

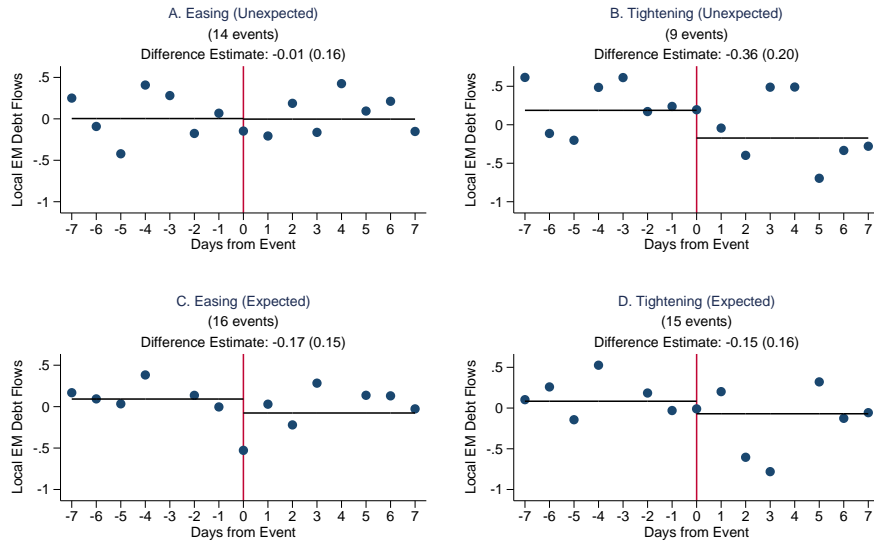


Figure B7: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on local currency emerging market debt flows by all investors.

## Shadow Rate Announcements and Mixed EM Debt Flows (All investors, 54 events)

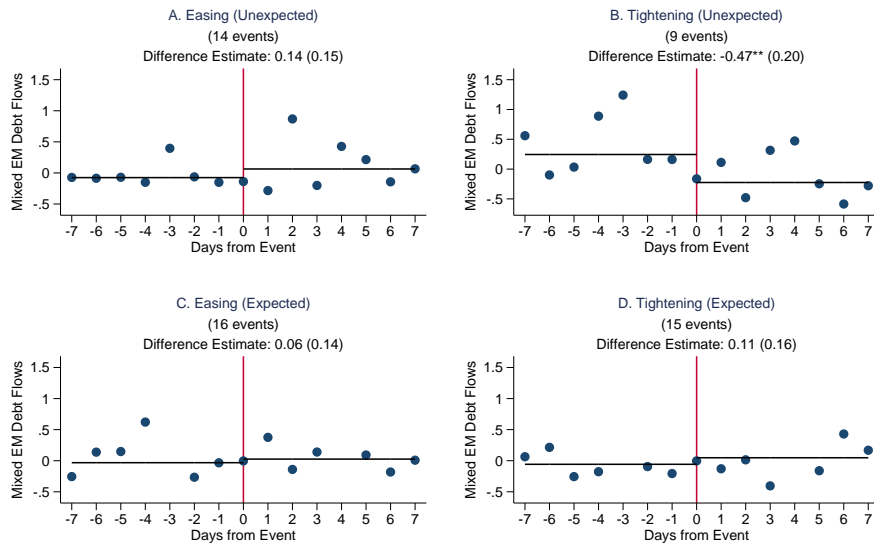


Figure B8: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on mixed currency emerging market debt flows by all investors.

## Shadow Rate Announcements and Hard EM Debt Flows (Active investors, 54 events)

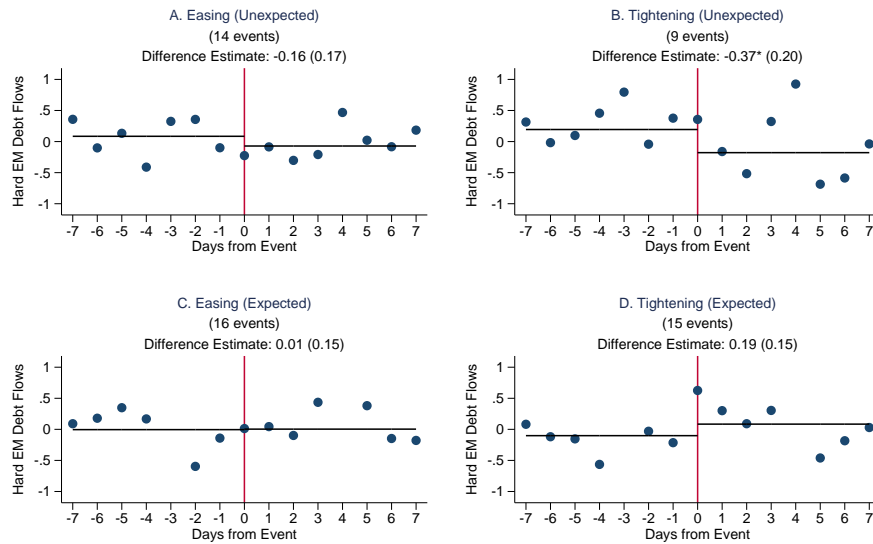


Figure B9: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on hard currency emerging market debt flows by active investors.

## Shadow Rate Announcements and Local EM Debt Flows (Active investors, 54 events)

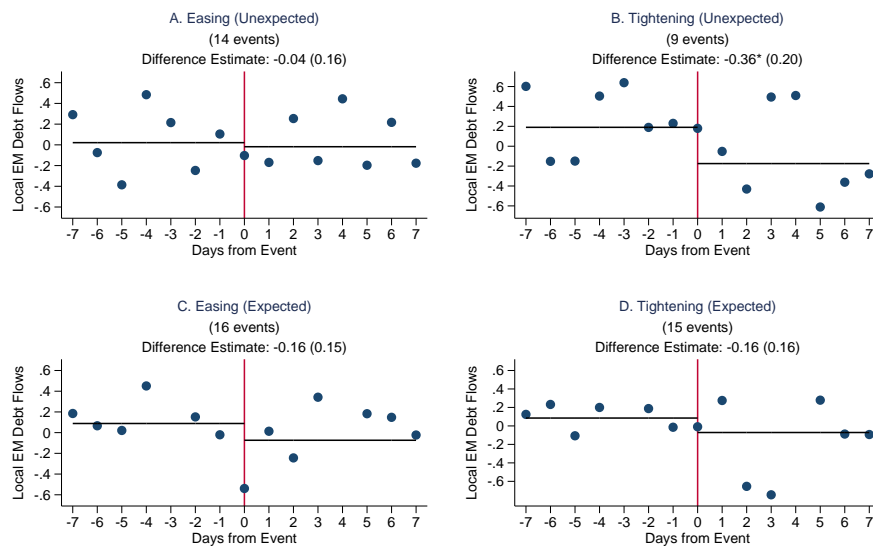


Figure B10: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on local currency emerging market debt flows by active investors.

## Shadow Rate Announcements and Mixed EM Debt Flows (Active investors, 54 events)

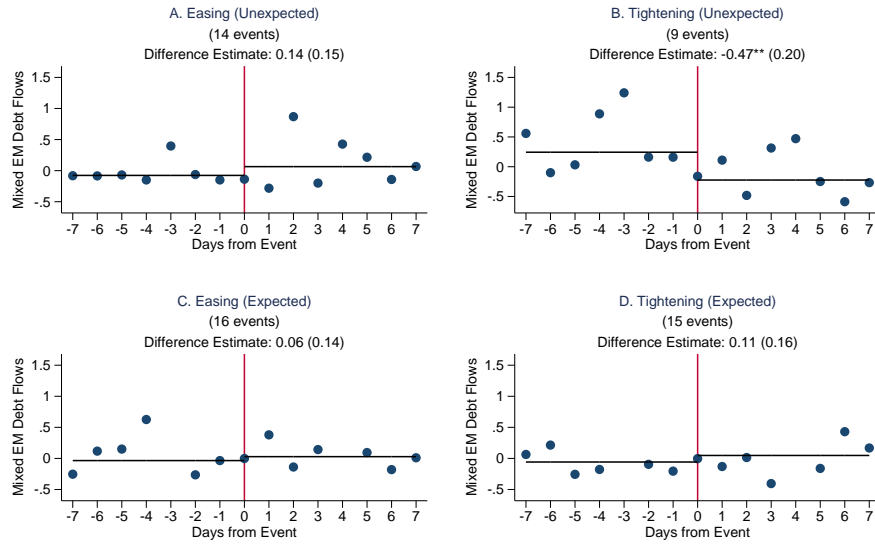


Figure B11: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on mixed currency emerging market debt flows by active investors.

## Shadow Rate Announcements and All EM Debt Flows (Passive investors, 54 events)

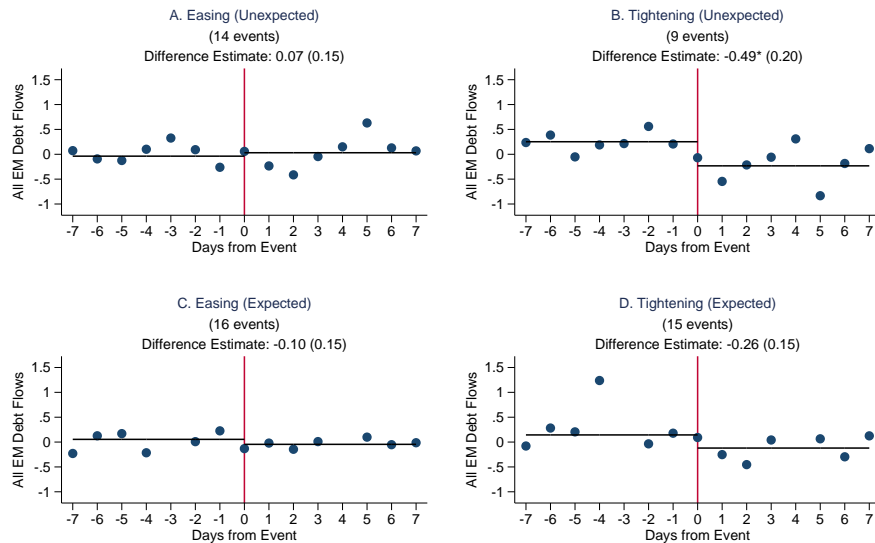


Figure B12: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on all emerging market debt flows by passive investors.

### Shadow Rate Announcements and Local EM Debt Flows (Passive investors, 54 events)

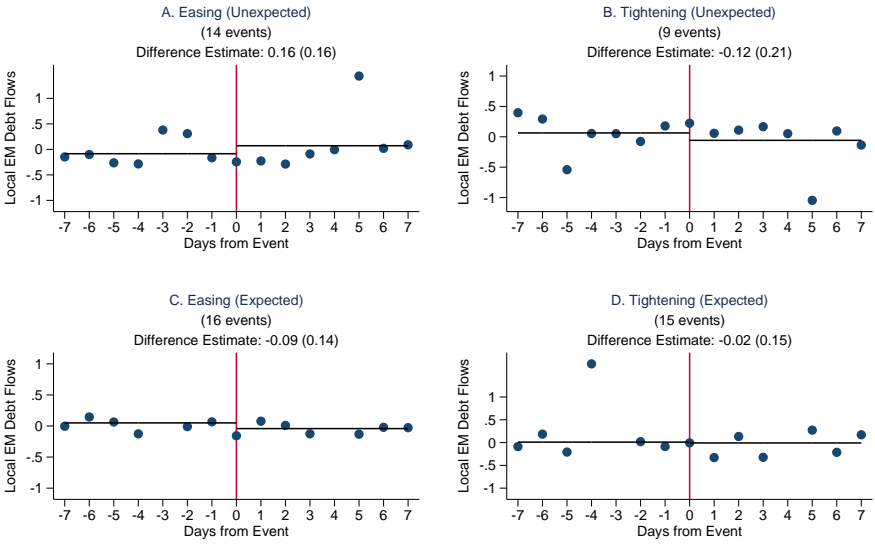


Figure B13: Standardized effects of Federal Reserve announcements classified by the Shadow Rate Model on local currency emerging market debt flows by passive investors.

Table B1: 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 B2: Summary Statistics for Emerging Market Debt Flows

	Obs	Mean	Std. Dev.	Min	Max
All Investors					
All	1573	40.43	226.47	-1443.86	1772.20
Hard	1573	10.64	119.54	-617.73	2153.71
Local	1573	17.14	129.77	-751.89	957.56
Mixed	1573	12.64	51.73	-288.64	570.53
Asia ex-Japan, All	1573	3.94	34.58	-315.32	194.66
Asia ex-Japan, Hard	1573	-0.59	5.03	-38.79	78.48
Asia ex-Japan, Local	1573	6.33	30.32	-309.86	194.17
Asia ex-Japan, Mixed	1573	-0.68	11.33	-97.13	112.69
EMEA, All	1573	-2.01	14.77	-156.56	155.17
EMEA, Hard	1573	-0.31	5.45	-40.07	152.40
EMEA, Local	1573	-0.83	13.34	-138.56	178.68
EMEA, Mixed	1573	-0.87	5.81	-155.44	26.06
Latin America, All	1573	-3.49	39.61	-420.60	458.93
Latin America, Hard	1573	0.37	5.26	-36.96	33.66
Latin America, Local	1573	-3.80	38.73	-418.31	458.21
Latin America, Mixed	1573	-0.07	1.29	-32.72	18.50
Global EM, All	1573	40.85	201.11	-1224.42	1921.28
Global EM, Hard	1573	11.17	117.12	-601.60	2157.76
Global EM, Local	1573	15.44	104.96	-651.90	949.27
Global EM, Mixed	1573	14.27	48.72	-348.58	563.61
Active Investors					
All	1573	29.66	207.39	-1208.16	1766.32
Hard	1573	3.84	104.68	-518.37	2153.78
Local	1573	13.18	122.06	-720.22	931.76
Mixed	1573	12.63	51.70	-288.64	570.53
Asia ex-Japan, All	1573	3.15	28.66	-297.27	201.42
Asia ex-Japan, Hard	1573	-0.63	4.96	-38.79	78.48
Asia ex-Japan, Local	1573	5.43	23.65	-289.64	209.38
Asia ex-Japan, Mixed	1573	-0.68	11.33	-97.13	112.69
EMEA, All	1573	-2.01	14.72	-156.56	155.17
EMEA, Hard	1573	-0.33	5.39	-40.07	152.40
EMEA, Local	1573	-0.81	13.33	-138.56	178.68
EMEA, Mixed	1573	-0.87	5.81	-155.44	26.06
Latin America, All	1573	-3.20	39.56	-420.53	458.93
Latin America, Hard	1573	0.38	5.26	-36.96	33.66
Latin America, Local	1573	-3.52	38.72	-418.23	458.21
Latin America, Mixed	1554	-0.07	1.29	-32.72	18.50
Global EM, All	1573	30.73	183.75	-1101.83	1921.39
Global EM, Hard	1573	4.42	102.22	-511.21	2157.80
Global EM, Local	1573	12.08	100.17	-657.76	949.25
Global EM, Mixed	1573	14.26	48.72	-348.58	563.61
Passive Investors					
All	1573	10.77	49.85	-407.71	333.29
Hard	1573	6.80	40.54	-287.31	315.95
Local	1573	3.96	27.40	-427.35	251.83
Mixed	900	0.02	1.11	-16.97	18.40
Asia ex-Japan, All	1573	0.79	17.55	-327.25	150.74
Asia ex-Japan, Hard	698	0.08	1.36	-18.24	22.55
Asia ex-Japan, Local	1573	0.90	17.75	-327.27	150.74
Asia ex-Japan, Mixed	-	-	-	-	-
EMEA, All	1362	0.01	1.14	-25.38	24.64
EMEA, Hard	257	0.15	2.04	-12.24	24.64
EMEA, Local	1362	-0.02	0.71	-25.38	2.90
EMEA, Mixed	-	-	-	-	-
Latin America, All	1305	-0.35	4.79	-94.55	42.26
Latin America, Hard	1305	-0.01	0.29	-5.14	4.00
Latin America, Local	1305	-0.34	4.70	-94.55	42.26
Latin America, Mixed	670	0.01	1.21	-16.97	18.40
Global EM, All	1573	10.12	46.63	-259.16	326.31
Global EM, Hard	1573	6.75	40.59	-287.32	315.97
Global EM, Local	1108	4.77	22.63	-157.97	252.85
Global EM, Mixed	230	0.03	0.74	-2.44	9.46

Table B3: Federal Reserve Announcements Classification Results

Date	Event	Federal Fund Futures	Shadow Rate Model	Federal Fund Futures	Shadow Rate Model
		(1)	(2)	(3)	(4)
10/8/2008	FOMC/Joint CB Statement				
10/29/2008	FOMC Meeting	Easing (Expected)	Tightening (Expected)	-3.78	1.72
LSAP 1					
11/25/2008	Fed MBS/Agency Purchases	Easing (Unexpected)	Easing (Unexpected)	-10.05	-23.48
12/16/2008	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-9.34	-38.97
1/28/2009	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	1.96	14.27
3/18/2009	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-4.52	-17.90
4/29/2009	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	2.34	0.56
6/24/2009	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	2.98	3.02
8/12/2009	FOMC Meeting	Easing (Expected)	Easing (Expected)	-3.44	-2.83
9/23/2009	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	-4.50	-3.89
11/4/2009	FOMC Meeting	Tightening (Expected)	Easing (Expected)	1.10	-3.93
12/16/2009	FOMC Meeting	Easing (Expected)	Easing (Expected)	-1.82	-2.70
1/27/2010	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	4.19	5.34
3/16/2010	FOMC Meeting	Easing (Expected)	Easing (Expected)	-3.84	-2.58
4/28/2010	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	2.06	4.01
6/23/2010	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-6.67	-6.93
LSAP 2					
8/10/2010	FOMC Meeting	Easing (Expected)	Easing (Expected)	-2.99	-3.63
8/27/2010	Bernanke at Jackson Hole	Tightening (Unexpected)	Tightening (Unexpected)	12.14	13.20
9/21/2010	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-9.09	-10.53
10/15/2010	Bernanke at Boston Fed	Easing (Expected)	Easing (Unexpected)	-3.20	-6.66
11/3/2010	FOMC Meeting	Tightening (Expected)	Easing (Unexpected)	0.99	-11.46
12/14/2010	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	8.09	6.49
1/26/2011	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	1.59	6.87
3/15/2011	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	0.35	5.82
4/27/2011	FOMC Meeting	Tightening (Expected)	Easing (Expected)	0.67	-1.53
6/22/2011	FOMC Meeting	Easing (Expected)	Tightening (Expected)	-0.55	0.12
MEP					
8/9/2011	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-49.40	-31.48
8/26/2011	Bernanke at Jackson Hole	Unclassified	Easing (Unexpected)	-	-14.39
9/21/2011	FOMC Meeting	Easing (Expected)	Tightening (Unexpected)	-2.63	31.38
11/2/2011	FOMC Meeting	Easing (Unexpected)	Tightening (Expected)	-6.38	0.31
12/13/2011	FOMC Meeting	Unclassified	Tightening (Expected)	0.00	1.06
1/25/2012	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-15.38	-14.76
3/13/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	7.50	4.42
4/25/2012	FOMC Meeting	Unclassified	Easing (Expected)	-	-2.37
6/20/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	6.00	3.18
8/1/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	12.82	2.33
LSAP 3					
9/13/2012	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-9.80	-6.51
10/24/2012	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	-5.00	-2.04
12/12/2012	FOMC Meeting	Tightening (Expected)	Easing (Expected)	2.44	-1.46
1/30/2013	FOMC Meeting	Easing (Expected)	Easing (Unexpected)	-2.67	-5.91
3/20/2013	FOMC Meeting	Unclassified	Tightening (Expected)	-	4.30
5/1/2013	FOMC Meeting	Tightening (Expected)	Easing (Expected)	2.08	-2.00
5/22/2013	Bernanke Testimony	Tightening (Unexpected)	Tightening (Expected)	4.76	4.96
6/19/2013	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	15.73	16.29
7/31/2013	FOMC Meeting	Unclassified	Easing (Expected)	-	-3.16
9/18/2013	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-17.28	-13.56
10/30/2013	FOMC Meeting	Unclassified	Easing (Expected)	-	-1.13
12/18/2013	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	-4.76	-5.53
1/29/2014	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	-5.76	-3.50
3/19/2014	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	22.29	32.20
4/30/2014	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	-4.37	-4.21
6/18/2014	FOMC Meeting	Unclassified	Easing (Expected)	-	-1.70
7/30/2014	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	2.30	2.89
9/17/2014	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	3.11	2.80
10/29/2014	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	8.85	11.12



Table B4: Shadow Rate Announcements and Overall EM Debt Flows

	All Investors			Active Investors			Passive Investors				
	All (1)	Hard (2)	Local (3)	Mixed (4)	All (5)	Hard (6)	Local (7)	Mixed (8)	All (9)	Hard (10)	Local (11)
Easing (Unexpected)	-0.03 (0.16)	-0.14 (0.16)	-0.01 (0.16)	0.14 (0.15)	-0.04 (0.16)	-0.16 (0.17)	-0.04 (0.16)	0.14 (0.15)	0.07 (0.15)	-0.02 (0.15)	0.16 (0.16)
Observations	153	153	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.47** (0.20)	-0.46* (0.19)	-0.36 (0.20)	-0.47** (0.20)	-0.44** (0.20)	-0.37* (0.20)	-0.36* (0.20)	-0.47** (0.20)	-0.49* (0.20)	-0.51** (0.20)	-0.12 (0.20)
Observations	94	94	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.09 (0.15)	-0.01 (0.16)	-0.17 (0.15)	0.06 (0.14)	-0.08 (0.15)	0.01 (0.15)	-0.16 (0.15)	0.06 (0.14)	-0.1 (0.15)	-0.05 (0.15)	-0.09 (0.14)
Observations	176	176	176	176	176	176	176	176	176	176	176
Tightening (Expected)	-0.06 (0.16)	0.03 (0.15)	-0.15 (0.16)	0.11 (0.16)	-0.01 (0.16)	0.19 (0.15)	-0.16 (0.16)	0.11 (0.16)	-0.26 (0.15)	-0.29* (0.15)	-0.02 (0.15)
Observations	165	165	165	165	165	165	165	165	165	165	165

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

Table B5: Shadow Rate Announcements and Regional EM Debt Flows

	Asia ex-Japan			EMEA			Latin America			Global EM		
	All (1)	Hard (2)	Mixed (4)	All (5)	Hard (6)	Mixed (8)	All (9)	Hard (10)	Mixed (12)	All (13)	Hard (14)	Mixed (16)
Easing (Unexpected)	-0.09 (0.16)	0.27* (0.16)	-0.15 (0.17)	0.26 (0.16)	-0.05 (0.15)	0.29* (0.17)	-0.32* (0.16)	0.17 (0.17)	-0.29** (0.16)	0.03 (0.16)	-0.16 (0.16)	0.14 (0.15)
Observations	153	153	153	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.31 (0.20)	-0.43* (0.20)	-0.31 (0.20)	-0.44** (0.20)	-0.32 (0.20)	-0.41** (0.20)	-0.41* (0.20)	0.19 (0.20)	-0.46** (0.20)	-0.44* (0.19)	-0.46** (0.20)	-0.47** (0.20)
Observations	94	94	94	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.17 (0.15)	0.24 (0.15)	-0.21 (0.15)	-0.23 (0.15)	-0.22 (0.16)	-0.21 (0.14)	0.2 (0.15)	0.22 (0.16)	-0.12 (0.16)	-0.1 (0.15)	-0.03 (0.16)	0.1 (0.14)
Observations	176	176	176	176	176	176	176	176	176	176	176	176
Tightening (Expected)	0.16 (0.15)	-0.21 (0.16)	0.23 (0.15)	-0.11 (0.16)	0.16 (0.17)	0.03 (0.16)	-0.07 (0.16)	-0.05 (0.16)	-0.12 (0.15)	-0.08 (0.16)	0.04 (0.15)	0.12 (0.16)
Observations	165	165	165	165	165	165	165	165	165	165	165	165

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

Table B6: Overall EM Debt Flows Controlling for the VIX

	All Investors			Active Investors			Passive Investors				
	All (1)	Hard (2)	Local (3)	Mixed (4)	All (5)	Hard (6)	Local (7)	Mixed (8)	All (9)	Hard (10)	Local (11)
Easing (Unexpected)	-0.06 (0.16)	-0.17 (0.16)	-0.03 (0.16)	0.11 (0.15)	-0.07 (0.16)	-0.19 (0.16)	-0.05 (0.16)	0.12 (0.15)	0.05 (0.15)	-0.03 (0.15)	0.14 (0.15)
Observations	153	153	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.47** (0.02)	-0.48** (0.20)	-0.35** (0.20)	-0.46** (0.20)	-0.44** (0.20)	-0.40* (0.20)	-0.35* (0.20)	-0.45* (0.20)	-0.49** (0.20)	-0.52** (0.20)	-0.13 (0.21)
Observations	94	94	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.09 (0.15)	-0.01 (0.16)	-0.17 (0.15)	0.06 (0.14)	-0.08 (0.15)	0.01 (0.15)	-0.16 (0.15)	0.06 (0.14)	-0.1 (0.15)	0.05 (0.15)	-0.09 (0.15)
Observations	176	176	176	176	176	176	176	176	176	176	176
Tightening (Expected)	-0.12 (0.13)	0.00 (0.15)	-0.20 (0.14)	0.04 (0.13)	-0.05 (0.13)	0.15 (0.14)	-0.20 (0.14)	0.04 (0.13)	-0.27* (0.15)	-0.29* (0.15)	-0.04 (0.15)
Observations	165	165	165	165	165	165	165	165	165	165	165

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

Table B7: Regional EM Debt Flows Controlling for the VIX

	Asia ex-Japan			EMEA			Latin America			Global EM						
	All	Hard	Local	All	Hard	Local	All	Hard	Local	All	Hard	Local				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Easing (Unexpected)	-0.11 (0.16)	0.27* (0.16)	-0.16 (0.16)	-0.06 (0.16)	0.23 (0.15)	-0.06 (0.15)	0.19 (0.15)	0.28* (0.17)	-0.32** (0.16)	0.16 (0.17)	-0.34** (0.16)	-0.27** (0.15)	0 (0.16)	-0.19 (0.16)	0.1 (0.16)	0.11 (0.15)
Observations	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.32 (0.20)	-0.44** (0.20)	-0.31 (0.20)	0.01 (0.21)	-0.41** (0.19)	-0.28 (0.19)	-0.17 (0.20)	-0.41** (0.20)	-0.42** (0.21)	0.2 (0.21)	-0.47** (0.20)	-0.23 (0.21)	-0.44** (0.20)	-0.48** (0.20)	-0.25 (0.20)	-0.45** (0.19)
Observations	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.177 (0.15)	0.24 (0.15)	-0.21 (0.15)	-0.09 (0.15)	-0.23 (0.15)	-0.22 (0.16)	-0.08 (0.16)	-0.21 (0.14)	0.2 (0.15)	0.22 (0.16)	0.18 (0.15)	-0.12 (0.16)	-0.1 (0.15)	-0.03 (0.15)	-0.21 (0.15)	0.1 (0.14)
Observations	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176
Tightening (Expected)	0.12 (0.13)	-0.25 (0.15)	0.20 (0.14)	-0.05 (0.14)	-0.15 (0.15)	0.13 (0.16)	-0.20 (0.15)	-0.01 (0.15)	-0.07 (0.16)	-0.06 (0.16)	-0.05 (0.16)	-0.12 (0.15)	-0.13 (0.13)	0.02 (0.15)	-0.27* (0.14)	0.07 (0.14)
Observations	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165

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

Table B8: Overall EM Debt Flows Controlling for the Oil Price

	All Investors			Active Investors			Passive Investors		
	All	Hard	Local	All	Hard	Local	All	Hard	Local
	(1)	(2)	(3)	(5)	(6)	(7)	(9)	(10)	(11)
Easing (Unexpected)	-0.02 (0.16)	-0.14 (0.16)	0 (0.16)	-0.04 (0.16)	-0.15 (0.16)	-0.04 (0.16)	0.07 (0.15)	-0.02 (0.15)	0.16 (0.15)
Observations	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.48** (0.20)	-0.47** (0.20)	-0.36* (0.20)	-0.45* (0.20)	-0.38* (0.20)	-0.37* (0.20)	-0.49* (0.20)	-0.52* (0.20)	-0.12 (0.21)
Observations	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.12 (0.13)	-0.02 (0.15)	-0.17 (0.15)	-0.08 (0.15)	0.01 (0.15)	-0.17 (0.15)	-0.1 (0.15)	-0.06 (0.15)	-0.09 (0.15)
Observations	176	176	176	176	176	176	176	176	176
Tightening (Expected)	-0.05 (0.15)	0.04 (0.15)	-0.15 (0.16)	0.02 (0.15)	0.19 (0.15)	-0.15 (0.16)	-0.26* (0.15)	-0.29* (0.15)	-0.01 (0.15)
Observations	165	165	165	165	165	165	165	165	165

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

Table B9: Regional EM Debt Flows Controlling for the Oil Price

	Asia ex-Japan			EMEA			Latin America			Global EM						
	All	Hard	Local	Mixed	All	Hard	Local	Mixed	All	Hard	Local	Mixed				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Easing (Unexpected)	-0.09 (0.16)	0.27* (0.16)	-0.14 (0.16)	-0.04 (0.16)	0.26 (0.15)	-0.05 (0.15)	0.21 (0.16)	0.29* (0.16)	-0.32** (0.16)	0.17 (0.17)	-0.34** (0.16)	-0.30** (0.15)	0.03 (0.16)	-0.19 (0.16)	0.12 (0.16)	0.14 (0.15)
Observations	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
Tightening (Unexpected)	-0.32 (0.20)	-0.44** (0.20)	-0.32 (0.20)	0.03 (0.21)	-0.44** (0.20)	-0.31 (0.19)	-0.19 (0.21)	-0.41** (0.20)	-0.41** (0.20)	0.19 (0.20)	-0.46** (0.20)	-0.22 (0.20)	-0.45** (0.20)	-0.47** (0.19)	-0.27 (0.21)	-0.47** (0.20)
Observations	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Easing (Expected)	-0.18 (0.15)	0.24 (0.15)	-0.22 (0.15)	-0.09 (0.15)	-0.15 (0.15)	-0.22 (0.16)	-0.08 (0.16)	-0.2 (0.14)	0.19 (0.15)	0.22 (0.16)	0.17 (0.15)	-0.12 (0.16)	-0.11 (0.15)	-0.03 (0.15)	-0.22 (0.15)	0.1 (0.14)
Observations	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176
Tightening (Expected)	0.17 (0.15)	-0.21 (0.16)	0.24 (0.15)	0.00 (0.15)	-0.11 (0.16)	0.16 (0.16)	-0.18 (0.15)	0.03 (0.16)	-0.07 (0.16)	-0.05 (0.16)	-0.06 (0.16)	-0.12 (0.15)	-0.07 (0.15)	0.05 (0.15)	-0.22 (0.16)	0.13 (0.15)
Observations	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165

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

Table B10: Federal Reserve Announcements Classification Results

Date	Event	Federal Fund Futures	Shadow Rate Model	RSW (2014)	Federal Fund Futures	Shadow Rate Model	RSW (2014)
		(1)	(2)	(3)	(4)	(5)	(6)
10/8/2008	FOMC/Joint CB Statement						
10/29/2008	FOMC Meeting	Easing (Expected)	Tightening (Expected)	Easing	-3.78	1.72	-0.009
	LSAP 1						
11/25/2008	Fed MBS/Agency Purchases	Easing (Unexpected)	Easing (Unexpected)	Easing	-10.05	-23.48	-0.061
12/16/2008	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-9.34	-38.97	-0.270
1/28/2009	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	Tightening	1.96	14.27	0.020
3/18/2009	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-4.52	-17.90	-0.370
4/29/2009	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	Tightening	2.34	0.56	0.053
6/24/2009	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	Tightening	2.98	3.02	0.109
8/12/2009	FOMC Meeting	Easing (Expected)	Easing (Expected)	Easing	-3.44	-2.83	-0.026
9/23/2009	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	Easing	-4.50	-3.89	-0.099
11/4/2009	FOMC Meeting	Tightening (Expected)	Easing (Expected)	Easing	1.10	-3.93	-0.024
12/16/2009	FOMC Meeting	Easing (Expected)	Easing (Expected)	Tightening	-1.82	-2.70	0.028
1/27/2010	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	Tightening	4.19	5.34	0.064
3/16/2010	FOMC Meeting	Easing (Expected)	Easing (Expected)	Easing	-3.84	-2.58	-0.043
4/28/2010	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	Easing	2.06	4.01	-0.009
6/23/2010	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-6.67	-6.93	-0.025
	LSAP 2						
8/10/2010	FOMC Meeting	Easing (Expected)	Easing (Expected)	Easing	-2.99	-3.63	-0.085
8/27/2010	Bernanke at Jackson Hole	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	12.14	13.20	0.086
9/21/2010	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-9.09	-10.53	-0.071
10/15/2010	Bernanke at Boston Fed	Easing (Expected)	Easing (Unexpected)	Unclassified	-3.20	-6.66	0.000
11/3/2010	FOMC Meeting	Tightening (Expected)	Easing (Unexpected)	Easing	0.99	-11.46	-0.057
12/14/2010	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	8.09	6.49	0.032
1/26/2011	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	Easing	1.59	6.87	-0.019
3/15/2011	FOMC Meeting	Tightening (Expected)	Tightening (Unexpected)	Tightening	0.35	5.82	0.068
4/27/2011	FOMC Meeting	Tightening (Expected)	Easing (Expected)	Easing	0.67	-1.53	-0.034
6/22/2011	FOMC Meeting	Easing (Expected)	Tightening (Expected)	Tightening	-0.55	0.12	0.037
	MEP						
8/9/2011	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-49.40	-31.48	-0.142
8/26/2011	Bernanke at Jackson Hole	Unclassified	Easing (Unexpected)	Easing	-	-14.39	-0.008
9/21/2011	FOMC Meeting	Easing (Expected)	Tightening (Unexpected)	Tightening	-2.63	31.38	0.032
11/2/2011	FOMC Meeting	Easing (Unexpected)	Tightening (Expected)	Unclassified	-6.38	0.31	0.000
12/13/2011	FOMC Meeting	Unclassified	Tightening (Expected)	Tightening	0.00	1.06	0.007
1/25/2012	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-15.38	-14.76	-0.057
3/13/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	7.50	4.42	0.047
4/25/2012	FOMC Meeting	Unclassified	Easing (Expected)	Tightening	-	-2.37	0.015
6/20/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	Tightening	6.00	3.18	0.015
8/1/2012	FOMC Meeting	Tightening (Unexpected)	Tightening (Expected)	Tightening	12.82	2.33	0.053
	LSAP 3						
9/13/2012	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Tightening	-9.80	-6.51	0.016
10/24/2012	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	Easing	-5.00	-2.04	-0.002
12/12/2012	FOMC Meeting	Tightening (Expected)	Easing (Expected)	Tightening	2.44	-1.46	0.005
1/30/2013	FOMC Meeting	Easing (Expected)	Easing (Unexpected)	Easing	-2.67	-5.91	-0.024
3/20/2013	FOMC Meeting	Unclassified	Tightening (Expected)	Tightening	-	4.30	0.011
5/1/2013	FOMC Meeting	Tightening (Expected)	Easing (Expected)	Tightening	2.08	-2.00	0.003
5/22/2013	Bernanke Testimony	Tightening (Unexpected)	Tightening (Expected)	Tightening	4.76	4.96	0.031
6/19/2013	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	15.73	16.29	0.198
7/31/2013	FOMC Meeting	Unclassified	Easing (Expected)	Easing	-	-3.16	-0.054
9/18/2013	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-17.28	-13.56	-0.223
10/30/2013	FOMC Meeting	Unclassified	Easing (Expected)	Tightening	-	-1.13	0.048
12/18/2013	FOMC Meeting	Easing (Unexpected)	Easing (Unexpected)	Easing	-4.76	-5.53	-0.020
1/29/2014	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	Easing	-5.76	-3.50	-0.013
3/19/2014	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	22.29	32.20	0.147
4/30/2014	FOMC Meeting	Easing (Unexpected)	Easing (Expected)	Easing	-4.37	-4.21	-0.017
6/18/2014	FOMC Meeting	Unclassified	Easing (Expected)	Easing	-	-1.70	-0.022
7/30/2014	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	Easing	2.30	2.89	-0.012
9/17/2014	FOMC Meeting	Tightening (Expected)	Tightening (Expected)	Tightening	3.11	2.80	0.078
10/29/2014	FOMC Meeting	Tightening (Unexpected)	Tightening (Unexpected)	Tightening	8.85	11.12	0.055