Effects of Fed Announcements on Emerging Markets: What Determines Financial Market Reactions?*

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Abstract

This paper analyzes market reactions to the 2013-14 Fed announcements related to the tapering of asset purchases and examines how these reactions are influenced by financial depth. The study focuses on long-term government bond yields and uses daily data for all emerging markets. Controlling for all time-invariant country characteristics as well as time-varying macroeconomic fundamentals (changes in current account, fiscal balance, GDP growth, and inflation), countries with deeper domestic financial markets (as measured by higher bank credit, M2, M3, or stock market capitalization) experienced smaller increases in government bond yields during four-day windows around Federal Open Market Committee (FOMC) announcements related to tapering. Countries with better macroeconomic fundamentals (measured by improvements in current account, fiscal balance, and GDP growth) also experienced smaller increases in government bond yields around such episodes.

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1 Introduction

In the aftermath of the Global Financial Crisis, loose monetary policy in advanced economies prompted a global search for yields with investors flocking into emerging markets (EMs). This trend got disrupted in May 2013 when the Fed signaled its intention to unwind its unconventional monetary policy. While unconventional monetary policies (UMP) by the Fed were not expected to last forever, talks about reducing the quantity of asset purchases (or "tapering") did surprise markets and created bouts of volatility across EMs as investors realized that the transition to higher global rates had begun. These episodes of market pressure were marked by sharp reactions in EMs - rapid currency depreciations, increases in external financing premia, declines in equity prices, and reversal in capital flows (see Sahay et al. (2014)). Importantly, investors seemed to have focused their attention particularly on countries with larger external financing needs and macroeconomic imbalances, exerting severe pressure on countries like Brazil, India, Indonesia, Turkey, and South Africa. These five countries saw, on average, bond yields rise by 2.5 percentage points, equity markets fall by 13.75 percent, and exchange rates depreciate by 13.5 percent during May 22-(end of) August 2013.

Against this background, this paper provides a systematic analysis of market reactions in EMs from January 1, 2013, to January 22, 2014 following FOMC announcements, and uncovers factors that influenced them. In particular, it explores the role played by the depth of domestic financial markets, once macroeconomic fundamentals (changes in current account, fiscal balance, inflation, and GDP growth) are controlled for. Market reactions are measured by daily data on long-term government bond yields, and are analyzed using event study techniques around Federal Open Market Committee (FOMC) meetings and release of their minutes.

We find that market pressures were more subdued in countries with deeper domestic financial markets. Financial depth is proxied by size, and measured using M2, M3, bank credit, and stock market capitalization (all relative to GDP). Controlling for all observed and unobserved time invariant country specific effects as well as time varying macroeconomic factors (such as changes in current account, fiscal balance, GDP growth, and inflation), we find that countries with deeper domestic financial markets experienced smaller increase in government bond yields around episodes of volatility. The results suggest that in countries with larger financial markets, investors can move large amounts of capital toward other markets without significant changes in prices. We also find that countries with better macroeconomic fundamentals (improved current account, fiscal balances, and GDP growth) experienced smaller increase in yields around episodes of volatility, indicating that markets differentiated countries based on their macroeconomic fundamentals.

Our paper is related to the large and growing literature on transmission of unconventional monetary policies to emerging markets. Mohanty (2014), for example, using a range of country-specific studies, concludes that global interest rates and asset prices have become increasingly correlated during the period of unprecedented monetary easing by the major advanced economies. Using high-frequency data, Gilchrist et al. (2014) found that UMP effects are particularly pronounced in long-term interest rates, and they further note that the effects on government bond yields are both heterogeneous across countries and different from those during conventional monetary policy period. However, their paper does not investigate the source of heterogeneity in term of country characteristics. In light of these findings, our paper contributes to the literature by providing further evidence of the impact of the Fed's monetary policy announcements on EMs, and its relationship with EMs' macroeconomic fundamentals and the depth of their domestic financial sector.

By including dates for both FOMC statement and minute releases, our study provides further evidence on the information content of FOMC minutes, especially their effects on foreign asset prices. Both FOMC statements and minutes are part of central bank communication, however, they are different in both their release dates and their information. FOMC statements, released after each meeting, explain the decisions as well as provide information about future monetary policy stance, whereas FOMC minutes, released three weeks after, contain more detailed information about the economic outlook and perspectives of FOMC members. Conventionally, researchers only measure the effect of monetary policy around FOMC meeting dates, thus they miss out the information content

revealed by other forms of communication. In fact, themes and tones revealed in those minutes are found to be useful predictors of future economic conditions and policy decisions (Apel and Grimaldi (2012) and Boukus and Rosenberg (2006)). Moreover, Jubinski and Tomljanovich (2013) and Rosa (2013) find that the releases of FOMC minutes significantly affect volatility of asset prices. Our paper contributes to this literature and emphasizes the importance of information revealed by other forms of central bank communication.

Furthermore, there is a significant body of evidence on the role of country characteristics in explaining financial market reactions. Our paper is closely related to at least three papers. Ahmed et al. (2017) use country-level OLS regressions with a sample of 35 emerging market economies, and correlate changes in government bond yields, and several other variables, with country characteristics. They measure the cumulative financial performance during the taper tantrum episode (April-August 2013). They find that during the taper tantrum, financial markets were more resilient in EMs with better macro fundamentals (higher reserves/GDP, lower inflation, higher run-up in credit/GDP, and lower vulnerability index). In contrast, financial markets deteriorated more in EMs with larger previous inflows and appreciation. Aizenman et al. (2016) analyze the impact of "news" of tapering announcements by Fed senior policy makers during November 27th, 2012 to October 3rd, 2013 on EMs' financial markets. They measure "news" by searches in Bloomberg using various keywords, and then cross-check their codings with other publications. They measure financial performance by changes in exchange rates, stock prices, and CDS spreads 24 hours after Fed taper news. Using thresholds to define "robust" and "fragile" emerging markets, they find that news of tapering caused short-term deteriorations in financial variables in the more "robust" EMs, with robustness determined by current account balances, the level of international reserves, and external debt. Finally, Eichengreen and Gupta (2015) also look at the correlation between financial performance and a set of macroeconomic variables. Financial performance is measured as exchange rate depreciation and depreciation pressure from start to end of the taper tantrum episode (April-August 2013). They find that during the taper tantrum, financial conditions deteriorated more in EMs with larger financial markets (measured as the log of private external financing received during 2010-12). In addition, financial conditions also deteriorated more in EMs that received more capital inflows previously (measured as the increase in current account deficits and REER appreciations during 2010-2012).[1]

Our paper contributes to this literature in three distinctive ways. First, our paper uniquely focuses on the role of domestic financial depth in enhancing resilience to shocks, while controlling for macroeconomic fundamentals. Second, unlike most earlier papers, we focus on long-term government bond yields, and on how they react around episodes of turmoil. Third, we use a novel two-step methodology. In the first step we use a data driven approach to identify specific episodes of volatility. In the second step, we analyze how country characteristics affect market reactions around volatile episodes. What makes the results novel and interesting is that the effect of financial depth is not clear a priori. While greater financial depth can enhance resilience to shocks, deeper financial systems could also lead to macroeconomic instability as investors can unwind their positions faster in more liquid markets. Our findings support the former hypothesis.

Our results confirm some of the findings in the literature. We find strong evidence for negative financial market reaction around May 22nd, 2013, as also established by, for example, Aizenman et al. (2016). Our results on the importance of macroeconomic fundamentals are also broadly consistent with the literature. Similar to Eichengreen and Gupta (2015), we find that countries with improvements in current account balance were more resilient to shocks. Ahmed et al. (2017), find that bond markets differentiate relatively early in the taper tantrum episode, specifically around June, July, and August. Our paper complements their findings and demonstrates that the differentiation can be seen at even

[1] Several other papers establish the importance of macroeconomic fundamentals. Rai and Suchanek (2014) employ an event-study framework with four announcements in 2013, and show that macroeconomic fundamentals mattered during the Fed tapering period. Bowman et al. (2015) and Chen et al. (2014) use longer time samples, and also find evidence for market differentiation across emerging markets, in the effect of changes in US financial or monetary variables, on EM financial market variables. Dahlhaus and Vasishtha (2014), instead, look directly at capital flows to emerging markets and show that the effect of monetary policy normalization shock on portfolio flows to EMs is economically small.

a much shorter horizons.

The results in our paper, however, also differ from the literature in several ways. First, unlike Ahmed et al. (2017) and Aizenman et al. (2016), we are not able to detect any robust and consistent evidence for market differentiation based on levels of macroeconomic fundamentals. This could be either due to methodological issues, e.g. the estimations in levels could be misspecified due to the existence of unit roots in some of the macroeconomic variables for which we find some evidence, or facts on the ground, that indeed while markets reward countries which improve their fundamentals, they seem to care less about the levels in our sample.

Finally, the methodology used in this paper is novel. For example, while the strategy for the identification of events used in Aizenman et al. (2016) is subjective, ours is data-based. Consequently, although our sample and classification of events appear to be similar, they are not entirely comparable. For example, despite differences in interpretations, both papers find that May 1st, 2013 is a "Quantitative Easing" (QE) event followed by positive market reactions, while May 22nd, 2013 is a "tapering" event followed by negative reactions. However, unlike Aizenman et al. (2016), we find another significant "tapering" event during the common sample period, which is the FOMC meeting on June 18th-19th. In fact, this event is the most significant one in our sample, triggering even stronger reactions from emerging markets than that of May 22nd. Second, the identification strategy in Aizenman et al. (2016) does not take into account whether the "news" have been anticipated by the market because they assume "all news events emanating from the United States as strictly exogenous for emerging markets." Indeed, they find a large number of news-based events - a total of 29 events associated with "tapering" news and 33 events associated with "QE" news. This assumption may be problematic if the degree of market differentiation depends on the nature of news as established in our paper. Particularly, we take the nature of news into account by measuring market reactions around each event, and our assumption is that only unanticipated news would be associated with significant market reactions. In fact, our findings suggest that there are several events that are anticipated by the markets, where market reactions are statistically insignificant, and we do not find strong evidence for differentiation around these "non-events".

The remainder of our paper is organized as follows. Section II describes the data and provides some descriptive evidence on market reactions in EMs. Section III describes the empirical methodology, our baseline results, and robustness check. Section IV concludes with policy implications.

2 Data

The study uses data for 28 emerging markets, including Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czech Republic, Hungary, India, Indonesia, Israel, Kenya, Korea, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Taiwan Province of China, Thailand, Turkey, and Vietnam. The key dependent variable we use in the empirical analysis is local currency government bond yields because the data are of higher quality and their reactions are free of government intervention.[2] We use 10-year local currency government bond yields from Thomson Reuters for most countries, except for some countries where they are not available. The data on government bond yields are daily and cover the period from January 1, 2013 to January 22, 2014.[3]

The select country characteristics we examine can be classified into two main categories: (i) domestic financial depth as broadly proxied by bank credit/ GDP, M2/GDP, M3/GDP, stock market cap-

[2]Daily data of exchange rates are influenced by government intervention. And data on capital flow from EPFR are only weekly, and provide only a limited picture of portfolio flows since it covers only a fraction of the flows covered by the Balance of Payments.

[3]We start with a comprehensive list of 60 emerging markets (based on various existing studies), but only 28 of them (excluding financial centers) have data available on Thomson Reuters for long-term government bond yields. For the purposes of this paper, following Rogoff et al. (2004), emerging market economies include Korea, Singapore, and Taiwan, as these are included in the Morgan Stanley Capital International (MSCI) index. However, we do not include financial centers such as Hong Kong and Singapore.

italization/GDP, and (ii) macroeconomic fundamentals: fiscal balance/GDP, current account/GDP, inflation, and real GDP growth.[4] The main goal of this paper is to examine if and how markets differentiate based on financial depth of countries; and does financial depth matter after controlling for macro fundamentals. Financial depth and macroeconomic fundamentals are measured at quarterly frequency, except for inflation rate at monthly frequency. Financial depth variables are in levels, while macroeconomic fundamentals are measured as year-on-year changes. All variables are lagged two quarter. For example, for the tapering event on May 22nd (2013Q2), we will include the changes of macroeconomic variables between 2012Q4 and 2011Q4. We make this adjustment to take into account the timing of macroeconomic data releases and avoid possible endogeneity issues. Variables, data sources, and summary statistics are described in Table 10.

2.1 What happened in the summer of 2013? A first look at the data

The release of FOMC minutes on May 22, 2013 together with Chairman Bernanke' speech before the Joint Economic Committee of the U.S. Congress triggered a global reassessment of expectations around the timing and path of adjustment in U.S. monetary policy. The New York Fed survey of markets' expectations of Fed bond purchases shows markets (the 25th percentile of survey participants) revise down the amounts of agency and treasury bonds they were expecting the Fed to purchase in the Fall of 2013 (Figure 1).

In the April survey, the most conservative of the surveyed market participants were expecting the Fed to maintain the decision to buy US$85 billion a month of bonds through its July 30-31 meeting and reduce that amount to US$55 billion at its December 17-18 meeting. It is not clear what the expected path of these purchases were between the July FOMC meetings and the December ones since no projections were given for the September 17-18 and the October 29-30 FOMC meetings. However, the July survey, which was done after Chairman Bernanke's speech, shows that markets were expecting the Fed to buy only US$65 billion in bonds per month at its September meeting and reduce that amount to US$45 billion after the December meeting. This revision in expectations was accompanied with a sell-off of EMs' assets. Between May 22 and end-June, currencies across EMs depreciated and spreads rose. On average, currencies across EMs depreciated 3 percent, and government bond yields rose 1 percentage point (Figure 2).

A first look at the data suggests some evidence for differentiation. This differentiation seems to have been based on macroeconomic fundamentals, including external, fiscal, and macroeconomic imbalances (current account, fiscal account, and inflation), as well as financial depth. Countries whose current account and fiscal balances deteriorated less between 2009 and 2012, countries with lower average inflation, and deeper financial markets (measured by M2 and bank credit relative to GDP) experienced smaller increase in government bond yields between May, and December 2013 (Figure 3). While fiscal and current account balances appear to be rather weakly correlated with financial market reactions (Figures 3A and 3B), our regression results in the next section provide a more thorough analysis of the question. The relationship is statistically significant for M2/GDP (Figure 3D) and bank credit (Figure 3E). Taiwan Province of China, China, Malaysia, Korea, or Thailand are examples of economies with deeper financial markets than others and that were less affected; these economies experienced smaller increases in yields between May and December of 2013, compared to other emerging markets.

Overall, the volatility episodes in global markets that followed U.S. monetary policy announcements since May 2013 and the way EMs were affected seem to suggest that country characteristics matter in determining market reactions. The sections that follow analyze rigorously the link between market reactions and EMs' financial structure, as well as macroeconomic fundamentals.

[4] We also used the size of domestic government debt securities outstanding from BIS Debt Securities Statistics as an alternative measure of financial depth. When we use this measure the sample shrinks results substantially (down to 19 countries), but the results reported in the paper remain qualitatively similar.

3 Empirical Methodology and Baseline results

To uncover the role of financial structures and macroeconomic characteristics played in market reactions to the Fed's policy announcements, we use an event study framework. An advantage of our approach is that we will have a clean identification of the effect since we would not expect any other economic news happening in such a short window. The methodology can be decomposed into two steps.

3.1 Documenting market reactions

3.1.1 Empirical Methodology:

In the first step, we pool across countries and events, and document market reactions around these events. Our goal is to use this regression as a data-driven approach to identify significant events. The estimating equation in the first step is specified as follows:

$$\Delta \mathbf{y}_{i,t-2,t+2} = \alpha + \sum_{j=1}^{J-1} \beta_j * \mathbf{d}_j + \eta_i + \varepsilon_{i,t} \tag{1}$$

Where $\Delta \mathbf{y}_{i,t-2,t+2}$ is the four-day change in government bond yields of country i, J is the total number of events, η_i is country i fixed-effect, and $\mathbf{d}_j$ are time dummies that mark each event of interest. Based on market reactions, we classify events as negative, positive, or non-events. Negative events are expected to be associated with positive coefficients: yields increase, around negative events. Positive events are associated with negative coefficients: yields decrease around positive events. Episodes that do not fall into either of the two categories above are classified as non-events. The interpretation is that negative (positive) events capture market reactions to a "surprise" contractionary (expansionary) monetary policy shocks, and non-event capture market reactions to fully anticipated news. In addition, we cluster the standard errors at the country level. Basically, we assume that reactions of each country are independent from those of others, but within each country, we allow for those reactions to be serially correlated. Table 1 shows that during January 1, 2013, and January 22, 2014, there were 17 news events related to the Fed monetary policy, which include both the days of FOMC meetings and release of their minutes. Note that our methodology is not directly comparable to the literature on monetary policy "surprise", as in Bernanke and Kuttner (2005) for example, because we are only interested in the sign, not the magnitude of the reactions for the purpose of classification. However, we do control for monetary "surprise" in the subsequent analysis when we try to explain the heterogeneity in market reactions.

3.1.2 Pooling the events during January 2013-January 2014:

To determine market reactions around the events listed in Table 1, we estimate Equation (1), which relates the four-day change in yields to a constant and a dummy around the events. The sample comprises 28 emerging economies and 17 events. The regression includes 16 dummies (one for each event, while including the constant term). The regression results (shown in Table 2) suggest that markets reacted negatively to meetings on June 18-19 and October 29-30, as well as minute releases on May 22 and November 20.

Why did markets react negatively to those meetings and minute releases? Market observers suggest that emerging markets' strong reactions on May 22 can be related to the speech by Chairman Bernanke when he first signaled the Fed's intention to taper faster than anticipated. Moreover, in the next FOMC meeting on June 18-19, the Fed further signaled tapering of QE assets by year-end, which was interpreted as hawkish by markets, and in turn causing negative market reactions. In the October 29-30 meetings, the Fed stayed on hold and remained in a "wait and see" mode, but markets still sold off initially, as they were expecting a more dovish tone. The reactions were less negative relative

to the June meeting though. Finally, the FOMC minutes released on November 20th, increased the probability of earlier tapering, inducing sell offs and a negative market reaction. Also, it is noteworthy that markets did not react negatively to the December 17-18 meeting when the Fed actually announced tapering its asset purchases starting January, 2014 - perhaps because there was no "news" content in the announcement as tapering had already been priced in by markets.

The sample period considered in this study is also characterized by positive events and non-events. Meetings on April 30-May 1, September 17-18, and October 16 are classified as positive events. There were strong positive reactions following the September 17-18 meeting when the Fed announced it was postponing tapering of QE assets. Markets also reacted positively after the October 16 meeting, which was also perceived to be associated with a postponement of tapering. Even though our paper mainly focuses on analyzing the determinants of market reactions around periods of turmoil (or negative events), we do include positive events (and their interaction with country characteristics) in some specifications to check for robustness.

3.2 Uncovering the role of country characteristics

3.2.1 Empirical Methodology:

Once the events have been identified, we estimate regressions by pooling the 17 events across all the EMs. Our regressions relate four-day changes in bond yields to a constant, dummies for the negative events, and interactions between the negative events dummies and country characteristics. Formally, the specification is as follows:

$$\Delta \mathbf{y}_{i,t-2,t+2} = \alpha + \beta * \mathbf{D}^N + \zeta \mathbf{Z}_{t-2,t+2} + \delta * \mathbf{D}^N * \mathbf{X}_{i,t-2q} + \gamma * \mathbf{X}_{i,t-2q} + \eta_i + \varepsilon_{i,t} \tag{2}$$

Where $\mathbf{D}^N$ is the dummy for negative event, $\mathbf{X}_{i,t-2q}$ is the characteristic for country i measured two quarters before the event to allow for any lags in publication of quarterly statistics, and η_i is the country-fixed effect. Country fixed effects can control for any time-invariant country characteristics, such as measures of the degree of development of sovereign bond markets, as long as it does not change over time. Country fixed effects also control for all other country variables that are not likely to vary much over the one-year period we focus on in this study. $\mathbf{X}_{i,t-2q}$ can be both time-invariant and time varying. For regressions where $\mathbf{X}_{i,t-2q}$ is time-invariant, the variable will be collinear with the country fixed effect and will drop out. Finally, $\mathbf{Z}_{t-2,t+2}$ consists of changes in yields of U.S. 10-year government bonds and 2-year forward futures in the same period in order to control for monetary "surprises" from these announcements.

We note that there is a trade-off in choosing window length for our study: a too-narrow window may not leave enough room for market participant to digest the information and adjust their expectations, whereas a too-long window may contain other information unrelated to the announcements. Recent research, such as Gagnon et al. (2010) and Neely (2010), persuasively argue that measuring effects over a longer time window is more appropriate due to the novelty of UMP announcement and difficulties in their interpretations. Also, we have to consider the fact that we are measuring the effect of FOMC communications on emerging markets and not on the US. Thus, although the literature on measuring effects of monetary policy shocks in the United States typically uses narrow intra-day windows around announcements (for example, Gürkaynak et al. (2005)), we prefer to use longer time windows as our paper focuses on reactions in emerging markets to US monetary policy announcements.

In particular, we use a four-day horizon (two days before and two days after the event). By using a longer time window, we take into account any concerns relating to time difference between the United States and emerging markets. The meetings typically take place on Wednesdays. Therefore, we analyze differences in variables between Monday and Friday of the week. Our results are robust if shorter windows, e.g. two day (difference in variables between Tuesday and Thursday of the week), are used. As noted above, we do not look at results for longer horizon, like six-day, eight-day window etc., since the longer the horizon we use to measure the reactions, the more likely we are confounding

market reactions to U.S. monetary policy with their reactions to other economics news and government interventions.

The main hypothesis we examine is how the response of yields around negative events depends on a country's financial depth (measured in various ways including stock market capitalization/GDP, bank credit/GDP, M2/GDP, and M3/GDP). Financial depth is expected to enhance countries' resilience to shocks (see IMF (2014)) and hence countries with deeper markets are expected to fare better than others (e.g. less of a rise in bond yields). At the same time, in theory, deeper financial systems could lead to macroeconomic instability, as investors are able to unwind their positions faster in more liquid market. Amongst macroeconomic fundamentals, the study looks at fiscal and current account balance, inflation, and real GDP growth. The hypothesis we explore is whether countries with weaker fundamentals are harder hit - i.e. they experience a higher increase in bond yields.

3.2.2 Baseline results: Market reaction, financial depth, and macroeconomic fundamentals

The results from estimating Equation (2) are described in Table 3. All regressions include country fixed effects. Standard errors are clustered at the country-level in all regressions. The macroeconomic variables are measured as year-on-year changes, and therefore capture an improvement in fundamentals.[5] Column [1] shows that markets differentiate on the basis of macroeconomic fundamentals around negative events. The coefficients on interactions between the event dummy and each of the three variables - current account, fiscal balance, and GDP growth - are negative and statistically significant. The results imply that countries with improvements in current account, fiscal balance, and GDP growth, experienced lower increase in bond yields, and therefore, fared better around periods of turmoil than those with worse fundamentals.

Columns [2]-[5] present the results for financial depth. Financial depth is measured alternatively by four different measures: M2, M3, bank credit, and stock market capitalization (all relative to GDP). Higher values of these variables indicate greater financial depth. While M2 and M3 may also reflect monetary policy interventions by emerging market central banks, bank credit to GDP is likely to be a cleaner measure of financial depth. In any case, all four measures are strongly correlated. For example, the correlation coefficient between M2 and bank credit is 0.84, while the correlation between M3 and bank credit is 0.92. Stock market capitalization exhibits the lowest correlation with other measures, but is still high, ranging between 0.70 and 0.77. Not surprisingly, the results are qualitatively similar using different measures. The estimated coefficients on interactions between the negative event dummy and each of the four variables are negative, and three of them are statistically significant, except for stock market capitalization. Overall, the results suggest that countries with deeper financial markets experienced smaller increase in bond yields around negative events.

Notably, all regressions in Columns [2]-[5] control for macroeconomic fundamentals. The results support our main finding that controlling for macroeconomic factors, financial depth enhances countries' resilience to shocks. The result is consistent with recent work, which highlights the importance of developing a local investor base in emerging markets. IMF (2014), for example, presents evidences which show that EMs with a larger local investor base, deeper banking sectors and capital markets, and better institutions exhibit lower sensitivity to global financial shocks. Importantly, the effect of macroeconomic fundamentals and financial depth around non-negative events are given by the estimated coefficients on these variables (without interaction with the event dummy). We find some weak evidence for differentiation around non-negative events, based on changes in inflation and M3/GDP. In the next section, we will further explore this result.

[5]The sample in Table 3, Column [1] covers 24 countries, and is smaller than Table 2 due to missing observations on macroeconomic characteristics (4 countries with missing data are Bulgaria, Kenya, Pakistan, and Vietnam). Columns [2] to [5] cover less than 24 countries due to missing data for M2/GDP (Kenya, Latvia, Pakistan, Vietnam), M3/GDP(China, Kenya, Latvia, Pakistan,Vietnam), Credit/GDP (Kenya, Latvia, Pakistan), and stock market capitalization (Hungary, Pakistan).

Furthermore, we note that the estimated coefficients on financial variables are economically significant. For example, an estimated coefficient of -0.16 on bank credit/GDP from the baseline results in Column [4] of Table 3 suggests that a country with one percentage point higher bank credit/GDP would have a roughly 0.2 basis point lower increase in yields. For a country that has a bank credit/GDP of 120 percent of GDP, compared with a sample average of 69 percent of GDP, the estimated coefficient would imply the bond yields would increase by 8 basis points lower over the four-day window (around 4 percent annualized). The estimated coefficients on measures of macroeconomic fundamentals are economically significant as well. For example, Column [1] of Table 3 suggests that a country with one percentage point of GDP higher change in fiscal balance would see its bond yields increase by 2 basis points less than the average over a four-day period. For a country that has a change in fiscal deficit about two percent of GDP, which is one standard deviation higher than the mean, the estimated coefficient would imply the bond yields would increase an additional 4 basis points over the four-day window (around 2 percent annualized).

Figure 5 illustrates the economic magnitudes of the effect of deeper financial markets, and better macroeconomic conditions. The chart shows the additional increase in yields (in annualized terms) a country can face due to one standard deviation higher "vulnerability" than the average. For all country characteristics, lower values of the variables are defined to denote a higher degree of vulnerability. The average and standard deviations for various variables used in the chart are shown in Table 10. For example, a one standard deviation lower bank credit to GDP is associated with a 3 percent higher increase in yields in annualized terms, and so is a one standard deviation lower in the change of GDP growth.

3.3 Robustness

In what follows, we conduct a series of robustness checks to examine whether the baseline results are supported by different specifications, and alternative measures of financial depth.

3.3.1 Shorter time window

The literature on identification of monetary policy shocks in the US and other advanced economies use very short time windows (often intra-day windows). As discussed, in the baseline specification, we used a four-day window around the FOMC announcements to take into account the time difference between the FOMC announcements and allow markets enough time to adjust. In this subsection, we check the robustness of our main findings by using shorter time window - a two-day window (difference in variables between Tuesday and Thursday of the week). The results for financial depths (shown in Table 4) are qualitatively and quantitatively similar to the baseline findings. The estimated coefficients on macroeconomic characteristics, however, are not as significant as shown in the baseline regressions. Overall, the evidence supports our main finding that market reactions depend on domestic financial depth, after controlling for macroeconomic fundamentals, even over shorter horizons.

3.3.2 Differentiation around positive events

Although this paper mainly focuses on analyzing the determinants of market reactions around periods of turmoil (i.e. negative events), we check the robustness of our baseline findings to inclusion of positive and non-events. Positive events are classified based on Table 2, and we use a single dummy variable to classify any positive event. The results are shown in Table 5. Our main findings remain robust.

Deeper financial markets are associated with a smaller increase in yields around negative events. Improvements in current account, fiscal balance, and GDP growths are also associated with smaller rise in yields.

Importantly, there is not much evidence for differentiation around positive events. For example, countries with improvement in current account balance experience smaller decline in yields around positive events, but the estimates are statistically indistinguishable from zero. There is also some weak evidence for deeper financial markets to be associated with dampened market reaction around positive events.

3.3.3 Changes in financial depth

The results presented above establish that countries with deeper financial markets experienced smaller increase in yields around negative events. Were countries that increased their level of financial depth affected differently during volatile episodes? In order to address this question, we interact the year-on-year change in financial depth with the negative event dummy. The results are shown in Table 6. The estimated coefficients on the interaction terms is negative for M2/GDP and M3/GDP, but only the one associated with M2/GDP is negative and statistically significant at 10 percent level. Therefore, there is some evidence, albeit weak, that countries which increased their financial depth, experienced smaller market reactions around volatile episodes.

3.3.4 Effect of financial depth: Principal component analysis

While the sections above focused on establishing the importance of individual measures, they do not provide a holistic view of financial depth. In this section, we implement a different approach where we summarize various measures into a single indicator. The approach is based on a factor analysis of all financial depth measures used above. In particular, we extract the first principal component from all four variables: bank credit/GDP, M2/GDP, M3/GDP, and stock market capitalization/GDP. Based on the first principal component, some of the economies with deep financial markets include Taiwan Province of China, Malaysia, Korea, and Thailand.

We repeat the baseline results in Table 3, by replacing the individual measure of financial depth with the first principal component. The results are shown in Table 7. The main findings reported above remain robust.The coefficient on the interaction between the dummy and the index of financial depth is negative and statistically significant for bond yields. The deeper the financial markets are, the lower the increases in government bond yields around negative events. In addition, financial depth does not matter significantly around non-negative events.

3.3.5 Additional Specifications

We conduct several additional robustness checks relative to our baseline specification in Table 3.[6] First, we drop country fixed effects. Second, instead of using time-varying characteristics, we fix all the country macroeconomic variables to the averages between 2011 and 2012. Third, we use four-quarter lags of the country characteristics instead of two-quarters. Fourth, we dropped the negative event of May 22, 2013, when Fed Chairman Bernanke's testimony to the Congress coincided with the release of the FOMC minutes. Fifth, we include all the speeches given by Fed officials in 2013 as events, and repeated the analysis. Finally, we expanded our sample to FOMC announcements since

[6] Results are available upon request.

post crisis in 2010. The baseline results presented in Table 3 remain virtually identical in all the alternative specifications. In particular, our main findings remain robust to the larger sample. The coefficients are not statistically different for most measures of financial depth, though the effect of stock market capitalization is stronger in the larger sample. Therefore, our results are not driven by the 2013 period. Nonetheless, we focus on the 2013-2014 period in our main analysis, because markets appeared more sensitive around that period, and in fact, it was the 2013 period, which brought out the importance of emerging market fundamentals in dealing with episodes of volatility.

3.3.6 Alternative Measures of Financial Depth

We check the robustness of our findings to 28 additional measures of financial depth, which we compile from the Global Financial Development (GFD) database of the World Bank. As described in Čihák et al. (2012), these measures could potentially serve as indicators of financial depth for an economy. The variables are, however, available at annual and not at quarterly frequency. In 21 out of the 28 measures, we find that countries with deeper financial markets, react less around episodes of volatility. Only for 7 of the measures, we find the estimated effect to be positive in sign, but the effects for each of these measures, are statistically indistinguishable from zero. A summary of the variables and the findings are reported in Table 8.[7]

Finally, we also compute three other comprehensive measures of financial depth (relative to GDP), by combining some of the indicators that measure the depth of specific markets: (1) stock market capitalization and domestic government debt securities, (2) stock market capitalization, domestic government debt securities, and private bank assets, and (3) stock market capitalization, domestic government debt securities, private bank assets, and non-bank assets. Data availability on the three comprehensive measures is limited, and lead to reduced statistical significance of some of the estimates, but overall, the results are supportive of our main findings.[8]

3.4 Additional Findings

In this subsection, we report additional findings where we analyze whether markets differentiate based on country characteristics other than financial depth and macroeconomic fundamentals. These variables include a measure of the stance of macroprudential policies, trade linkages with China and the United States as measured by the sum of exports to and imports from these countries as ratios of their GDP, and degree of financial integration measured by stock of portfolio assets and liabilities over GDP.

3.4.1 Macroprudential policies

Many emerging markets put in place macroprudential measures prior to 2013 as loose monetary policy in advanced economies, a global search for yield, and seemingly better growth prospects in EMs were associated with large capital inflows into EMs. Left unchecked, the inflow of liquidity contributed to loosening monetary conditions in EMs, further fueling credit growth and imbalances in asset markets.

[7] We thank an anonymous referee for the suggestion to explore additional measures of financial depth. One indicator in the GFD database which we did not end up using is central bank assets/GDP, because the data were inconsistent with that from the IFS for several countries. Since IMF is the primary source of compiled data on central bank sheets, we prefer to use the IFS measure. The findings in the paper are robust when we use central bank assets/GDP calculated by the IMF as a measure of financial depth.

[8] Results are available upon request.

As a motivation, Figure 4 shows a positive relationship between the overflow of capital into EMs and the bond market reaction during May 22-September 17, 2013,suggesting that countries that saw most capital inflows in the run-up to 2013 were more impacted during the 2013 May-September volatility episodes.[9]

The data on macroprudential policies is taken from Zhang and Zoli (2016). The indicator of macroprudential measures includes changes in loan-to-value and debt-to-income ratios, counter-cyclical capital requirements, dynamic provisions, reserve requirements, liquidity tools, and capital measures. The index from Zhang and Zoli (2016) takes values of -1, 0, and +1 depending on whether the policies were loosened, kept unchanged, or tightened respectively. We create a measure of cumulative stance of macroprudential policies at the country-level by cumulating the policies over the period starting from 2000 up to the last quarter of 2012. In Table 9 column [1], we introduce the interaction between the macroprudential policy stance and the event dummy. The interaction term is negative but only weakly significant at the 15 percent level. The results imply that countries that tightened macroprudential policies prior to 2013 experienced a lower increase in bond yields. Overall, there are some weak evidences that a tighter stance on macroprudential in the run-up to the episodes of turmoil in 2013-14 helped mitigate negative market reactions.

3.4.2 Trade linkages with China and United States

Trade openness is another variable that could potentially enhance a country's resilience to negative shocks. In particular, strong trade linkages with China, given that Chinese demand still remained broadly resilient during our sample period, could potentially provide some buffers to countries to offset potential adverse impact of tighter financing conditions or volatility related to the unwinding of unconventional monetary policy in the United States.

We explored overall trade openness, but did not find it to be significant in reducing vulnerability to shocks. Exposure to China, however, seems to play a significant role. Exposure to China is measured by the sum of a country's exports to and imports from China as a ratio of its GDP. The variable is at the country-level, and measured in the last quarter of 2012.[10] In Column [2] of Table 8, we introduce the interaction of this variable with the event dummy. The estimated coefficient on the interaction is negative, and statistically significant at the 10 percent level. Countries with stronger trade links to China were less hit during the volatility episodes. These are mainly countries in the Asian supply chain. Countries with stronger trade linkages with the United States on the other hand do not experience any significant difference in yields around volatility episodes (Column [3], Table 8).

These results provide evidence for the stabilizing role which exposure to China has played on markets' reaction to Fed monetary policy announcements in 2013. The finding can be interpreted as linkages with China acting as a buffer, whereby investors tend to display more confidence in countries that have greater exposure to China. Both foreign and domestic investors are less likely to sell-off from such markets, and therefore exchange rates depreciate less and bond yields increase less in countries with stronger linkages to China.

[9] The overflow is defined as the amount of capital inflows into EMs in excess of what can be explained by fundamentals, including U.S. growth, U.S. and domestic interest rates, the Fed QE, and the VIX. For details see Sahay et al. (2014) and Sahay et al. (2015).

[10] Note that the exposure to China is measured simply by trade linkages in the paper. Exposure to China could also be measured through other direct and indirect channels e.g. through financial linkages of countries with China, or a rise in commodity prices.

3.4.3 International financial integration

The impact of financial integration is a priori ambiguous. On the one hand, more financially integrated countries are more exposed to external shocks and could therefore be expected to be affected more during periods of volatility. On the other hand, greater financial integration could mean better opportunity for diversifying risks, in which case one could expect the more financially integrated countries to be less affected during periods of volatility. Financial integration is calculated as the ratio of the sum of foreign portfolio assets and liabilities to GDP. It is at the country-level and measured in the last quarter of 2012. Column [4], Table 8 shows the result. We do not find any evidence for more integrated countries to experience any significant difference in yields around volatility episodes. We also looked at measures of capital openness (Chinn-Ito Index as described in Chinn and Ito (2008)), and a cumulated capital flow management index from Zhang and Zoli (2016). There is some evidence that economies with a greater degree of capital openness as captured by the two measures are more resilient to shocks; the estimates however, are statistically indistinguishable from zero.[11]

4 Conclusion

The Fed plans and subsequently decisions to taper were accompanied by significant market reaction in many EMs. We provide robust evidence for the importance of financial depth in determining market reactions. The main finding is that controlling for all time-invariant country characteristics, as well as several time-varying macroeconomic variables, countries with deeper financial markets experienced smaller increased in yields around episodes of volatility following FOMC announcements in 2013-14. We also find that better macroeconomic fundamentals, tighter macroprudential policy stance in the run-up to the tapering episodes, and also strong trade ties with China helped dampen market reactions.

These results have important implications. In particular, deepening domestic financial markets can provide a cushion against external shocks. In countries with larger financial markets, investors can move large amounts of capital toward other domestic markets or outside the country without significant changes in prices - therefore such economies are likely to experience more muted market reactions around volatile episodes.

[11] Results are available upon request.

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Table 1: List of FOMC Meetings and Minutes release of minutes between January 1, 2013, and January 22, 2014.

List of FOMC Meetings and Minutes			
Meeting Number	Date of Meeting		Release of Minutes
1	January	29-30	20-Feb-13
2	March	19-20	10-Apr-13
3	April/May	30-1	22-May-13
4	June	18-19	10-Jul-13
5	July	30-31	21-Aug-13
6	September	17-18	9-Oct-13
7	October	16	
8	October	29-30	20-Nov-13
9	December	17-18	8-Jan-14

Table 2: **Market Reactions to FOMC Meetings and Release of Minutes.** This table shows the regression results between four-day changes in bond yields around the events and the event dummies. Government bond yields are 10-year (except for Chile-9 year, Croatia-7 year, Lithuania-9 year, and Philippines-5 year). All regressions include country fixed effects. Standard errors clustered at the country-level, are denoted in parentheses. ***, **,*, and ^ denote statistical significance at the 1, 5, 10, and 15 percent levels respectively.

	Government bond yields
FOMC Meetings	
March, 20th	2.16
	(2.71)
May, 1st	-5.68**
	(2.44)
June, 19th	31.89***
	(6.76)
July, 31st	0.10
	(3.53)
September, 18th	-10.03**
	(3.96)
October, 16th	-7.08**
	(2.82)
October, 30th	9.50**
	(4.04)
December, 18th	2.25
	(4.14)
FOMC Minutes	
Feb, 20th	0.91
	(2.86)
April, 10th	-2.91
	(3.31)
May, 22nd	8.76**
	(3.54)
July, 10th	-4.06
	(3.86)
August, 21st	2.50
	(5.78)
October, 9th	-0.18
	(3.30)
November, 20th	7.26**
	(2.65)
January, 8th	-1.67
	(2.66)
Constant	0.23
	(1.88)
Observations	476
Countries	28
R-squared	0.24

Table 3: **Market Reaction, Financial Depth, and Macroeconomic Fundamentals.** This table shows the regression results from estimating Equation (2) in the paper, where the four-day change in bond yields around the events is regressed on a dummy for negative events, and its interaction with several country characteristics. The dummy takes a value of one for the following negative events: Meetings. June 19th, and October 30th; Release of Minutes. May 22nd, and November 20th. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **, *, and ^ denote statistical significance at 1,5,10, and 15 percent respectively.

	(1)	(2)	(3)	(4)	(5)
Dummy	9.68***	16.72***	17.78***	20.56***	12.65**
	(2.72)	(4.51)	(4.70)	(4.85)	(4.64)
10-year US bonds	0.20^	0.15	0.13	0.15	0.15
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
2-year US Forward Futures	0.81***	0.91***	0.95***	0.90***	0.91***
	(0.27)	(0.27)	(0.28)	(0.26)	(0.27)
Interaction of Dummy with					
Current Account/GDP (Y/Y Change)	-2.01***	-1.60*	-1.79**	-1.72**	-1.65**
	(0.65)	(0.80)	(0.77)	(0.74)	(0.69)
Fiscal Balance/GDP (Y/Y Change)	-2.06**	-1.42	-1.45	-1.37	-2.51**
	(0.94)	(1.04)	(1.03)	(1.04)	(0.94)
Real GDP Growth (Y/Y Change)	-1.71***	-1.35**	-1.27**	-1.18**	-1.35***
	(0.51)	(0.51)	(0.49)	(0.50)	(0.39)
Inflation (Y/Y Change)	0.91	0.10	0.47	0.02	0.06
	(1.72)	(1.65)	(1.67)	(1.62)	(1.75)
M2/GDP (Level)		-0.09**			
		(0.04)			
M3/GDP (Level)			-0.09**		
			(0.04)		
Bank Credit/GDP (Level)				-0.16***	
				(0.05)	
Stock Market Capitalization/GDP (Level)					-0.05
					(0.05)
Non-interacted terms					
Current Account/GDP (Y/Y Change)	0.52	0.35	0.50	0.32	0.38
	(0.38)	(0.35)	(0.36)	(0.35)	(0.35)
Fiscal Balance/GDP (Y/Y Change)	-0.05	-0.21	-0.27	-0.20	-0.30
	(0.36)	(0.36)	(0.38)	(0.35)	(0.46)
Real GDP Growth (Y/Y Change)	0.21	0.11	0.04	0.08	0.03
	(0.24)	(0.23)	(0.20)	(0.24)	(0.22)
Inflation (Y/Y Change)	-0.95**	-0.67^	-1.02**	-0.63^	-0.88*
	(0.44)	(0.42)	(0.41)	(0.40)	(0.43)
M2/GDP (Level)		-0.18			
		(0.66)			
M3/GDP (Level)			-0.89*		
			(0.49)		
Bank Credit/GDP (Level)				-0.26	
				(0.55)	
Stock Market Capitalization/GDP (Level)					0.19
					(0.20)
Constant	-0.28	12.87	70.39*	17.67	-12.42
	(0.54)	(48.67)	(39.25)	(37.15)	(13.03)
Observations	408	391	374	391	374
R-squared	0.31	0.34	0.35	0.34	0.32
Countries	24	23	22	23	22

Table 4: **Market Reaction, Financial Depth, and Macroeconomic Fundamentals: Robustness to Shorter Time Window.** This table shows the regression results, where the two-day change in bond yields around the events is regressed on a dummy for negative events, and its interaction with several country characteristics. The dummy takes a value of one for the following negative events: Meetings. June 19th, and October 30th; Release of Minutes. May 22nd, and November 20th. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **,*, and ^ denote statistical significance at 1,5,10, and 15 percent respectively.

	(1)	(2)	(3)	(4)	(5)
Dummy	6.89***	12.43***	11.26***	13.84***	9.14***
	(1.64)	(2.75)	(3.04)	(3.15)	(2.81)
10-year US bonds	-0.04	-0.05	-0.06	-0.05	-0.08
	(0.10)	(0.10)	(0.11)	(0.10)	(0.10)
2-year US Forward Futures	0.74***	0.78***	0.81***	0.77***	0.79***
	(0.25)	(0.25)	(0.26)	(0.25)	(0.26)
Interaction of Dummy with					
Current Account/GDP (Y/Y Change)	-0.78*	-0.49	-0.66	-0.60	-0.73^
	(0.43)	(0.60)	(0.56)	(0.55)	(0.45)
Fiscal Balance/GDP (Y/Y Change)	-0.97*	-0.44	-0.52	-0.44	-0.93*
	(0.48)	(0.55)	(0.53)	(0.54)	(0.53)
Real GDP Growth (Y/Y Change)	-0.48*	-0.22	-0.28	-0.14	-0.34
	(0.27)	(0.27)	(0.27)	(0.24)	(0.23)
Inflation (Y/Y Change)	0.13	-0.44	-0.36	-0.47	-0.09
	(1.16)	(1.11)	(1.15)	(1.13)	(1.25)
M2/GDP (Level)		-0.07***			
		(0.02)			
M3/GDP (Level)			-0.05*		
			(0.02)		
Bank Credit/GDP (Level)				-0.10***	
				(0.03)	
Stock Market Capitalization/GDP (Level)					-0.04
					(0.03)
Non-interacted terms					
Current Account/GDP (Y/Y Change)	-0.13	-0.24	-0.22	-0.24	0.03
	(0.32)	(0.32)	(0.33)	(0.31)	(0.23)
Fiscal Balance/GDP (Y/Y Change)	-0.24	-0.39	-0.33	-0.39	-0.56^
	(0.31)	(0.31)	(0.31)	(0.31)	(0.34)
Real GDP Growth (Y/Y Change)	-0.27^	-0.32*	-0.32**	-0.34**	-0.25*
	(0.16)	(0.15)	(0.15)	(0.15)	(0.13)
Inflation (Y/Y Change)	-0.69	-0.50	-0.55	-0.53	-1.05**
	(0.58)	(0.58)	(0.62)	(0.58)	(0.43)
M2/GDP (Level)		-0.03			
		(0.35)			
M3/GDP (Level)			-0.27		
			(0.40)		
Bank Credit/GDP (Level)				0.27	
				(0.32)	
Stock Market Capitalization/GDP (Level)					0.08
					(0.13)
Constant	-0.58	1.49	20.84	-19.20	-6.06
	(0.41)	(26.14)	(31.92)	(21.54)	(8.57)
Observations	408	391	374	391	374
R-squared	0.25	0.27	0.27	0.27	0.25
Countries	24	23	22	23	22

Table 5: **Market Reaction, Financial Depth, and Macroeconomic Fundamentals: Robustness to Including Positive Events.** This table shows regression results where the four-day change in bond yields around the events is regressed on a dummy for negative events, a dummy for positive events, and the interaction of both negative and positive event dummies with several country characteristics. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **,*,and ^ denote statistical significance at 1,5, 10, and 15 percent respectively. The estimated coefficients on the non-interacted terms are not shown for brevity.

	(1)	(2)	(3)	(4)	(5)
Negative Event Dummy	8.89***	14.98***	15.90***	18.45***	11.33**
	(2.51)	(4.11)	(4.46)	(4.52)	(4.31)
Positive Event Dummy	-3.60^	-6.53^	-7.12**	-8.48**	-5.05^
	(2.24)	(3.93)	(3.38)	(3.78)	(3.20)
Changes in 10-year US bonds	0.26**	0.23*	0.22*	0.23*	0.20*
	(0.11)	(0.12)	(0.12)	(0.11)	(0.12)
Changes in 2-year Forward Futures	0.66**	0.74***	0.77**	0.74***	0.80***
	(0.27)	(0.26)	(0.28)	(0.26)	(0.27)
Interaction of Negative-event Dummy with					
Current account /GDP (Y/Y Change)	-1.93***	-1.54**	-1.76**	-1.66**	-1.55**
	(0.61)	(0.73)	(0.69)	(0.67)	(0.66)
Fiscal Balance /GDP (Y/Y Change)	-2.15**	-1.63^	-1.66^	-1.60^	-2.62**
	(0.90)	(1.00)	(0.98)	(0.99)	(0.96)
Real GDP Growth (Y/Y Change)	-1.66***	-1.37**	-1.29**	-1.23**	-1.42***
	(0.48)	(0.50)	(0.48)	(0.49)	(0.39)
Inflation (Y/Y Change)	1.03	0.39	0.81	0.32	0.39
	(1.47)	(1.42)	(1.46)	(1.41)	(1.50)
M2/GDP (Level)		-0.08**			
		(0.03)			
M3/GDP (Level)			-0.08*		
			(0.04)		
Bank credit/GDP (Level)				-0.14***	
				(0.04)	
Stock market cap/GDP (Level)					-0.04
					(0.04)
Interaction of Positive-event Dummy with					
Current account /GDP (Y/Y Change)	0.61	0.50	0.47	0.52	0.63
	(0.45)	(0.59)	(0.62)	(0.59)	(0.54)
Fiscal Balance /GDP (Y/Y Change)	-0.71	-1.09	-1.07	-1.14	-0.54
	(0.83)	(0.84)	(0.87)	(0.86)	(0.81)
Real GDP Growth (Y/Y Change)	0.25	-0.01	-0.02	-0.13	-0.05
	(0.31)	(0.26)	(0.27)	(0.28)	(0.20)
Inflation (Y/Y Change)	0.44	1.07	1.29	1.12	1.40
	(1.61)	(1.53)	(1.50)	(1.52)	(1.69)
M2/GDP (Level)		0.04			
		(0.03)			
M3/GDP (Level)			0.04^		
			(0.03)		
Bank credit/GDP (Level)				0.08*	
				(0.04)	
Stock market cap/GDP (Level)					0.04
					(0.03)
Constant	0.41	5.77	58.64	15.99	-11.59
	(0.46)	(47.06)	(39.80)	(36.98)	(13.37)
Observations	408	391	374	391	374
R-squared	0.32	0.35	0.36	0.35	0.33
Countries	24	23	22	23	22

Table 6: **Market Reaction, Changes in Financial Depth, and Macroeconomic Fundamentals**.Unlike Table 3, we include changes in financial depth rather than its level. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **,*, and ^ denote statistical significance at 1,5,10, and 15 percent respectively.

	(1)	(2)	(3)	(4)
Dummy	13.59***	11.83***	9.82***	7.00**
	(3.93)	(3.14)	(3.07)	(3.36)
10-year US bonds	0.15	0.16	0.15	0.14
	(0.12)	(0.12)	(0.12)	(0.12)
2-year US Forward Futures	0.89***	0.92***	0.92***	0.86***
	(0.26)	(0.27)	(0.27)	(0.27)
Interaction of Dummy with				
Current Account/GDP (Y/Y Change)	-2.17***	-2.02***	-1.81^	-1.40*
	(0.74)	(0.71)	(1.12)	(0.72)
Fiscal Balance/GDP (Y/Y Change)	-1.89*	-1.77*	-1.71*	-3.10***
	(0.99)	(0.88)	(0.96)	(0.86)
Real GDP Growth (Y/Y Change)	-1.08*	-1.56***	-1.61***	-1.93***
	(0.61)	(0.49)	(0.52)	(0.53)
Inflation (Y/Y Change)	0.11	0.19	0.41	0.35
	(1.68)	(1.76)	(1.65)	(1.79)
M2/GDP (Y/Y Change)	-1.81**			
	(0.83)			
M3/GDP (Y/Y Change)		-1.02		
		(1.28)		
Bank Credit/GDP (Y/Y Change)			0.03	
			(1.12)	
Stock Market Capitalization/GDP (Y/Y Change)				0.52*
				(0.27)
Non-interacted terms				
Current Account/GDP (Y/Y Change)	0.46	0.59^	0.37	0.29
	(0.41)	(0.38)	(0.43)	(0.37)
Fiscal Balance/GDP (Y/Y Change)	-0.24	-0.28	-0.27	-0.17
	(0.34)	(0.37)	(0.37)	(0.41)
Real GDP Growth (Y/Y Change)	0.21	0.09	0.16	0.12
	(0.23)	(0.21)	(0.25)	(0.22)
Inflation (Y/Y Change)	-0.73*	-1.14***	-0.93**	-0.85*
	(0.42)	(0.39)	(0.44)	(0.45)
M2/GDP (Y/Y Change)	-0.70***			
	(0.21)			
M3/GDP (Y/Y Change)		-0.74*		
		(0.39)		
Bank Credit/GDP (Y/Y Change)			-0.75	
			(0.55)	
Stock Market Capitalization/GDP (Y/Y Change)				0.04
				(0.11)
Constant	1.30*	1.00	0.76	-0.29
	(0.74)	(0.81)	(0.81)	(0.72)
Observations	391	374	391	374
R-squared	0.34	0.35	0.33	0.33
Number of country	23	22	23	22

Table 7: **Market Reaction and Financial Depth: Principal Component Analysis.** This table shows the results from principal component analysis where four-day change in government bond yields is regressed on a single indicator of financial depth, rather than individual measures. Using factor analysis, the first principal component is extracted from the four variables: bank credit/GDP, M2/GDP, M3/GDP, and stock market capitalization/GDP. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **,*, and ^ denote statistical significance at 1,5,10, and 15 percent respectively.

	Government bond yields
Dummy	9.21***
	(2.89)
Changes in 10-year US bonds	0.16
	(0.14)
Changes in 2-year Forward Futures	0.94***
	(0.29)
Interaction of Dummy with	
Current account /GDP (Y/Y Change)	-1.63**
	(0.69)
Fiscal Balance /GDP (Y/Y Change)	-2.13**
	(0.99)
Real GDP Growth (Y/Y Change)	-1.19**
	(0.42)
Inflation (Y/Y Change)	-0.03
	(1.76)
Financial Deepening Index (Level)	-2.20**
	(1.00)
Non-interacted terms	
Current account /GDP (Y/Y Change)	0.41
	(0.33)
Fiscal Balance /GDP (Y/Y Change)	-0.12
	(0.48)
Real GDP Growth (Y/Y Change)	0.01
	(0.20)
Inflation (Y/Y Change)	-1.20***
	(0.38)
Financial Deepening Index (Level)	-11.57
	(16.53)
Constant	0.12
	(0.61)
Observations	357
R-squared	0.34
Countries	21

Table 8: **Alternative measures of financal depth**. This table replicates Table 3 using financial depth measures from the Global Financial Development Database. For brevity, the table only summarizes the sign and statistical significance of the interaction terms. Highlighted cells mean significant at conventional level.

SUMMARY TABLE FOR COMPREHENSIVE MEASURES OF FINANCIAL DEPTH	
Name	**Sign and Statistical Significance**
Corporate bond issuance volume to GDP (%)	Negative
Deposit money bank assets to deposit money bank assets and central bank assets (%)	Negative
Deposit money banks' assets to GDP (%)	Negative
Domestic credit to private sector (% of GDP)	Negative
Financial system deposits to GDP (%)	Negative
Gross portfolio debt assets to GDP (%)	Negative
Liquid liabilities to GDP (%)	Negative
Outstanding domestic private debt securities to GDP (%)	Negative
Pension fund assets to GDP (%)	Negative
Private credit by deposit money banks and other financial institutions to GDP (%)	Negative
Private credit by deposit money banks to GDP (%)	Negative
Syndicated loan issuance volume to GDP (%)	Negative
Gross portfolio equity assets to GDP (%)	Negative
Insurance company assets to GDP (%)	Negative
Life insurance premium volume to GDP (%)	Negative
Nonbank financial institutions? assets to GDP (%)	Negative
Nonlife insurance premium volume to GDP (%)	Negative
Outstanding international private debt securities to GDP (%)	Negative
Outstanding total international debt securities / GDP (%)	Negative
Stock market capitalization to GDP (%)	Negative
Stock market total value traded to GDP (%)	Negative
Corporate bond average maturity (years)	Positive
Gross portfolio debt liabilities to GDP (%)	Positive
Gross portfolio equity liabilities to GDP (%)	Positive
Mutual fund assets to GDP (%)	Positive
Outstanding domestic public debt securities to GDP (%)	Positive
Outstanding international public debt securities to GDP (%)	Positive
Syndicated loan average maturity (years) %	Positive

Table 9: **Market Reaction, Financial Depth, Macroprudential measures, Trades, and Financial Integration.** This table shows additional regression results where the four-day change in bond yields around the events is regressed on a dummy for negative events, and its interaction with macroprudential measures, trade channels, and portfolio integration. All regressions include country fixed effects. Standard errors are clustered at the country-level. ***, **,*, and ^ denote statistical significance at 1,5,10, and 15 percent respectively.

	[1]	[2]	[3]	[4]
Dummy	12.02***	14.56***	9.11**	12.54***
	(3.40)	(4.42)	(3.61)	(3.98)
Changes in 10-year US bonds	0.21^	0.17	0.14	0.20^
	(0.14)	(0.13)	(0.12)	(0.12)
Changes in 2-year Forward Futures	0.84**	0.93***	0.92***	0.81***
	(0.31)	(0.27)	(0.26)	(0.28)
Interaction of Dummy with				
Current account /GDP (Y/Y Change)	-2.01**	-1.99**	-1.72**	-1.98***
	(0.88)	(0.74)	(0.72)	(0.65)
Fiscal Balance /GDP (Y/Y Change)	-1.44	-1.54	-1.72*	-2.06**
	(1.06)	(1.04)	(0.90)	(0.95)
Real GDP Growth (Y/Y Change)	-1.67***	-1.33**	-1.61***	-1.64***
	(0.57)	(0.52)	(0.49)	(0.50)
Inflation (Y/Y Change)	0.38	0.11	0.44	0.82
	(1.73)	(1.61)	(1.71)	(1.71)
Macro Prudential Measures	-0.31^			
	(0.19)			
Trade Linkage to China		-0.61*		
		(0.32)		
Trade Linkage to US			0.17	
			(0.28)	
Portfolio Integration				-0.07
				(0.07)
Non-interacted terms				
Current account /GDP (Y/Y Change)	0.50	0.48	0.27	0.55
	(0.52)	(0.34)	(0.37)	(0.38)
Fiscal Balance /GDP (Y/Y Change)	-0.26	-0.20	-0.22	-0.05
	(0.44)	(0.38)	(0.37)	(0.36)
Real GDP Growth (Y/Y Change)	0.19	0.06	0.12	0.20
	(0.27)	(0.21)	(0.21)	(0.23)
Inflation (Y/Y Change)	-0.71	-0.91**	-0.70^	-0.95**
	(0.51)	(0.39)	(0.42)	(0.44)
Trade Linkage to China		-0.29		
		(0.81)		
Trade Linkage to US			4.02^	
			(2.52)	
Constant	-0.12	1.86	-28.46^	-0.29
	(0.52)	(6.22)	(17.79)	(0.54)
Observations	357	374	391	408
R-squared	0.31	0.35	0.33	0.31
Countries	21	22	23	24

Table 10: **Summary Statistics**

Variables (In Percent unless noted otherwise)	Mean	Standard Deviation	Mininum	Maximum	Frequency	Sources
4-day change in Yields (in basis point)	2.4	19.6	-96.6	134.0	Daily	Datastream
4-day change in US Yields (in basis point)	1.2	10.8	-13.1	34.9	Daily	Datastream
4-day change in Fed Fund Futures (in basis point)	-0.2	7.2	-18.5	20.0	Daily	Datastream
Current Account Balances/ GDP	-0.4	4.2	-8.4	12.4	Quarterly	National authorities
Fiscal Balances/ GDP	-1.7	4.1	-10.9	11.1	Quarterly	National authorities
Real GDP Growth	3.3	3.0	-2.5	19.1	Quarterly	National authorities
Inflation Rate	3.6	2.4	-0.3	12.1	Monthly	IMF IFS
Current Account Balances/ GDP (Y/Y Changes)	0.1	2.8	-9.7	7.5	Quarterly	National authorities
Fiscal Balances/ GDP (Y/Y Changes)	0.1	2.4	-4.9	9.3	Quarterly	National authorities
Real GDP Growth (Y/Y Changes)	-0.3	3.5	-7.3	28.1	Quarterly	National authorities
Inflation Rate (Y/Y Changes)	-0.6	1.9	-5.0	6.3	Monthly	IMF IFS
M2/ GDP	74.0	52.8	19.9	242.1	Quarterly	IMF IFS and national authorities
M3/ GDP	79.5	46.5	35.6	242.0	Quarterly	IMF IFS and national authorities
Bank Credit to Private Sector/ GDP	68.0	36.5	15.1	146.6	Quarterly	IMF IFS, BIS, and national authorities
Market Capitalization/ GDP	65.6	44.1	8.0	180.1	Quarterly	Bloomberg
Cummulative Macroprudential Index from 2000 (in unit)	6.0	8.7	-1.0	40.0	Annual	Zhang and Zoli (2016)
Trade Exposure to China	7.7	6.4	1.7	26.0	Quarterly	IMF Direction of Trade
Trade Exposure to US	7.0	8.1	1.0	41.6	Quarterly	IMF Direction of Trade
Portfolio Integration	40.3	28.2	6.3	127.7	Annual	IMF International Investment Position

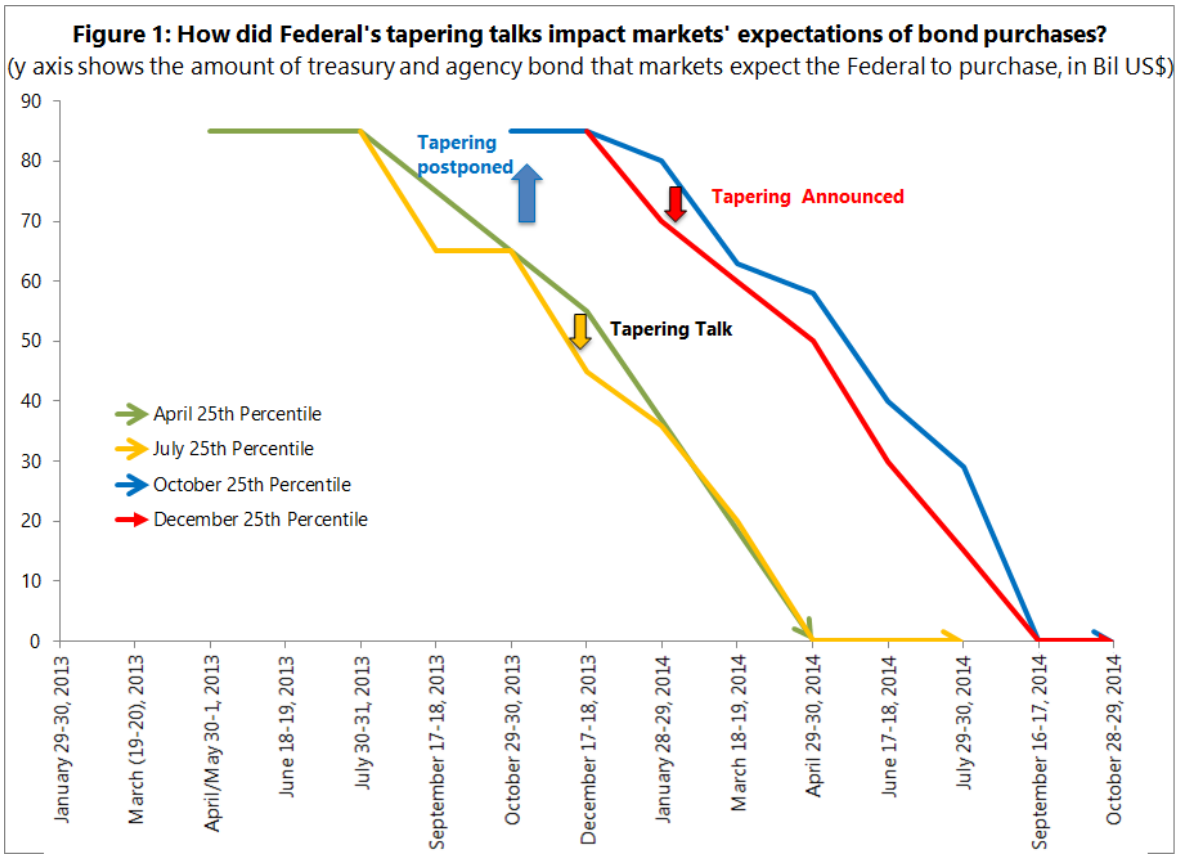
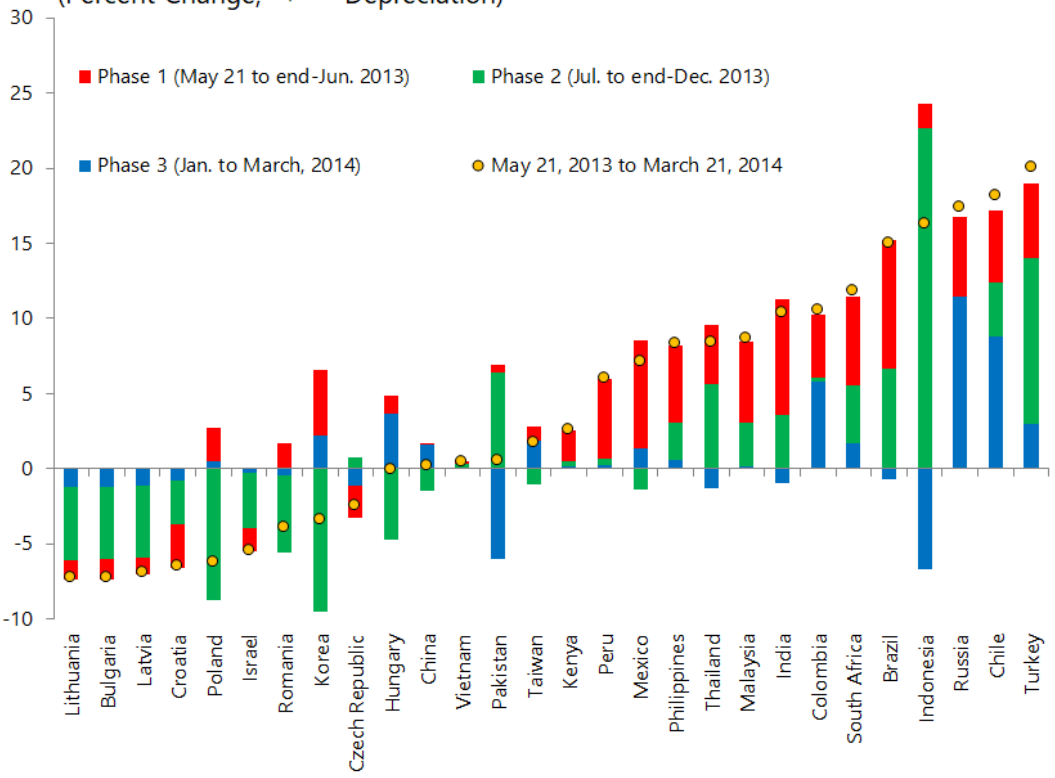


Figure 1: Notes. This figure shows the amount of treasury and agency bonds the most conservative of market participants (25th percentile) expected the Federal Reserve to purchase based on the results from a survey done by the New York Fed. In the April survey, market participants were expecting the Fed to maintain the decision to buy 85 billion USD a month through its July 30-31 meeting, and reduce that amount to 55 billion USD at its December 17-18 meeting. The July survey shows that markets were expecting the Fed to buy only 65 USD billion a month at its September meeting, and reduce that amount to 45 billion USD, after the December meeting.

Figure 2A: Foreign Exchange Rates
(Percent Change, "+" = Depreciation)



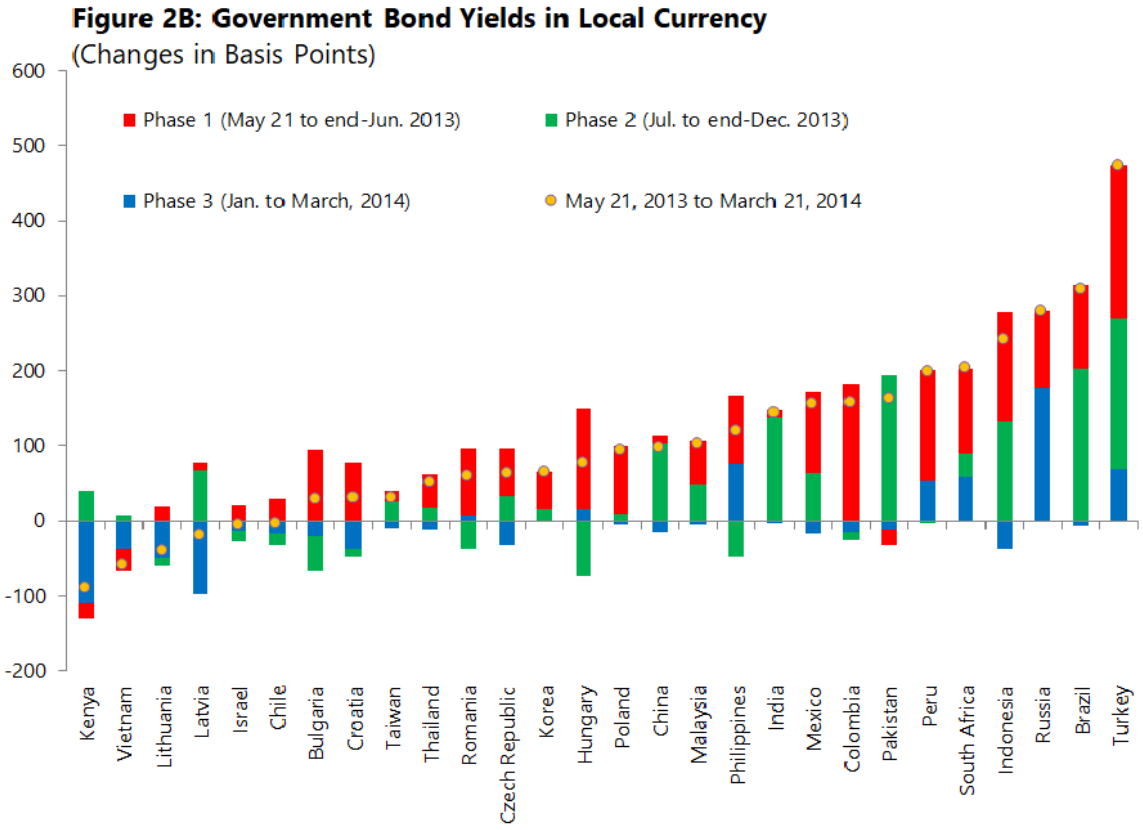


Figure 2: Notes. Figures 2A and 2B show the movement in exchange rates and government bond yields across a sample of 22 emerging markets between May 21, 2013 to March 21, 2014. The maximum depreciation of the exchange rate, and the increase in bond yields for the majority of countries, took place May and December, 2013. The government bond yields are 10-year local currency for most countries, except for Chile (9-year), Croatia (7-year), Lithuania (9-year), and Philippines (5-year). An increase in exchange denote a depreciation of the local currency vis-Ãă-vis the USD.

Figure 3A. Bond Yields Changes (May-Dec, 2013)

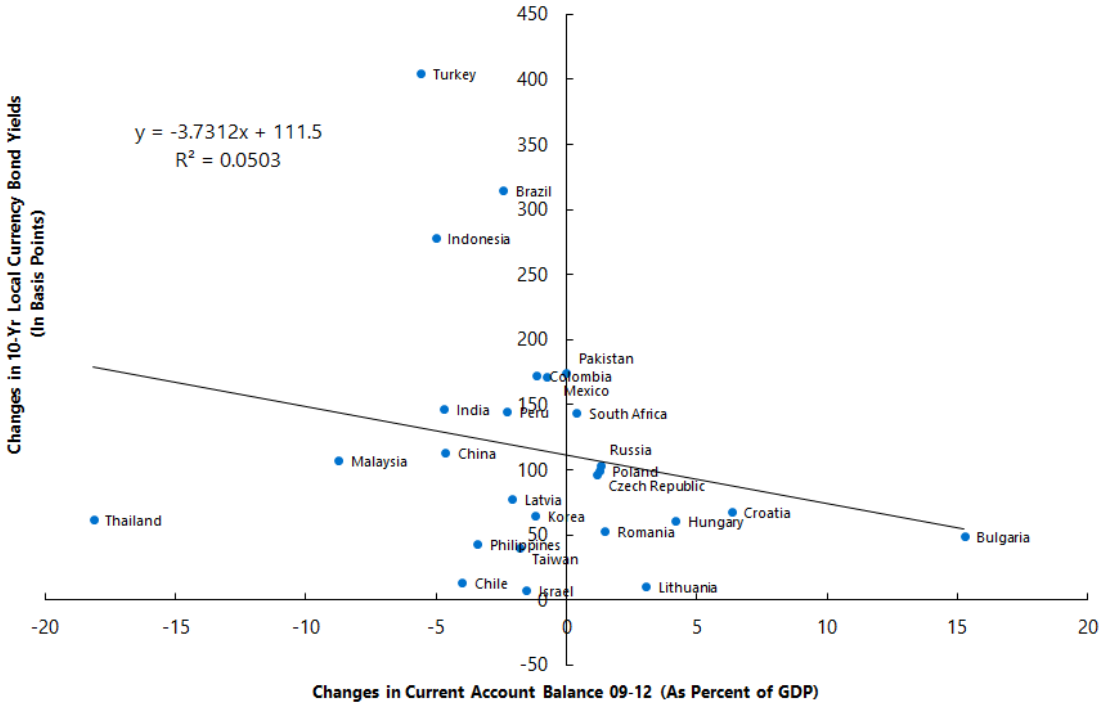


Figure 3B. Bond Yields Changes (May-Dec, 2013)

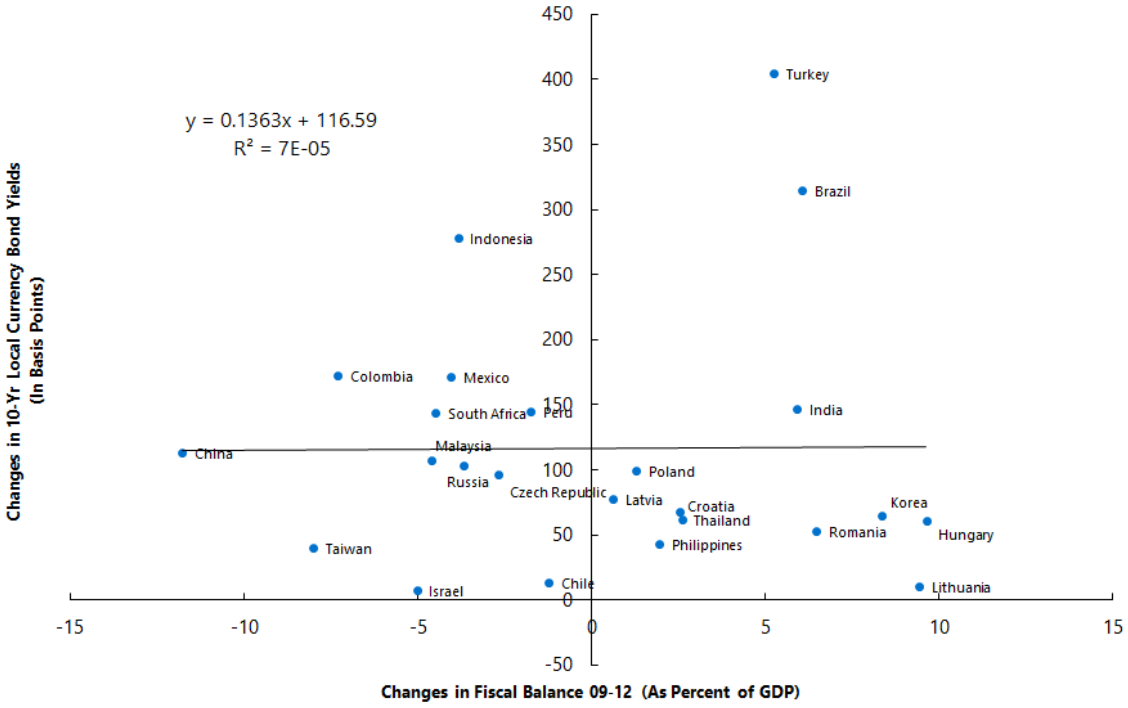


Figure 3C. Bond Yields Changes (May-Dec, 2013)

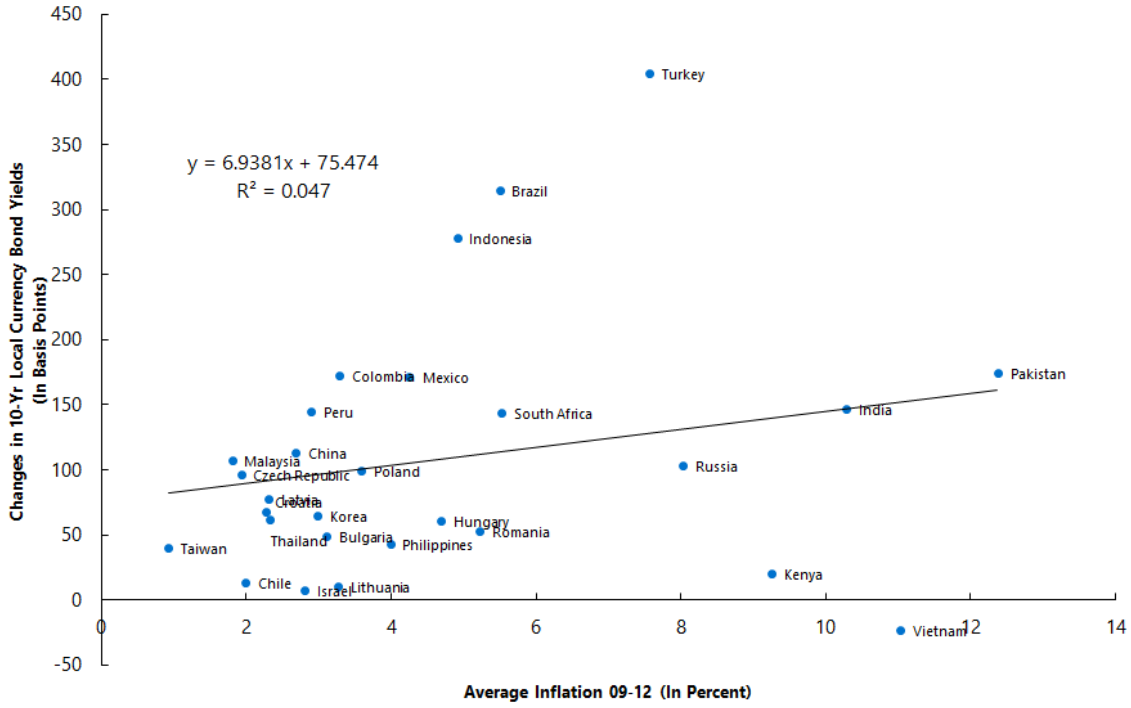
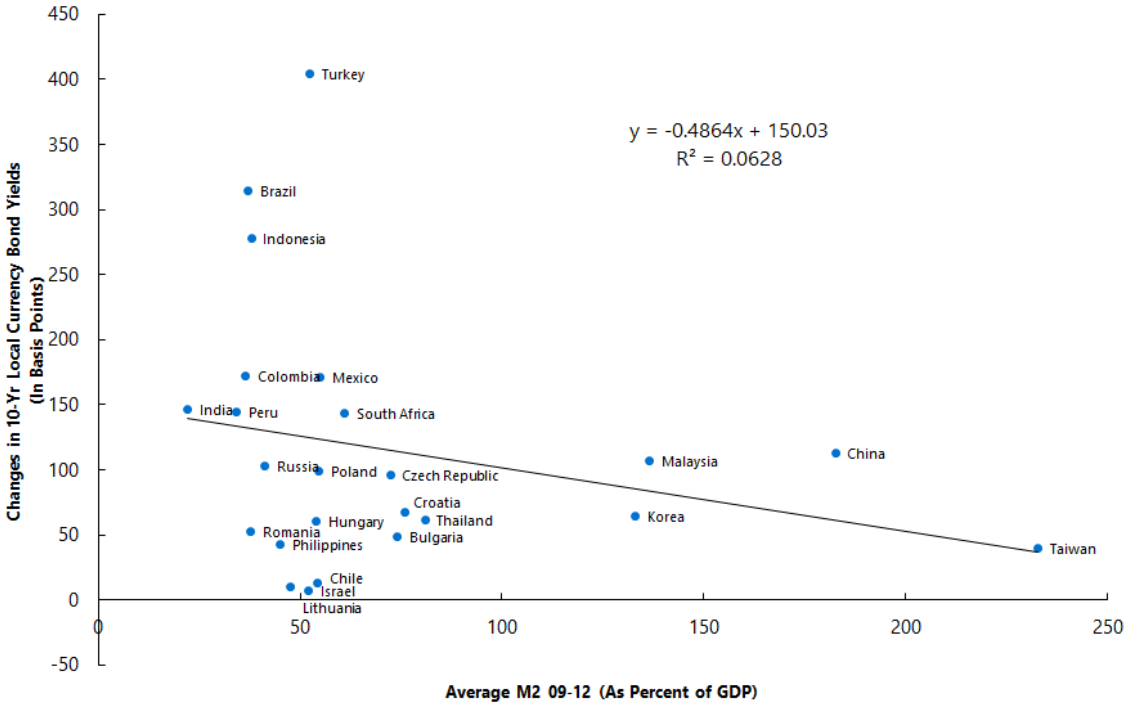


Figure 3D. Bond Yields Changes (May-Dec, 2013)



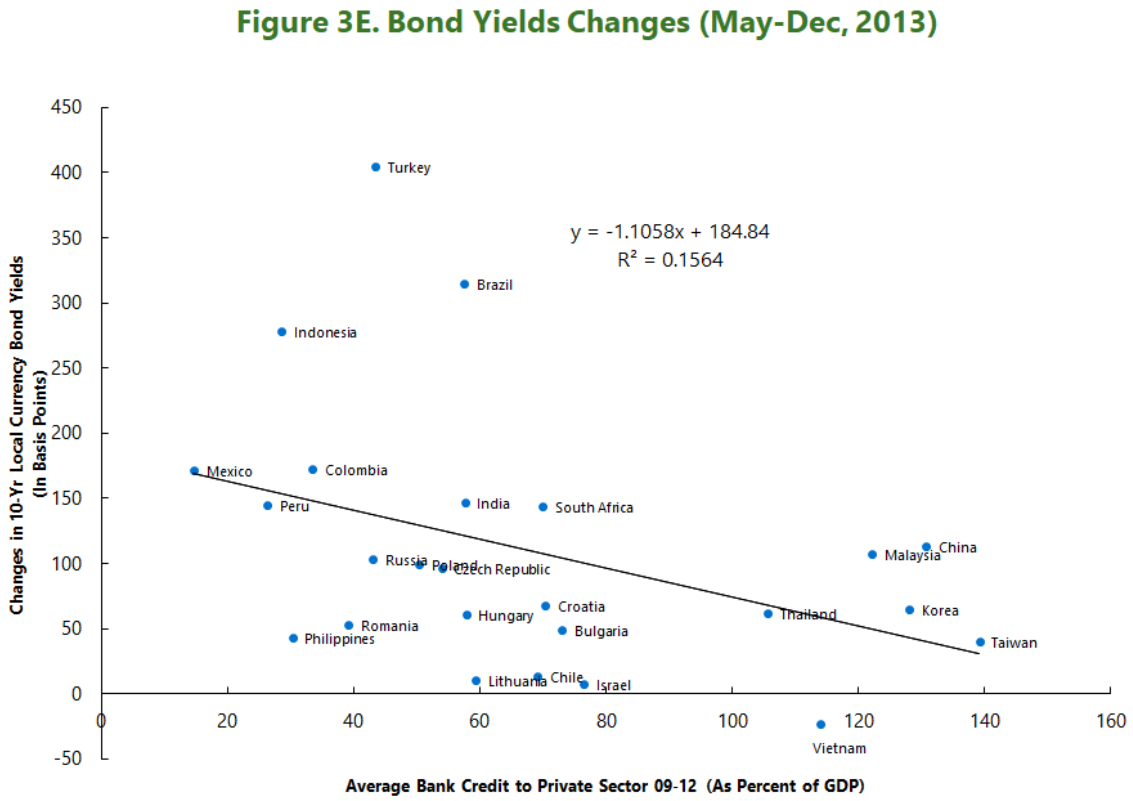


Figure 3: Notes to Figures 3A-3E: Figures 3A-3C show the correlation between changes in government bond yields between May and December, 2013 and macroeconomic characteristics (improvements in current account, fiscal balance, and inflation over 2009-2012). Figure 3D and 3E show the correlation between changes in government bond yields and level of financial depth (measured by M2 and bank credit to GDP, on average, between 2009-2012). The government bond yields are 10- year local currency for most countries, except for Chile (9-year), Croatia (7-year), Lithuania (9-year), and Philippines (5-year).

Figure 4: Excess Capital Inflow and Bond Yields

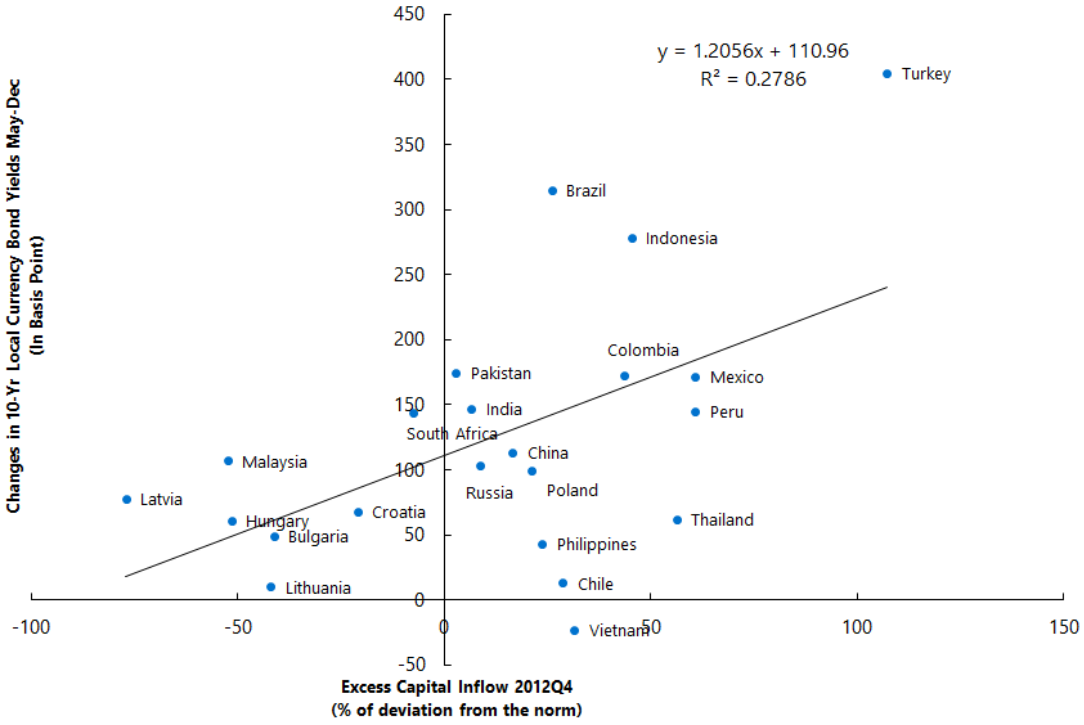


Figure 4: Note. Figure 4 plots the correlation between changes in government bond yields between May, and December 2013, and excess capital inflow in the last quarter of 2012.The excess capital inflow is defined as the amount of capital inflows into EMs in excess of what can be explained by fundamentals, including U.S. growth, U.S. and domestic interest rates, the Fed QE, and the VIX. For details see Sahay et al (2014).

Figure 5. Effect on Bond Yields (Annualized, Jan 2013-Jan 2014)

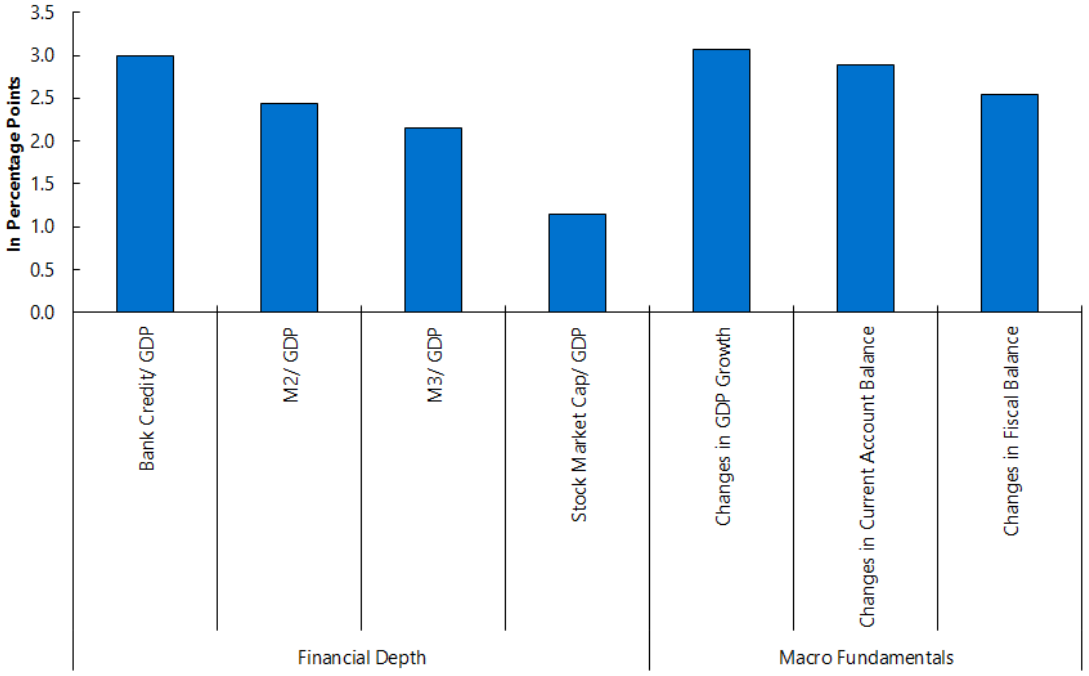


Figure 5: Note. Figure 5 shows the additional increase in yields from a one standard deviation higher vulnerability. The effect on bond yields is estimated by multiplying the standard deviations below the mean (based on Table A1) with the estimated coefficients on the interaction terms between the negative event dummy and the country characteristics from Table 3 and Table 8. The coefficient estimates for estimating the effects of financial depth and macroeconomic fundamentals are taken from Table 3; whereas the coefficients for estimating the effects of linkages with China, and tighter macroprudential policy stance is taken from Table 8.