An Analysis of the Short-term Effectiveness of Emerging Markets' Capital Controls on Capital Flows During the "Taper Tantrum"

by

Moritz Liebelt

An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Undergraduate College

Leonard N. Stern School of Business

New York University

May 2016

Professor Marti G. Subrahmanyam	Professor Viral V. Acharya
Faculty Adviser	Thesis Adviser

Abstract

Numerous studies have been conducted to analyze the effectiveness of different emerging markets' (EMs) capital controls, and they overwhelmingly conclude that such controls are successful in the short term.[1] In this paper, we study the degree of effectiveness of EMs' capital controls on a single day. We focus on May 22nd, 2013, when Fed chairman Professor Bernanke's announcement of a possible slowdown in the Fed's bond purchasing program gave rise to volatile capital flows throughout EMs.[2] First, we measured the country-specific volatility in fifteen EMs' equity, bond, and FX asset levels on May 22nd, 2013. Next, we developed numerical values that represent the degree of restrictiveness of each country's capital controls on their equity, bond, and FX flows. Finally, we analyzed how the countries' capital controls affected their capital flows. We discovered that capital controls on FX flows are effective; capital controls on bond flows are ineffective; and capital controls on equity flows are influential, but contrary to their objective. Moreover, we found that Bernanke's speech introduced a new trend in EMs' bond capital flows, at least in the three months subsequent to his speech.

[1] Baba, Chikako, and Annamaria Kokenyne, "Effectiveness of Capital Controls in Selected Emerging Markets in the 2000s" (December 2011), 24.

[2] Sahay, Ratna, and Preya Sharma, "Emerging Markets & Volatility: Lessons from the Taper Tantrum" (December 9th, 2014).

Acknowledgements
First and foremost, I would like to thank my thesis adviser, Professor Viral V. Acharya, for his enlightened insight into the world of global capital flows and the post-crisis landscape of emerging markets' capital controls. I am deeply grateful to you for your moral and academic support throughout this past year, and hope you understand just how much I enjoyed working with you on my thesis.

Moreover, I would like to thank Professor Paul A. Wachtel for reminding me that the study of capital flows lies at the intersection of finance and economics.

I would also like to thank Professor Marti G. Subrahmanyam for overseeing the Honors Thesis Program. Without your unconditional faith in students' curiosity outside the classroom, this unique program would not have come into existence. Thank you, as well as Jessica Rosenzweig, for enriching my experience at Stern ineffably.

It goes without saying that my sincerest thanks must also be extended to the Stern Undergraduate Honors Class of 2016. We share some wonderful memories both inside and outside Stern, as well as academically and personally, for which I am most indebted to all of you.

Lastly, I would like to thank my family and friends for their relentless support throughout the thesis writing process, my undergraduate career, and my life. Words cannot describe my genuine appreciation to all of you for believing in me.

Contents

1. Background 5
2. Introduction 8
3. Hypothesis 12
4. Remarks on the Data Applied 15
5. Explanation of the Data 17
    1. Measures of Capital Flow Restrictiveness 17
        Chinn-Ito Index 18
        Open/Gate/Wall Category 19
        Financial Integration Dataset 21
    2. Capital Flows 24
        Equities 24
        Bonds 26
        FX 26
    3. Finding the Relative Significance of a Daily Level Change 26
    4. Finding a Measure for Countries' Capital Controls' Restrictiveness 31
6. Graphs with Asset Levels 33
    1. Graph Findings and Analyses 34
        Equities 34
        Bonds 35
        FX 37
7. Regression with Asset Levels 38
    1. Dummy Variables 38
    2. Regression Findings 42
        Equities 42
        Bonds 45
        FX 47
8. Graphs with Flows 48
    1. Graph Findings 50
        Equities 50
        Bonds 53
        Difference between Equity and Fixed Income Net Capital Flows 58
9. Conclusion 58
10. Bibliography 63

1. Background

Subsequent to the global financial crisis of 2007-08, in an attempt to support the recovery of their respective economies, central banks of both advanced economies (AEs) and EMs implemented unconventional monetary policies.[3] In general, such policies took the form of different degrees of monetary easing measures, whether through the outright central bank purchase of government securities to increase the money supply or through other forms that effectively lower interest rates, in order to encourage widespread domestic investment and spending. Especially the four major AEs' central banks – the Federal Reserve System (Fed), the Bank of England (BoE), the European Central Bank (ECB), and the Bank of Japan (BoJ) – expanded their pre-crisis or implemented new post-crisis quantitative easing programs to kick-start their economies, creating unforeseen low-interest rate environments across the globe. Consequently, investors that traditionally had allocated their capital in AEs' debt instruments, due to those products' financial safety relative to equities and EMs' debt instruments, moved their investments away from AEs and into EMs' fixed income products in a search for more attractive yield.[4] Accordingly, EMs faced significantly strong capital inflows, which led to appreciating asset prices and higher economic growth expectations.[5]

Yet, even though capital inflows generally benefit receiving economies, significant surges in such inflows can also have disadvantageous effects. As an example, volatile capital inflows can lead to rapid FX appreciation, which is disadvantageous to many export-reliant EMs, as well as result in a higher probability of economic overheating, and an increase in domestic

[3] Andrew T. Foerster, "Financial Crises, Unconventional Monetary Policy Exit Strategies, and Agents' Expectations" (August 2011; revised May 2015), 2.
[4] Capital Group, "Strategy Insights: The Search for Yield," (July 2015), 1.
[5] International Monetary Fund, "Recent Experiences in Managing Capital Inflows – Cross-Cutting Themes and Possible Policy Framework" (February 14th, 2011), 3.

demand, which in turn can translate to an upward pressure on inflation and a widening current account deficit.[6,7] As a result of those negative effects of unusually high capital inflows, numerous EMs introduced various forms of capital control measures on capital inflows, both before and after the crisis.[8,9] Similarly, capital outflows, if significantly strong in nature, can lead to rapidly falling stock markets, declining bond prices, and depreciating currencies, which can pull down a country's growth rate, lower its fiscal revenues, and even increase its debt burden.[10] Hence, prior to the crisis, a number of EMs introduced capital controls on capital outflows, and when realizing that AEs' central banks would not be easing indefinitely – thus anticipating eventual volatile capital outflows from EMs into AEs –, a number of EMs introduced post-crisis capital controls on capital outflows.[11] Overall, EMs imposed capital controls on both capital in- and outflows prior to and after the crisis, as they understood that their limitations in borrowing in their own currencies from international capital markets translated to macroeconomic and financial sector vulnerabilities to volatile capital flows.[12,13]

In fact, between October 2009 and March 2012, Brazil introduced 14 capital controls that increased restrictions on capital flows.[14] Similarly, among other measures, India raised the cash reserve requirement from 5% to 5.5% on February 13, 2010, and eventually to 6% on April 24, 2010, while Indonesia imposed a six-month holding period on central bank bonds in May

---

[6] Jang-Yung Lee, "Sterilizing Capital Inflows" (February 1997).
[7] David Lipton, "Managing Capital Flows: Lessons from Emerging Markets for Frontier Economies" (March 2nd, 2015).
[8] Dubravko Mihaljek, "The Financial Stability Implications of Increased Capital Flows for Emerging Market Economies" (2004), 24.
[9] Lorena Keller, "The Unintended Consequences of Capital Controls on Inflows" (February 2nd, 2016), 2.
[10] United Nations Conference on Trade and Development, "When the Tide Goes Out: Capital Flows and Financial Shocks in Emerging Markets" (December 2015), 2.
[11] Carolyn Cui, "In Emerging Markets, Capital Controls Are Ratcheted Up to Stem Outflow of Funds" (January 21st, 2016).
[12] Stijn Claessens, and Swati R. Ghosh, "Capital Flow Volatility and Systemic Risk in Emerging Markets: The Policy Toolkit" (October 2013), 93.
[13] The Economic Times, "Volatile Capital Flows Pose Risk to Emerging Economies: RBI" (January 31st, 2012).
[14] Marcos Chamon, and Márcio Garcia, "Capital Controls in Brazil: Effective?" (November 13th - 14th, 2014), 29.

2011.[15,16,17] Turkey, on the other hand, raised the required reserve ratio for foreign currency liabilities from 9% to 9.5% on April 30, 2010, and subsequently to 11% on October 1, 2010.[18] These are a few examples that accurately reflect the general types of capital control measures that many EMs across the world implemented after the crisis, in order to protect themselves from volatile capital flows.

After years of central banks around the world applying easing rhetoric, hawkishness first re-appeared in AEs' central banks' statements on May 22nd, 2013. On that date, upon the US economy producing positive economic data in the spring of 2013, chairman of the Federal Reserve Professor Ben Bernanke testified to Congress that the Fed would start tapering the pace of its bond purchase program if US economic data would continue to exhibit strength.[19] In fact, this announcement would later be referred to as the start of the "Taper Tantrum," when longer run US treasury yields surged as a result of investors pricing fixed income assets for the removal of Fed bond purchases.[20] This much-anticipated – and for EMs much-dreaded – central bank announcement nonetheless caught the financial world off-guard, causing an unexpectedly strong reaction by traders and investors around the globe. Thus, in the summer of 2013, volatility in the global financial markets ensued, resulting in especially strong movements in EMs' asset prices and currencies.[21]

---

[15] Marius Rodriguez, and Thomas Wu, "The Effect of Capital Controls and Prudential FX Measures on Options-Implied Exchange Rate Stability" (May 2013), 13.
[16] International Monetary Fund. "The Liberalization and Management of Capital Flows: An Institutional View" (November 14th, 2012), 41.
[17] Juda Agung, "Incorporating Macroprudential Instruments into Monetary Policy: Indonesian Experience" (March 22nd - 23rd, 2012), 11.
[18] Marius Rodriguez, and Thomas Wu, "The Effect of Capital Controls and Prudential FX Measures on Options-Implied Exchange Rate Stability" (May 2013), 2.
[19] Christopher J. Neely, "Lessons from the Taper Tantrum" (January 28th, 2014).
[20] Michael S. Derby, "Last Year's Taper Tantrum May Have Been Taste of the Future, Paper Says" (February 28th, 2014).
[21] Ratna Sahay, et al., "Emerging Market Volatility: Lessons from the Taper Tantrum" (September 2014), 4.

2. Introduction

While extensive research has been conducted on the long-term effectiveness of EMs' capital controls on capital flows, little literature exists on the efficacy of such controls on specific single days. Consequently, this paper focuses on measuring the usefulness of capital controls in EMs through an event study that revolves around the day that Bernanke first announced the possibility of Fed tapering. Moreover, the event study focuses on three different forms of capital flows: equity flows, bond flows, and foreign exchange flows. Equity and bond flows were chosen because of international investors' wide use of equity and fixed income products, while FX flows were added due to their close correlation with expectations of future interest rates, which aligns well with this paper's underlying topic of capital flight to quality due to investors' anticipation of higher US interest rates.[22] Moreover, since EMs often impose capital controls on all three kinds of flows, an accurate analysis of EMs' capital controls' effectiveness has to include data from those three asset classes.[23] Finally, in order to minimize the impact of company-specific events on equity flows, the thesis at hand studies foreign portfolio investments, rather than foreign direct investments.

Given that numerous EMs implemented different degrees of capital controls before and after the crisis in order reduce their respective exposures to volatile capital flows, we were intrigued by the prospect of analyzing how effective those capital controls actually were in reducing EMs' exposure to volatile capital flows. In order to do so, we first had to find a post-crisis event that gave rise to volatile capital flows in EMs, and then study how freely different EMs' capital – each with varying degrees of capital controls in place – was able to flow on that event. Since Bernanke's aforementioned taper announcement in May 2013 gave rise to volatile

[22] Jeremy Wagner, "Interest Rates and the FX Market" (July 3rd, 2012).
[23] The Financial Times, "Special FX: The Asset Class That Thrives on Volatility" (February 4th, 2009).

capital flows, we decided to construct an event study that would allow us to gauge how different EMs' capital controls potentially affected the ease with which their capital was able to flow on the day of the announcement. The countries' capital controls and flows that the research at hand analyzes are Brazil, Chile, China, Colombia, Guatemala [although merely for FX; Guatemala does not possess an equity or fixed income market that is easily accessible for international investors], India, Indonesia, Malaysia, Mexico, Peru, Poland, South Africa, Thailand, Turkey, and Vietnam. Each of these 15 countries is considered an EM, and they have been picked so that the overall dataset consists of countries that had different degrees of capital controls in place by May 2013.[24,25]

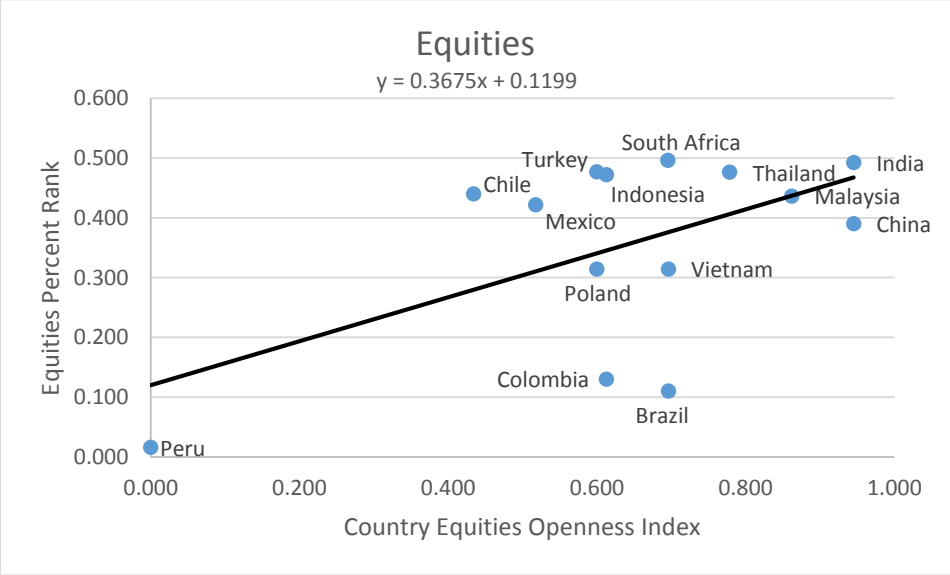
Moreover, in order to perform such an event study, we had to create two types of numerical values: one set of values that would show the degree of restrictiveness of the EMs' respective capital controls; and a second set of values that would represent the volatility of the different EMs' capital flows. The latter would be used as a gauge for how freely our EMs' capital was able to flow on the day of Bernanke's announcement. The below section "5. Explanation of the Data" explains how we constructed those two sets of numerical values.

Prior to studying the data we collected on different EMs' daily equity, fixed income, and FX flows from mid-2012 to May 2013, we hypothesized how the degree of a country's capital controls might affect the movement of that country's capital, and constructed the following regression hypothesis: $y = -0.5x + 0.5$, where *x* represents the independent variable "capital control measures," and *y* the dependent variable "capital flows." The below section "3. Hypothesis" demonstrates how we developed the aforementioned regression hypothesis.

[24] MSCI, "MSCI Annual Market Classification Review" (n.d.).
[25] Guatemala and Vietnam are often considered emerging markets: Elaine Moore, et al., "Guatemala Bucks EM Trend with Prospect of $500m Eurobond" (January 13th, 2016); Steve Johnson, "Vietnam Defies Emerging Market Slowdown" (September 22nd, 2015), respectively.

Once we analyzed our data, we discovered that while bond and FX flows behave similarly to our above regression hypothesis, equity flows do not. As the below graph shows, which will be explained in further detail in the subsection "1. Graph Findings" in the below section "6. Graphs with Asset Levels," equity flows actually exhibit a positive relationship between the degree of restrictiveness of a country's equity capital control measures and that country's equity products' ability to flow unrestrainedly.

Graph 2.1: Relationship: Country Equities Openness Index and Equities Percent Rank



Subsequent to this intriguing observation, we applied a regression analysis in order to understand the statistical significance of the relationships we studied. Doing so, we found that of the three asset classes studied here, the relationship between a country's capital control measures and capital's inability to flow freely is strongest for FX products. On top of that, we discovered that a country's capital controls on equity flows are quite effective, while a country's capital controls on bond flows have quite limited influence on the daily change of that country's yield levels. Moreover, we detected a surprisingly close correlation between a country's deposit interest rate and the change in that country's 10- or 9-year yield, as well as between a country's current account balance and the change in that country's exchange rate level.

One should add that, as the below section "4. Remarks on the Data Applied" explains, due to a lack of access to private information, this paper views changes in the different countries' major stock indices as a proxy for equity flows; changes in the different countries' 10-year yields [or 9-year yield for Peru] as a proxy for bond flows; and changes in the different countries' exchange rate levels to the USD as a proxy for FX flows. In other words, we used changes in asset levels as proxies for changes in capital flows. Viewed through the economic lens of supply of and demand for capital, however, we understood that using asset levels as proxies for capital flows is a relatively accurate method. Section "4. Remarks on the Data Applied" goes into further detail on this topic.

Eventually, we received some access to private data on the weekly sum of equity and bond flows of Brazil, India, Indonesia, Turkey, South Africa (BIITS), and Mexico, from March 13th until July 31st, 2013. We applied this data to comprehend whether Bernanke's speech gave rise to new trends in the different countries' equity and debt flows, as we were intrigued by the prospect of understanding the speech's effects on those flows beyond the event study's narrow timeframe of merely one day. In analyzing the private data, we realized that Bernanke's speech did not give rise to a new trend in short-term weekly equity flows, but it did in short-term weekly bond flows. We hypothesized that Bernanke's announcement had a more significant influence on bond flows than on equity flows, because while interest rates influence the prices of fixed income products directly inversely, they can affect equity prices both bearishly and bullishly.[26,27] Finally, we suggest that due to Bernanke's announcement's introduction of a new trend in bond flows, EMs should consider introducing capital controls on bond flows retroactively to surprise

[26] U.S. Securities and Exchange Commission, "Interest Rate Risk – When Interest Rates go up, Prices of Fixed-rate Bonds fall" (June 2013), 2.
[27] Aswath Damodaran, "The Fed, Interest Rates and Stock Prices: Fighting the Fear Factor" (September 4th, 2015).

central bank announcements, assuming that those EMs find their bond capital controls to be effective beyond the very short term of a single day.

3. Hypothesis

This paper examines one central hypothesis to determine how capital controls affect capital flows. The hypothesis suggests that in countries with stricter capital controls, capital flows' volatility following Bernanke's announcement was lower than in countries where capital controls were less restrictive. This hypothesis rests on the assumption that a greater degree of controls on capital flows will impede investors' ability to move their capital.

Thus, in order to construct a regression hypothesis that describes the relationship between the independent variable of capital control measures (x) and the dependent variable of volatility in capital flows (y), we first need to understand what values the variables x and y can take. The subsections "1. Measure of Capital Flow Restrictiveness" and "4. Finding a Measure for Countries' Capital Controls' Restrictiveness" in the below section "5. Explanation of the Data" go into further detail on how this paper assigned numerical values for variable x for each of the 15 countries studied here. At this point, in order to understand the below regression hypothesis, one merely has to comprehend that a low x value symbolizes that a country possesses relatively loose impositions on capital flows, while a high x value symbolizes that a country has restrictive capital controls in place. Moreover, one should know that in this paper, $0 \leq x \leq 1$. With regards to the dependent variable y, the subsection "3. Finding the Relative Significance of a Daily Level Change" in section "5. Explanation of the Data" outlines how a greater normalized percent rank in a country's capital flows on May 22nd or May 23rd, 2013 – our dependent variable y – symbolizes that capital flows on that date were, relative to that country's daily capital flows over the year preceding Bernanke's announcement, more significant than countries' flows with lower

percent ranks. In other words, a greater normalized percent rank implies more volatile capital flows on the date considered in this paper. Finally, this paper sets y so that $0 \leq y \leq 0.5$.

Consequently, in thinking about how to construct a regression hypothesis for the data studied here, we had to consider the five observations that we determined thus far:

1.) A higher x value represents a greater degree of a country's capital controls' restrictiveness on its capital flows compared to a country with a lower x value.

2.) The inequality $0 \leq x \leq 1$ holds.

3.) A higher y value represents a greater significance in the movement of a country's capital flows on the date under consideration than in a country with a lower y value.

4.) The inequality $0 \leq y \leq 0.5$ holds.

5.) We hypothesize that countries with stricter controls on capital flows will experience less significant changes in their respective capital flows as a result of Bernanke's speech than countries with looser capital controls.

In other words, we anticipate a directly negative relationship between x and y: the greater a country's restrictiveness on capital flows (x), the less significantly that country's capital flows will react to Bernanke's speech (y) relative to countries will lower x values. Moreover, given the two above inequalities, we know that x's coefficient has to take a value so that y cannot be negative or greater than 0.5. Moreover, since both x and y cannot take negative values, a directly negative relationship in the form $y = -bx$, where $-b$ represents the relationship's slope, cannot hold. Consequently, we constructed the following regression hypothesis, excluding the effect of any potential other variables such as dummy variables:

$$y = -0.5x + 0.5$$

The above formula represents our hypothesis that the greater a country's restrictiveness on capital flows (x), the smaller that country's capital flow's reaction to the event analyzed at hand (y). Moreover, if x takes its absolute minimum value of zero, y will equal 0.5; if x takes its absolute maximum value of one, y will equal zero. In other words, $0 \leq y \leq 0.5$ holds.

Yet, in constructing this regression hypothesis, one realizes that there is a fundamental difference between equity and bond flows on the one side, and FX flows on the other. While equity and fixed income products are mainly traded because of speculative reasons, investors and traders take FX positions for a second reason: hedging. The mere speculative aspect of FX trading and investing, if viewed in isolation, could potentially provide an accurate picture of how a country's capital controls affect its FX flows, because speculative trading occurs due to investors' views on country-specific qualities. Hence, the speculative aspect by itself could reveal some influence that capital controls have on FX flows. The hedging aspect, however, distorts that picture; an investor who sells its equity positions in, for example, Chile will also have to unwind its Chilean peso position in order to remain FX-neutral. This trade takes place because of the investor's decision to sell Chilean equities and its desire to remain FX-neutral, rather than due to Chile's and the peso's idiosyncratic characteristics. Hence, thinking of FX flows as the mere result of investors' speculative, and thus country-specific, views might provide an inaccurate picture of how a country's FX capital controls effectively influence its FX flows. Consequently, we concluded that it is impossible to construct an intuitive and logical regression hypothesis for FX flows, as we do not know whether the speculative aspect, which reveals country-specific information, or the hedging aspect, which does not reveal information peculiar to a country, dominates. Consequently, the above regression hypothesis merely applies to equity and bond flows.

4. Remarks on the Data Applied

Due to a lack of access to private information, this paper utilizes quotes on the different countries' major stock indices as a proxy for equity flows; quotes on the different countries' 10-year yields [9-year yield for Peru] as a proxy for bond flows; and quotes on the different countries' exchange rate levels compared to the USD as a proxy for FX flows. Put differently, this paper uses changes in asset levels as a gauge for capital flows.

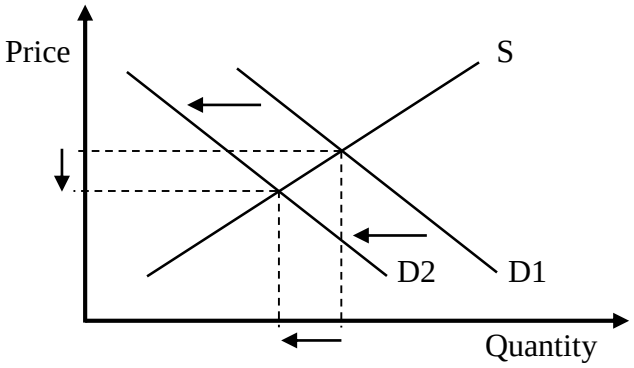
We appreciate the disconnect between these proxies and their respective actual net capital flows, since the daily change of, for example, a country's major stock index might inaccurately reflect upon the actual change in that country's net equity flows on that day. However, if one views capital flows through the economic framework of supply of and demand for capital, one realizes that the disconnect between changes in asset levels and the underlying capital flows is potentially not as significant as one initially believes.

In a supply-and-demand model of capital, one could view asset levels as the "price" for capital, and the underlying capital flows as the "quantity" of capital. Thus, a change in a country's stock index, which signifies a change in that country's equity asset level, could somewhat accurately imply a change in that country's equity flows. The below "Graph 4.1" visualizes this relationship for the event at hand, where "S" stands for the supply of an EM's equity capital, "D1" represents the demand for that EM's equity capital before, for example, Bernanke's announcement, and "D2" shows the demand for that EM's equity capital after Bernanke's speech. If one assumes that the supply of that EM's equity capital on the event date remains constant, which is a typical and logical *ceteris paribus* assumption in the field of economics given the unlikeliness of the EM's supply of equity capital having changed on the event date, a fall in the "price" of that EM's equity capital would reflect an inward shift in that

EM's equity capital demand curve. In turn, such an inward shift in the demand curve would translate to a fall in the "quantity" of that EM's equity capital, as the lowermost arrow shows. To refer back to our above example: given this economic model, a fall in a country's stock index could reveal shrinking equity flows to that country. On the other hand, an increase in a country's stock index could reveal expanding equity flows to that country. Naturally, an increase in a country's exchange rate or yield level would imply diminishing FX and bond flows, as both the selling of a currency and a bond lead to higher FX and yield levels, respectively.

One should add that since we do not know the gradient of the supply curve, we cannot construct a perfect inference on how much the "quantity" of an EM's capital changed from the changes in the "price" of that capital. Nonetheless, the supply-and-demand model of capital shows that our subsequent use of changes in asset levels as proxies for flows in the underlying capitals is not a completely illogical method.

Graph 4.1: Supply of and Demand for Capital



Finally, due to the fact that the Asian and South African markets were closed by the time that Bernanke made his announcement on May 22nd, 2013, this paper analyzed changes in equity, bond, and FX levels on two days. For Brazil, Chile, Colombia, Guatemala, Mexico, and Peru, we analyzed daily changes in asset levels on May 22nd, 2013. For the remaining nine countries, we analyzed daily changes in asset levels on May 23rd, 2013.

5. Explanation of the Data

In order to understand how a country's capital controls affected that country's equity, bond, and FX flows on May 22nd or May 23rd, 2013, we need two numerical values:

1.) One that reflects the degree of a country's capital controls' restrictiveness on its capital flows. The below subsection "1. Measure of Capital Flow Restrictiveness" provides a thorough explanation for how we constructed such a value.

2.) One that shows how significant, or how volatile, a country's changes in its stock index, bond yield, and FX level were as a result of Bernanke's announcement. The subsection "3. Finding the Relative Significance of a Daily Level Change" explains how we constructed such a value.

1. Measures of Capital Flow Restrictiveness

Initially, one created a timetable in which each country's post-crisis capital control implementations were chronologically organized, in order to develop a more accurate understanding of how measures that were introduced more recently might have had a different effect on capital flows following Bernanke's announcement than controls that were implemented in the farther past. In doing so, however, one quickly faced the difficulty of comprehending how different countries' capital controls might vary from each other in their degree of restrictiveness on capital flows. Moreover, one realized that in order to regress the degree of a country's capital controls' restrictiveness with that country's capital flows' volatility, one would have to assign numerical values to contrasting degrees of restrictiveness of countries' capital controls. Finally, we decided that in order to comprehend how a country's capital controls affected its capital flows in mid-May 2013, we would have to include the country's total capital controls in our regressions, rather than merely focusing on the controls the country imposed subsequent to the

crisis. Given that various recent studies already computed numerical values that represent the restrictiveness of different countries' total capital controls, we decided to refer to those values, rather than tediously and probably inaccurately computing new ones.

This thesis refers to three different measures for how restrictive a country's implemented capital controls are on capital flows: the *Chinn-Ito Index*, the *Open/Gate/Wall Category*, and the *Financial Integration Dataset*.

Chinn-Ito Index

The Chinn-Ito Index (called *KAOPEN*), which was initially published in 2006 in a paper by Chinn and Ito called *Journal of Development Economics*, is an index that measures a country's degree of capital account openness.[28] The index is derived by the binary dummy variables that measure a country's restrictions on cross-border financial transactions, and refers to variables from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).*[29] Given that the IMF already published the 2013 *AREAER*, the Chinn-Ito Index includes data from 2013 and thus can be used in this analysis.

The below table lists each country's Chinn-Ito Index for the year 2013. The column *Kaopen* shows the index's actual readings, while the column *Ka_open* shows the index's normalized readings. Chinn and Ito normalized the *Kaopen* figures in order for the new normalized values – called *Ka_open* – to take values that range between 0 and 1. Here, the larger the *Ka_open* figure, the less restrictive a country's capital controls are on its capital flows.

However, the other two measures of a country's capital controls' restrictiveness that this paper takes into consideration, which will be explained in further detail below, exhibit values where a higher reading represents more restrictive capital controls. Hence, in order to align the

[28] The Graduate Institute, Geneva, "Chinn-Ito Financial Openness Index" (January 2014).
[29] Menzie Chinn, and Hiro Ito, "The Chinn-Ito Index: A De Jure Measure of Financial Openness" (May 1st, 2015).

Ka_open figures with the other two measures of a country's capital controls' restrictiveness, one computed the *Ka_open (reformed)* figure, whereby:

$$Ka\_open\ (reformed) = 1 - Ka\_open$$

Now, a low *Ka_open (reformed)* reading resembles relatively looser capital controls, while a high *Ka_open (reformed)* reading reflects relatively restrictive capital controls. The below column *Ka_open (reformed)* lists these personally computed figures.

Table 5.1.1: Country's Chinn-Ito Index (2013)

Year: 2013 Country's Chinn-Ito Index			
Country Name	Kaopen	Ka_open	Ka_open (reformed)
South Africa	-1.188	0.164	0.836
India	-1.188	0.164	0.836
Malaysia	-1.188	0.164	0.836
Thailand	-1.188	0.164	0.836
China	-1.188	0.164	0.836
Brazil	-0.130	0.411	0.589
Colombia	-0.130	0.411	0.589
Indonesia	-0.130	0.411	0.589
Vietnam	-0.130	0.411	0.589
Turkey	0.036	0.450	0.550
Poland	0.036	0.450	0.550
Chile	1.093	0.697	0.303
Mexico	1.093	0.697	0.303
Peru	2.390	1.000	0.000
Guatemala	2.390	1.000	0.000

Open/Gate/Wall Category

This category was first introduced by Klein in a paper published in 2012 called *Capital Controls: Gates versus Walls*, in which the author analyzes the pattern of controls on capital inflows. One of the paper's central tools in studying the effectiveness of capital controls on capital inflows is applying a distinction between countries that possess long-standing controls on a broad range of assets, and countries that episodically impose and remove controls on a

generally narrower set of assets.[30] Klein calls countries with long-standing controls on a broad set of assets *walls*, and countries with episodic implementation of controls on a narrower set of assets *gates*. The category *open* applies to countries that barely possess any capital controls. In formulating such categories, Klein refers to a paper published by Schindler in 2009, in which the author presents data from the annual *AREAER* on controls of six categories of assets: shares or other securities of a participating nature; bonds or other debt securities, money market instruments, collective investments, financial credits, and direct investment.[31]

The below table lists each country's respective *Open/Gate/Wall* category for 2013. In order to apply these categories in the analysis at hand, one ascribed a numerical value to each category; the category *Open* was ascribed the value 0, the category *Gate* was ascribed the value 0.5, and the category *Wall* was ascribed the value 1. One should note that these numerical ascriptions to the three different categories align with the 0 to 1 scale that the *Ka_open (reformed)* figures represent, and can be found in the below table under the column *Numerical*.

[30] Michael W. Klein, "Capital Controls: Gates versus Walls" (November 2012).
[31] Martin Schindler, "Measuring Financial Integration: A New Data Set" (December 23rd, 2008).

Table 5.1.2: Country's Open/Gate/Wall Category and the Numerical Equivalent (2013)

Year: 2013 Country's Open/Gate/Wall Category		
Country Name	Open/Gate/Wall Category	Numerical
South Africa	Gate	0.5
India	Wall	1.0
Malaysia	Wall	1.0
Thailand	Gate	0.5
China	Wall	1.0
Brazil	Gate	0.5
Colombia	Gate	0.5
Indonesia	Gate	0.5
Vietnam	Gate	0.5
Turkey	Gate	0.5
Poland	Gate	0.5
Chile	Gate	0.5
Mexico	Gate	0.5
Peru	Open	0.0
Guatemala	Open	0.0

Financial Integration Dataset

Lastly, the thesis at hand refers to the *Financial Integration Dataset* outlined in a paper published in 2015 by Fernández, Klein, Rebucci, Schindler and Uribe, called *Capital Control Measures: A New Dataset*.[32] It is the same data that Klein refers to in his *Open/Gate/Wall* categories, but a more intricate application of that data was applied in the computation of the *Financial Integration Dataset* utilized in this thesis.

To gauge the degree of restrictiveness of a country's capital controls on equity flows as per the paper *Capital Control Measures: A New Dataset*, one computed the average of a country's equity inflow (*eqi*) and outflow (*eqo*) restrictions in 2013. The figure for equity inflow restrictions consists of an average of the numerical values assigned to restrictions on local equity purchases by nonresidents (*eq_plbn*) and equity sales or issuances by abroad residents (*eq_siar*).

[32] Andrés Fernández, et al., "Capital Control Measures: A New Dataset" (February 2015).

The figure for equity outflow restrictions consists of an average of the numerical values assigned to equity purchases by abroad residents (*eq_pabr*) and local equity sales or issuances by nonresidents (*eq_siln*). The column *Average Equity Restrictions* reflects the overall average of a country's equity inflow and outflow restrictions.

Table 5.1.3: Country's Equity Capital Control Measures (2013)

Year: 2013 Country's Equity Capital Control Measures							
		Equity Inflow Restrictions			Equity Outflow Restrictions		
Country Name	Average Equity Restrictions	eqi	eq_plbn	eq_siar	eqo	eq_pabr	eq_siln
South Africa	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
India	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Malaysia	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Thailand	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
China	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Brazil	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Colombia	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Indonesia	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Vietnam	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Turkey	0.750	0.50	*1.0*	*0.0*	1.00	*1.0*	*1.0*
Poland	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Chile	0.500	0.00	*0.0*	*0.0*	1.00	*1.0*	*1.0*
Mexico	0.750	0.50	*1.0*	*0.0*	1.00	*1.0*	*1.0*
Peru	0.000	0.00	*0.0*	*0.0*	0.00	*0.0*	*0.0*

To gauge the degree of restrictiveness of a country's capital controls on bond flows as per *Capital Control Measures: A New Dataset*, one computed the average of a country's bond inflow (*boi*) and outflow (*boo*) restrictions in 2013. The figure for bond inflow restrictions consists of an average of the numerical values assigned to restrictions on local bond purchases by nonresidents (*bo_plbn*) and bond sales or issuances by abroad residents (*bo_siar*). The figure for bond outflow restrictions consists of an average of the numerical values assigned to bond purchases by abroad residents (*bo_pabr*) and local bond sales or issuances by nonresidents (*bo_siln*). The column *Average Bond Restrictions* reflects the overall average of a country's bond inflow and outflow restrictions.

Table 5.1.4: Country's Bond Capital Control Measures (2013)

Year: 2013 Country's Bond Capital Control Measures								
		Bond Inflow Restrictions			Bond Outflow Restrictions		
Country Name	Average Bond Restrictions	boi	bo_plbn	bo_siar	boo	bo_pabr	bo_siln
South Africa	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
India	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Malaysia	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Thailand	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
China	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Brazil	0.500	0.00	*0.0*	*0.0*	1.00	*1.0*	*1.0*
Colombia	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Indonesia	0.750	1.00	*1.0*	*1.0*	0.50	*1.0*	*0.0*
Vietnam	1.000	1.00	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Turkey	0.500	0.00	*0.0*	*0.0*	1.00	*1.0*	*1.0*
Poland	0.750	0.50	*0.0*	*1.0*	1.00	*1.0*	*1.0*
Chile	0.500	0.00	*0.0*	*0.0*	1.00	*1.0*	*1.0*
Mexico	0.500	0.00	*0.0*	*0.0*	1.00	*1.0*	*1.0*
Peru	0.000	0.00	*0.0*	*0.0*	0.00	*0.0*	*0.0*

To gauge the degree of restrictiveness of a country's capital controls on FX flows as per *Capital Control Measures: A New Dataset*, one computed the average of a country's direct investments (*di*) and collective investments (*ci*) restrictions in 2013. One understands that one previously stated that foreign direct investments would not be considered for equity flows, in order to prevent the inclusion of company-specific qualities in the flow of equity. However, the dataset at hand does not provide measures for the degree of restrictiveness of countries' capital controls on FX flows. Consequently, one concluded that restrictions on foreign direct investments could provide a somewhat accurate proxy for the degree to which FX flows are impeded. A similar rationale was applied when deciding to include collective investments restrictions in one's computation of the restrictiveness of a country's capital controls' measures on FX flows. The figure for direct investments restrictions (*di*) consists of an average of the numerical values assigned to restrictions on direct investments inflows (*dii*), on direct investment outflows (*dio*), and on direct investment liquidation (*ldi*). The figure for collective investments

restrictions (*ci*) consists of an average of the numerical values assigned to restrictions on collective investments inflows (*cii*) and collective investments outflows (*cio*). The column *Average FX Restrictions* reflects the overall average of a country's direct investments and collective investments restrictions.

Table 5.1.5: Country's FX Capital Control Measures (2013)

Year: 2013 Country's FX Capital Control Measures								
		Direct Investments Restrictions				Collective Investments Restrictions		
Country Name	Average FX Restrictions	di	dii	dio	ldi	ci	cii	cio
South Africa	0.625	0.50	*0.0*	*1.0*	*0.0*	0.75	*0.5*	*1.0*
India	0.875	1.00	*1.0*	*1.0*	*1.0*	0.75	*0.5*	*1.0*
Malaysia	0.875	1.00	*1.0*	*1.0*	*0.0*	0.75	*0.5*	*1.0*
Thailand	0.500	0.50	*1.0*	*0.0*	*0.0*	0.50	*0.0*	*1.0*
China	1.000	1.00	*1.0*	*1.0*	*1.0*	1.00	*1.0*	*1.0*
Brazil	0.750	1.00	*1.0*	*1.0*	*0.0*	0.50	*0.0*	*1.0*
Colombia	0.875	1.00	*1.0*	*1.0*	*1.0*	0.75	*0.5*	*1.0*
Indonesia	0.375	0.50	*1.0*	*0.0*	*0.0*	0.25	*0.5*	*0.0*
Vietnam	1.000	1.00	*1.0*	*1.0*	*0.0*	1.00	*1.0*	*1.0*
Turkey	0.625	0.50	*1.0*	*0.0*	*0.0*	0.75	*0.5*	*1.0*
Poland	0.875	1.00	*1.0*	*1.0*	*0.0*	0.75	*0.5*	*1.0*
Chile	0.500	0.50	*1.0*	*0.0*	*0.0*	0.50	*0.0*	*1.0*
Mexico	0.625	0.50	*1.0*	*0.0*	*0.0*	0.75	*0.5*	*1.0*
Peru	0.000	0.00	*0.0*	*0.0*	*0.0*	0.00	*0.0*	*0.0*
Guatemala	0.000	0.00	*0.0*	*0.0*	*0.0*	0.00	*0.0*	*0.0*

2. Capital Flows

Equities

As previously mentioned, due to a lack of access to private information on equity flows, the thesis at hand views the changes of each country's stock index level on either May 22nd or May 23rd, 2013, as a proxy for equity flows. The stock indices used for each country are:

- South Africa: FTSE/JSE All Share
- India: Bombay Sensex
- Malaysia: Kuala Lumpur Composite
- Thailand: FTSE SET Large Cap
- China: Shanghai Composite

- Brazil: Bovespa
- Colombia: IGBC
- Indonesia: Jakarta Composite
- Vietnam: VNI
- Turkey: BIST 100
- Poland: WIG
- Chile: IPSA Select
- Mexico: IPC All-Share
- Peru: IGBVL

One understands that indices that are only made up of a few companies, such as Thailand's FTSE SET Large Cap Index, which is comprised of the 30 largest eligible companies by full market capitalization, might be driven by the largest companies' idiosyncratic stock price movements, rather than changes in the country's overall equity landscape. Yet, a major problem of analyzing lesser-known indices that are made up of hundreds of different companies is that international investors trade those indices less frequently compared to countries' major indices, since such indices might be illiquid or difficult to access for foreign investors.[33] Consequently, for countries with relatively small equity markets, the thesis at hand computes those countries' equity flows by studying the countries' respective main national stock indices' levels. For countries with larger equity markets, we analyze stock indices that are comprised of more companies in order to make sure that company-specific exposures are mostly diversified away.

[33] Greg Behar, and Ben Goetsch, "Changing Dynamics in Emerging Markets" (2014), 1.

Bonds

Given that in AEs, the most liquid government bond products are the 10-year bonds, one assumed that international investors would most frequently trade EMs' 10-year bonds. The Peruvian government does not issue 10-year bonds, so one analyzed the nation's government bond with a maturity closest to 10 years, which is the 9-year bond. Again, as previously mentioned, due to a lack of access to private information, daily changes in each country's 10- or 9-year bond yield shall be interpreted as each country's daily net bond flows.

FX

No further remarks need to be stated here, other than the fact that this thesis views daily changes in each country's FX level compared to the USD as each county's daily net FX flows.

3. Finding the Relative Significance of a Daily Level Change

We firstly collected daily data on each country's stock index level, 10- or 9-year bond yield, and FX level from May 21st, 2012 up to May 24th, 2013. Unfortunately, some products were not internationally traded or did not exist that far back in time, in which case one collected the latest available data up to May 24th, 2013. Secondly, we computed the daily percentage changes in a country's stock index level, 10- or 9-year bond yield, and FX level over the past year, and then concentrated on the daily percentage change of each country's three asset levels on May 22nd or May 23rd, 2013. The following table shows each country's daily changes in its three asset levels on either of the two dates, depending on the country's time zone.

Table 5.3.1: Country's Daily Percentage Change in Stock Index, Yield, and FX Levels on May 22nd or May 23rd, 2013

Year: 2013 Country's Daily Percentage Change in Stock Index, Yield, and FX Levels on May 22nd or May 23rd, 2013			
Country Name	Daily Change in Stock Index Level	Daily Change in Yield Level	Daily Change in FX Level
South Africa	-2.343%	2.578%	-0.467%
India	-1.934%	0.244%	0.099%
Malaysia	-0.607%	0.446%	0.430%
Thailand	-1.845%	1.502%	0.100%
China	-1.161%	0.875%	0.047%
Brazil	0.291%	0.596%	0.377%
Colombia	0.217%	1.543%	0.473%
Indonesia	-1.663%	0.890%	0.061%
Vietnam	-0.798%	0.559%	0.624%
Turkey	-1.961%	2.284%	-0.146%
Poland	-0.535%	-0.029%	-0.120%
Chile	0.874%	0.589%	0.866%
Mexico	-1.059%	3.617%	0.696%
Peru	-0.057%	8.437%	0.850%
Guatemala	N/A	N/A	0.652%

Next, we considered ranking each country's daily changes within each of the three asset classes, from largest to smallest change, in order to understand which countries' asset levels reacted most significantly to Bernanke's announcement, relative to the other countries studied here. Importantly, we realized that this paper studies the effectiveness of countries' capital controls in reducing the volatility of those countries' respective capital flows, rather than analyzing how capital controls affect the direction of those capital flows. Hence, we realized that we have to take the absolute values of the countries' above daily percentage changes in each of the three asset levels. Doing so ensures that positive and negative changes of the same absolute magnitude are regarded as the same; as an example, a daily change in a country's stock index level of +3% is of the same magnitude as a change of -3%.

The second important realization we made here is twofold:

1.) Some countries have historically experienced positive daily percentage changes in their asset levels on a more frequent basis than other countries. This means that, as an example, if the median of a country's daily percentage changes in its stock index level over a certain period of time is positive, a positive change in that country's stock index level on a certain date is potentially less significant than a positive daily percentage change in the stock index level of a country that has a negative median daily percentage change in its stock index level over a similar period of time.

2.) Some countries inherently exhibit more volatile daily percentage changes in their asset levels than others. In other words, if a country's daily changes in its stock index level possess a large standard deviation, a +3% daily change in that country's stock index level on a certain day might be less meaningful than a +3% daily change in the stock index level of a country that exhibits a lower standard deviation in the daily percentage change of its stock index level.

The below two tables highlight the two above points, respectively.

Table 5.3.2: Country's Median Daily Percentage Changes in Stock Index, Yield, and FX Levels, from May 21st, 2012 to May 24th, 2013

Year: 2013 Country's Median Daily Percentage Changes in Stock Index, Yield, and FX Levels, from May 21st, 2012 to May 24th, 2013			
Country Name	Median Daily Percentage Change in Stock Index	Median Daily Percentage Change in Yield	Median Daily Percentage Change in FX
South Africa	0.052%	0.000%	-0.006%
India	0.076%	0.000%	0.018%
Malaysia	0.043%	0.000%	0.000%
Thailand	0.157%	0.000%	0.000%
China	0.005%	0.000%	-0.010%
Brazil	-0.071%	0.000%	0.030%
Colombia	0.007%	-0.143%	0.006%
Indonesia	0.157%	0.000%	0.026%
Vietnam	0.130%	0.000%	0.000%
Turkey	0.225%	-0.111%	-0.028%
Poland	0.066%	0.000%	0.003%
Chile	-0.014%	0.000%	0.000%
Mexico	0.036%	0.000%	-0.008%
Peru	-0.080%	0.000%	0.000%
Guatemala	N/A	N/A	0.000%

As the above table shows, some countries exhibit positive, while other countries possess negative median daily percentage changes in their respective stock index and FX levels between mid-2012 and mid-2013. Interestingly, not a single country had a positive median daily percentage change in its 10- or 9-year yield.

Table 5.3.3: Country's Standard Deviation (Std Dev) in Daily Percentage Changes in Stock Index, Yield, and FX Levels, from May 21st, 2012 to May 24th, 2013

Year: 2013 Country's Standard Deviation (Std Dev) in Daily Percentage Changes in Stock Index, Yield, and FX Levels, from May 21st, 2012 to May 24th, 2013			
Country Name	Std Dev Daily Percentage Change in Stock Index	Std Dev Daily Percentage Change in Yield	Std Dev Daily Percentage Change in FX
South Africa	0.007	0.009	0.008
India	0.008	0.003	0.006
Malaysia	0.005	0.006	0.003
Thailand	0.009	0.011	0.003
China	0.011	0.018	0.001
Brazil	0.013	0.010	0.006
Colombia	0.009	0.013	0.003
Indonesia	0.008	0.010	0.002
Vietnam	0.012	0.011	0.002
Turkey	0.011	0.010	0.004
Poland	0.008	0.012	0.008
Chile	0.006	0.006	0.004
Mexico	0.007	0.013	0.006
Peru	0.009	0.038	0.002
Guatemala	N/A	N/A	0.002

As the above table shows, there are especially significant discrepancies in the different countries' standard deviations of their daily percentage changes in their respective yields, with Peru's median being 0.038 while India only exhibits a median of 0.003.

Given our above realization that we have to find the flows' magnitudes, rather than their directions, and the observation that countries possess differing median daily percentage changes and standard deviations in those changes in the three asset classes, we decided to rank a country's daily percentage change in each of the three asset levels on May 22nd or May 23rd, 2013 within that country's daily percentage changes in each asset class over the year prior to Bernanke's announcement. To clarify: a value's percent rank reflects that value's rank as a percentage of the overall data set. Thus, a percent rank reading of 0.5 signifies that the daily percentage change of one of the three asset classes on May 22nd or May 23rd, 2013 was the exact

median percentage change of that asset class' level when compared to the daily percentage changes of that asset class' levels over the past year. Thus, relatively speaking, that day's percentage change was statistically insignificant. On the other hand, a percent rank reading of 0.01 or 0.99 signifies that the daily percentage change of one of the three asset classes on May 22nd or May 23rd, 2013 was in the 1st or 99th percentile of the class' level's daily percentage changes over the past year. In other words, that day's percentage change was, relatively speaking, quite significant.

By finding the country-specific percent rank of a daily change in an asset class' level, we accounted for the fact that different countries possess different median daily percentage changes and standard deviations in those changes. However, we did not account for the problem that a daily change of +3% is treated differently than a daily change of -3%. Previously, we mentioned that we could account for this problem by computing the absolute value of each daily percentage change figure, and then ranking those values. Yet, we found a more elegant solution to this problem that does not require any interference with our data.

Given that a percent rank of 0.01 or 0.99 is equally relevant – as the distance to the median is the same in both cases – we had to find a way to assign the same numerical value for both percent ranks. Consequently, we decided that for percent rank values larger than or equal to 0.5, we would subtract 0.5 from the percent rank, in order to compute a normalized percent rank (p^*).

If: percent rank value $p \geq 0.5$

Then: normalized percent rank $p^* = p - 0.5$

For percent rank values smaller than 0.5, one subtracted the percent rank from 0.5 in order to compute a normalized percent rank (p^*).

If: percent rank value $p < 0.5$

Then: normalized percent rank $p^* = 0.5 - p$

By doing so, both a percent rank of 0.99, which shows a relatively strong positive change, and of 0.01, which shows a relatively strong negative change, now take the same normalized percent rank value: 0.49 (*0.99 – 0.5 = 0.49*; *0.5 – 0.01 = 0.49*; respectively). We applied this method to the percent ranks of the daily changes of each country's stock index level, 10- or 9-year bond yield, and FX level on May 22nd or May 23rd, 2013.

One should reiterate the fact that the normalized percent ranks of the daily percentage changes reveal the significance of the magnitude of the percentage changes on the day of Bernanke's announcement, relative to the country's daily percentage changes over the previous year, rather than the significance of the directional changes of those flow. The rationale behind choosing to focus on the volatility rather than the direction of capital flows is that we are trying to measure how capital controls restrain capital flows, rather than how those measures affect the direction of flows. Moreover, since EMs imposed their capital controls in order to reduce their exposure to volatile capital flows, and our analysis aims at evaluating the effectiveness of those very capital controls in the first place, we believe that studying capital flows' volatility rather than their directional changes is the correct approach here. Hence, by normalizing the percent rank values, a reading of 0.01 or 0.99, which reflects an equal degree of volatility, now shows an equally strong ability by investors to respond to Bernanke's press conference.

4. Finding a Measure for Countries' Capital Controls' Restrictiveness

Under the above section "5. Explanation of the Data – Measure of Capital Flow Restrictiveness," this paper outlines how one considered three different numerical measures to compute the restrictiveness of a country's capital controls. In order to find one value for each country's degree of restrictiveness on its equity, bond, and FX flows, one averaged that country's

numerical reading as suggested by the *Chinn-Ito Index*, the *Open/Gate/Wall Category*, and the *Financial Integration Dataset*. One should add that owing to the granular nature of the *Financial Integration Dataset*, one was able to assign three separate values to the degrees of restrictiveness of EMs' capital controls; for equity, bond, and FX flows. Thus, we computed our own index called the *Country Equities Openness Index*, which represents the degree of restrictiveness of a country's measures on its equity flows. We computed this index by averaging that country's reading as per the 2013 *Chinn-Ito Index*, the *Open/Gate/Wall Category*, and the average of that country's equity inflow (*eqi*) and outflow (*eqo*) restrictions measures in 2013. Similarly, we computed the *Country Bonds Openness Index*, which represents the degree of restrictiveness of a country's measures on its bond flows, by averaging that country's reading as per the 2013 *Chinn-Ito Index*, the *Open/Gate/Wall Category*, and the average of that country's bond inflow (*boi*) and outflow (*boo*) restrictions measures in 2013. Finally, we computed the *Country FX Openness Index*, which represents the degree of restrictiveness of a country's measures on its FX flows, by averaging that country's reading as per the 2013 *Chinn-Ito Index*, the *Open/Gate/Wall Category*, and the average of that country's direct investment (*di*) and collective investment (*ci*) restrictions measures in 2013. The below table shows each country's *Openness Index* for equity, bond, and FX flows.

Table 5.4.1: Country Equities, Bonds, and FX Openness Indices (2013)

Year: 2013 Country Equities, Bonds, and FX Openness Indices			
Country Name	Country Equities Openness Index	Country Bonds Openness Index	Country FX Openness Index
South Africa	0.695	0.695	0.654
India	0.945	0.945	0.904
Malaysia	0.862	0.862	0.904
Thailand	0.779	0.779	0.612
China	0.945	0.945	0.945
Brazil	0.696	0.530	0.613
Colombia	0.613	0.696	0.655
Indonesia	0.613	0.613	0.488
Vietnam	0.696	0.696	0.696
Turkey	0.600	0.517	0.558
Poland	0.600	0.600	0.642
Chile	0.434	0.434	0.434
Mexico	0.518	0.434	0.476
Peru	0.000	0.000	0.000
Guatemala	N/A	N/A	0.000

6. Graphs with Asset Levels

Now that we know each country's numerical value representing its capital controls' restrictiveness on equity, bond, and FX flows, we graphed the relationship between all countries' restrictiveness values (which the *Country Equities Openness Index*, *Country Bonds Openness Index*, and *Country FX Openness Index* represent) and the countries' respective normalized percent rank for the different capital flows (which the *Equities Percent Rank*, *Yield Percent Rank*, and *FX Percent Rank* show) on the dates under consideration. Again, one reiterates that the normalized percent rank values reflect the volatility of capital flows on the dates under consideration, not the direction of those capital flows. The following presents each country's capital measures on and percent rank of the three asset classes on the date under consideration, both in table and graph format.

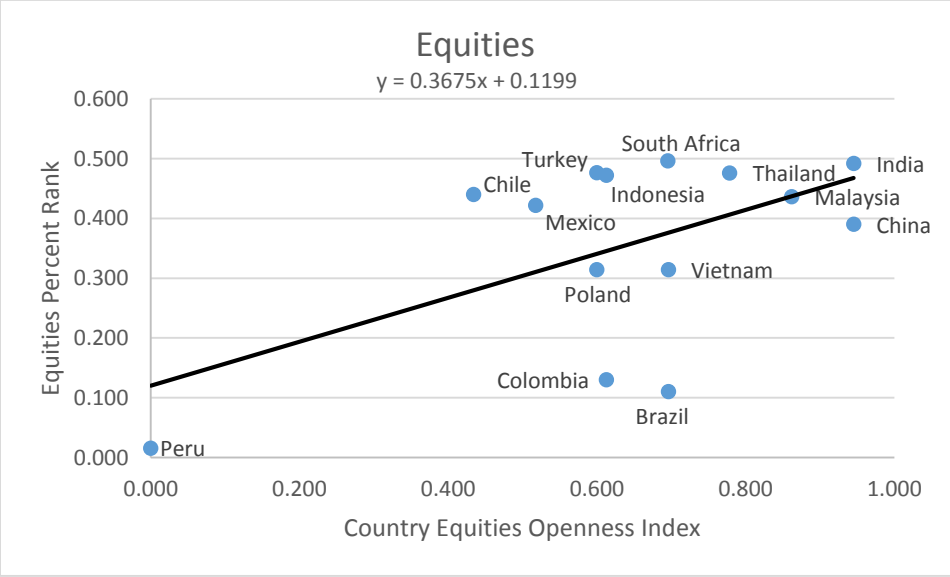
1. Graph Findings and Analyses

Equities

Table 6.1.1: Country Equities Openness Index and Equities Percent Rank (2013)

Year: 2013 Country Equities Openness Index and Equities Percent Rank		
Country Name	Country Equities Openness Index	Equities Percent Rank
South Africa	0.695	0.496
India	0.945	0.492
Malaysia	0.862	0.436
Thailand	0.779	0.476
China	0.945	0.390
Brazil	0.696	0.110
Colombia	0.613	0.130
Indonesia	0.613	0.472
Vietnam	0.696	0.314
Turkey	0.600	0.477
Poland	0.600	0.314
Chile	0.434	0.440
Mexico	0.518	0.422
Peru	0.000	0.016

Graph 6.1.1: Relationship: Country Equities Openness Index and Equities Percent Rank



This graph shows that there is a positive relationship between the degree of a country's average capital controls' restrictiveness on equity flows and the percent rank of the change in the

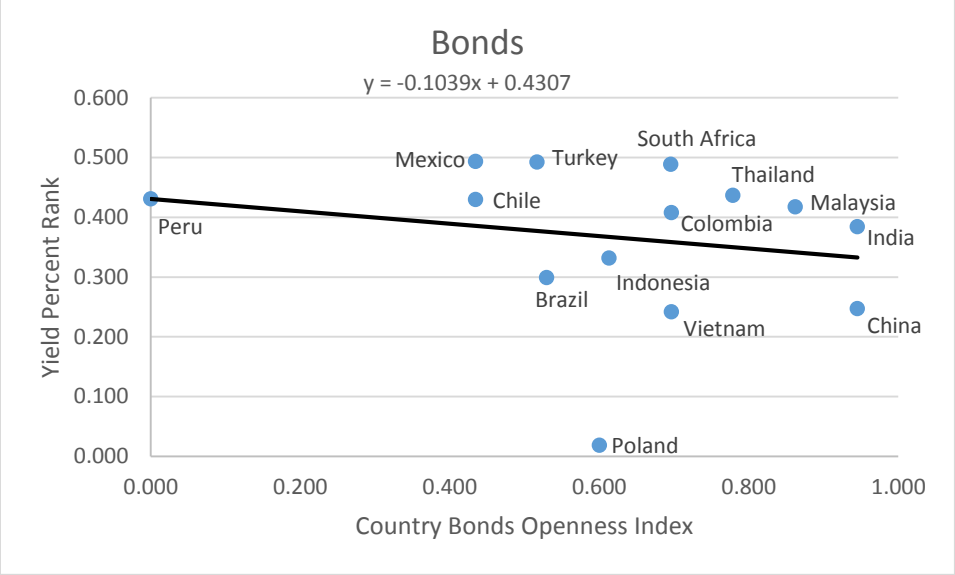
country's stock index's level on May 22nd or May 23rd, 2013. This relationship is relatively strong, as the gradient of the line of best fit is 0.3675. This observation is surprising; countries with higher equities openness indices readings saw their equity asset levels move by a more volatile degree than countries with less restrictive equity measures as a result of Bernanke's announcement. It thus proves the aforementioned regression hypothesis, $y = -0.5x + 0.5$, wrong, as it reveals a positive rather than a negative correlation between the degree of restrictiveness of a country's measures on equity flows and the movement of that country's equity assets. From this finding, we can infer that EMs' capital controls affect the countries' respective equity flows, but contrary to their objective. Finally, one should note that Brazil and Colombia seem to be defying this trend.

Bonds

Table 6.1.2: Country Bonds Openness Index and Yield Percent Rank (2013)

Year: 2013 Country Bonds Openness Index and Yield Percent Rank		
Country Name	Country Bonds Openness Index	Yield Percent Rank
South Africa	0.695	0.489
India	0.945	0.384
Malaysia	0.862	0.418
Thailand	0.779	0.437
China	0.945	0.247
Brazil	0.530	0.299
Colombia	0.696	0.408
Indonesia	0.613	0.332
Vietnam	0.696	0.242
Turkey	0.517	0.493
Poland	0.600	0.019
Chile	0.434	0.430
Mexico	0.434	0.493
Peru	0.000	0.431

Graph 6.1.2: Relationship: Country Bonds Openness Index and Yield Percent Rank



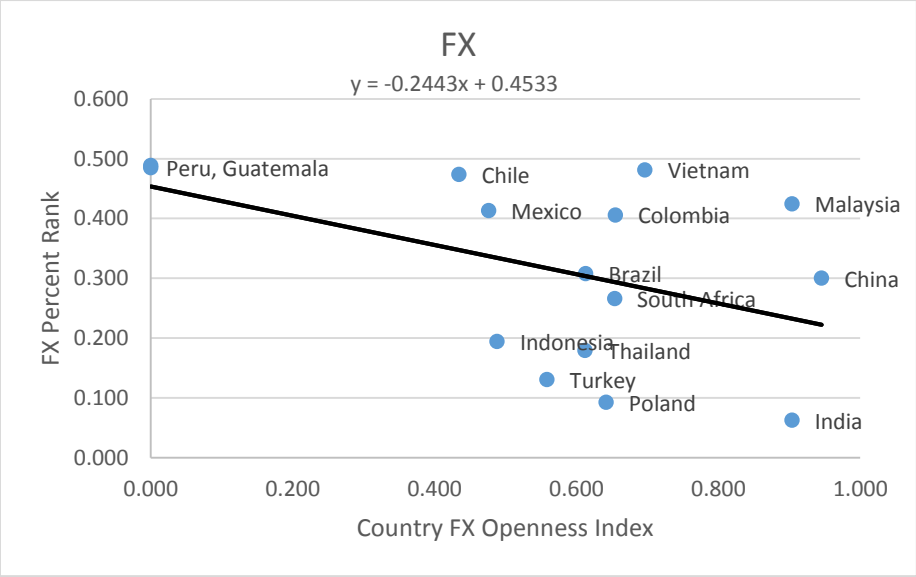
This graph reveals the existence of a slightly negative correlation between the degree of a country's average capital controls' restrictiveness on bond flows and the percent rank of the change in the country's 10- or 9-year yield on the dates under consideration. One should note that this relationship does not seem to be too strong, as the gradient of the line of best fit is merely -0.1039. This observation is congruent with the aforementioned first hypothesis; in countries with stricter capital controls in place, capital flows on the event date will take place to a smaller degree than in countries where capital controls exist to a less restrictive degree. From this finding, we can infer that EMs' capital controls on bond flows are somewhat effective. One should mention the fact that Poland is a significant outlier here.

FX

Table 6.1.3: Country FX Openness Index and FX Percent Rank (2013)

Year: 2013 Country FX Openness Index and FX Percent Rank		
Country Name	Country FX Openness Index	FX Percent Rank
South Africa	0.654	0.266
India	0.904	0.062
Malaysia	0.904	0.425
Thailand	0.612	0.179
China	0.945	0.300
Brazil	0.613	0.308
Colombia	0.655	0.406
Indonesia	0.488	0.194
Vietnam	0.696	0.481
Turkey	0.558	0.130
Poland	0.642	0.092
Chile	0.434	0.474
Mexico	0.476	0.413
Peru	0.000	0.485
Guatemala	0.000	0.489

Graph 6.1.3: Relationship: Country FX Openness Index and FX Percent Rank



This graph shows the existence of a negative correlation between the degree of a country's average capital controls' restrictiveness on FX flows and the percent rank of the change in the country's FX level on the dates under consideration. Again, this observation is congruent with

the aforementioned first hypothesis; stricter capital controls hinder capital flows. One should note that while this relationship seems to be relatively strong, as the gradient of the line of best fit is -0.2443, the data points in this graph are spread out to a more significant degree than in the previous two graphs. Regardless, the fact that the line of best fit's gradient is negative allows us to infer from the graph that EMs' capital controls on FX flows are somewhat effective.

7. Regression with Asset Levels

Gauging the statistical relationship, and the significance of that relationship, between the different countries' capital flow restrictiveness and their respective capital flows by analyzing the gradient of the line of best fit is mathematically inaccurate. Consequently, one conducted regressions between each country's numerical value representing its capital controls' restrictiveness on equity, bond, and FX flows (the independent variables), and the countries' respective normalized percent ranks of the changes in the three asset classes as a result of Bernanke's announcement (the dependent variable).

1. Dummy Variables

In order to account for country-specific characteristics that might influence equity, bond, and FX flows in general, one analyzed the following six dummy variables:

1.) The first dummy variable one studied consists of a country's current account. One considered including this dummy variable in the regression at hand, given that a current account surplus could reveal greater foreign investors' interaction with and interest in that country's capital markets compared to countries with current account deficits, and thus translate to investors' reluctance to move out capital from that country.

2.) The second dummy variable one evaluated consists of a country's change in its GDP growth rate from 2012 to 2013. One considered including this dummy variable in the

regression at hand, as investors might be less interested in extracting their capital from economically growing countries than from economically shrinking countries.

3.) The third dummy variable one inspected consists of a country's percentage change in its Consumer Price Indexes (CPI) in 2013. One considered including this dummy variable, given that a country's high inflation rate might lead to faster capital depreciation, and thus induce investors to pull out their capital from that country.

4.) The fourth dummy variable one investigated consists of a country's market capitalization of listed domestic companies as a percentage of GDP. One considered including this dummy variable, as a high percentage of a country's market capitalization of listed domestic companies to GDP provides a good proxy for how open a country is to foreign capital, and thus might additionally influence the ease with which investors can move around their capital.

5.) The fifth dummy variable one evaluated consists of a country's deposit interest rate. One considered choosing this dummy variable, as a high deposit interest might induce investors to retain especially their capital invested in that country's fixed income products. On the other hand, a high deposit interest rate might reflect on the presence of a high inflation rate in that country, which would likely reduce investors' willingness to keep their capital in that country due to the possibility that their capital would depreciate faster than it could accrue interest. The potential effect of this dummy variable is less clear.

6.) The sixth dummy variable one studied consists of a country's Corruption Perceptions Index, which is an index computed by the Transparency International that scores countries on a scale from 0, which stands for highly corrupt, to 100, which stands for very clean.[34]

[34] Transparency International, "Corruption Perceptions Index 2013" (n.d.).

One considered including this dummy variable, as one believes that the more the public perceives a country to be corrupt, the more likely international investors are to pulling out their capital from that country.

Eventually, since each of the six dummy variables consists of numbers, we decided not to transform those variables into either zeros or ones, as doing so would lead to the loss of potentially explanatory information represented by the variables' actual readings.

The below two tables show the countries' actual figures for each dummy variable sector.

Table 7.1.1: Country's Actual Figure for Each Dummy Variable Sector (Part 1; 2013)

Year: 2013				
Country's Actual Figure for Each Dummy Variable Sector (Part 1)				
	Dummy Variable 1			*Dummy Variable 2*
Country Name	Current Account to GDP	GDP Growth 2012 (annual % change)	GDP Growth 2013 (annual % change)	Change in GDP Growth
South Africa	-5.80%	2.20%	2.20%	0.00%
India	-2.60%	5.10%	6.90%	35.29%
Malaysia	3.60%	5.50%	4.70%	-14.55%
Thailand	-0.90%	7.30%	2.80%	-61.64%
China	1.90%	7.80%	7.70%	-1.28%
Brazil	-3.40%	1.80%	2.70%	50.00%
Colombia	-3.20%	4.00%	4.90%	22.50%
Indonesia	-3.20%	6.00%	5.60%	-6.67%
Vietnam	5.50%	5.20%	5.40%	3.85%
Turkey	-7.90%	2.10%	4.20%	100.00%
Poland	-1.30%	1.60%	1.30%	-18.75%
Chile	-3.70%	5.50%	4.20%	-23.64%
Mexico	-2.40%	4.00%	1.40%	-65.00%
Peru	-4.50%	6.00%	5.80%	-3.33%
Guatemala	-2.50%	3.00%	3.70%	23.33%

Table 7.1.2: Country's Actual Figure for Each Dummy Variable Sector (Part 2; 2013)

Year: 2013				
Country's Actual Figure for Each Dummy Variable Sector (Part 2)				
	Dummy Variable 3	*Dummy Variable 4*	*Dummy Variable 5*	*Dummy Variable 6*
Country Name	CPI (annual % change)	Domestic Market Cap (% of GDP)	Deposit Interst Rate (%)	Corruption Perceptions Index
South Africa	5.40%	257.40%	5.20%	42
India	10.90%	61.20%	7.50%	36
Malaysia	2.10%	154.80%	3.00%	50
Thailand	2.20%	84.30%	2.90%	35
China	2.60%	41.60%	3.00%	40
Brazil	6.20%	42.70%	7.80%	42
Colombia	2.00%	53.30%	4.20%	36
Indonesia	6.40%	38.10%	6.30%	32
Vietnam	6.60%	23.40%	7.10%	31
Turkey	7.50%	23.80%	15.80%	50
Poland	1.00%	39.00%	1.50%	60
Chile	1.80%	95.80%	5.20%	71
Mexico	3.80%	41.80%	1.30%	34
Peru	2.80%	40.10%	2.30%	38
Guatemala	4.30%	N/A	5.50%	29

After regressing countries' equities percent ranks with their respective country equities openness index and their respective six dummy variables, we found that only the dummy

variables “Change in GDP Growth” and “Deposit Interest Rate (%)” had low enough *P*-values to explain some variation in the countries’ equities percent ranks.

After regressing countries’ yield percent ranks with their respective country bonds openness index and their respective six dummy variables, we found that only the dummy variable “Deposit Interest Rate (%)” had a low enough *P*-value to explain some variation in the countries’ yield percent ranks.

After regressing countries’ FX percent ranks with their respective country FX openness index and their respective six dummy variables, we found that only the dummy variable “Current Account to GDP” had a low enough *P*-value to explain some variance in the countries’ FX percent ranks.

In light of the fact that we could only collect very few observations for our three dependent variables, we decided to re-run the three above regressions with only the dummy variables that had some explanation power for each respective asset class. Doing so allowed us to prevent computing an inflated *R Square* figure as a result of including multiple independent variables. In other words, by reducing the numbers of variables in the regression, we minimized the difference between the *R Square* and the *Adjusted R Square* figures. Remember that the *Adjusted R Square* is a version of the *R Square* that has been modified in order to account for the number of predictors in the model. Moreover, we realized that since some dummy variables were simply irrelevant for certain asset classes, such as the dummy variable “Domestic Market Cap” for bond flows, or “Change in GDP Growth” for FX flows, there would be no reason to include these dummy variables in our regressions.

Additionally, the fact that a country’s interest rates were somewhat explanatory for its bond flows seemed logical to us; after all, interest rates influence the prices of fixed income

products inversely, and varying interest rates across EMs will quite likely give rise to differences in the degrees to which investors are willing to pull out their capital from certain EMs' fixed income products. This also applies to FX flows; if a country possesses a current account deficit, it essentially has to borrow capital from foreign sources to make up for the deficit, thus giving rise to excess demand for foreign currencies and lowering the domestic exchange rate. Hence, it seemed statistically accurate to us to merely include the aforementioned dummy variables in each asset class' regression. The following tables reflect our regression findings for each country's equities percent rank to country equities openness index; yield percent rank to country bonds openness index; and FX percent rank to country FX openness index.

2. Regression Findings

Equities

Table 7.2.1: Regression Analysis: Country Equities Openness Index and Equities Percent Rank; Dummy Variables: "Change in GDP Growth," "Deposit Interest Rate (%)"

Year: 2013

Regression Analysis: Country Equities Openness Index and Equities Percent Rank

Regression Statistics	
Multiple R	0.842
R Square	0.708
Adjusted R Square	0.621
Standard Error	0.098
Observations	14

ANOVA

	F	*Significance F*
Regression	8.095	0.005

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.113	0.101	-1.120	0.289
Country Equities Openness Index	0.344	0.115	2.981	0.014
Change in GDP Growth	-0.444	0.122	-3.655	0.004
Deposit Interst Rate (%)	4.857	1.383	3.512	0.006

Statistical Observations:

Of the three regression analyses conducted in this paper, this one reveals the strongest relationship between the independent variable, in this case "Country Equities Openness Index," and the dependent variable, here "Country's Equities Percent Rank." Suppose we set our significance level α at 0.05, meaning that we have only a 5 percent chance of making a Type I error.[35] Then, given that the *P*-value of the "Country Equities Openness Index" variable is 0.014, the *P*-value is less than $\alpha = 0.05$, implying that we can reject the null hypothesis H_0. This means that the hypothesis stating that sample observations, in this case the different countries' equities percent ranks, result purely from chance, can be nullified. In other words, the above regression analysis reveals that a country's equities openness index quite likely explains that country's equity percent rank. Moreover, the *P*-values for the two dummy variables are extremely low, too, with a reading of 0.004 for "Change in GDP Growth," and 0.006 for "Deposit Interest Rate (%)." Again, one should reiterate that as a result of our dataset at hand being quite small, the regressions here provide mere indications of potential trends and correlations, rather than actual statistical explanations. That said, the above *P*-values are impressively small for the fact that the data here is limited in size. On top of that, the regression's *R Square* value is 0.708, meaning that 70.8 percent of the variation in the response variable, here countries' equities percent ranks, is explained by a linear model. In other words, as this *R Square* reading is quite high, it reveals that the data is particularly close to the fitted regression line. Naturally, as explained above, the *Adjusted R Square* value is lower, at 0.621, due to the inclusion of the two dummy variables in the regression. Finally, a *Significance F* reading of 0.005 shows that the overall model has a strong statistically significant predictive capability, as the *Significance F* value of 0.005 shows a

[35] A Type I Error occurs when one rejects the null hypothesis even though it is, in fact, true.

reading lower than the typically assumed significance level of 0.05. One should clarify that the *Significance F* essentially computes a *P*-value on the overall *F*-test. All in all, the significantly low *P*-value of the "Country Equities Openness Index" variable, combined with the high *R Square* reading and the very low *Significance F* reading, show that a country's equities openness index, in combination with the two dummy variables, strongly explains the degree of freedom with which a country's equity capital can flow.

As "Graph 6.1.1: Relationship: Country Equities Openness Index and Equities Percent Rank" reveals, countries' equity flows seem to correlate positively with the degree of restrictiveness of the respective countries' equity capital controls. In other words, the more restrictive a country's capital controls on equity flows, the more volatile a country's stock index reacted to Bernanke's announcement. The above regression analysis restates that fascinating and unexpected finding by showing a positive coefficient for the "Country Equities Openness Index" variable of 0.344.

Bonds

Table 7.2.2: Regression Analysis: Country Bonds Openness Index and Yield Percent Rank; Dummy Variable: "Deposit Interest Rate (%)"

Year: 2013

Regression Analysis: Country Bonds Openness Index and Yield Percent Rank

Regression Statistics	
Multiple R	0.310
R Square	0.096
Adjusted R Square	-0.068
Standard Error	0.135
Observations	14

ANOVA

	F	*Significance F*
Regression	0.586	0.573

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.390	0.113	3.462	0.005
Country Bonds Openness Index	-0.109	0.152	-0.715	0.490
Deposit Interst Rate (%)	0.839	0.999	0.841	0.419

Statistical Observations:

Compared to the above regression analysis of a country's equities percent rank to its equities openness index, the regression analysis here reveals a much weaker relationship of a country's yield percent rank to its bonds openness index and the dummy variables. One arrives to that conclusion through a high reading of 0.573 for the *Significance F* value. Moreover, the *P*-value of the "Country Bonds Openness Index" variable is very high, at 0.490, meaning that we cannot confidently nullify the hypothesis stating that the sample observations, in this case the different countries' yield percent ranks, resulted purely from chance. Moreover, the above regression analysis reveals a significantly high *P*-value of 0.419 for the dummy variable. In fact, the low *R Square* reading of 0.096 confirms this observation, as it reveals that merely 9.6% of the variability in the response is accounted for in the model. Again, we are working with a small

dataset here, so a country's bonds openness index might, in actuality, have a stronger influence on a country's bond flows than the above regression reveals. Yet, assuming the regression accurately reflects the actual relationship between the dependent and independent variables, we would conclude that a country's bonds openness index has barely any effect on the degree of freedom with which that country's fixed income capital can flow.

Finally, as "Graph 6.1.2: Relationship: Country Bonds Openness Index and Yield Percent Rank" already revealed above, countries' bond flows seem to correlate negatively with the degree of restrictiveness of the respective countries' bond capital controls. The above regression restates that by showing a negative coefficient for the "Country Bonds Openness Index" variable of -0.109. This concurs with our regression hypothesis and with the logical expectation that as the degree of restrictiveness of a country's capital controls on bond flows increases, the ability of that country's fixed income capital to flow freely falls.

FX

Table 7.2.3: Regression Analysis: Country FX Openness Index and FX Percent Rank; Dummy Variable: "Current Account to GDP"

Year: 2013

Regression Analysis: Country FX Openness Index and FX Percent Rank

Regression Statistics	
Multiple R	0.698
R Square	0.487
Adjusted R Square	0.401
Standard Error	0.118
Observations	15

ANOVA

	F	*Significance F*
Regression	5.690	0.018

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.586	0.088	6.661	0.000
Country FX Openness Index	-0.385	0.125	-3.067	0.010
Current Account to GDP	2.609	1.007	2.591	0.024

Statistical Observations:

This regression output reveals a rather strong relationship between a country's "Country FX Openness Index" and its "FX Percent Rank." The *P*-value of the "Country FX Openness Index" variable is 0.010, implying that we can reject the null hypothesis H_0 if we set our significance level α at the commonly used 0.05 level. This means that the hypothesis stating that sample observations, in this case the different countries' FX levels, result purely from chance, can be nullified. Secondly, an *R Square* reading of 0.487 reveals that 48.7% of the percent of the variation in the response variable, here countries' FX percent ranks, is explained by a linear model. Given our limited dataset, one can interpret this reading as being quite high. Finally, this regression's *Significance F* reading of 0.018 is significantly low, too, meaning that the set of terms we included in this model improved the fit of the model. Overall, this regression analysis

reveals that a country's FX capital controls strongly reduce the ability of that country's FX capital to flow freely.

Once again, the regression at hand supports the findings in "Graph 6.1.3: Relationship: Country FX Openness Index and FX Percent Rank" by showing a negative coefficient for the "Country FX Openness Index" variable of -0.385. This is furthermore congruent to our regression hypothesis; that countries' FX flows correlate negatively with the degree of restrictiveness of the respective countries' FX capital controls.

Moreover, one should note that the dummy variable "Current Account to GDP" has a significantly low *P*-value of 0.024, highlighting a rather non-trivial relationship between a country's current account balance and the trading in that country's exchange rate on a certain date. We already stated that a country with a current account deficit has to borrow capital from foreign sources to make up for its deficit, which translates to excess demand for foreign currencies and thus lowers the domestic exchange rate. Yet, while this should have relatively little impact on foreign investors' willingness and ability to trade a country's FX on a specific date, such as May 22nd or May 23rd, 2013, the above regression suggests differently. Given this interesting finding, one proposes that more research be dedicated to discovering the roots of the relationship between a country's current account balance and the trading in that country's FX.

8. Graphs with Flows

In the above analysis, due to a lack of access to private data, we used changes in equity asset levels as a proxy for equity flows, changes in 10- or 9-year yields as a proxy for bond flows, and changes in FX quotes compared to the USD as a proxy for FX flows. In other words, we used asset levels as a gauge for capital flows, and remarked the fact that there is a disconnect between these proxies and their respective actual net capital flows, albeit the economic model

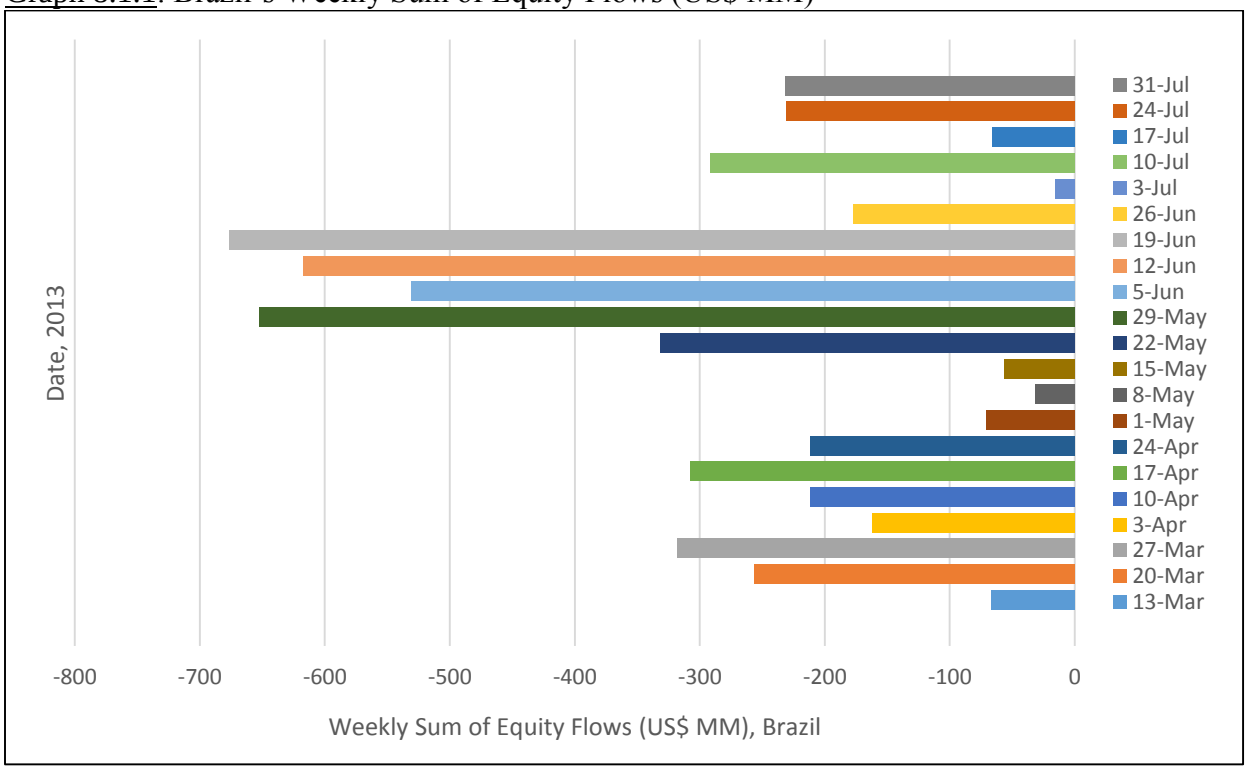
provided in section "4. Remarks on the Data Applied" showing some economic relationship between the "price" of capital and its "quantity."

Eventually, we fortunately received some access to private data on EMs' actual capital flows around the time of Bernanke's announcement. Thus, we were able to obtain figures on the weekly sum of equity and bond flows of Brazil, India, Indonesia, Turkey, South Africa (short: BIITS), and Mexico, from March 13th until July 31st, 2013. Hence, this section focuses on determining the degree to which Bernanke's speech gave rise to new trends in the different countries' equity and debt flows over the short term. Here, we did not conduct a narrow event study, as this paper did in the sections "6. Graphs with Asset Levels," and "7. Regression with Asset Levels," due to three reasons: a lack of access to data on daily equity and bond flows, our interest in understanding how Bernanke's announcement affected equity and bond flows beyond the very short term, and our curiosity in comprehending how Bernanke's announcement affected the direction of capital flows. Moreover, one should note that the below "Observations" sections will refer to net flows during the five trading days ending on May 29th as the first set of data that reflects investors' knowledge of Bernanke's announcement. Granted, if one would look at the net equity and bond flows on the five trading days ending on May 22nd, one would include the actual day on which Bernanke announced potential Fed tapering. In doing so, however, one would also include the four prior trading days, which do not provide any information on taper-related changes in equity and bond flows. Consequently, given that this section focuses on revealing changes in trends of weekly flows, rather than analyzing changes in the volatility of daily flows, we regarded the total net flows on the five trading days ending on May 29th as the earliest sets of data potentially exhibiting some information on taper-induced changes to flows.

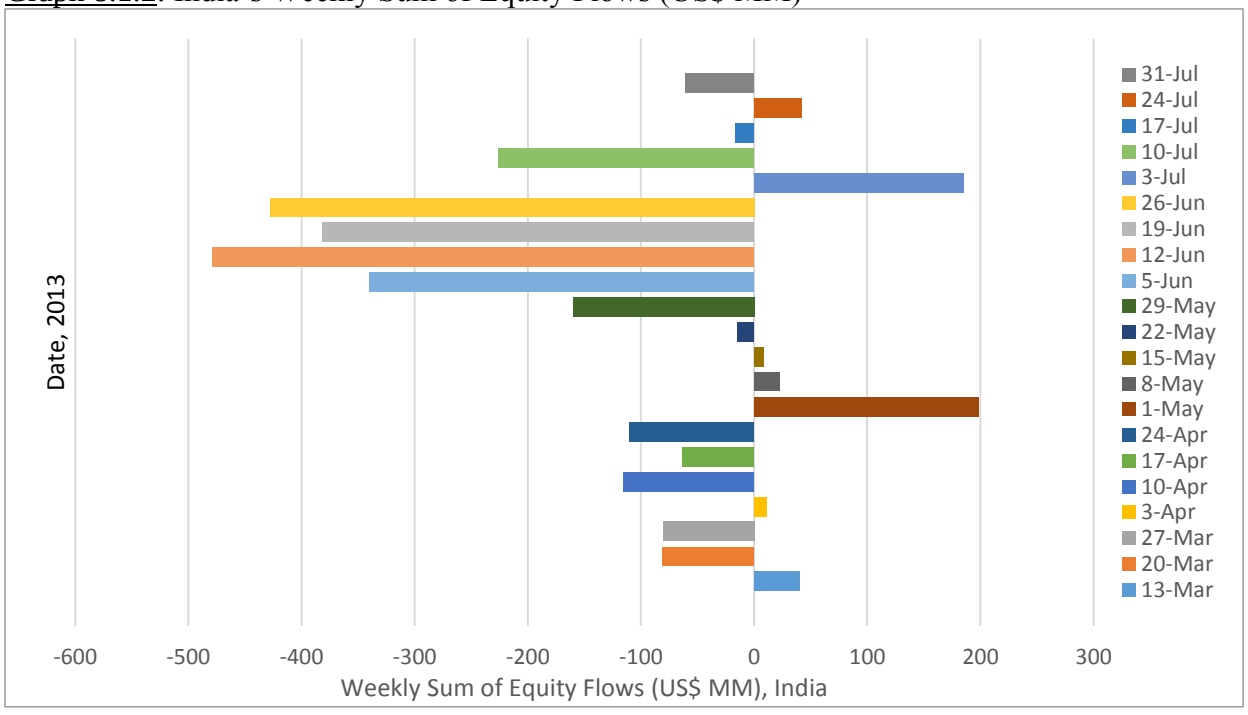
1. Graph Findings

Equities

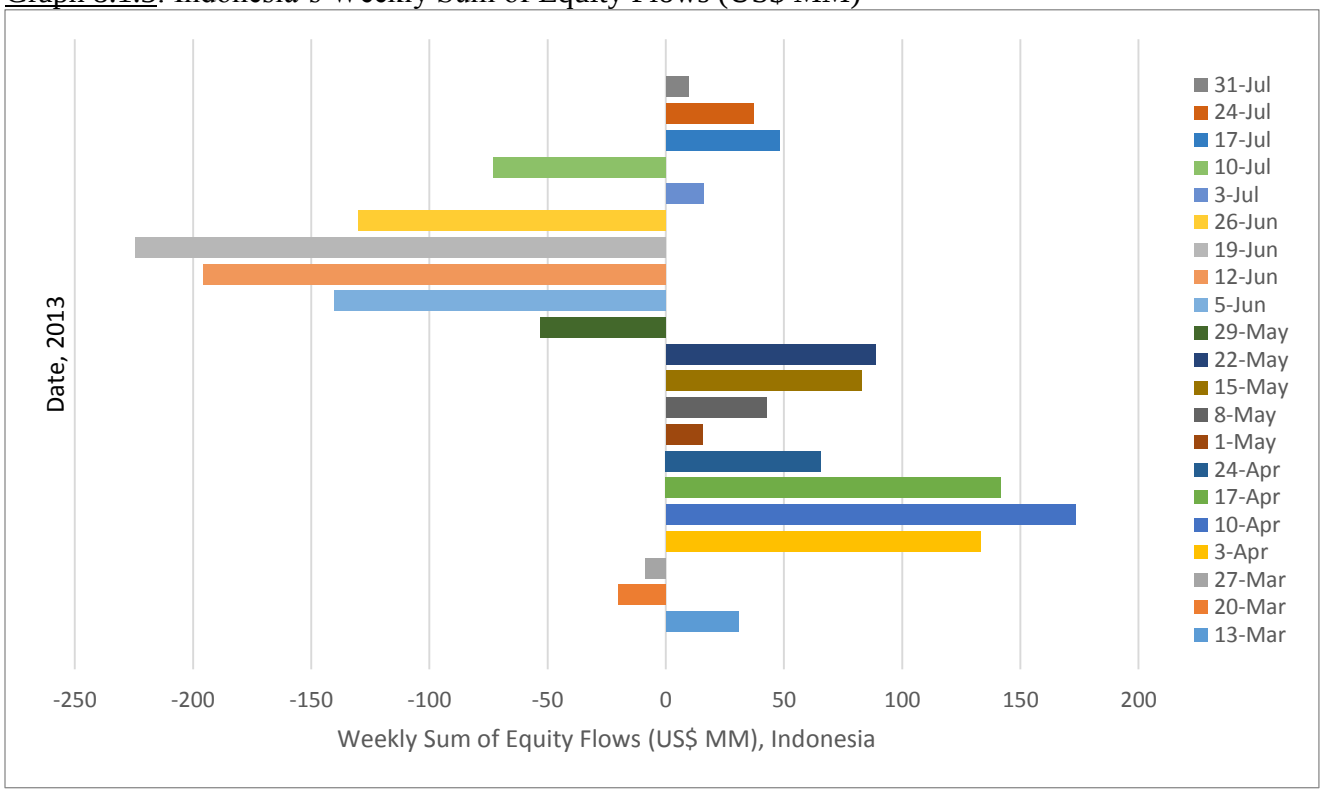
Graph 8.1.1: Brazil's Weekly Sum of Equity Flows (US$ MM)



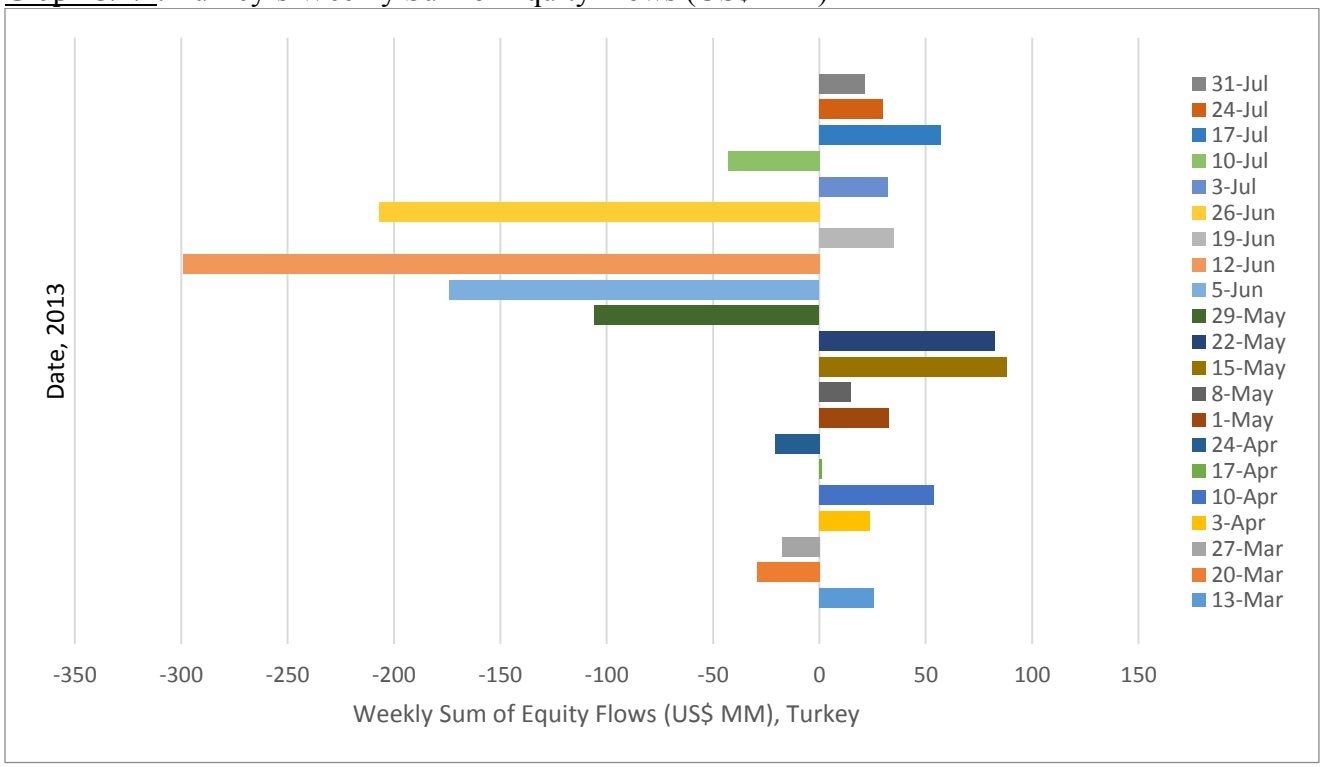
Graph 8.1.2: India's Weekly Sum of Equity Flows (US$ MM)



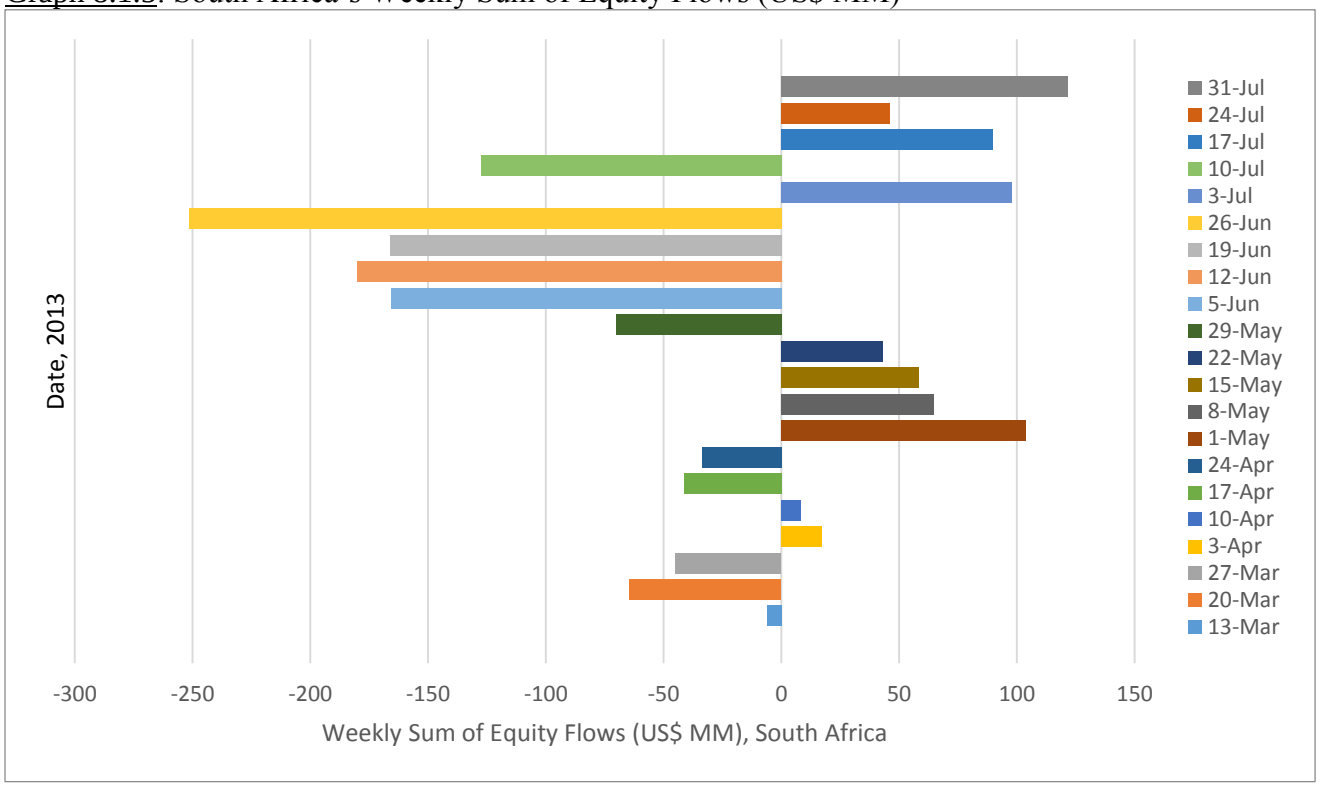
Graph 8.1.3: Indonesia's Weekly Sum of Equity Flows (US$ MM)



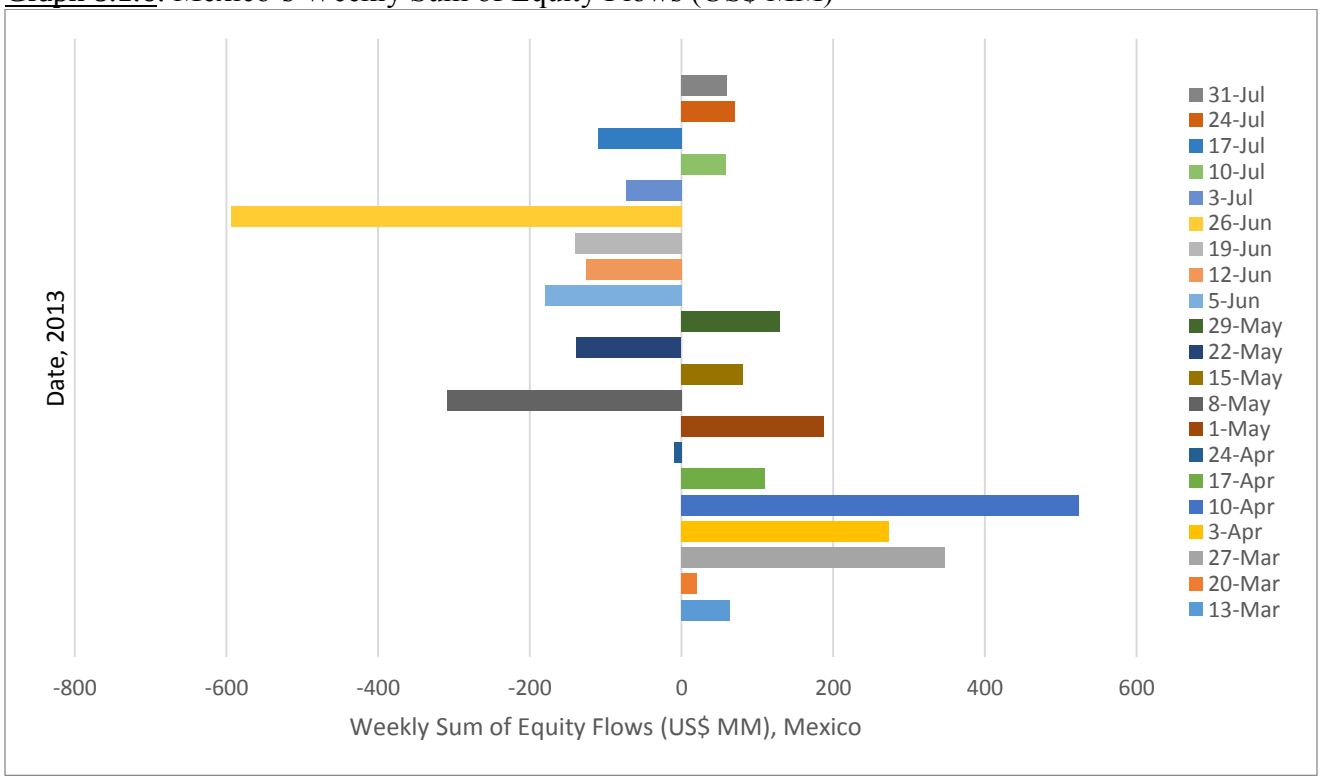
Graph 8.1.4: Turkey's Weekly Sum of Equity Flows (US$ MM)



Graph 8.1.5: South Africa's Weekly Sum of Equity Flows (US$ MM)



Graph 8.1.6: Mexico's Weekly Sum of Equity Flows (US$ MM)



Observations:

As the above graphs show, investors reacted to Bernanke's announcement by pulling out equity investments from the BIITS and Mexico. Interestingly, Mexico experienced net equity capital inflows on the five trading days ending on May 29th. As Table 7.1. shows, Mexico's equity capital controls are the weakest of the six countries under consideration, which might explain the fact that it is the only country that experienced net equity capital inflows on the five trading days ending on May 29th. On the other hand, with a country equities openness index value of 0.518, Mexico possesses only marginally less restrictive equity capital controls than Indonesia and Turkey, supporting the argument that the equity capital inflows it experienced were due to country-specific reasons that are independent from its equity capital controls.

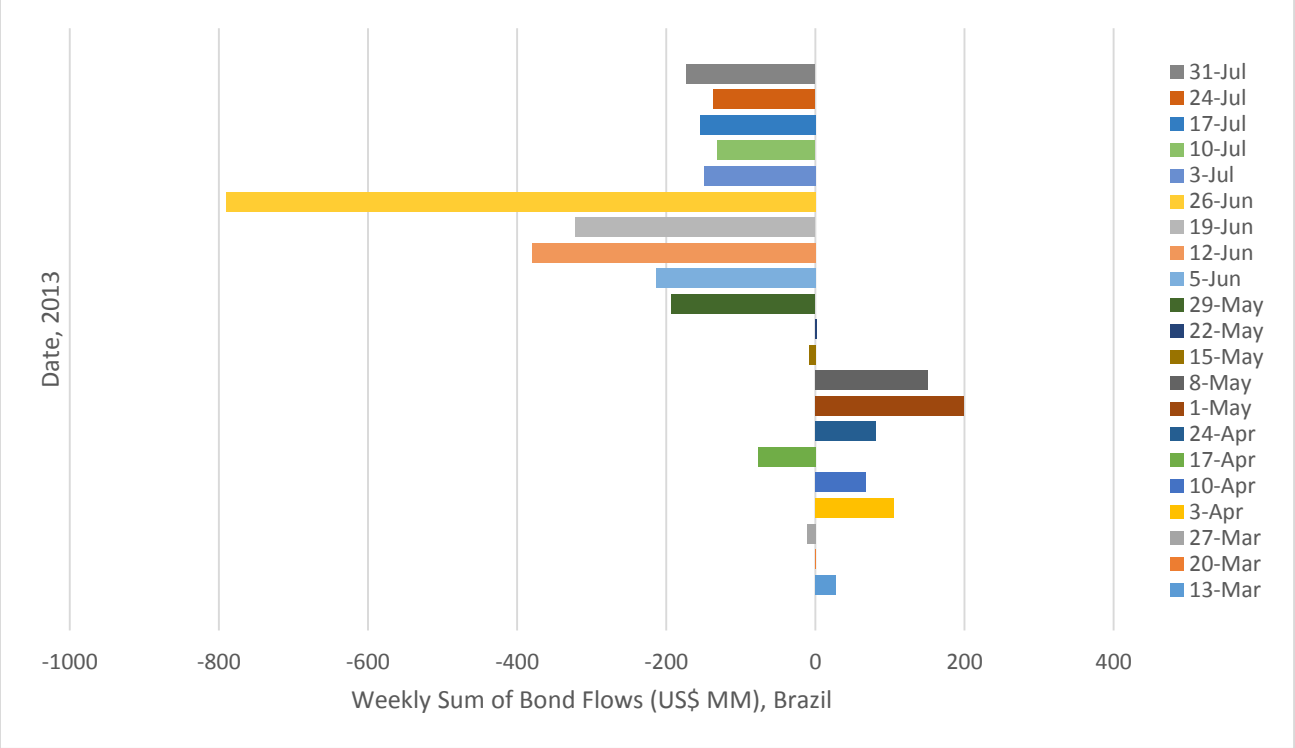
Table 8.1.1: Country Equities Openness Index (2013)

Year: 2013 Country Equities Openness Index	
Country Name	Country Equities Openness Index
South Africa	0.695
India	0.945
Brazil	0.696
Indonesia	0.613
Turkey	0.600
Mexico	0.518

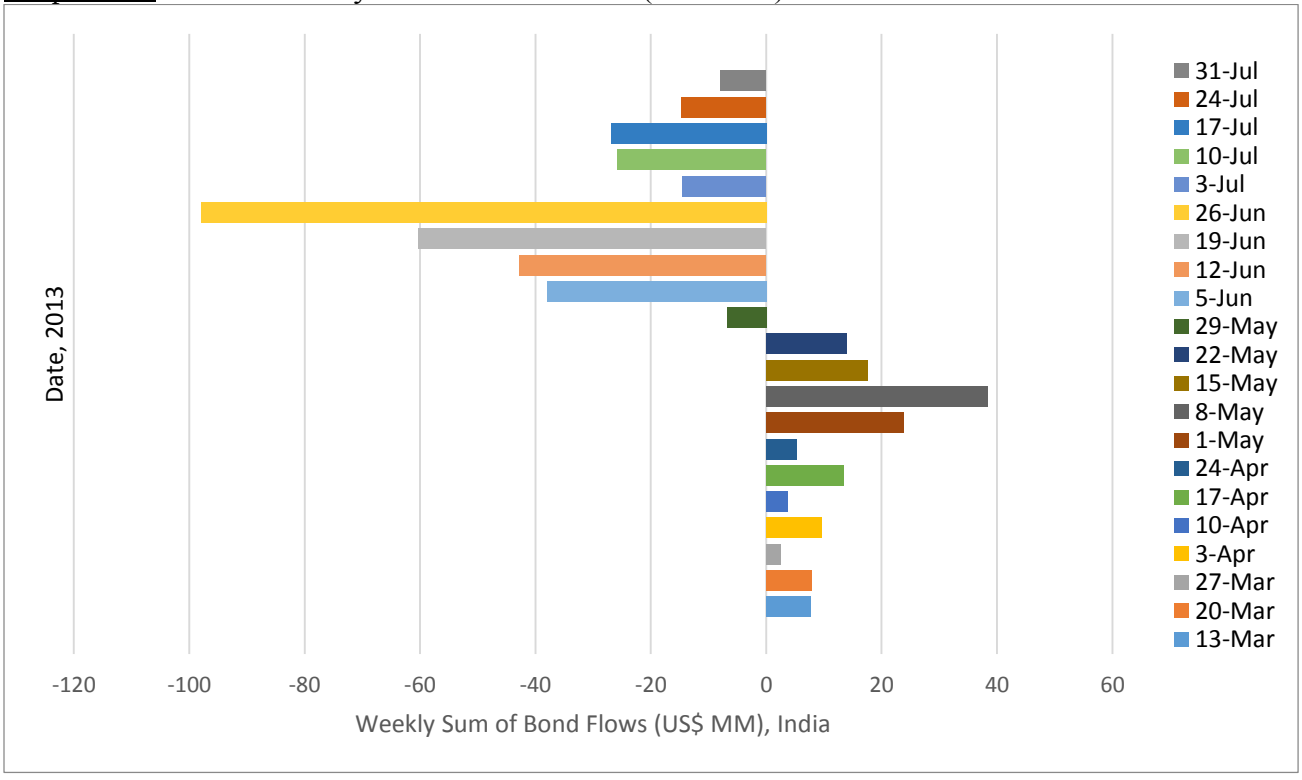
Moreover, the above graphs show that Bernanke's speech's effect on weekly equity flows to the BIITS and Mexico did not last particularly long, as each of the six countries analyzed here experienced weekly net equity capital inflows in mid- and late July.

Bonds

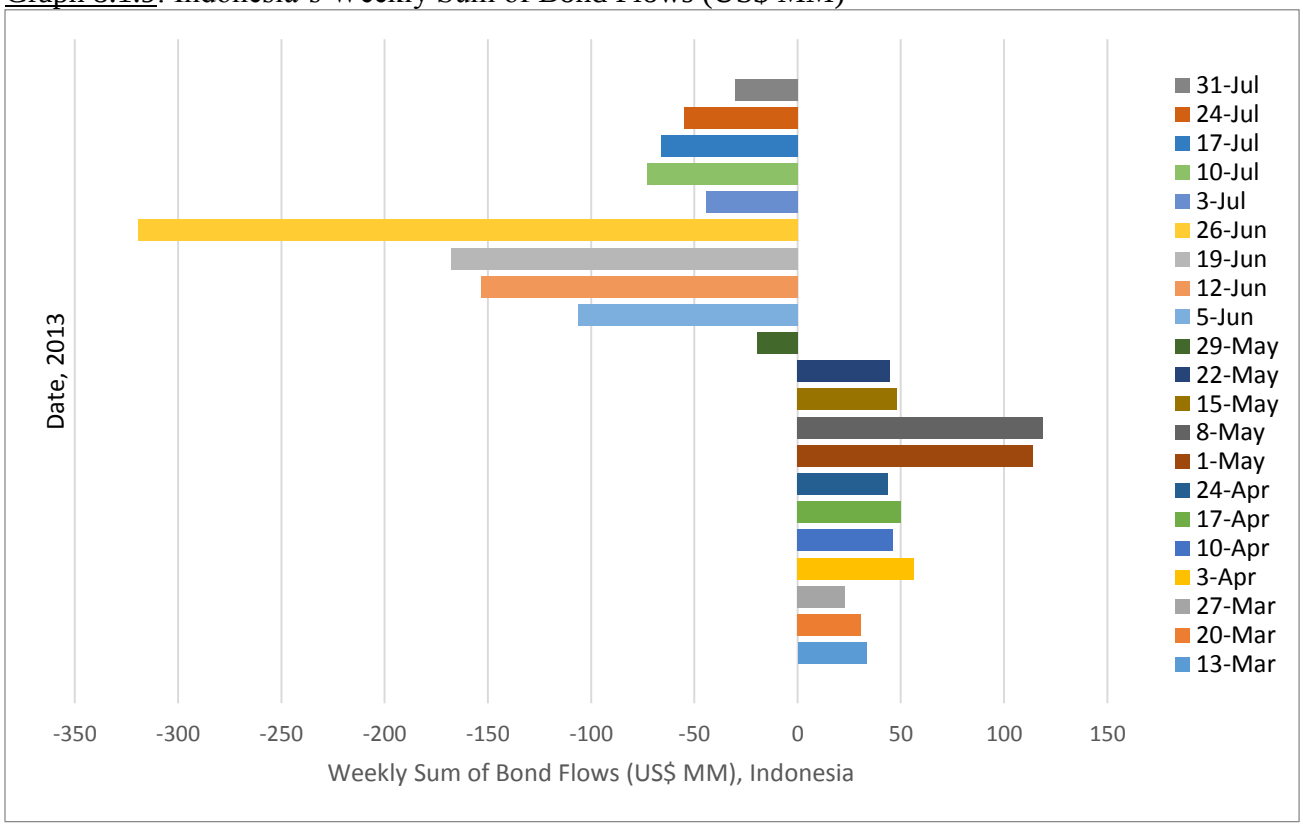
Graph 8.1.7: Brazil's Weekly Sum of Bond Flows (US$ MM)



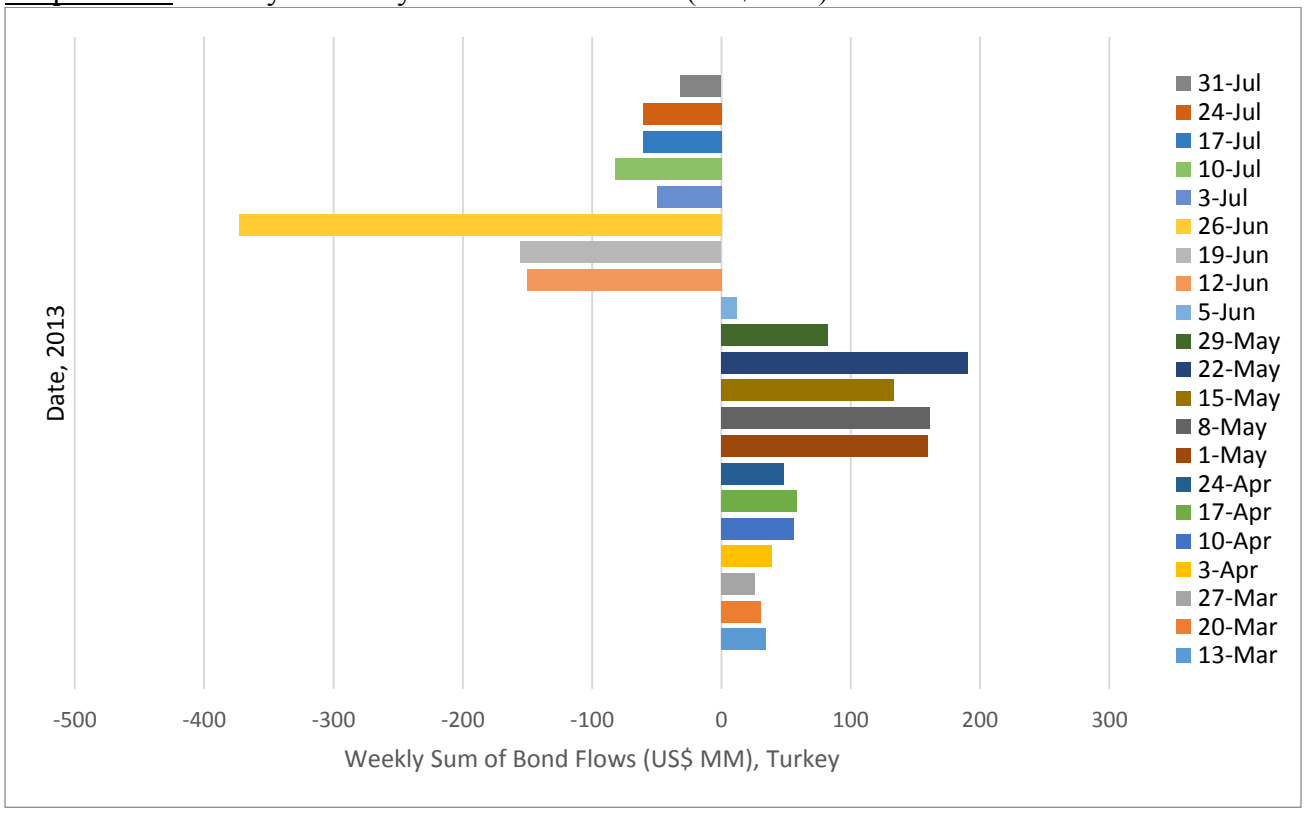
Graph 8.1.8: India's Weekly Sum of Bond Flows (US$ MM)



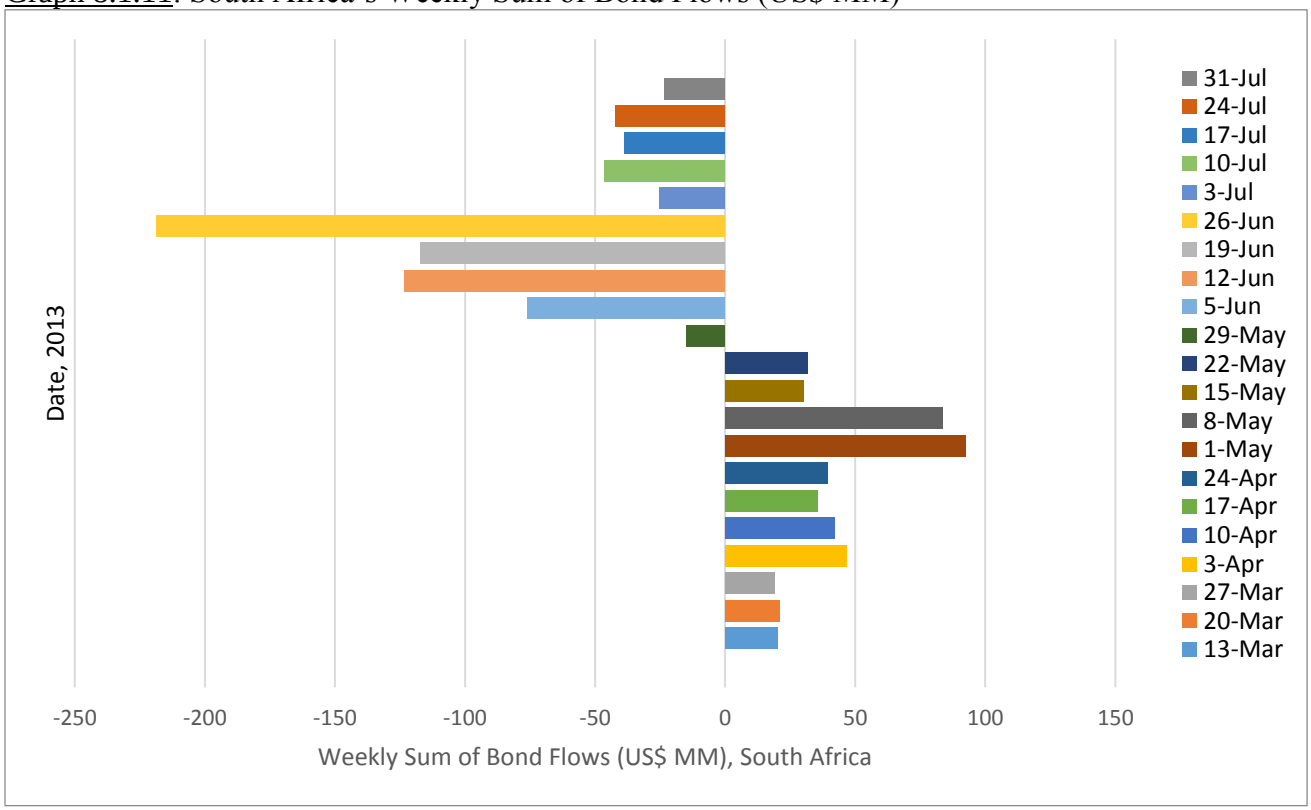
Graph 8.1.9: Indonesia's Weekly Sum of Bond Flows (US$ MM)



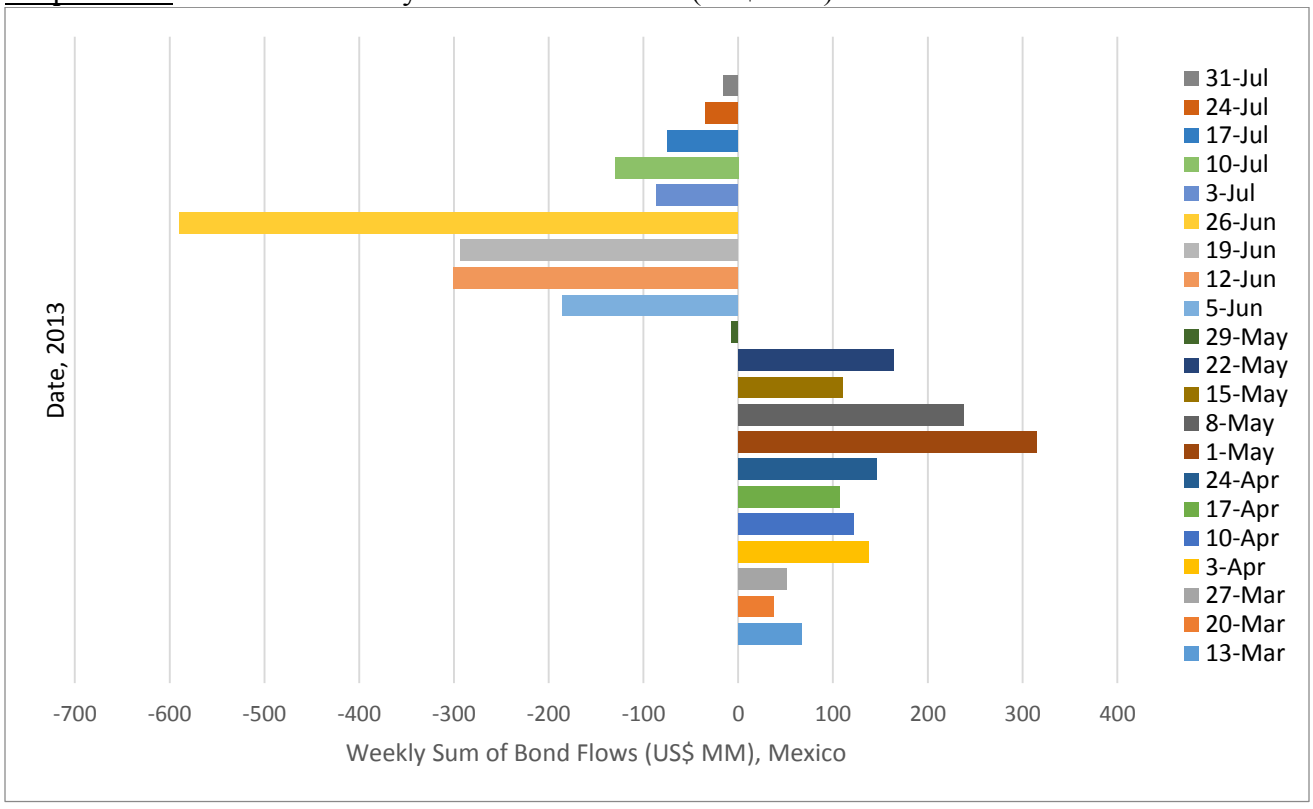
Graph 8.1.10: Turkey's Weekly Sum of Bond Flows (US$ MM)



Graph 8.1.11: South Africa's Weekly Sum of Bond Flows (US$ MM)



Graph 8.1.12: Mexico's Weekly Sum of Bond Flows (US$ MM)



Observations:

As the above graphs show, investors reacted to Bernanke's announcement by pulling out fixed income investments from the BIITS and Mexico. Interestingly, Turkey experienced net fixed income capital inflows on the five trading days ending on May 29th. As Table 7.2. shows, Turkey's fixed income capital controls are similar to that of Brazil and Indonesia, and even stronger than Mexico's controls, again strengthening the argument that the fixed income capital net inflows Turkey experienced on that week were due to country-specific reasons that are independent from its fixed income capital controls.

Table 8.1.2: Country Bonds Openness Index (2013)

Year: 2013 Country Bonds Openness Index	
Country Name	Country Bonds Openness Index
South Africa	0.695
India	0.945
Brazil	0.530
Indonesia	0.613
Turkey	0.517
Mexico	0.434

Interestingly, as opposed to the above graphs in this section's "Equities" subsubsection, the graphs here reveal that Bernanke's speech actually gave rise to a new trend in weekly bond flows, at least in the short term. In the two and a half months leading up to Bernanke's announcement, each country experienced weekly net fixed income capital inflows, while in the two months following Bernanke's speech, each country experienced weekly net fixed income capital outflows. Even Turkey, which, as mentioned above, experienced net fixed income capital inflows on the five trading days ending on May 29th, eventually saw a reversal in its bond flows and the begin of a weekly net outflow trend. Due to a lack of access to data that extends beyond July 31st, 2013, we could not study whether Bernanke's speech's effect of introducing a new

trend in EMs' bond flows extended beyond the short term. However, as the above graphs show, net bond inflows to the six countries diminished toward the end of July, so it is quite likely that this trend in bond flows was of mere temporary nature.

2. Difference between Equity and Fixed Income Net Capital Flows:

As the above graphs in this section's "Equities" and "Bonds" subsubsections show, Bernanke's speech did not give rise to a new trend in weekly equity flows, but it did in weekly bond flows, at least in the short term. One believes that the reason for why the "taper" announcement had a more significant influence on bond flows than on equity flows is that while interest rates influence the prices of fixed income products inversely, they can affect equity prices both bearishly and bullishly. Hence, when investors realized that the Fed will start raising its interest rates sometime over the medium term, they concluded that they no longer have to search for yield in relatively risky non-AEs' fixed income markets and started shifting their capital tied to EMs' fixed income products to AEs' fixed income markets. On the other hand, as opposed to evaluating the attractiveness of different countries' fixed income products, differing interest rates do not play as much of an important role in gauging the relative financial appeal of equity products in AEs over such products in EMs. This could explain why Bernanke's speech introduced, at least in the short term, a new trend in bond flows to and from EMs, but not in equity flows.

9. Conclusion

As a result of our above graphs in section "6. Graphs with Asset Levels," which visualize our findings in our three event studies on either May 22nd or May 23rd, 2013, we were able to reveal an unexpected positive correlation between the restrictiveness of EMs' capital controls on equity flows and the countries' respective equity flows following Bernanke's announcement. In

other words, “Graph 6.1.1: Relationship: Country Equities Openness Index and Equities Percent Rank” showed that the higher the restrictiveness of a country’s capital controls on its equity flows, the more volatile equity flows reacted to Bernanke’s speech. Subsequently, we conducted a regression analysis in section “7. Regression with Asset Levels,” to understand the statistical relationship between a country’s equities openness index and its equity flows on the date of interest. The regression’s significantly low *P*-value of the “Country Equities Openness Index” variable, combined with the high *R Square* reading and the very low *Significance F* reading, show that a country’s equities openness index, in combination with the two dummy variables, strongly affect the degree of freedom with which a country’s equity capital can flow. Given the positive relationship between equity controls and flows, one concludes that while countries’ controls on equity flows strongly affect those flows, they do so counter to their objective.

Moreover, the graphs in section “6. Graphs with Asset Levels” showed a negative correlation between EMs’ capital controls and EMs’ bond and FX flows. This is congruent with our regression hypothesis; countries with tighter capital controls on bond and FX flows will observe their yield levels and exchange rates move to a lesser degree than countries with looser capital controls. However, compared to the above regression analysis of a country's equities openness index and its equities percent rank, the regression analysis here reveals a much weaker relationship between a country's bonds openness index and its yield percent rank. The regression’s significantly high *P*-value of the “Country Bonds Openness Index” variable, in combination with the low *R Square* reading and the relatively high *Significance F* value, reveal that a country’s bonds openness index, in combination with the dummy variable, explain the degree of freedom with which a country’s bond capital can flow only very weakly. Hence, we conclude that countries’ controls on bond flows are ineffective.

On the other hand, the regression analysis for FX flows shows that a country's FX openness index has a strong influence on that country's FX flows, as the significantly low *P*-value of the "Country FX Openness Index," as well as the regression's relatively high *R Square* and significantly low *Significance F* readings show. Given the negative coefficient of the "Country FX Openness Index" variable, combined with the statistically proven significant correlation between controls on FX flows and such flows, we conclude that capital controls on FX flows are quite effective in reducing the freedom with which FX capital can flow.

One realizes that the dataset applied in this paper is rather small in size, so one would urge future researchers that deal with this paper's topic to use a broader dataset. We naturally tried to tackle this problem ourselves, but came across two major difficulties in doing so:

1.) Smaller EMs do not possess capital markets that are easily accessible for international investors. As outlined in the above section "3. Hypothesis," we experienced this issue with Guatemala, which does not possess an equity or fixed income market that is open to foreign investors. Moreover, even though we define volatility in capital flows within a country-specific spectrum, so that historically volatile countries' figures are not directly compared with historically stable countries' figures, we concluded that major capital flows in countries that are mainly inaccessible to international investors would occur due to more country-specific reasons, such as the outbreak of war or hyperinflation, rather than due to events of mere indirect influence, which Bernanke's announcement arguably had.

2.) A limited number of central bank announcements that surprised the capital markets enough to cause a similarly strong volatile reaction in EMs' capital flows as Bernanke's announcement. As an example, Mr. Mario Draghi's announcement of the ECB's start of its quantitative easing program in January 22nd, 2015, or Ms. Janet Yellen's press conference declaring the Fed's first

rate hike in December 16th, 2015, can hardly be called surprising. Future research into this paper's topic might want to consider how the BoJ's unexpected announcement of its introduction of negative interest rates on January 29th, 2016, affected EMs' capital flows.

Assuming that the above regression analyses were conducted with a sufficiently large sample data, one would conclude that countries aiming to inhibit their equity flows should actually introduce less restrictive equity capital controls. Moreover, countries planning to influence their bond flows should consider doing so through measures other than capital controls. Finally, it seems that only FX flows confirm our initial regression hypothesis, implying that countries aiming to reduce their exposure to volatile FX flows should do so by increasing the restrictiveness of their FX capital controls.

Moreover, as the regression analysis for equity flows reveals, the dummy variables "Change in GDP Growth" and "Deposit Interest Rate (%)" have significantly low *P*-values, revealing the existence of a statistical relationship between those two dummy variables and the volatility of a country's equity flows. Thus, countries contemplating to alter their equity capital controls should potentially investigate the relationship between the above two dummy variables and the volatility in their respective equity flows before doing so.

Similarly, the regression analysis for FX flows shows that the dummy variable "Current Account to GDP" has a significantly low *P*-value. Consequently, and similarly to our above suggestion, countries considering to alter their FX capital controls should study the relationship between the above dummy variable and the volatility in their FX flows before doing so.

Finally, as the above graphs in section "8. Graphs with Flows" reveal, while Bernanke's speech did not give rise to a new trend in EMs' weekly equity flows, it did introduce a new trend in weekly bond flows, at least in the short term. This observation could help countries anticipate

more accurately how prospective surprise central bank announcements might affect their equity and bond flows. Moreover, countries could consider implementing capital controls on bond flows retroactively to surprise central bank announcements, given the directionally strong and persistent reaction of bond flows to Bernanke's announcement. Of course, this requires bond capital controls to be effective, which our research disproves, so we urge that additional work be committed to discovering the short-term effectiveness of bond capital controls.

10. Bibliography

1. Works Cited

Agung, Juda. "Incorporating Macroprudential Instruments into Monetary Policy: Indonesian Experience." *Monetary Policy Workshop on Strengthening Macroprudential Frameworks* (March 22nd - 23rd, 2012). Last accessed on April 23rd, 2016: https://www.imf.org/external/oap/np/seminars/2012/macroprudential/pdf/II5Agung.pdf.

Baba, Chikako, and Annamaria Kokenyne. "Effectiveness of Capital Controls in Selected Emerging Markets in the 2000s." *IMF Working Paper, Monetary and Capital Markets Department* (December 2011). Last accessed on May 1st, 2016: https://www.imf.org/external/pubs/ft/wp/2011/wp11281.pdf.

Behar, Greg, and Ben Goetsch. "Changing Dynamics in Emerging Markets." *Northern Trust Database* (2014). Last accessed on May 4th, 2016: https://www.northerntrust.com/documents/white-papers/asset-management/changing-dynamics-emerging-markets.pdf.

Capital Group. "Strategy Insights: The Search for Yield." *Capital Group Database* (July 2015). Last accessed on April 19th, 2016: http://server.capgroup.com/capgroup/Content/GIG/Europe/pdf/II_TheSearchForYield_0715.pdf.

Chamon, Marcos, and Márcio Garcia. "Capital Controls in Brazil: Effective?" *IMF, 15th Jacques Polak Annual Research Conference* (November 13th - 14th, 2014). Last accessed on March 27th, 2016: https://www.imf.org/external/np/res/seminars/2014/arc/pdf/chamon_garcia.pdf.

Chinn, Menzie, and Hiro Ito. "The Chinn-Ito Index: A De Jure Measure of Financial Openness." *Chinn-Ito Website* (May 1st, 2015). Last accessed on February 25th, 2016: http://web.pdx.edu/~ito/Chinn-Ito_website.htm.

Claessens, Stijn, and Swati R. Ghosh. "Capital Flow Volatility and Systemic Risk in Emerging Markets: The Policy Toolkit." *Dealing with the Challenges of Macro Financial Linkages in Emerging Markets, Chapter 3* (October 2013). Last accessed on April 20th, 2016: http://www.worldbank.org/content/dam/Worldbank/document/Poverty%20documents/EMERGING_WB_CH03_91-118.pdf.

Cui, Carolyn. "In Emerging Markets, Capital Controls Are Ratcheted Up to Stem Outflow of Funds." *The Wall Street Journal Database* (January 21st, 2016). Last accessed on April 19th, 2016: http://www.wsj.com/articles/battered-emerging-markets-race-to-stem-outflows-1453410496.

Damodaran, Aswath. "The Fed, Interest Rates and Stock Prices: Fighting the Fear Factor." *Musings on Markets* (September 4th, 2015). Last accessed on February 18th, 2016: http://aswathdamodaran.blogspot.com/2015/09/the-fed-interest-rates-and-stock-prices.html.

Derby, Michael S. "Last Year's Taper Tantrum May Have Been Taste of the Future, Paper Says." *The Wall Street Journal Database* (February 28th, 2014). Last accessed on April 19th, 2016: http://blogs.wsj.com/economics/2014/02/28/last-years-taper-tantrum-may-have-been-taste-of-the-future-paper-says/.

Fernández, Andrés, et al. "Capital Control Measures: A New Dataset." *The National Bureau of Economic Research, Working Paper Series* (February 2015). Last accessed on April 11th, 2016: http://www.columbia.edu/~mu2166/fkrsu/fkrsu.pdf.

Foerster, Andrew T. "Financial Crises, Unconventional Monetary Policy Exit Strategies, and Agents' Expectations." *The Federal Reserve Bank of Kansas City, Research Working Papers* (August 2011; revised May 2015). Last accessed on March 10th, 2016: https://www.kansascityfed.org/publicat/reswkpap/pdf/rwp11-04.pdf.

International Monetary Fund. "The Liberalization and Management of Capital Flows: An Institutional View." *International Monetary Fund Database* (November 14th, 2012). Last accessed on April 23rd, 2016: http://www.imf.org/external/np/pp/eng/2011/021411a.pdf.

International Monetary Fund, prepared by the Strategy, Policy, and Review Department. "Recent Experiences in Managing Capital Inflows – Cross-Cutting Themes and Possible Policy Framework." *IMF Policy Paper* (February 14th, 2011). Last accessed on March 21st, 2016: http://www.imf.org/external/np/pp/eng/2011/021411a.pdf.

Johnson, Steve. "Vietnam Defies Emerging Market Slowdown." *The Financial Times Database* (September 22nd, 2015). Last accessed on March 24th, 2016: http://www.ft.com/intl/cms/s/3/f7d2a700-604b-11e5-a28b-50226830d644.html.

Keller, Lorena. "The Unintended Consequences of Capital Controls on Inflows." *Northwestern University, The Kellogg School of Management Database* (February 2nd, 2016). Last accessed on April 19th, 2016: http://www.kellogg.northwestern.edu/faculty/keller/Keller_Feb2016_CapitalControls.pdf+&cd=13&hl=en&ct=clnk&gl=us.

Klein, Michael W. "Capital Controls: Gates versus Walls." *The National Bureau of Economic Research, Working Paper Series* (November 2012). Last accessed on March 22nd, 2016: http://www.nber.org/papers/w18526.pdf.

Lee, Jang-Yung. "Sterilizing Capital Inflows." *IMF Economic Issues, No. 7* (February 1997). Last accessed on April 19th, 2016: https://www.imf.org/EXTERNAL/PUBS/FT/ISSUES7/issue7.pdf.

Lipton, David. "Managing Capital Flows: Lessons from Emerging Markets for Frontier Economies." *IMF Conference* (March 2nd, 2015). Last accessed on April 17th, 2016: https://www.imf.org/external/np/speeches/2015/030215.htm.

Mihaljek, Dubravko. "The Financial Stability Implications of Increased Capital Flows for Emerging Market Economies." *BIS Papers, No. 44* (2004). Last accessed on April 6th, 2016: http://www.bis.org/publ/bppdf/bispap44b.pdf.

Moore, Elaine, et al. "Guatemala Bucks EM Trend with Prospect of $500m Eurobond." *The Financial Times Database* (January 13th, 2016). Last accessed on March 24th, 2016: http://www.ft.com/intl/cms/s/0/e15303e8-ba1f-11e5-a7cc-280dfe875e28.html.

MSCI. "MSCI Annual Market Classification Review." *MSCI Database* (n.d.). Last accessed on April 9th, 2016:
https://www.msci.com/market-classification.

Neely, Christopher J. "Lessons from the Taper Tantrum." *The Federal Reserve Bank of St. Louis, Economic Synopses* (January 28th, 2014). Last accessed on March 2nd, 2016: https://research.stlouisfed.org/publications/economic-synopses/2014/01/28/lessons-from-the-taper-tantrum/.

Rodriguez, Marius, and Thomas Wu. "The Effect of Capital Controls and Prudential FX Measures on Options-Implied Exchange Rate Stability." *The Federal Reserve Bank of San Francisco, Working Paper Series* (May 2013). Last accessed on February 17th, 2016: http://www.frbsf.org/economic-research/files/wp2013-20.pdf.

Sahay, Ratna, et al. "Emerging Market Volatility: Lessons from the Taper Tantrum." *IMF Staff Discussion Note* (September 2014). Last accessed on April 19th, 2016: https://www.imf.org/external/pubs/ft/sdn/2014/sdn1409.pdf.

Sahay, Ratna, and Preya Sharma. "Emerging Markets & Volatility: Lessons from the Taper Tantrum." *iMFdirect, IMF Blog* (December 9th, 2014). Last accessed on May 1st, 2016: https://blog-imfdirect.imf.org/2014/12/09/emerging-markets-volatility-lessons-from-the-taper-tantrum/.

Schindler, Martin. "Measuring Financial Integration: A New Data Set." *IMF Staff Papers* (December 23rd, 2008). Last accessed on April 7th, 2016: http://www.palgrave-journals.com/imfsp/journal/v56/n1/full/imfsp200828a.html.

The Economic Times. "Volatile Capital Flows Pose Risk to Emerging Economies: RBI." *The Economic Times Database* (January 31st, 2012). Last accessed on April 19th, 2016: http://articles.economictimes.indiatimes.com/2012-01-31/news/31010638_1_capital-flows-capital-controls-economies.

The Financial Times. "Special FX: The Asset Class That Thrives on Volatility." *The Financial Times Database* (February 4th, 2009). Last accessed on April 23rd, 2016: http://www.ft.com/intl/cms/s/0/de39e20a-f2e7-11dd-abe6-0000779fd2ac.html#axzz46hiKdchO.

The Graduate Institute, Geneva. "Chinn-Ito Financial Openness Index." *The Graduate Institute, Geneva Database* (January 2014). Last accessed on April 21st, 2016: http://graduateinstitute.ch/home/study/academicdepartments/international-economics/md4stata/datasets/chinn_ito.html.

Transparency International. "Corruption Perceptions Index 2013." *Transparency International Database* (n.d.). Last accessed on April 4th, 2016: http://www.transparency.org/cpi2013/results#myAnchor1.

U.S. Securities and Exchange Commission, prepared by the Office of Investor Education and Advocacy. "Interest Rate Risk – When Interest Rates go up, Prices of Fixed-rate Bonds fall." *SEC Investor Bulletin* (June 2013). Last accessed on April 1st, 2016: https://www.sec.gov/investor/alerts/ib_interestraterisk.pdf.

United Nations Conference on Trade and Development. "When the Tide Goes Out: Capital Flows and Financial Shocks in Emerging Markets." *Policy Brief No. 40* (December 2015). Last accessed on April 20th, 2016: http://unctad.org/en/PublicationsLibrary/presspb2015d14_en.pdf.

Wagner, Jeremy. "Interest Rates and the FX Market." *DailyFX Website* (July 3rd, 2012). Last accessed on April 13th, 2016: https://www.dailyfx.com/forex/education/trading_tips/daily_trading_lesson/2012/07/04/Interest_Rates_and_the_FX_Market.html.

2. Data Cited

Public Data

Equities

BIST 100. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/ise-100-historical-data.

Bombay Sensex. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.bseindia.com/indices/IndexArchiveData.aspx.

Bovespa. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/bovespa-historical-data.

FTSE SET Large Cap. Daily Quotes. Range: 05/21/2012 - 05/23/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/ftse-set-large-cap-historical-data.

FTSE/JSE All Share. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/ftse-jse-all-share-historical-data.

IGBC. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/col-general-historical-data.

IGBVL. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/lima-stock-exchange-general-historical-data.

IPC All-Share. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/ipc-historical-data.

IPSA Select. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/ipsa-historical-data.

Jakarta Composite. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016:
http://www.investing.com/indices/idx-composite-historical-data.

Kuala Lumpur Composite. Daily Quotes. Range: 05/21/2012 - 05/23/2013. Last accessed on April 9th, 2016:
http://finance.yahoo.com/q/hp?s=^KLSE&a=11&b=3&c=2012&d=04&e=21&f=2013&g=d.

Shanghai Composite. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016:
http://www.investing.com/indices/shanghai-composite-historical-data.

VNI. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/vn-historical-data.

WIG. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 9th, 2016: http://www.investing.com/indices/wig-historical-data.

Bonds

Brazil 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/brazil-10-year-bond-yield-historical-data.

Chile 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/chile-10-year-bond-yield-historical-data.

China 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/china-10-year-bond-yield-historical-data.

Colombia 10-Year Bond Yield. Daily Quotes. Range: 07/10/2012 - 05/24/2013. Last accessed on April 10th, 2016:

http://www.investing.com/rates-bonds/colombia-10-year-bond-yield-historical-data.

India 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/india-10-year-bond-yield-historical-data.

Indonesia 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/indonesia-10-year-bond-yield-historical-data.

Malaysia 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/malaysia-10-year-bond-yield-historical-data.

Mexico 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/mexico-10-year-historical-data.

Peru 9-Year Bond Yield. Weekly Quotes. Range: 09/23/2012 - 05/25/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/peru-9-year-bond-yield-historical-data.

Poland 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/poland-10-year-bond-yield-historical-data.

South Africa 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/south-africa-10-year-bond-yield-historical-data.

Thailand 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/thailand-10-year-bond-yield-historical-data.

Turkey 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/turkey-10-year-bond-yield-historical-data.

Vietnam 10-Year Bond Yield. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 10th, 2016:
http://www.investing.com/rates-bonds/vietnam-10-year-bond-yield-historical-data.

FX

US Dollar to Brazil Real. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-brl-historical-data.

US Dollar to Chilean Peso. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-clp-historical-data.

US Dollar to Chinese Yuan. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-cny-historical-data.

US Dollar to Colombian Peso. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-cop-historical-data.

US Dollar to Guatemalan Quetzal. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-gtq-historical-data.

US Dollar to Indian Rupee. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-inr-historical-data.

US Dollar to Indonesian Rupiah. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-idr-historical-data.

US Dollar to Malaysian Ringgit. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-myr-historical-data.

US Dollar to Mexican Peso. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-mxn-historical-data.

US Dollar to Peru Sol. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-pen-historical-data.

US Dollar to Polish Zloty. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-pln-historical-data.

US Dollar to South African Rand. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-zar-historical-data.

US Dollar to Thai Baht. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-thb-historical-data.

US Dollar to Turkish Lira. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-try-historical-data.

US Dollar to Vietnamese Dong. Daily Quotes. Range: 05/21/2012 - 05/24/2013. Last accessed on April 8th, 2016:
http://www.investing.com/currencies/usd-vnd-historical-data.

Dummy Variables
Annual Percentage Change of CPI in 2013. All countries. Last accessed on April 2nd, 2016:
http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG.

Annual Percentage Change of GDP Growth Rate in 2012, 2013. All countries. Last accessed on April 2nd, 2016:
http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries.

Corruption Perceptions Index in 2013. All countries. Last accessed on April 2nd, 2016:
http://www.transparency.org/cpi2013/results#myAnchor1.

Current Account Balance as Percentage of GDP in 2013. All countries. Last accessed on April 2nd, 2016:
http://data.worldbank.org/indicator/BN.CAB.XOKA.GD.ZS.

Deposit Interest Rate in 2013. India. Last accessed on April 2nd, 2016:
https://www.karnatakabank.com/ktk/InterestChartTD.jsp.

Deposit Interest Rate in 2013. Poland. Last accessed on April 2nd, 2016:
https://ycharts.com/indicators/poland_central_bank_deposit_interest_rate.

Deposit Interest Rate in 2013. South Africa, Malaysia, Thailand, China, Brazil, Colombia, Indonesia, Vietnam, Turkey, Chile, Mexico, Peru, Guatemala. Last accessed on April 2nd, 2016:
http://data.worldbank.org/indicator/FR.INR.DPST/countries.

Market Capitalization of Listed Domestic Companies as Percentage of GDP in 2013. All countries. Last accessed on April 2nd, 2016:
http://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS.

Private Data

EPFR Global Database.