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Andrew Kliewer April 14, 2020

Shaping the “Monetary Tsunami:” Political Institutions and Spillovers from Quantitative Easing

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Abstract

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Following the Great Recession of 2007-2009, central banks in developed countries faced a sluggish economy not responding to traditional monetary tools. With interest rates near, at, or below zero, these banks turned to a novel solution: “quantitative easing” (QE). By purchasing government bonds and private securities through QE programs, central banks were able to drive down long-term interest rates and provide monetary stimulus to depressed economies. These programs led to unintended “spillovers” in emerging market economies. Investors moved their assets to these countries seeking higher returns as developed countries pushed down long-term interest rates. When central banks tapered QE by gradually reducing asset purchases, capital flowed out of these nations, causing negative macroeconomic effects.

A significant amount of heterogeneity exists in the level of spillover effects emerging markets experienced. I hypothesize that political institutional features of these nations, namely government and central bank transparency, central bank independence, and level of democracy, can explain this variation. Using methodology developed by MacDonald (2017) and others, I run a linear multivariate regression interacting these four political variables with US Federal Reserve asset purchases, looking at changes in the bond, stock, foreign exchange, and property markets of emerging economies between December 2009 and December 2014. I find evidence that each of these institutional factors influence spillovers to a degree, with central bank independence having the strongest effect. These variables amplify or mediate spillovers in the bond market to the greatest extent, although I find some evidence of influence in the property market as well. Ultimately, my research shows that political institutions can explain some of the variation in spillovers across countries. Further research could provide more definitive answers concerning the mechanism of these effects.

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Table of Contents

Tables and Figures

Introduction

In the height of the Great Recession, policy makers at the United States Federal Reserve (or "Fed") and other central banks faced a situation unprecedented in modern history. The developed world had been plunged into the worst economic crisis since the Great Depression, leading to widespread job losses as the financial panic generated in part by the burst of the US housing bubble bled over into the global economy. However, in December 2008, the Fed's benchmark short term interest rate hit zero. When central banks hit this zero-lower interest rate bound, they are essentially out of room to influence monetary policy through conventional methods. Instead, the Fed turned to the innovative approach of large-scale asset purchases, also referred to as quantitative easing (QE) to stimulate the economy. During its three QE programs between 2009 and 2014, the Fed purchased trillions of dollars in US Treasury bonds and mortgage-based securities from government-backed Fannie May and Freddie Mac (Haltom and Walmon 2012, 1). By the end of the program, the Fed's balance sheet had doubled to $4 trillion (Federal Reserve Board).

QE programs were also adopted by the central banks of the United Kingdom, Europe, and Japan. However, while the policy decisions regarding QE and its intended consequences are focused on the economies of these countries themselves, the increasingly integrated nature of the world economy and globalization of financial flows ensured that the effects of QE programs did not stay within them. Research has shown that QE programs have caused "spillover effects" in countries other than the countries conducting QE, particularly emerging market economies. Emerging market economies are nations that have enjoyed a stable growth rate and stable

political environment over the past several decades but are not yet considered to be developed (Lim et al. 2014, 2). With long term interest rates driven down in developed countries by QE, investors sought out what they considered to be relatively safe options for higher returns in these emerging market economies. However, this rapid influx of capital into emerging economies had negative economic effects on many of these countries, as they struggled with the surge of financial inflows and fear of sudden outflows following the end of QE (Lim et al. 2014, 3). Between 2009 and 2013, gross financial inflows to developing countries increased at twice the pace they had in the period between 2002 and 2006, in what Brazil's President Dilma Rousseff called a "monetary tsunami" (Lim et al. 2014, 5) (Blackden 2012). When the Fed announced the end of the final QE3 program in 2013, emerging market economies saw rapid capital outflows. Research has found that around 5% of capital flows in equity markets and 25% of flows in bond markets of emerging market economies in this time period can be attributed to US Federal Reserve policy. (Fratzer and Lo Duca 2012, 4)

What's also striking is how widely these spillovers varied across markets. Some countries had wide swings in their asset markets, while others saw relatively little change during the QE time period. Figures 9 and 10 show the wide heterogeneity in the changes in bond yields and stock prices across countries during US QE. Examples of this at the country level can be seen in Figures 6, 7, and 8, which look at bond yields in Argentina, Brazil, and Chile during the US QE program. Argentina experiences the most variation, followed by Brazil and then Chile. The question remains: what explains this variation? Existing research into the spillover effects of QE, as outlined below in my literature review, has been primarily focused on its economic causal pathways and the resulting effects. Eichengreen et al. (2014) identify several factors which influence the level of spillovers a country sees, including exchange rate policy, financial market

size, and current account deficits (14). Bowman et al. (2015) additionally find that countries with high domestic interest rates have greater vulnerability to spillovers (14). MacDonald (2015) finds that countries with greater capital market openness (modeled based on how easily capital flows to United States) experience greater spillovers during the time period. Finally, Bhattarai (2015) further identifies government debt and interest rates as factors which explain heterogeneity (21).

While these factors certainly do account for some of the variation in spillovers from QE, another aspect of this phenomena that has yet to be fully explored is how the political institutions and features of the emerging economies themselves shape spillover effects. An emerging area of research focuses on how these factors can explain variation in spillover effects. Fratzer and Lo Duca (2012) briefly explore how "institutional quality" in general mediates spillover effects, however no paper has looked at how different political features of emerging economies can explain variation in spillovers. Certain political institutions can change the incentives of and information available to investors, as shown by existing research I detail below. For example, in some cases they increase the information investors have when making decisions (e.g. government and central bank transparency). In other cases, they can solve commitment problems, such as how independent central banks can credibly bind governments to future deficit reduction. Therefore, while the economic variables explored in existing research may explain how countries can alter many of the channels through which spillover effects occur, they fail to explain many of the basic features which can alter investor behavior. My research question is:

What explains variation in QE's spillover effects across countries and time?

And more specifically:

To what extent is such variation explained by differences in political institutions of emerging market economies?

Given this existing research into how political institutions shape investor behavior, I theorize that certain institutional aspects of a country could amplify or mitigate the spillover effects of QE in that country. Building off Fratzscher and Lo Duca's (2012) work, I seek to understand how specific political and institutional features mediate spillover effects. To determine which specific institutions to examine, I turn to existing research on how political and institutional features of a country influence investor behavior. Spillover effects are at a basic level the result of individual investor behavior, and so the same factors that affect investor behavior should influence spillover effects. I argue that three political features in particular - government and central bank transparency, central bank independence, and level of democracy can explain variation in spillover effects between countries. My arguments are that:

1. *Emerging economies with high levels of macroeconomic transparency by their government and central bank will experience milder spillover effects from QE.*
2. *Emerging economies with a more independent central bank will experience lessened spillover effects from QE.*
3. *Emerging economies with a higher level of democracy will see reduced spillover effects from QE.*

To evaluate how these institutional features of emerging economies can explain variation in spillovers across countries, I regress the change in Federal Reserve asset purchases, which are

the mechanism the Federal Reserve uses to conduct Quantitative Easing, on four asset-price indicators of capital flows. These are: equity prices, sovereign bond yields, exchange rates relative to the US dollar, and property prices. As I explain below, these asset price indicators are closely tied to capital inflows and outflows, and their availability allows me to form a more complete picture of spillovers compared to using capital inflow and outflow data. In my regression, I include interaction terms for my three mediating variables of interest (transparency, central bank independence, and democracy level), so that I can gauge the independent effect of each of these variables on cross-border spillovers. Through my analysis, I find some evidence in support of my hypotheses. It appears that my political variables of interest have the greatest mediating effect in the bond market, and a weaker effect on other markets. Additionally, central bank independence is the political variable with the most consistent mediating effect across my analysis, although other variables do have some mediating effect as well.

While not all political variables decrease spillovers in each market, my analysis does show that political institutions and features of a country can serve to mitigate spillover effects. This is increasingly important now with both US and European short-term interest rates close to zero as central banks face the prospect of a prolonged global recession (Fed Board of Governors, European Central Bank). Central banks such as the Bank of England are again turning to Quantitative Easing to stimulate tanking economies as they run out of room to lower traditional short-term interest rates (Elliot 2020). Knowing the answers to the questions I pose could help governments and central banks in emerging economies adopt institutional features that decrease spillover effects. This knowledge could also help investors avoid nations that have features that contribute to increased spillover effects. Finally, this research fills an existing gap in the literature concerning how political institutions affect investor behavior in the context of QE.

Given the large external shock to emerging market economies that QE creates, these programs constitute a relatively unique opportunity to see how investor behavior can change over a short period of time due to market pressures. By specifically examining asset prices, I look at how these investor decisions translate to the broader economies of emerging markets.

Literature Review: Spillover Effects

To examine how political institutions mediate spillover effects, it is first necessary to define spillover effects. In essence, spillovers are externalities, unintended cross-border consequences of programs designed to stimulate domestic economies. They are transmitted through the behavior of investors, who make individual decisions on whether to invest in markets across the globe. When these investors rely on the same framework in making investment decisions, the effects quickly compound. Lim et. al (2014) find three causal mechanisms for how investors' decisions related to quantitative easing are transferred to emerging economies (6). In the portfolio balance channel (mentioned above) QE reduces the amount of privately available domestic long-term investment opportunities including government bonds and mortgage backed securities, leading investors to seek higher interest rates in emerging economies. In the liquidity channel, central bank purchases of bonds and securities are credited to private banks as reserves, essentially generating more currency. This leads to an overall increase in lending, some of which flows to emerging economies. Finally, QE serves a signaling role, demonstrating that central banks are committed to keeping interest rates low and diminishing deflation concerns within developed countries. This increases investor confidence and capital flows to emerging economies. Lim et al. (2014) find evidence that spillover effects occurred through all three mechanisms.

While rapid capital inflows to emerging economies during QE (and outflows following its conclusion) are the immediate manifestation of spillovers into emerging economies, they do not measure the full extent of economic spillovers. Rapid capital inflows and outflows can also affect other markets within emerging economies, leading to further economic consequences. Bouraoui (2015), using a sample of five emerging economies (Brazil, India, Turkey, Tunisia and South Africa), finds that the Fed's announcement of QE's end depreciated exchange rates for their currencies relative to the US dollar, following an initial appreciation during QE (1568). This provides further evidence of spillover effects, showing that exchange rates of emerging economies can be affected. Sudden currency depreciation can trigger further effects, shaking investor confidence and increasing inflation. Bouraoui further finds that this exchange rate depreciation can be explained due to capital outflows or the expectation of capital outflows following the end of QE (1567).

Bhattarai (2015), looking at the initial implementation period of US QE, finds evidence of further markets that spillovers from QE can affect. He finds that an expansionary QE shock is highly correlated with rapid increases in stock prices and a reduction in long-term bond yields in emerging market economies, as well as currency depreciation and capital inflows (4). However, there is little to no effect on consumer prices and output in these countries, which Bhattarai attributes to the fact that the expansionary effect of capital inflows can be counteracted by the contractionary effect of currency appreciation on emerging economies that are export oriented. Notably however, Bhattarai only examines the period when US QE programs are in place, meaning that their study does not preclude the possibility of more clearly defined negative effects to economic output in emerging economies following QE's end.

Finally, Stolbov and Shchepelevab (2016) specify several other indicators of financial stress in emerging economies. They note an increase in financial stress in emerging economies between 2013 and 2015, which they attribute to fears of expected US monetary policy tightening as QE winds down (4). To measure "financial stress" precisely, they construct a metric called the Financial Stress Index (FSI). The FSI takes into account five data indicators: riskiness of sovereign debt, stock market risk, banking sector instability, currency risk, and residential real estate market fragility (3). These are respectively measured through: the prices of credit default swaps on sovereign debt (essentially investors' belief in the risk of sovereign default), monthly change and variance in stock prices, short-term interbank lending rates, currency depreciation against the US dollar, and changes in the nominal prices of real estate assets. Each of these are potential variables that could denote spillover effects from QE. These metrics provide additional insight into how QE can affect emerging economies beyond just examining capital inflows and outflows. Due to lack of data availability, I do not use the FSI in my methodology. However, it is helpful to note that it incorporates data from many of the same markets I ultimately use as indicators of spillover effects, such as sovereign bond markets, equity markets, and foreign exchange rates.

As laid out above, spillover effects manifest themselves differently within each country. Capital inflows during QE can lead to increases in stock and real estate prices, due to the creation of artificially inflated bubbles. Further evidence of this is found by Bowman et al. (2015) who state that Fed's announcements of the beginning of QE programs can be seen through increases in stock prices, decreases in sovereign bond yields, and increases of exchange rates in emerging economies (39). Additionally, MacDonald (2015) similarly finds that Fed QE was associated with a large rise in equity prices across emerging economies along with a decrease in sovereign

yields (141). Looking at the end of QE, Eichengreen et al. (2014) find that spillovers following the end of QE are realized through drops in exchange rate, outflows of foreign currency reserves, and collapses in stock prices (5).

When QE ends, the bubble "bursts" with sudden collapses in the prices of these markets along with devaluation of the country's currency. In some cases, this can also lead to an increase in the perceived risk of the country's sovereign debt, making it more difficult for governments to borrow and increasing the potential risk of sovereign default. Capital outflows could also decrease the amount of credit available in emerging economies' domestic banking systems, increasing borrowing rates and leading to economic contraction. As detailed by Stobov and Shchepelevab (2016), real estate prices are a market that is particularly susceptible to the development of asset bubbles from QE. Therefore, some combination of currency values, stock markets, sovereign bond yields, real estate markets, and banking sector performance indicate how spillovers from QE are realized in the broader economy of each country. Based on data availability, I ultimately incorporate the first four of these indicators in my analysis.

These findings support the theory that spillovers from quantitative easing affect overall economic conditions, beyond simply capital inflows and outflows, within at least some emerging market economies. However, they do fail to answer the question of why these spillovers vary in intensity and direction across countries. Existing literature mostly looks at economic variables to explain this variation but fails to consider political institutions. Bhattarai (2015) identifies five countries, which he calls the "Fragile Five," that respond more strongly across of these variables to US QE programs. These countries are: Brazil, India, Indonesia, Turkey, and South Africa. In the time period examined, the Fragile Five countries had higher long-term interest rates than other countries examined, making them more attractive to investors seeking high returns and

leading to them receiving greater capital inflows. These nations also had higher levels of current account deficits, fiscal deficits, and government debt to GDP ratio. However, while Bhattarai looks at surface-level economic indicators that can explain some of the variation between nations in spillover effects, he does not look at the underlying political variables that may influence these economic factors. Based on my dataset, these countries have lower levels of central bank independence, but higher levels of my other mediating variables. While not in line with some of my hypotheses, this does conform to my hypothesis that central bank independence has explanatory power over levels of spillover effects in emerging economies. It is probable that the lack of an independent central bank in these nations is a direct cause of many of the fiscal features that left them susceptible to spillovers. As I further explain below, independent central banks can discourage excessive deficit spending and government borrowing that would leave a country highly reliant on foreign capital inflow.

Fratzscher and Lo Duca (2015) seek to explain heterogeneity in spillover effects by looking at political in addition to economic variables. They find that countries with an active monetary policy (defined by variation in interest rates) and high-quality institutions (from an aggregate index) experience lower spillover effects (23). This is an important finding in determining that institutions can play a role in shaping investor response to QE. This ties into my theories that countries with robust institutions and independent central banks are able to avoid spillover effects by credibly committing to taking actions that are attractive to investors in the long run (e.g. deficit reduction or counter-cyclical monetary policy). However, Fratzscher and Lo Duca do not examine how specific institutional features can solve these commitment problems. They also leave unanswered the question of how institutions can affect investor behavior

surrounding spillovers through transparency or lack thereof. Both of these are questions I seek to answer in this paper.

Literature Review: Political Institutions

Spillover effects can be viewed through the framework of two political science frameworks, incomplete information and commitment problems, both of which describe issues that arise during bargaining interactions. When an investor decides to buy an investment such as a stock or bond in a foreign country, they are engaging in a bargaining interaction with outside actors. As a general principle, market forces determine the price of these investments. If borrowers and lenders have access to the same information, they can agree on a mutually acceptable price for investments based on the fundamental soundness of the investment. Bonds of countries with a higher risk of default should pay higher risks premium than those of safer investments. Similarly, the prices of stocks and global currencies should reflect investors' expectations of how these investments will perform in the future.

However, with incomplete information concerning the security of these investments, investors lack the data they need to make informed decisions based on such factors. Instead, they may simply base their investment decision on what other investors are doing, leading to an irrational "herding" effect. Additionally, even if investors have access to complete information when making decisions, there may still be uncertainty about actors' future decisions. "Commitment problems" between lenders and borrowers arise when one side faces uncertainty on whether the other will honor its promises in the future. For example, a state could default on its debt, preventing bondholders from being paid the full value of their investment. A foreign government could also impose capital controls, leaving investors with stocks or foreign exchange

reserves unable to withdraw their assets. As existing research I detail in this section shows, these information and commitment problems cause investors to act in otherwise irrational ways.

A primary way that investors receive information about a country's financial condition is the release of macroeconomic data by a country's government and central bank. Such data can indicate the decision-making process behind a country's fiscal and monetary policies, allowing investors to assess exactly what these policies are and adjust their expectations accordingly. It can also indicate the overall economic health of a country and the actors within through metrics such as unemployment or inflation rates. However, without access to accurate financial data, investors are prone to "herding," which occurs when investors make decisions based on the actions of other investors rather than economic data or market fundamentals. In countries that lack macroeconomic transparency, I theorize that investors are particularly prone to herding behavior, since they lack access to sound data on which to make investment decisions. Herding would exacerbate the spillover effects of QE, likely leading investors to invest in and withdraw from emerging market economies simply because of the decisions of other investors. This would increase the overall rate of capital inflows and outflows to emerging market economies during and after QE. My first hypothesis is therefore:

H1: Higher levels of macroeconomic transparency by governments and central banks of emerging market economies will lead these economies to experience milder spillover effects from QE.

Gelos and Wei (2002) find that investor herding behavior is higher in countries with less transparent governments, based on the public availability of macroeconomic data (15). More

specifically, examining rates of capital outflows during financial crises, they find that more opaque countries experience greater capital outflows during the first month of the crisis. Under this same logic, countries with higher levels of transparency should see lessened capital outflows following the end of QE. This demonstrates the underlying causal link between herding behavior and rapid capital outflows – the same political conditions that increase herding behavior should lead to large outflows of capital following the end of QE.

Wang and Huang (2018) find a similar effect with corporate transparency. When the Taiwanese began to rate companies through an Information Disclosure and Transparency Ranking System (IDTRs), based on their levels of transparency, the country saw an overall decrease in investor herding behavior (1838). By pressuring companies to be more transparent, the Taiwanese government was able to reduce "information cascades" where information asymmetry between companies and investors can produce herding behaviors. While corporate transparency is not the same metric as government transparency, the mechanisms by which both reduce herding behavior are similar. The overall macroeconomic conditions of a country are ultimately an aggregate for the condition of individual actors such as companies within that country and should give investors a general idea of potential risks for investing in a particular emerging economy. If investors exhibit herding behavior when making decisions for individual companies, they should also do so for entire countries.

Additionally, it is important for central banks within each country to be transparent concerning their decision-making process and release of macroeconomic data for the same reasons outlined above. In many cases, central banks have as much influence over the economy as elected officials, meaning central bank policy will highly influence investor decisions. Although no existing research explicitly links central bank transparency to decreases in herding

behavior, Papadamou et al. (2014) find a negative link between central bank transparency and stock market volatility (375). If central banks are more transparent about their policy decisions and data they collect, investors have greater ability to anticipate macroeconomic changes and act accordingly. This should diminish herding behavior and decrease the probability of rapid swings in the stock market. Central bank transparency should therefore reduce sudden inflows of capital during QE and outflows of capital following its end through the same mechanism as overall government transparency: by giving investors accurate information concerning the strength of a nation's economy and its monetary policy.

Investors also face problems in trusting whether nations will honor commitments to protect their investments. The nature of investing in a foreign country creates a time inconsistency problem where investors first decide to invest in a country based on present and expected future market conditions. However, once that money is invested, power then shifts to the government of that country to decide whether it will honor the original agreement and preserve the conditions that the investment was made under. Governments have a wide variety of tools in their belt including defaulting on debt, modifying interest rates, and imposing capital controls which can rapidly alter investment conditions. Countries can "tie their hands" by giving power to political institutions unlikely to impose policies which hurt investors without due cause. I focus on two institutions in particular: an independent central bank and democratic government. As I detail below, both of these features generally give decision-making power to groups which have an incentive to preserve economic stability rather than change conditions for short term benefit. My second hypothesis is:

H2: Having a more independent central bank will lead emerging market economies to experience lessened spillover effects from QE.

I hypothesize that independent central banks reduce the likelihood and severity of spillovers by credibly committing countries to several policies which promote stability. Bordea and Hicks (2015) claim that, especially in democracies, having an independent central bank signals fiscal discipline and a commitment to keeping inflation low (6). Independent central banks can also credibly respond to short term drops in output or other forms of economic volatility without generating excessive inflation or exchange rate deprecation (8). This increases the predictability of returns to capital by giving investors greater faith in the ability of the central bank to respond to sudden economic changes. Bordea and Hicks find that in democracies, central bank independence increases overall capital flows and decreases government borrowing costs (24). Level of democracy is important because the existence of features such as strong institutional checks and balances and a free press ensures that a central bank can remain independent (13). In countries such as Venezuela, nominally independent central banks have made decisions under pressure from populist or autocratic governments.

Based on the causal mechanisms outlined by Bordea and Hicks, I theorize that central bank independence both increases capital inflows during QE and reduces capital outflows following its end, by giving investors faith that the central bank can effectively respond to any short term instability caused by capital outflows due to higher US interest rates. This also ties into the conclusions of Fratzscher and Lo Duca (2012), who find that countries with more activist monetary policies (defined as greater variation in interest rate over the QE time period) see reduced spillover effects (23). Under my theory, independent central banks should be more

willing to adjust interest rates to prevent the development of asset bubbles and sudden capital inflows and outflows that characterize QE spillovers by prioritizing long term economic growth and low inflation over short term growth.

Bordea and Higashijima (2017) focus on another causal mechanism that can lead independent central banks to reduce spillover effects. By working to counteract the expansionary effects of deficit spending, independent central banks can disincentivize countries with easy access to credit from incurring excessive levels of debt. Central bankers are more conservative regarding inflation and more focused on long term economic stability than elected politicians and are likely to enact counter-cyclical policies to prevent runaway inflation from deficit spending (51). Countries with independent central banks should therefore run lower deficits than countries that do not meet these criteria (48). Bordea and Higashijima find evidence that, in countries with a strong rule of law, which is highly related to democracy, independent central banks are correlated with reduced government deficits (66). Since high levels of government deficits can be indicative of economic instability and increase the risk of government default, I theorize that investors are more likely to pull out of countries that run high deficits with the inflow of capital they received from QE. When QE ends and investors stop purchasing the sovereign bonds of those countries, this can potentially lead to credit rating downgrades and even a default on the national debt, both of which would further accelerate capital withdrawals and increase economic instability. Therefore, an independent central bank should reduce the boom and bust cycle associated with QE in emerging economies.

Democracy is another institutional feature which can commit countries to pursue long term economic stability. As mentioned above, while Fratzscher and Lo Duca (2012) find that

higher levels of institutional quality reduce spillovers, existing literature also supports my theory that democracy itself mediates spillover effects. This explains my third hypothesis:

H3: Emerging Market Economies with a higher level of democracy will see reduced spillover effects from QE.

I explain two main factors that I believe mediate level of spillover effects through democracy: (1) property rights through capital controls and (2) political risk. Research such as Cao and Ward (2014) and Papaioannou (2004) provides evidence that democracies are more likely to respect property rights. In the case of liquid investment, this means that democracies would be less likely to impose capital controls restricting investor withdraws. While in theory these capital controls would reduce sudden capital outflows, research finds that they are largely ineffective and can in fact increase capital outflows effects by altering investor behavior (Edwards 1999, 69). Political risk theory also suggests that democracies are less likely to experience spillover effects due to their lower risk of policy instability.

Cao and Ward (2014) find that portfolio investors use level of democracy as a "shortcut" to determine whether a country has underlying conditions that make it attractive for investment, such as greater respect for property rights (218). Since information gathering about a country's exact level of respect for property rights is time-consuming and costly, investors rely on the fact that the same conditions that underly established democracy (freedom of speech, constraints on executive power, and a strong rule of law) can also guarantee credible property rights (218). While non-democracies may respect property rights in some instances, there are few institutional features that prevent autocratic governments from reversing any previously guaranteed

protections for property rights (224). Additionally, although the portfolio investment that characterizes capital inflows and outflows during QE is relatively liquid, it can be held in place through capital controls to varying degrees. This means that investors still have incentives to keep their money in countries where its mobility is unlikely to be restricted, which is correlated to democracy level in my theory. Cao and Ward find that democracies experience higher levels of portfolio investment and that this effect can be attributed to investors' subjective opinion of a country's property rights (241). These opinions are highly correlated to democracy level.

Papaioannou (2004) confirms the link between institutional quality and investment, finding that countries with well-functioning legal systems that have high levels of contract enforceability receive higher levels of foreign investment (27). Finally, Kastner and Rector (2003) find that countries with more veto players, characteristic of a stable democracy, are less likely to impose capital controls (20). This relationship is especially strong during periods of uncertainty such as the beginning or end of QE, when rapidly changing economic conditions could disrupt prevailing international norms concerning financial openness. Based on these findings, investors should generally be able to use democracy level to determine whether a country will allow mobility of their portfolio investment. In non-democracies, my theory states investors would likely rapidly withdraw their portfolio investment immediately following any announcement concerning the end of QE programs, in anticipation of the imposition of capital controls. Even if these capital controls are ultimately ineffective in preventing capital outflow as suggested by Edwards (1999), the threat of their imposition increases investor uncertainty and can in fact accelerate capital withdrawals. Edwards finds that in 70% of cases studied, capital outflow increased after the controls were put in place (7). Therefore, the threat of capital controls and the imposition of the controls themselves should exacerbate spillover effects.

Existing research into the relation between democracy level, political risk, and spillover effects also supports the theory that democracy reduces spillover effects. Quinn and Wooley (2001) theorize that democracies tend to be "risk averse" when it comes to economic policy decision making as voters tend to view stable long-term growth as a high priority (636). This is in contrast to the behavior of ruling elites in autocracies, who are more likely to exhibit risk seeking behavior (637). They find evidence both that democracies do show more stable patterns of economic growth and that voters punish volatility in economic policy by voting against incumbents who pursue volatile policies (653). Furthermore, Rodrik (1991) and Feng (2001) find that policy uncertainty reduces overall level of foreign investment. Since resource reallocation is costly, investors are less likely to put their money in countries where it may be subject to sudden future policy changes (Rodrik 1991, 230). Feng focuses more specifically on government capacity: whether the government is able to achieve its desired policy (275). Fluctuation in this variable can indicate governments lack consistency in their ability to produce desired outcomes, leading to policy uncertainty. Feng finds that countries with higher levels of policy uncertainty based on this measure see lower levels of foreign investment (283).

These findings can be extended to discuss spillover effects from QE. Since democracies are less likely to experience policy volatility and investors dislike policy volatility, it follows that investors are more likely to put their money into democracies. This is particularly true during and immediately following QE, considering that QE is an external shock to emerging economies that can lead to capital rapid inflows and outflows. Non-democracies may be more tempted to respond to this shock with capital controls or sudden changes in macroeconomic policy. Therefore, investors may be tempted to withdraw their capital from these countries in response to

or in anticipation of policy changes following the winding down of QE. This would lead to greater spillover effects in these non-democratic emerging economies.

Data and Methods

I base my strategy for data analysis on several existing studies that similarly examine mediating variables for QE, including Eichengreen et al. (2014), Bowman et al. (2015) and MacDonald (2017). Each of these studies conduct a regression analysis on various market indicators from emerging market economies to assess how different economic variables mediate spillover effects from QE. While they differ in the exact time periods they look at and their specific methods, all of these studies seek to explain the heterogeneity in how US QE affected emerging market economies. I use similar methods to these studies, but instead examine how political variables mediate the different levels of spillover effects. Following their methodology, I use the US Federal Reserve's three QE programs as my benchmark for examining the effects of QE on emerging market economies. Other central banks including the European Central Bank and Bank of Japan were conducting QE in a similar time frame. However, MacDonald (2017) finds that while emerging market economies were affected by these programs, the "magnitude of the spillover was substantially less" than that of the Fed's QE program (153). Therefore, assuming I examine a diverse group of emerging market economies, my results should be more influenced by US QE than other programs.

I operationalize my dependent variable of spillover effects through several indicators. Although the central mechanism for the spillover effects is capital inflows and outflows (primarily through its most liquid form, portfolio investment), reliable daily and monthly investment flow data is unavailable for many countries. I follow the examples of the above

studies and use the prices of several assets within emerging market economies as my dependent variables. The indicators are (1) sovereign bond prices, (2) stock prices, (3) exchange rates compared to the US Dollar, and (4) real estate prices. Each of these indicators is subject to sudden changes during periods of rapid capital inflow and outflows (e.g. during and after QE). Data for these variables is available globally either monthly or daily as described below. For variables with daily data available, I take values from the last day of each month. My unit of analysis is the monthly values for each of these variables across the countries in my sample. Looking at these narrow intervals will allow me to measure the sudden changes in macroeconomic conditions that indicate spillover effects.

Sovereign bond yields are used by all three of the aforementioned studies as indicators of spillover effect from QE. Bond yields of emerging market economies decreased during QE and subsequently increased as QE ended, in some case changing more than yields on US bonds themselves (Bowman et al. 2015, 14). During QE, investors sought the relatively higher returns of sovereign bonds in emerging market economies, depressing the yields on those bonds as they became more sought after (although their yields remained higher than those of US Treasury bonds). As the Fed reduced its balance sheet following the end of QE, rates on long term US Treasury bonds rose, and investors reduced their purchases of the sovereign bonds of emerging market economies, raising the yields on these bonds. A similar mechanism saw stock prices of emerging market economies rise during QE and fall after its end, as investors sought higher returns in these countries markets and then pulled out (Eichengreen et al. 2014, 7). There is, however, a large spread in the actualized results of stock market changes, suggesting significant heterogeneity in how emerging market economies saw spillover effects

Exchange rates are also closely related to these phenomena, as many countries saw increases in their exchange rate during QE as capital flowed in, and depreciations as the program ended and capital flowed out (Bowman et al. 2015, 5). Like stock prices, there are significant differences among countries in the extent to which this occurred. Finally, although none of my comparison studies look at real estate prices as indicators of spillover effects, I believe there may be some benefit to doing so. As described in the theory section, Stobov and Shchepelevab (2016) find that collapses in real estate prices were significant drivers of financial stress in emerging economies along with falling stock prices. The same rapid inflow outflow cycle that affects the stock market therefore also likely applies to real estate prices in emerging market economies.

For stock prices and bond yields, I obtain daily data from Thomson Reuter's Datastream service, which provides a wide array of macroeconomic data. Daily exchange rates relative to the US are available from the International Monetary Fund (IMF), and quarterly property price data are available from the Bank for International Settlements (BIS). For bonds, I look only at 10-year maturities to ensure comparability across countries. Bond data comes from the JP Morgan Emerging Market Bond Index (EMBI) which mirrors sovereign bond yields. For stock market prices, I choose the available index that includes the broadest representation of companies. Taken together, these variables provide a fairly comprehensive picture of spillover effects in emerging market economies by capturing broad macroeconomic trends within each country.

For the mediating variables I describe in my theory section, I use indicators that most closely capture the concepts I am trying to measure. For government transparency, I use the data from Coplevitch et al. (2018) measuring each country's released macroeconomic data concerning the state of its financial system. This is essentially what I am trying to measure with transparency. For central bank transparency, I use the index from Dincer and Eichengreen

(2013), which is the same measure utilized by Papadamou (2014). With central bank independence, I use data from Garriga (2016), which includes data from 182 countries between 1970 and 2012. This measures three main aspects, each of which are relevant to my research: (1) policy independence, or the ability of the central bank to set its own policy (2) personnel independence, based on the tenure of and limited governmental influence over the bank's governors, and (3) financial independence, which reflects the ability of the bank to fund its own expenditures and avoid entanglement in fiscal policy. Due to minimal variation in these data as well as its lack of availability after 2012, I extend out the last remaining values for each country through 2014, ensuring I can include 2013 and 2014 in my analysis. Finally, for democracy, I will use the electoral democracy score from the V-Dem Project, which includes data for 202 countries between 1789 and 2019. The electoral democracy score measures the responsiveness of government to its citizens, and includes concepts such as free and fair elections, an independent media, and freedom of expression, all of which capture the essence of democracy.

Considering my large number of observations and the quantitative nature of the data I am observing, a multivariate regression will be my primary method of analysis. I run independent models for each of my dependent variables, each containing the four mediating variables. This method allows me to view the independent effect of QE on each of my dependent variables, as evidence exists that the levels of spillovers seen in each of the markets I examine varies among countries (Stobov and Shchepelevab 2016, 6) and (MacDonald 2017, 141). There are also several methods for modeling QE itself within a regression. Eichengreen et al. (2014) simply look at the time period between April and August 2013 that followed the Fed's initial announcement of QE tapering and a second announcement that reduced expectations of tapering (2). However, this method assumes change in asset purchases to be a constant and thus would not allow me to look

at non-linear trends during the entire QE period (buildup and tapering). Bowman et al. (2015) examine a larger portion of the QE period, between 2008 and 2013, using an event study approach. This means they examine the dependent variables on a daily basis just before and immediately following major Fed QE announcements (9). They code the announcements based on their content (i.e. bond buying or tapering) and adjust their expectations for response variables accordingly. While this method does allow for analysis across the QE period, it requires daily data, which is not available for some of my chosen variables. Therefore, I go with the approach of MacDonald (2017), who interacts her mediating variable with Fed asset purchases, which are the actual mechanism that the Fed uses to conduct QE.

For my primary model, I go one step further than MacDonald (2017) and use the changes in asset purchases, rather than the asset purchases themselves, as my independent variable. Looking at the change in asset purchases allows me to incorporate investors' expectations of changes in economic conditions from asset purchases into my model without directly coding each announcement. When the Fed announces the beginning of QE purchases, investors should adjust their expectations for the coming months accordingly, incorporating purchases in the near future into their decision-making calculus. Similarly, when the Fed announces a tapering and begins to slow purchase, investors know that long term interest rates in the US will begin to rise and change their investment strategy. This method allows me to more dynamically model investor behavior, as opposed to simply assuming it changes linearly with each additional asset purchase. It allows me to account in part for investors' expectation of future changes without including Federal Reserve QE announcements into my equation.

Like MacDonald (2017), I use monthly values of my data from December 2008 to December 2014, fully capturing the time period of US QE. The unit of analysis in my research is

therefore the monthly values from each country I observe during this time period. My model allows me to fully analyze and compare the effects of QE across emerging market economies for the 2009-2014 time period. Additionally, I take several steps in line with MacDonald's methodology to ensure uniformity across assets from different countries that begin at various levels and are measured in different units. I standardize all assets in the first month of measurement to ensure uniformity, and then take the log value of this variable to reduce the influence of outliers on my model. Finally, I take the second derivative of this variable to obtain my measure of changes in asset purchases for each nation.

Due to the complex nature of international finance and capital flows, it is impossible to fully account for every additional variable that could interfere with my analysis. However, MacDonald (2017) does include several control variables in her analysis that I include in my regression as well. These are (1) the VIX index, which measures expected US stock market volatility, (2) the returns on the US S&P 500 stock mark index, (3) US 10-year Treasury bill yields and (4) the exchange rate policy of every country in my sample (154). All of these variables are also used as controls by Fratzscher and Lo Duca (2012) (11). Although Fratzscher and Lo Duca find that the inclusion of different sets of controls had only a "modest effect" on their regression coefficients, I still believe the inclusion of these of controls strengthens my analysis. The first three control variables (VIX index, S&P 500 returns, and 10-year Treasury bill yields) are indicative of economic conditions within the US and could therefore independently influence investor decisions to move capital to and from the US. Since I am examining how investors respond to QE itself and its effect on emerging market economies, rather than economic conditions in the US, I control for these variables. I use a similar method in modeling these control variables as my dependent variables, taking the difference of their log values. These

variables are also lagged by one month to account for the time it could take conditions in the US to influence emerging markets and investor behavior. Finally, I also control for exchange rate regime, as exchange rate policy should be separate from my other variable of interest and could either intensify or mediate capital flows, especially related to purchases of a country's currency. My regression equation, is therefore:

$$\Delta\ln(y_{ijt}) = \alpha_j + \chi_{ij.} + \gamma_j \Delta\ln(B_t) + \beta_j x_{it} + \mu_{1j}(\text{GovTransparency}_{it})\,\Delta\ln(B_t) + \mu_{2,j}(\text{CBTransparency}_{it})\,\Delta\ln(B_t) + \mu_{3,j}(\text{CBI}_{it})\Delta\ln(B_t) + \mu_{4,j}(\text{Democracy}_{it})\Delta\ln(Bt) + \mu_{5,j}(\text{GovTransparency}_{it}) + \mu_{6,j}(\text{CBTransparency}_{it}) + \mu_{7,j}(\text{CBI}_{it}) + \mu_{8,j}(\text{Democracy}_{it}) + K_{ijt} + \varepsilon_{ijt}$$

For country i in month t in market j (stock, bond, exchange rate, property)

Constant: α

Country-specific fixed effects: $\chi i,j$ for country i in month j

US LSAP balance sheet index value: B

Controls: K

I am confident in the robustness of my chosen mediating variables, as they mostly depend on institutional factors that are generally not subject to rapid change. Additionally, the research above lays out and confirms causal pathways between each of my mediating variables and investor behavior. Therefore, reverse causality or common causes should not be significant issues. A bigger problem could be alternative causes explaining more of the heterogeneity in spillover effects than my mediating variables. However, besides the aforementioned variables

I'm already controlling for, many of these alternative explanations factor into my proposed causal mechanisms and are unnecessary to control for. For example, Bowman et al. (2015) find that heterogeneity in spillover effects can be attributed in part to differences in countries' policy rate, CDS spread, sovereign yields, or interest rate differential, along with their current account deficits (11). However, as each of these could be intermediary variables (i.e. determined in part by my mediating variables) controlling for these variables could reduce the validity of my results.

Beyond my control variables, I rely on a broad and representative sample to ensure the validity of my results. I construct my sample to include a majority of countries considered emerging market economies while excluding economies that have other significant factors influencing them besides US QE. This means like Eichengreen et al. (2014), I exclude Eurozone countries as they have no national exchange rate and are likely more influenced by the monetary policies of the European Central Bank than the Fed. I also drop countries that use the US Dollar as their currency, as they also have no exchange rate to analyze. To obtain a starting sample of emerging economies, I rely on sampling strategy present in existing literature, as there is no universally excepted definition of an emerging market economy. I use the 53 emerging economies that Eichengreen et al. (2014) analyzed as my sample, as they take the above steps and have the largest sample among the three studies. Due to data availability among my dependent variables, my ultimate samples range between 14 and 36 countries for each dependent variable I analyze. I outline the exact sample of countries for each of these variables in Appendix B.

Results

My results show a mix of support for, mixed evidence for, and rejection of my hypotheses. However, they ultimately support the theory that political factors can influence and mediate spillover effects. Table 1 shows the results of my regression equation, with my four mediating variables interacting with the change in total Federal Reserve asset purchases between December 2008 and December 2014. Coefficients for control variables are also included.

Table 1: All Federal Reserve Asset Purchases (Change) Effects (Dec 2008- Dec 2014)

	Dependent variable:			
	Change in Exchange Rates	Change in Stock Prices	Change in Bond Yields	Change in Property Prices
	(1)	(2)	(3)	(4)
Government Transparency	-0.276	-0.036	0.061	-0.032
	(0.950)	(0.048)	(0.063)	(0.028)
Central Bank Transparency	-0.038	0.002	0.001	-0.002
	(0.147)	(0.004)	(0.005)	(0.002)
Central Bank Independence	1.905	-0.475	-0.189	0.317
	(5.331)	(0.307)	(0.203)	(0.607)
Democracy	0.596	-0.171*	-0.012	0.083
	(1.908)	(0.090)	(0.055)	(0.063)
Δln(Total Purchases)	1.123	-0.421	0.397	-1.885***
	(7.099)	(0.301)	(0.320)	(0.613)
Exchange Rate Regime	0.013	0.005	-0.004**	0.008**
	(0.047)	(0.004)	(0.002)	(0.003)
VIX Index	0.010	0.039***	0.023***	-0.006
	(0.152)	(0.008)	(0.006)	(0.007)

US Treasury 3 Month Bill Rate	0.521	0.042	-0.069**	0.013
	(0.836)	(0.042)	(0.031)	(0.021)
S&P 500 Returns	1.708	0.078	0.021	-0.014
	(1.251)	(0.063)	(0.048)	(0.056)
Government Transparency* Δln(Total Asset Purchases)	1.619	-0.057	-0.031	0.099
	(1.286)	(0.077)	(0.055)	(0.079)
Central Bank Transparency* Δln(Total Asset Purchases)	0.140	0.023	0.084***	0.014
	(0.748)	(0.029)	(0.022)	(0.066)
Central Bank Independence* Δln(Total Asset Purchases)	-7.052	0.200	-1.129*	0.849
	(8.285)	(0.357)	(0.576)	(0.596)
Democracy* Δln(Total Asset Purchases)	3.984	0.255	-0.446	1.366*
	(8.949)	(0.400)	(0.347)	(0.707)
Constant	-1.534	0.430*	0.037	-0.072
	(4.594)	(0.252)	(0.155)	(0.145)
Countries Sampled	36	25	25	14
Observations	737	684	587	185
R_2	0.033	0.058	0.124	0.265
Adjusted R_2	0.002	0.027	0.090	0.176
Residual Std. Error	1.322 (df = 713)	0.064 (df = 661)	0.045 (df = 564)	0.023 (df = 164)
F Statistic	1.049 (df = 23; 713)	1.860*** (df = 22; 661)	3.641*** (df = 22; 564)	2.964*** (df = 20; 164)

Note: *p<0.1; **p<0.05; ***p<0.01

The table shows a wide range of results with coefficients varying in magnitude and direction across markets. The relatively high negative interaction coefficients on *Central Bank Independence* in the foreign exchange and bond markets suggest that an independent central bank can have a mediating effect on spillovers in these markets. To further explore this finding, I examine Figures 1 and 3, which show the marginal effects of each political variable on the exchange and bond markets. Figure 1 does show evidence of a negative effect of *Central Bank Independence* on changes in the foreign exchange market due to QE. However, because of the large margin of error it is difficult to determine whether strong spillovers exist in the first place.

Figure 3 shows stronger evidence that *Central Bank Independenc*e has a negative effect on bond yields as QE accelerates. The marginal effect of Fed asset purchases on bond yields becomes negative as *Central Bank Independence* increases, suggesting that investors buy more bonds in countries with independent central banks as asset purchases increase. Although this finding shows that *Central Bank Independence* influences spillover effects, it appears that *Central Bank Independence* does not mediate spillover effects, as increased *Central Bank Independence* pushes the marginal effect of QE on bond yields away from zero. *Government Transparency* and *Electoral Democracy* show a similar trend, although again the wide confidence interval makes it difficult to determine whether strong spillovers exist in the absence of these political features. Interestingly, *Central Bank Transparency* shows an opposite trend, with transparent central banks increasing already existing positive spillovers in the bond market. These are puzzling results that largely contradict my hypothesis.

Other statistically significant results appear in the property market, where the marginal effect of changes in asset purchases trends towards zero as *Central Bank Independence*,

Electoral Democracy, and *Government Transparency* increase. In particular, the effect of a change in asset purchases on property values becomes statistically insignificant from zero as *Electoral Democracy* increases. This suggests that democracies see less spillover effects in the property market than non-democracies. Results in the foreign exchange and stock markets have a wide margin of error and that are not statistically significant different from zero. My analysis does not show any significant effect of political variables on spillovers in these markets.

Robustness

I perform several checks to ensure the robustness of my results. First, I run a collinearity test to ensure each of the variables that could explain variation in spillover effects are independent of each other. For example, if democracies were much more likely to have independent central banks or to transparently release financial data, this could skew my results. The results of this analysis show this not to be the case. No variable displays a correlation coefficient greater than .5.

	CBI	CBT	Electoral Democracy	Gov Transparency
CBI	1	-0.0952005903587871	-0.114004735539635	-0.158510293232372
CBT	-0.0952005903587871	1	0.459310502753533	-0.0966010050061165
Electoral Democracy	-0.114004735539635	0.459310502753533	1	0.226258085146918
Gov Transparency	-0.158510293232372	-0.0966010050061165	0.226258085146918	1

It is also important to account for the influence of outliers in my regression. Figure 5 shows the distribution of my chosen mediating variables, averaged by country. Several of these graphs feature significant outliers that likely impact the results. In particular, *Government Transparency* and *Central Bank Independence* contain several significant outliers. Brazil, India, and Vietnam have Central Banks with low levels of independence, while Colombia, Brazil and

South Africa have very high levels of government transparency. To test how these variables influence my regressions, I rerun them while excluding these countries. My main finding, that greater central bank independence correlates with a decrease in bond yields as QE increases, stays consistent. The positive and significant impact of *Central Bank Transparency* on changes in bond yields as asset prices increase also remained consistent. However, the direction of effect for *Central Bank Independence* on exchange rates flipped, and the effect of *Electoral Democracy* on the bond market moved from negative to zero. In the property market, the finding that *Electoral Democracy* mediates spillovers is no longer statistically significant. These results suggest that several of my findings may be skewed by these outliers. Ultimately, it is difficult to determine exactly what effect some political institutions have on spillovers. My main findings though, that independent central banks and central bank transparency influence and potentially amplify spillovers in the bond markets of emerging economies, appears to be robust.

Secondly, I rerun my regression with only Fed purchases of Treasury bonds as the dependent variable. MacDonald (2017) finds that Treasury security purchases caused more spillovers into emerging economies than other types of purchases by the Fed (136). In the stock and foreign exchange markets, results still appear to be not statistically significant. In the bond market, the effect of central bank transparency on spillovers become not statistically different from zero, showing this finding might not be robust. Interestingly, the direction of effect for *Central Bank Independence* on spillovers in the bond market entirely flips. It is unclear why exactly this coefficient changes when only looking at Treasury bond purchases. In the property market, all graphs become not statistically different from zero. Further research into the exact mechanism for how Treasury bond purchases as opposed to all Fed asset purchases create spillovers could yield insight into why these results show such marked differences.

Finally, to account for the fact that my samples are different for each market due to data availability, I run a regression exclusively consisting of countries with data for all three of the foreign exchange, stock, and bond markets (property is excluded due to lack of data availability compared to the other three). This regression yields no significant changes. My finding that *Central Bank Independence* amplifies a negative effect of asset purchases on bond yields still holds (although the confidence interval is wider with a smaller sample size). The finding that *Central Bank Transparency* amplifies a positive effect of asset purchases on bond yields again is not as robust, with that effect appearing to slightly subside (although it still exists). No effects in the foreign exchange and stock markets change to be statistically different from zero. These results suggest that sampling variation does not account for a significant amount of the discrepancy between results seen in different markets.

Discussion

As stated above, I find mixed support for my three main hypotheses depending on the market analyzed and institutional feature examined. Generally, my results show that the bond market is the market where these political features have the most effect on mediating spillovers. This aligns with previous research showing that US QE was responsible for greater spillovers in the bond than stock markets (Fratzer and Lo Duca 2012, 4). Intuitively, this makes sense as well because bonds are issued by governments, giving government and central bank policies more direct impact into this market. In many countries, central banks have the ability to control interest rates on these bonds, and governments can delay or default on payments in extreme circumstances. This is in contrast to stock and real estate markets, which are controlled by private actors who may face legal constraints in defaulting, reducing potential commitment

problems. These investments are also more diffuse by nature and influenced by many considerations other than government policy. Finally, the foreign exchange market seems to be in the middle of these extremes. While I did control for exchange rate regime, it is likely that a country's exchange rate policy has a larger effect on the foreign exchange market than many of my political variables. Further research could yield insight into how my chosen political variables interact with a government's exchange rate policy, and how this interaction changes their ultimate effect on spillovers.

Looking at each of my hypotheses, I find mixed evidence supporting the first: that government and central bank transparency reduces spillovers in emerging markets. The graphs do provide some evidence that the marginal effect of asset purchases moves towards zero as central bank transparency increases in the stock and property markets and as government transparency increases in the bond market. However, these findings are within the margin of error, and the only finding outside of this margin shows a positive effect of asset purchases on bond yields as central bank transparency increases. This suggests that investors have less demand for bonds as QE increases in countries with transparent central banks. It is unclear exactly why this is the case, as this would mean that central bank transparency would be discouraging investment. For the most part, the herding effect I hypothesized does not seem to be strong enough to mediate spillover effects at a significant level.

I find stronger support for the idea that independent central banks influence spillover effects. There is some evidence that independent central banks have a stabilizing effect in the stock market and property market, although the margin of error is larger in these cases, rendering them statistically insignificant. The strong and statistically significant negative effect of central bank independence on spillovers in the bond market shows that countries with independent

central banks experience lower bond yields as the rate of asset purchases increases. On its face, this finding goes against my hypothesis, suggesting that countries with independent central banks see greater spillovers. Bonds in these countries come into higher demand as the rate of Fed asset purchases increases, raising bond prices and pushing down their yields. It is possible that investors prefer countries with independent central banks to park their assets due to greater economic stability in these nations. Independent central banks can discourage governments from taking fiscally irresponsible actions that would make them more likely to default on their debt. Independent central banks also can prevent runaway inflation that could cause a deterioration in economic conditions. It is uncertain however, whether this greater inflow of capital into their bond markets leaves these countries with greater vulnerability to sudden capital outflows and financial distress following the end of QE.

Finally, I find some evidence that democracy reduces spillovers in the stock, bond, and property markets. Particularly in the property market, there is significant evidence that countries with a higher electoral democracy score experience lessened spillovers. These findings provide measured support for the theory that democracies tend to pursue risk adverse policies preferred by the average citizen as opposed to elite preferred policies that prioritize short-term economic gain. There appears to be less evidence for my second theory concerning democracy, that democracies are less likely to impose capital controls that spook investors into fleeing. The correlation coefficient between democracy and financial openness in my final dataset is only .23, suggesting that any correlation between democracy and financial openness is small. Due to a lack of suitable countries in my sample with similar features but different levels of democracy, I do not conduct case studies for this variable. Further research could provide clearer insight into which features associated with democracy could potentially mediate spillovers.

Case Studies

Although my regression results provide some clarity into how political institutions mediate spillovers, they leave many questions unanswered. Many of my regressions are inconclusive or show puzzling results that contradict my hypotheses. For further insight, I turn to case studies of three South American countries: Argentina, Brazil, and Chile. These countries are geographically in close proximity and share top trading partners. They also are all relatively stable democracies. However, they sit on different extremes in their levels of central bank transparency and central bank independence, which I theorize explains the differences these countries see in spillovers in their asset markets and broader economies. Figures 5, 6, and 7 show the asset markets of these three countries during the time period (property is excluded, and stock market data is unavailable for Brazil). Below, I describe political and economic conditions in the countries during the US QE program and how they respond.

Argentina

Argentina continued to grapple with financial turmoil in the aftermath of the 2008 financial crisis. Although the economy began to grow again in 2010, concerns ramped up about economic overheating and inflation (Barrionuevo 2011). In Figure 6, a sharp increase in Argentinian bond yields can be seen during this time period, likely reflecting growing investor concern about the ability of the Argentinian government to honor its financial commitments. Stock market performance in the time period sharply mirrors Fed asset purchases, spiking during the buildup and decreasing during the tapering. Current account and fiscal deficits, as well as diminishing foreign currency reserves led to a run on the Argentinian peso in 2012, which can be seen in the foreign exchange graph. In an attempt to prop up its currency and stem capital outflows, Argentina imposed capital controls in May of 2012, leading to demonstrations and

unrest (Christian Science Monitor 2012). The overall volatility in Argentina's currency market is likely largely due to domestic conditions.

Argentina has a relatively low level of central bank transparency coupled with a high level of central bank independence. This, combined with the financial turmoil it experienced in the time period, make it a useful case to look at. It does appear that Argentina experienced heightened spillovers during the time period. Although Argentinian bond yields in the time period trend upwards for the most part, likely due to the aforementioned concerns about the government's finances, drops can be seen when US asset purchases accelerate in 2009 and 2013. This effect is likely muted due to reluctance by investors to invest in a country experiencing inflation and currency issues. Each time the Fed begins to taper QE, spikes can be seen in bond yields, showing capital outflow. This appears to indicate that Argentina is particularly prone to spillovers in the form of investor flight.

The fact that Argentina has an independent central bank does not appear to assuage investor concern during this time period. This is perhaps due to the fact that government policy in Argentina spooked investors, making any consideration of central bank policy secondary. This likely explains why Argentina did not see lower bond yields during the time period, as other countries with independent central banks did. Secondly, Argentina has a relatively low level of central bank transparency, but high levels of government transparency. The low level of central bank transparency may have amplified herding behavior; however, this is difficult to determine. It is unlikely that the high level of government transparency negated spillovers given the financial issues Argentina faced. Finally, the fact that Argentina is a democracy did not appear sufficient to prevent the country from imposing capital controls. However, in 2015, Mauricio Macri was elected President on a platform of lifting capital controls as public opinion grew

against the policy (Reuters 2015). While this did not occur in time to prevent the spike in bond yields and sharp reactions in the stock market to QE tapering, this does demonstrate that voters are averse to policies which damage long term economic growth.

Brazil

Brazil is another democratic country with a low level of central bank independence, as well as high levels of transparency by its central bank and government. It is also a member of the "Fragile Five," experiencing relatively high spillovers due to US Quantitative Easing. This makes it another ideal country for a case study. When US asset purchases accelerated, bond yields in Brazil dropped sharply, signaling heightened demand for Brazilian bonds by foreign investors. This can be seen in Figure 7. Yields increase during the tapering period when asset purchases level off and capital flows out of the country. Politicians in Brazil recognized the issue early on, with President Dilma Rousseff calling capital inflow as a result of QE a "monetary tsunami," that would devalue Brazil's currency and decrease the competitiveness of its exports (Blackden 2012). However, they failed to take meaningful action to prevent these capital inflows and the development of a credit bubble. During the tapering period of US QE, Brazil was plunged into one of the worst recessions in its history. In contrast to Argentina and Chile, Brazil experienced a deep recession caused in part by the US QE program.

It appears that the reason behind Brazil's troubles is a failure to reign in excessive capital inflows and inflation as the US ramped up QE. Throughout this buildup period, both fiscal and monetary policy were expansionary, with Brazil's official interest rate hitting record low levels in October 2012 (ECB Economic Bulletin). This resulted in a credit bubble. When the Fed announced QE tapering in late 2013, Brazilian policymakers thus had little leverage left to stimulate the economy. Whereas an independent central bank may have acted to reign in growth,

Brazil's central bank simply added fuel to the flames. Therefore, the lack of an independent central bank appears to be the key factor distinguishing Brazil from Argentina and especially Chile, both of which did not experience such severe economic contractions following the end of QE. Brazil also demonstrates that institutions hold power to determine whether the consequences of falling asset prices are contained or result in broader macroeconomic fallout.

Chile

Chile has high levels of central bank independence as well as central bank and government transparency. Chile is not one of the "Fragile Five" countries and did not experience a sustained economic downturn due to QE tapering. Chile's bond yields during the time period can be seen in Figure 8. Interestingly, the trend in bond yields for Brazil and Chile look largely similar, suggesting that Chile saw similar capital inflows and outflows in the bond market. However, it appears that Chile's government central bank took decisive action to prevent a "boom-bust" cycle from wreaking havoc on the nation's economy. This effect can be seen in the Chilean stock market, which remains remarkably stable throughout the time period. In fact, Chile saw economic growth of 1.8% in 2014. While not incredibly strong, this is far from the recession Brazil experienced (ECLAC).

The Central Bank of Chile maintained a stable monetary policy between 2012 and 2014, holding inflation to a steady target of 3% (ECLAC). When demand began to contract in 2014, due to investor uncertainty as the Fed tapered its QE program, Chile had room to cut interest rates and stimulate demand. It appears that Chile's independent central bank prioritized long-term economic growth over short term gain, giving it the ability to effectively steer Chile through this tumultuous period in the global economy. This supports my theory that central bank independence can reduce spillovers from QE. The steady fiscal policy of the Chilean

government also seems to have prevented sudden investor flight, like the imposition of capital controls by Argentina's government did. While Chile and Brazil saw similar trends in bond yields, the difference appears to occur in how these changes in bond yields bled over into the greater economy. Chile's government and central bank were much more effective in containing the fallout from QE than Brazil's and Argentina's.

Conclusion

While some of the questions I pose in this study remain unanswered, I do find evidence for my underlying theory: Political institutions and features influence spillovers from QE. Independent central banks appear to have the greatest effect on spillovers, particularly in the bond market. The heightened demand for bonds during QE in countries with more independent central banks seems to suggest that investors trust these institutions to protect their investments. Based on my case studies, particularly with Chile, it seems that independent central banks can also act to prevent these spillovers from QE from having negative effects the broader economies of these countries. However, as Argentina shows, independent central banks do not always have this effect and can still be constrained by government policies. Central bank transparency also affects spillovers in the bond market, but in the opposite direction. It is possible that transparent central banks are more willing to release negative data about macroeconomic conditions, pushing down demand for these countries' bonds and yields on the bonds up, but again further research would be needed to validate this theory.

Finally, in the property market, it appears democracies experience fewer spillovers. The initial direction of spillovers in the property market is the opposite of what I predicted, making this finding somewhat puzzling. However, this could be due to the remnant effects of the 2008

financial crisis overcoming any asset bubbles due to QE. It is conceivable that reduced spillovers are seen because democracies took actions to prevent sudden changes in property prices, such as foreclosure relief or fiscal stimulus, that other nations did not. This would be in line with my theory that democracies prioritize stability and the well-being of the average voter, in contrast with elite-ruled autocracies that make risky decisions for short term economic benefit. The fact that there is a significant effect of democracy on lessening spillovers in the property market gives some credence to this theory. Ultimately, I leave many of the questions I pose somewhat unanswered due to the complexity of fully modeling and analyzing the effects of QE on different asset markets. I do however provide some evidence certain political variables amplify or mediate spillovers in these markets. This hopefully provides a foundation for future research into a subject which is once again becoming relevant in the face of a global economic downturn and renewed QE programs.

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Figures

Figure 1: Marginal Effect of QE in XR Market

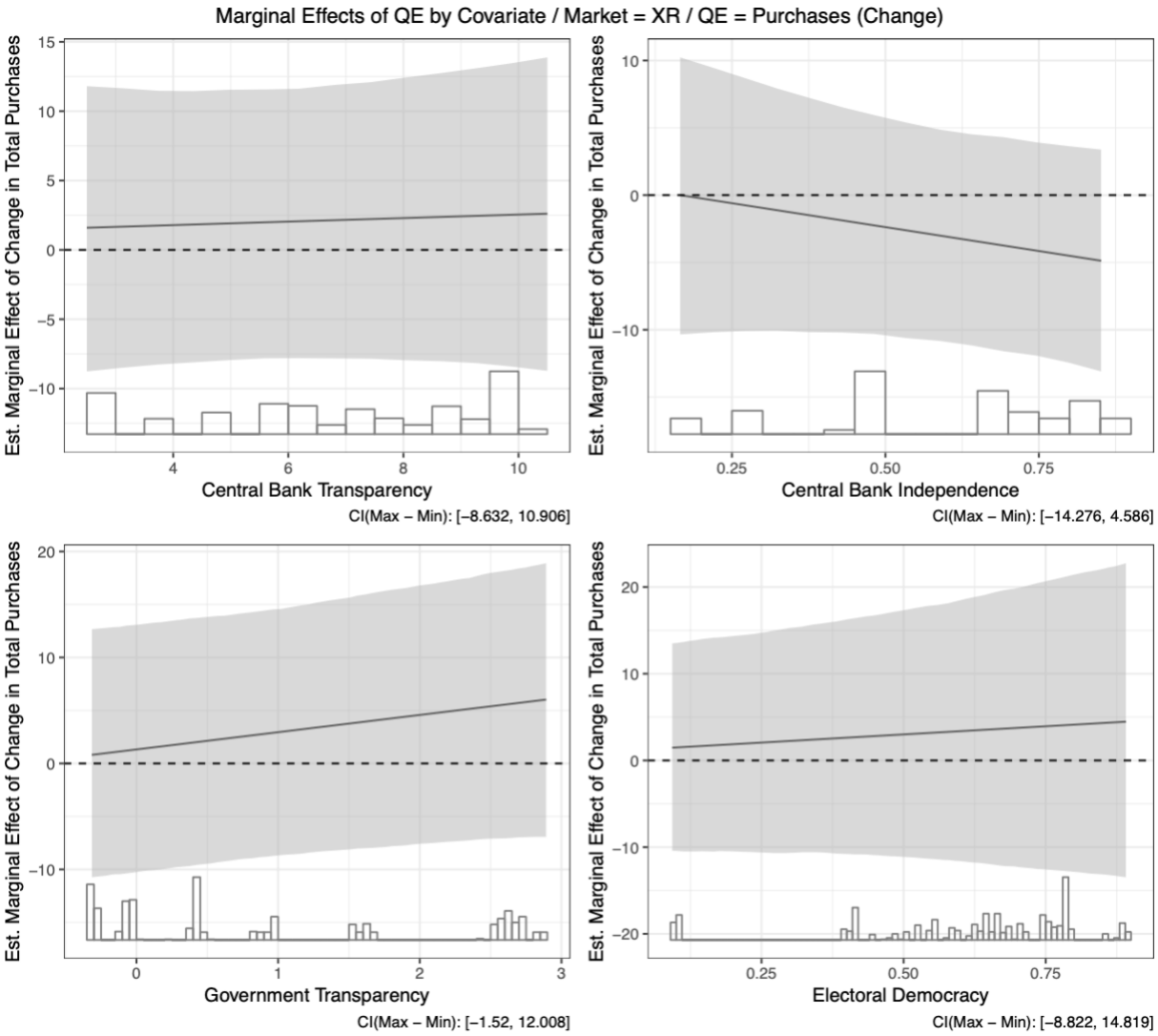


Figure 2: Marginal Effect of QE in Stock Market

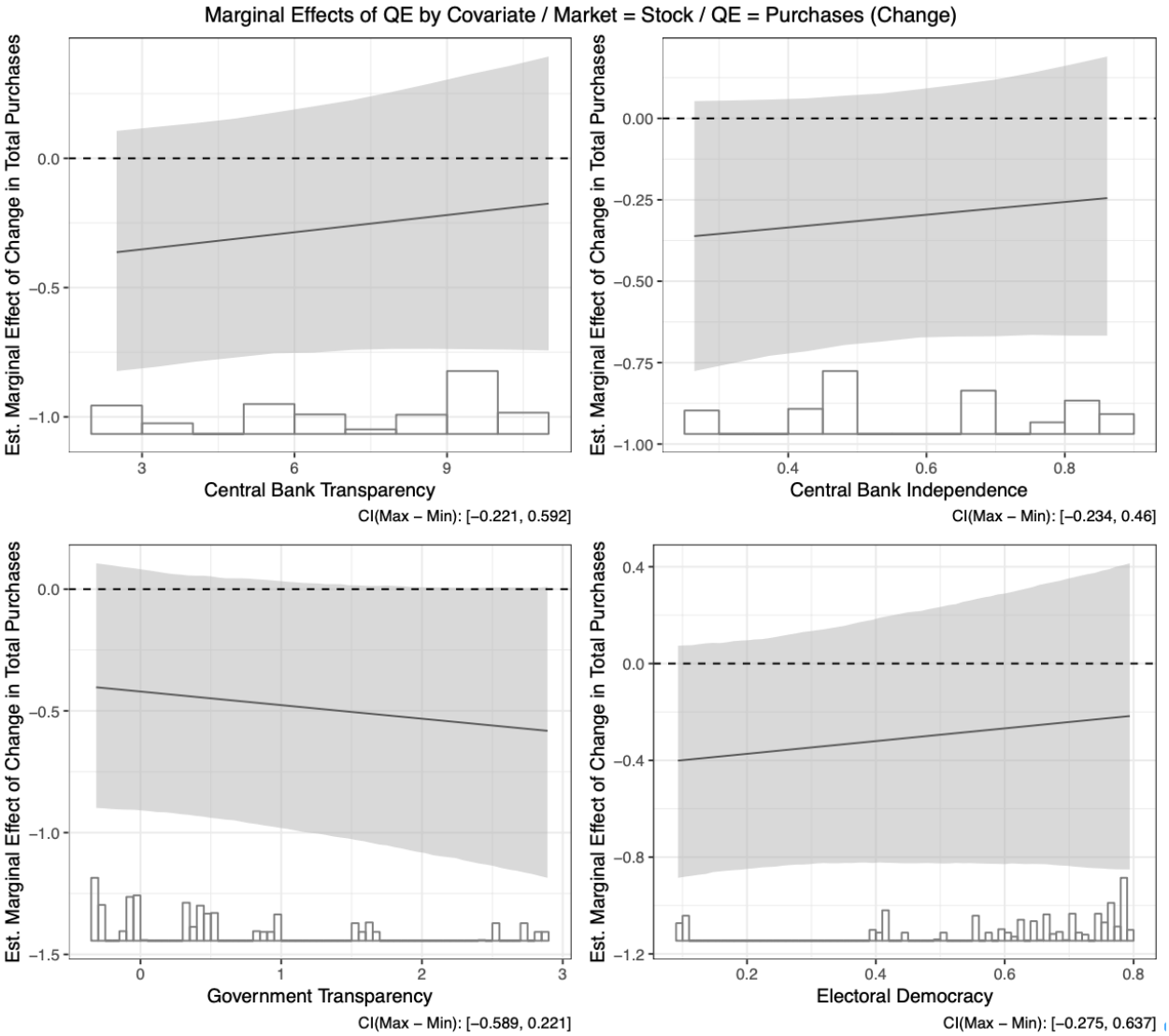


Figure 3: Marginal Effect of QE in Bond Market

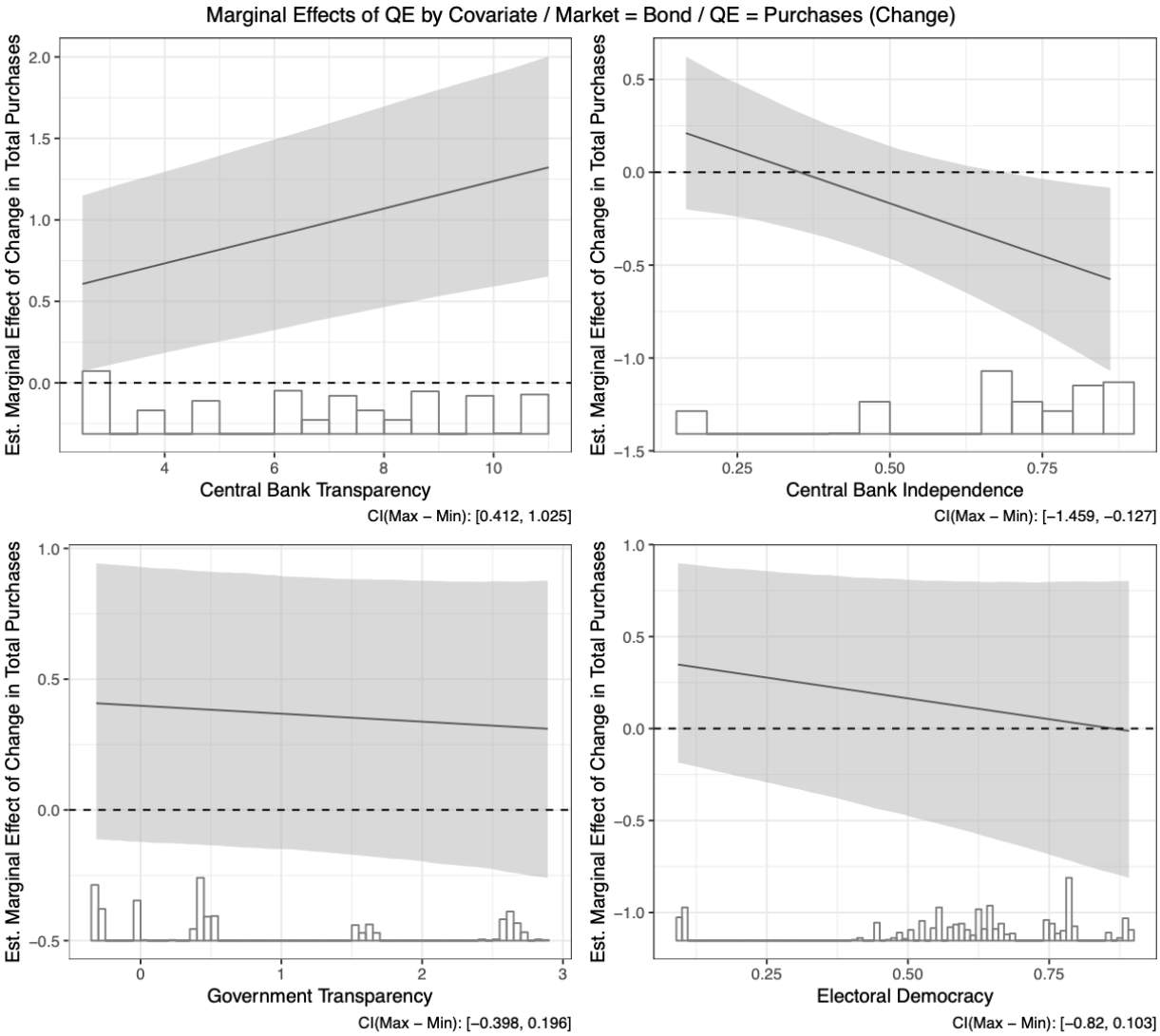


Figure 4: Marginal Effect of QE in Property Market

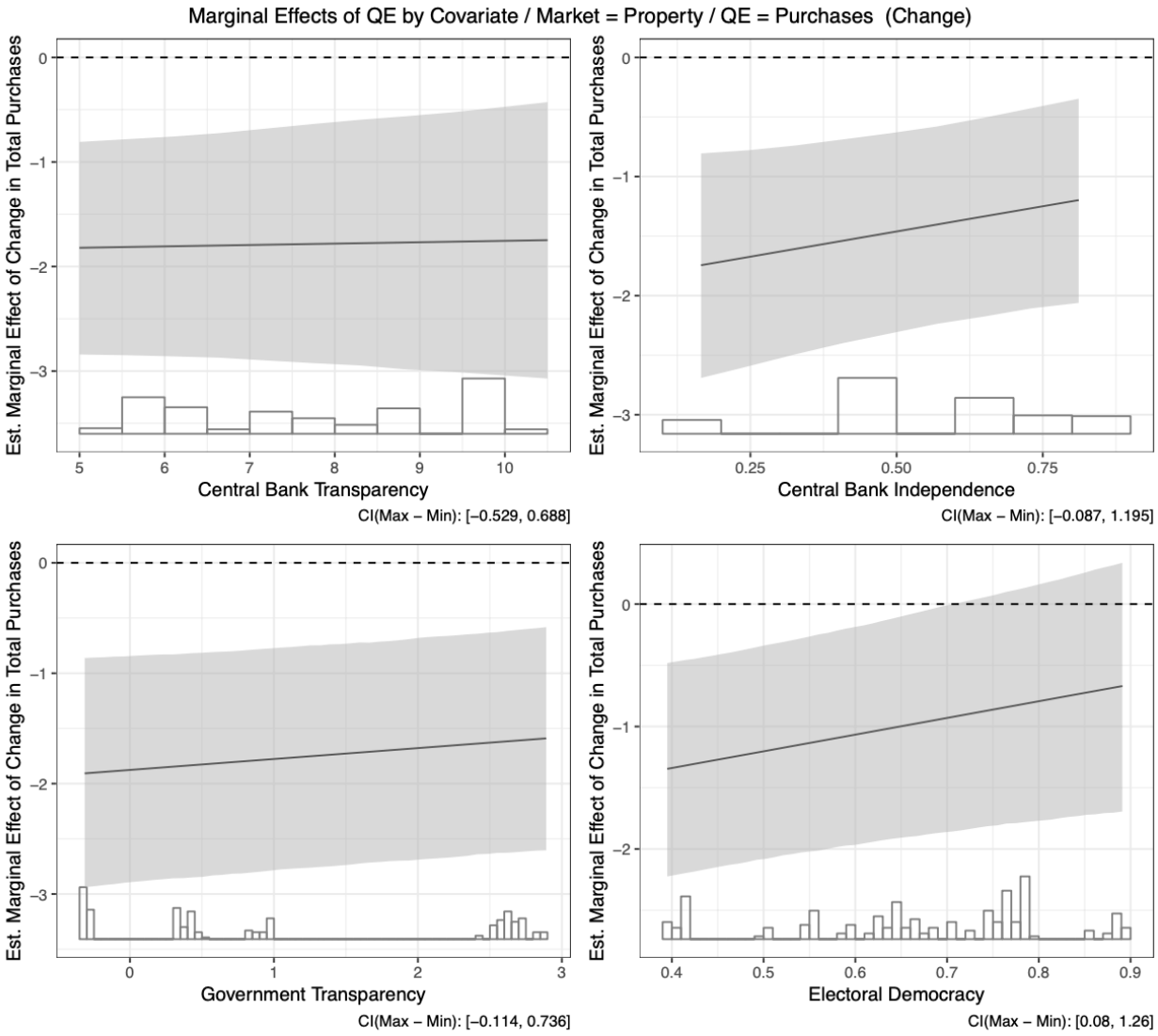


Figure 5: Distribution of Average Political Variables by Country

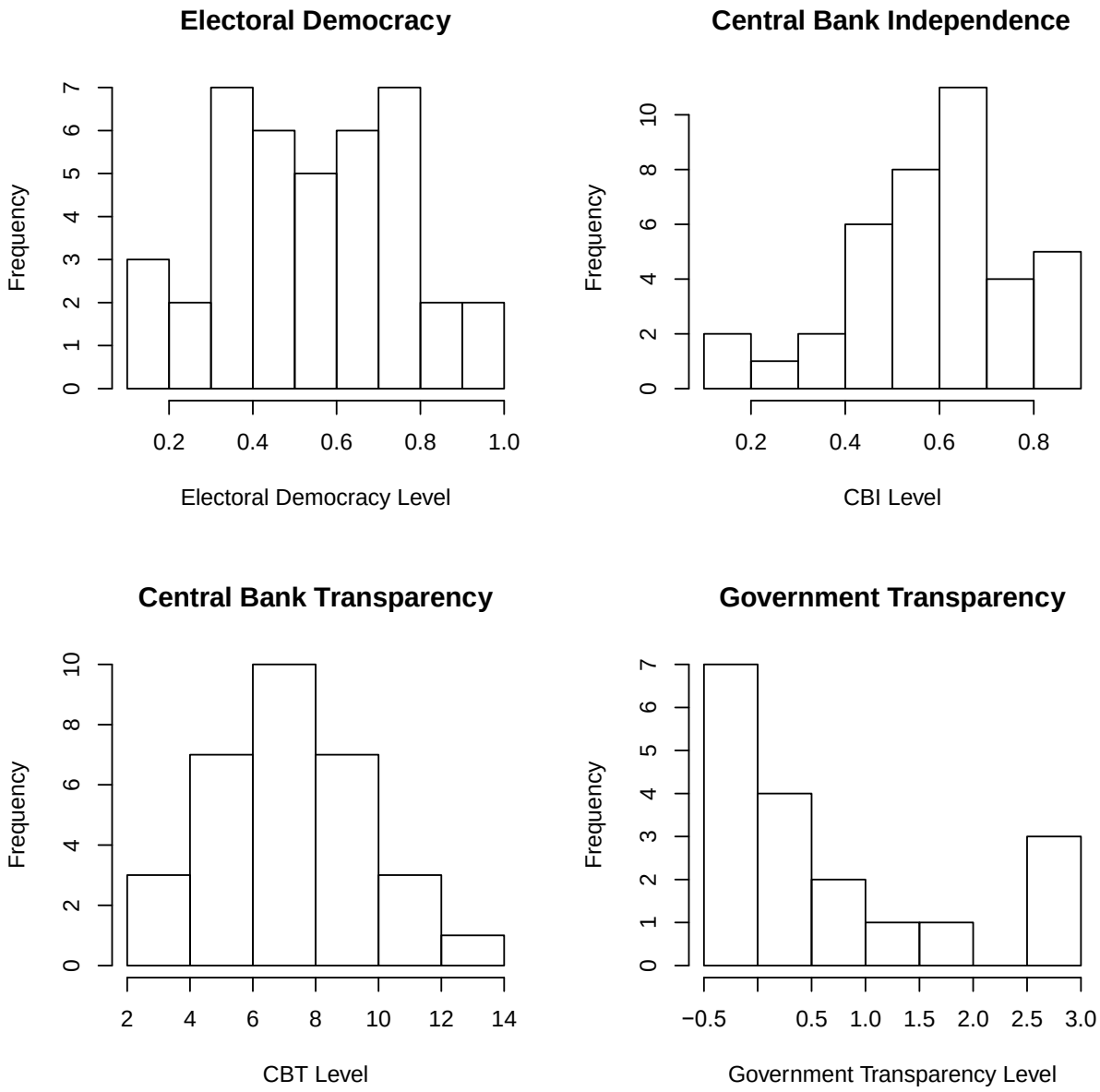
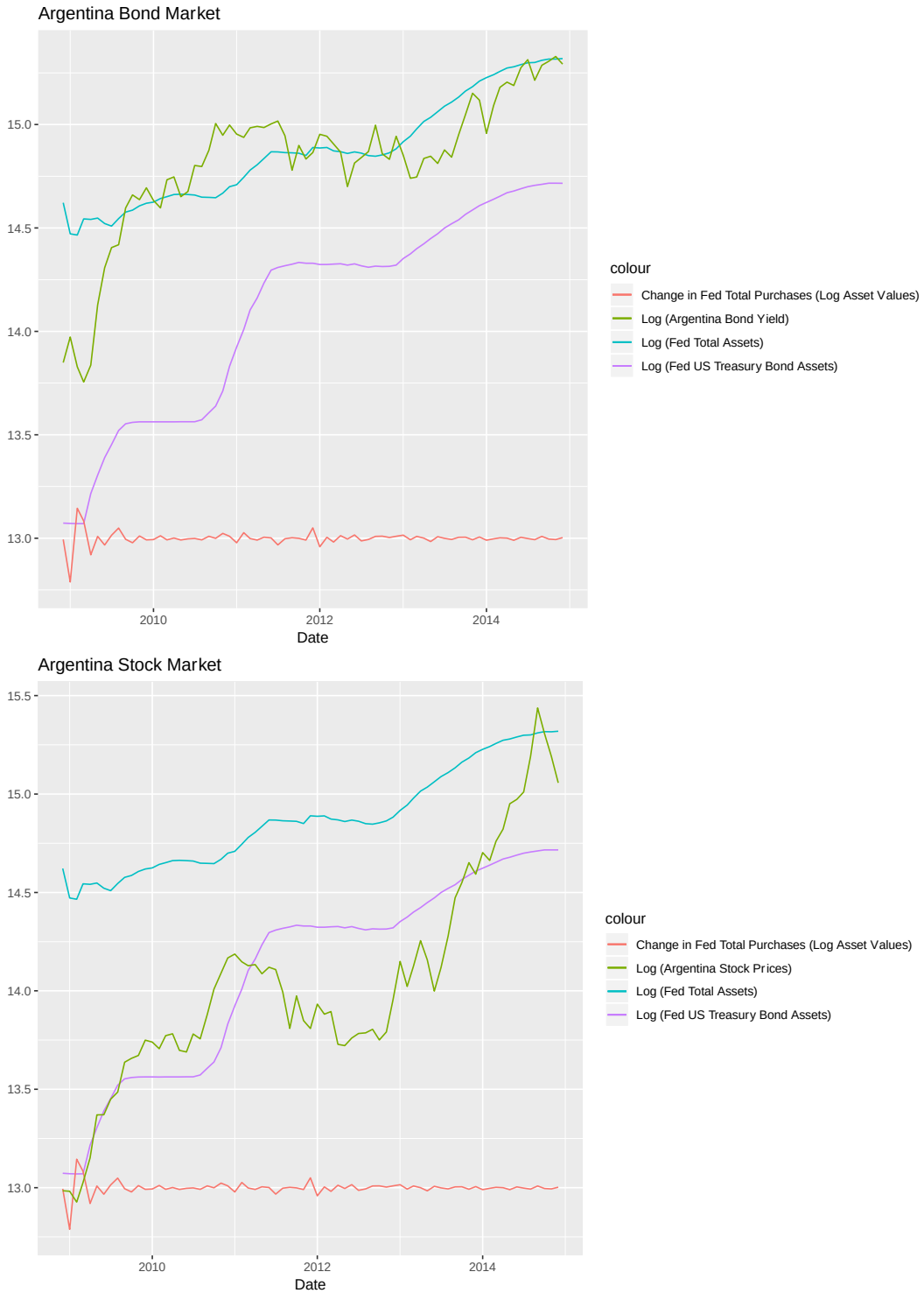


Figure 6: Argentina Markets



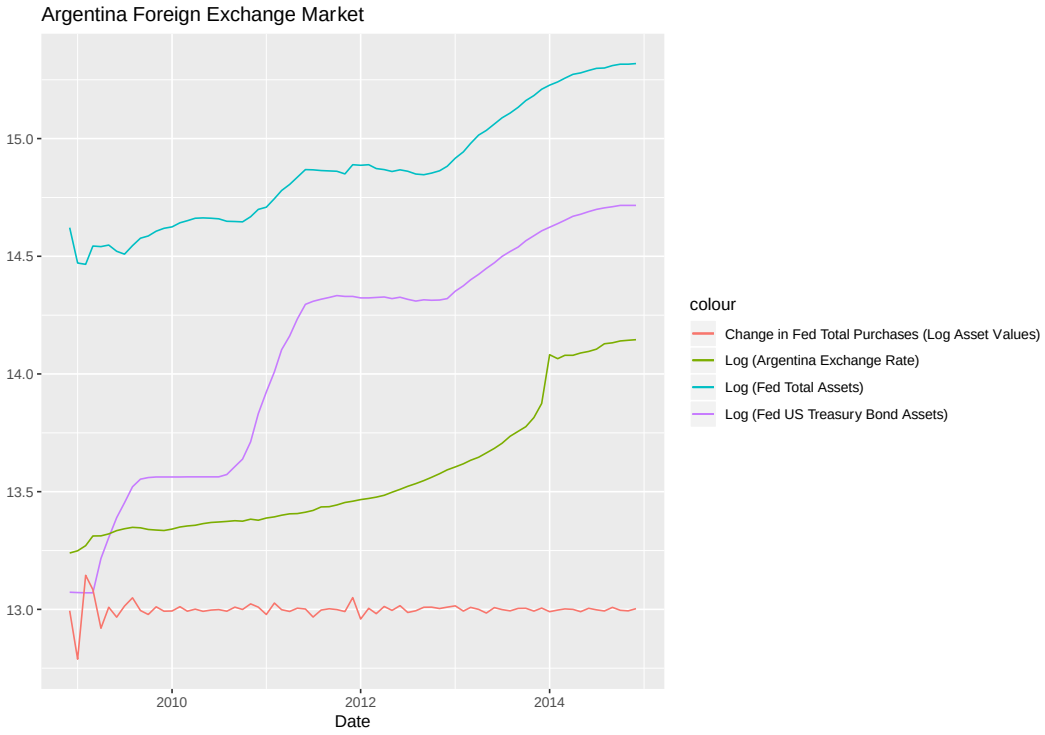

Argentina Foreign Exchange Market
15.0
14.5
14.0
13.5
13.0
2010
2012
2014
Date
colour
Change in Fed Total Purchases (Log Asset Values)
Log (Argentina Exchange Rate)
Log (Fed Total Assets)
Log (Fed US Treasury Bond Assets)

Figure 7: Brazil Markets

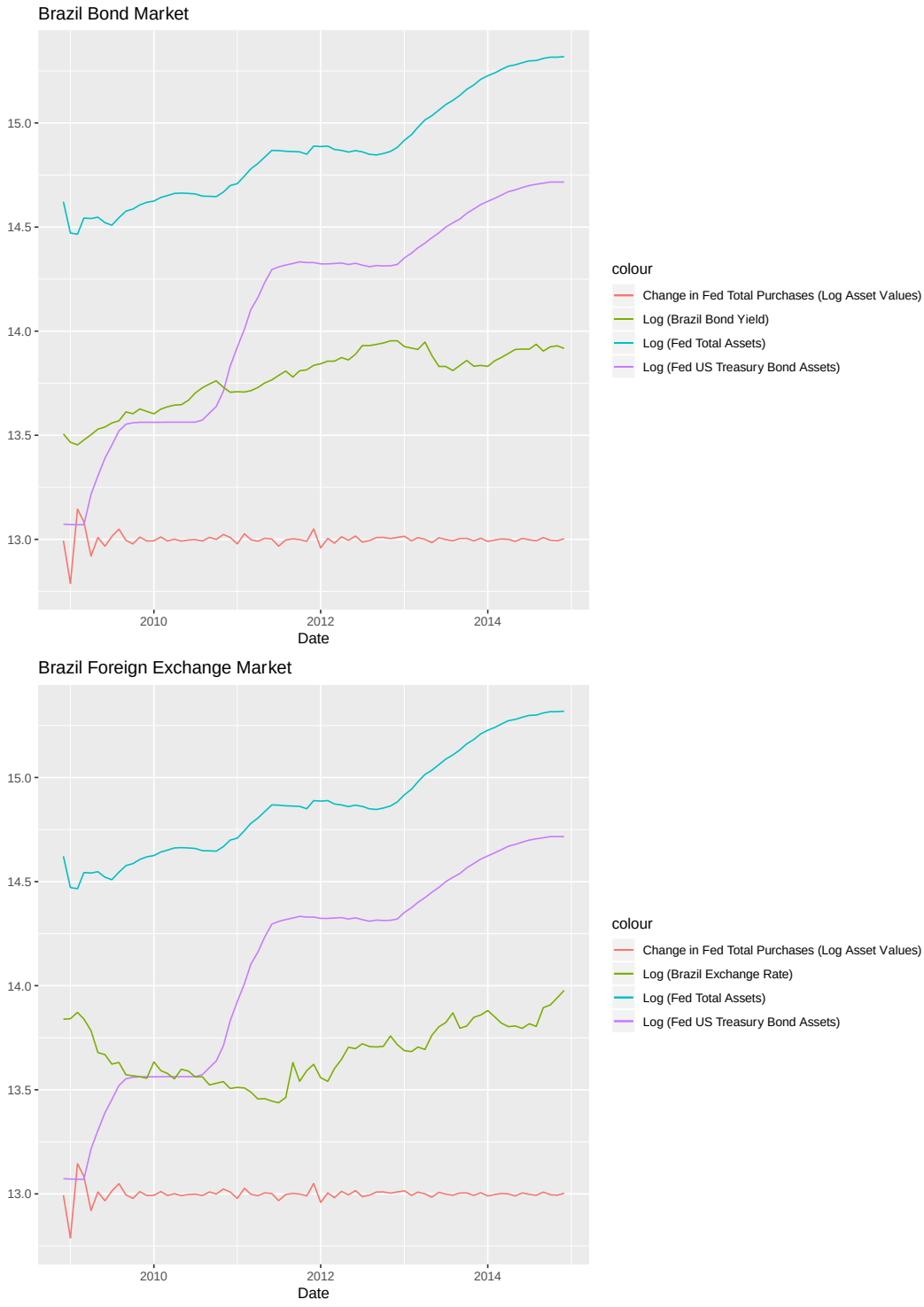
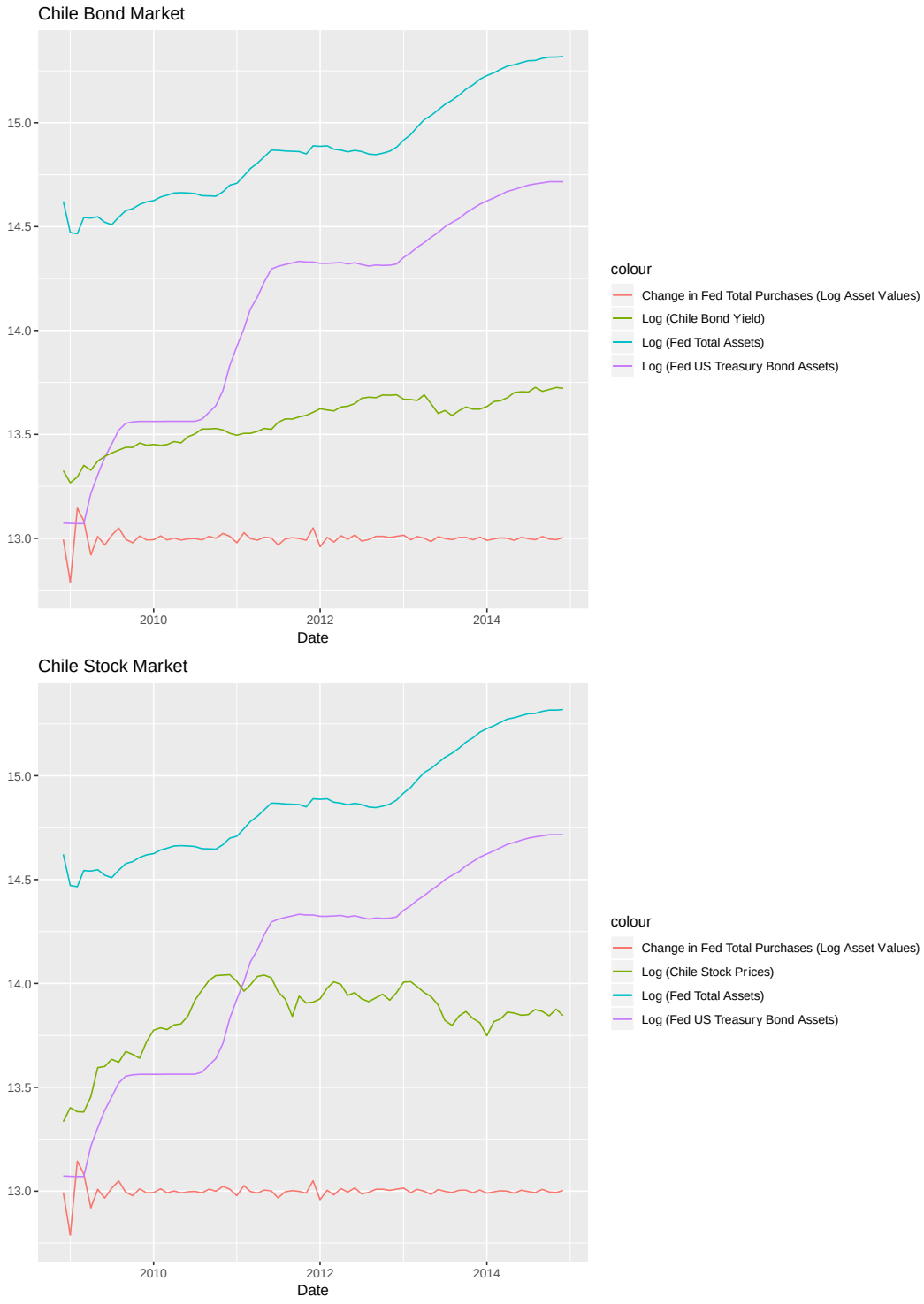


Figure 8: Chile Markets



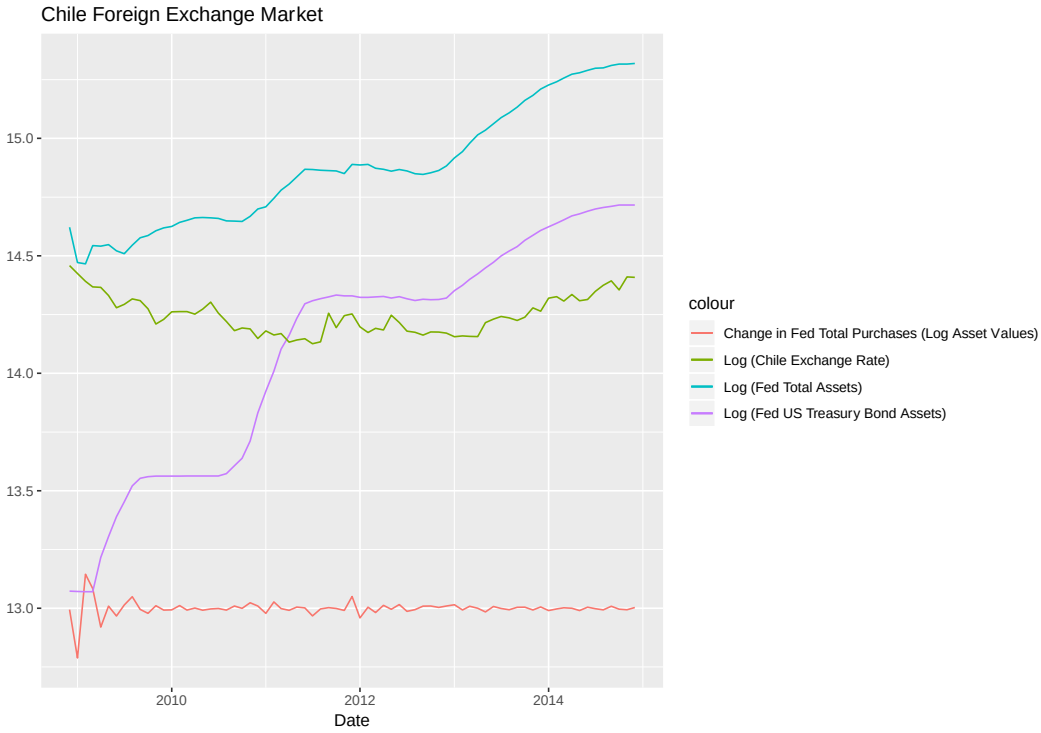

Chile Foreign Exchange Market
15.0
14.5
14.0
13.5
13.0
2010
2012
2014
Date
colour
Change in Fed Total Purchases (Log Asset Values)
Log (Chile Exchange Rate)
Log (Fed Total Assets)
Log (Fed US Treasury Bond Assets)

Figure 9: Variance in Bond Yields Across Countries (2009-2014)

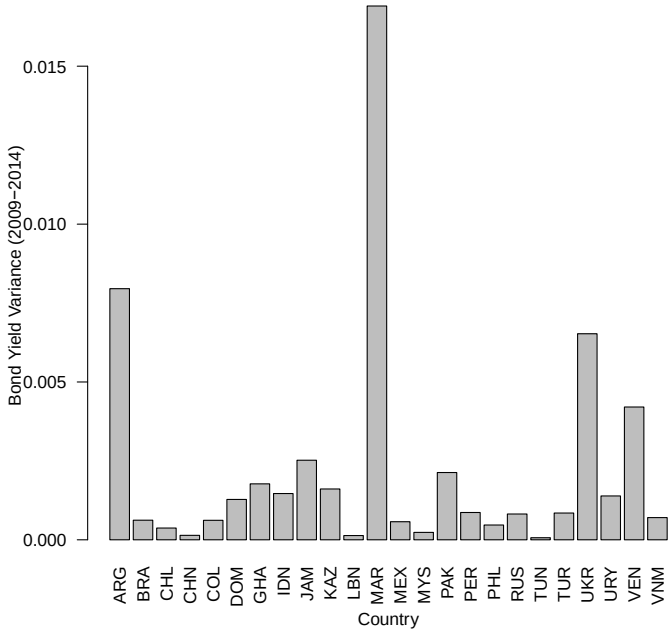
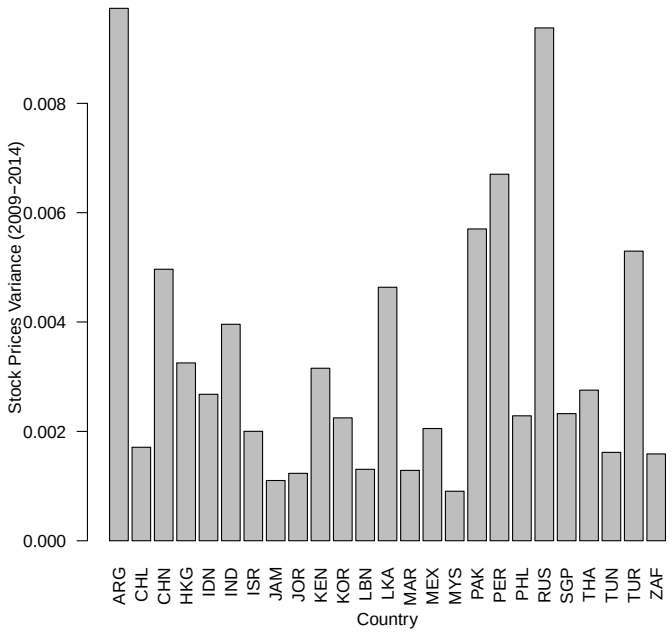


Figure 10: Variance in Stock Prices Across Countries (2009-2014)



Appendices

Appendix A: Data Sources

Variable	Source	Frequency	Notes
Nominal Exchange Rate	Datastream	Monthly, end of period values	Ratio of local currency to USD
10-Year Sovereign Bond Yields	Datastream, JP Morgan EMBI, EMBI+ and EMBI Diversified index	Monthly, End of period values	Default was EMBI index, but used data from other indices (EMBI+, EMBI Diversified) if EMBI was incomplete
Equity Market Index	Datastream	Monthly, end of period values	Available Stock Index with largest number of representative companies for each country used
Residential Property Prices	Bank of International Settlements	Quarterly	Available Property Index with largest number of properties for each country used
Fed US Treasury Security Purchases	FRED	Monthly, end of period values	
Fed Total Asset Purchases	FRED	Monthly, end of period values	
Government Transparency	Copelovitch et al. (2018)	Annual	
Central Bank Transparency	Dincer and Eichengreen (2014)	Annual	

Central Bank Independence	Garriga	Annual	
Electoral Democracy	V-Dem Project Electoral Democracy Score	Monthly, end of period values	
US Treasury Bill Yield	FRED	Monthly, end of period value	
VIX Index	Chicago Board Operations Exchange	Monthly, end of period value	
S&P 500 Index	FRED	Monthly, End of period values	
Exchange Rate Regime	Harms et. al	Annual	

Appendix B: Sample

Country	Property	Stocks	Bonds	Exchange Rate
Argentina		✓	✓	✓
Brazil			✓	✓
Chile	✓	✓	✓	✓
Colombia	✓		✓	✓
Costa Rica				✓
Dominican Republic			✓	✓
Ghana			✓	✓
Guatemala				✓
China		✓	✓	✓
Hong Kong	✓	✓		✓
Indonesia	✓	✓	✓	✓
India		✓		✓
Israel	✓	✓		✓
Jamaica		✓	✓	✓
Jordan		✓		✓
Kenya		✓		✓
South Korea	✓	✓		
Kazakhstan			✓	✓
Lebanon		✓	✓	✓
Sri Lanka		✓		✓
Mexico	✓	✓	✓	✓
Morocco	✓	✓	✓	✓
Mauritania				✓
Malaysia		✓	✓	✓
Pakistan		✓	✓	✓
Peru	✓	✓	✓	✓
Philippines	✓	✓	✓	✓
Paraguay				✓

Russia	✓	✓	✓	✓
Singapore	✓	✓		✓
Thailand	✓	✓		✓
Tunisia		✓	✓	✓
Turkey		✓	✓	
Ukraine			✓	✓
Uruguay			✓	✓
Venezuela			✓	✓
Vietnam			✓	✓
South Africa	✓	✓	✓	✓
Sample Size	14	25	25	36