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Spillover Effect of U.S. Quantitative Easing From the Emerging Markets Perspective

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II.

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IV.

Abstract

The US quantitative easing (QE) was undoubtedly one of the most notable monetary policies operated over the last decades. Since its beginning, the QE quickly arose growing concerns all around the world with respect to adverse externalities that it might have caused in a number of foreign economies.

The originality of this thesis is focus precisely on the spillover effects of QE on emerging market economies (EMEs). It aims to find evidences of not only QE spillover effects, but also differentiation across countries if any. To do so, we conducted an event study on both EMEs and developed country equity indices at key FOMC's meetings between 2008 and mid-2015. Unlike the existing literature, our time period of analysis also covers the effective tapering and US interest rate hike talks.

As our findings tend to support the existing literature, it can be summarised into the three following points. First, we find evidences supporting the theory that early Fed announcements helped to stabilise and strengthen the global financial market, while later statements provoked higher volatilities in emerging markets. Second, we show that EMEs with stronger fundamentals were more resilient to counter the effect of both the tapering talks and the actual tapering. Third, we find that the use of forward policy guidance may have greatly helped to mitigate the impact on EMEs of the tapering process and more importantly, the rate hike talks.

One must however bear in mind the relatively weak explanatory power and the underlying limits that our event study implies.

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X.

INTRODUCTION

"When the US sneezes the rest of the world catches cold" (unknown).

Motivation

For decades, the liberalisation of capital markets, as well as the opening of national economies to world market forces, has stimulated the development of a globally integrated economy. One might wonder the impact of such an environment. Over time, the economic realm has shown us that the world was smaller than we thought. In this respect, the financial crisis of 2008 started in the United States catalysed world media's attention, as the crisis became global in a record time. Due to the leading position of the USA, the exceptional monetary measures taken by the country after the financial crisis have been, more than ever, a central concern for all global actors.

To be more specific about the US monetary policies, the Federal Reserve first lowered the Fed funds rate in record time to respond to the financial crisis of 2008. However, given the exceptional magnitude of the crisis, conventional measures of the Fed showed their limits, pushing the American central bank to take unprecedented decisions. In this regard, the Fed introduced the forward policy guidance and launched the so-called Quantitative Easing (QE) programs. In the same vein than a credit easing, the successive QE1, QE2, Operation Twist and QE3 helped the United States to bounce back their economy, bringing back inflation and unemployment rate in line with Fed's dual mandate targets. As the US economic recovery looked sustainable by the end of 2013, the Fed tapered its QE3 - an open-ended program – between December 2013 and October 2014, ending therefore one of the biggest but also most controversial monetary policies.

Since then, plenty of studies about QE have been published. Most of recent works has focused on the US domestic effects. However, as the USA appears as a key player in the world, one might expect spillover effects of the QE programs on the rest of the world. In this regard, the originality of this thesis is to focus precisely on the global effects of QE, and especially the impact on emerging markets. Given the low interest rate of US Treasuries, our first intuition is that the QE has provoked a shift of interest to emerging markets by encouraging investors to rebalance their portfolios to riskier assets. Then, the tapering episode may have shift back the interest of market participants to safer assets, such as the US sovereign bonds. The amplitude of emerging asset price changes, as well as the evolution and net impact of such

unconventional policies remains prima facie difficult to assess. This is the central topic of the thesis.

To do so, we review thoroughly the existing literature relative to global transmission of monetary policies in order to provide keys to answer the following questions:

- ✓ Do we find empirical evidences of a significant spillover effects of QE announcements on the emerging asset prices and capital flows, and why? Have these effects evolved over time?
- ✓ Do we find differentiation across countries and why? Have these differentiation evolved throughout the years?

The overview of recent studies literature is however insufficient, because to the best of our knowledge, there is no (or few) paper(s) about episodes relative to the effective tapering and US interest rate hike talks. Furthermore, most of the papers focus on an economic interpretation, rather than a portfolio and investment perspective. Consequently, the empirical part of this thesis analyses the quantitative easing on foreign equities through the concept of abnormal return. In this regard, the objective is twofold. It aims to first support (or refute) the findings in the existing literature, and to extend the analysis until mid-2015, namely at the core of rate hike talks. Second, by adopting a more portfolio perspective, it aims to determine whether there are significant excessive returns of foreign asset prices after Fed statements, which might have affected the efficiency of Fed's monetary policies itself.

Outline

The thesis is divided into 7 chapters, grouped into distinct 2 parts. Part I provides the tools to better understand the motivations of the Fed to operate unconventional monetary policies after the financial crisis of 2008. It also gives an overview of the literature about global transmission of such monetary policies. Part II presents our methodological approach, analyses the resulting outcomes, and interprets it by giving keys to answer the research questions.

Part I

Chapter 1 clearly states the context of thesis. It reminds the role and conventional tools used by the Federal Reserves to influence the US economy.

Chapter 2 lists the unconventional tools at disposal of the Fed and their responses to the crisis of 2008.

Chapter 3 overviews the existing literature, going through the most relevant papers related to the global transmission of monetary policies, with a focus on effects of Fed's decisions on emerging countries between 2008 and 2013.

Part II

Chapter 4 indicates the methodological approach followed to empirically answer the research questions.

Chapter 5 summarises the outcomes of our models. Besides the analytical approach, we also illustrate our results by linking it to the economic news at this time.

Chapter 6 provides "food for thought" by stating the key lessons learned from the past and through our model to evaluate the impact of future US monetary policies on emerging markets. In this regard, the future interest rate hike is illustrated as an example.

Chapter 7 describes the limits of our empirical model.

4.

Part I

Context & Literature Review

6.

CHAPTER 1

MONETARY POLICY AND ITS ACTORS IN THE USA

The financial crisis of 2008 that plunged the US economy into recession prompted aggressive and decisive actions by policymakers. In the United States, a so-called “Quantitative Easing” has been launched in order to bounce back the economy. However, to better understand these widely debated actions, it is first helpful to acquire some basic knowledge of the role of US policymakers and tools used by them under normal and exceptional circumstances.

1.1. Brief Definition of the Monetary Policy

Monetary policies correspond to the actions of a central bank (or other regulatory committee) to guide healthy economic growth. According to monetarists, monetary policymakers determine the size and growth of money supply, which in turn affects the interest rates and the performance of economy.

In an economic turmoil, a central bank will typically increase the money supply by buying sovereign bonds, lowering therefore the interest rate yield curve, and creating an easy money environment.

Lowering the interest rate reduces indeed the borrowing costs. More people and firms are inclined to borrow money, creating greater demand for goods and services. It also encourages investors to allocate more to risky assets, as the result of equalizing risk-adjusted returns across their portfolios. Finally, changes in interest rate also indirectly affect the exchange rate of the US dollar against the other currencies. A lowered rate leads to the depreciation of the US dollar, boosting (decreasing) the local exportation (importation). All of these ultimately strengthen growth in aggregate demand (Board of Governors of the Federal Reserve System, 2005).

In the United States, the central bank is called the Federal Reserve, or simply Fed. As the US central bank is the main subject of this thesis, the next section focuses on its role, objectives and tools.

1.2. The US Federal Reserve

The Federal Reserve, or simply Fed, is "*the central bank of the United States. It was founded by Congress in 1913 to provide the nation with a safer, more flexible, and more stable monetary financial system*" (Board of Governors of the Federal Reserve System, 2005).

The Fed is exclusively the banker's and government's bank and does not conduct any commercial activities.

1.2.1. Composition of the FED

The Federal Reserve is a federal system, composed of a central agency - the Board of Governors – in Washington D.C., and a network of 12 regional Federal Reserve Banks.

The Board of Governors of the Federal Reserve System consists of 7 members, who are appointed by the US President, and approved by the Congress for a 14-year term. The Board is led by a chairman and vice-chairman, who are also appointed by the President for a 4-year term. The current chair is Janet L. Yellen, who took over from Ben Bernanke on January 31, 2014. The Board is responsible for determining and implementing monetary policies, as well as for the supervision and regulation of the US banking system.

The regional Federal Reserve Banks are located in major cities in the United States - each responsible for their geographical area - and operate under the supervision of the Board of Governors. Acting as the operating arm of the central bank, the 12 Reserves Banks distribute the nation's currency, supervise and regulate banks' members and bank holding companies, and serve as national banker for the US Treasury.

1.2.2. The Federal Open Market Committee

Another major component of the Fed is the Federal Open Market Committee (FOMC). The FOMC is the policy-making branch of the Federal Reserve, and ordinarily holds 8 scheduled meetings each year. At each meeting, there are first discussions about the outlook of the economy and the monetary policy options available. After the discussions, the FOMC votes. The voting members of the FOMC are the 7 members of the Board of Governors, the president of the Federal Reserve Bank of New-York, and presidents of 4 other Reserve Banks who serve on a rotating basis. The chairman of the Board usually serves as the committee

chairman. Note also that those presidents whom are not currently serving in the committee are involved in FOMC discussions, but do not vote. Their presence ensures the Fed to remain a decentralized entity (Board of Governors of the Federal Reserve System, 2005).

As they take decisions that influence monetary policies, and thereby the US interest rate, FOMC announcements get the most of the attention in the media.

1.2.3. Objectives of the Fed

The Federal Reserve Act specifies that the Board of Governors and the FOMC should seek "*to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates"* (Board of Governors of the Federal Reserve System, 2005).

To accomplish its mandate, the FOMC aims to lower the level of inflation at the rate of 2 percent. No precise figure for the unemployment rate is set though, since the maximum level of employment is largely dependent of non-monetary factors that affect the dynamic of labour market. Therefore, the target of the unemployment rate that would be expected to converge to in the next 5 to 6 years in absence of any shock is based on projections, varying over time between 5 and 6 percent. (Board of Governors, 2015)

1.2.4. Conventional Tools Used by the Fed

To effectively implement monetary policies, the Fed ordinarily controls over the amount of Federal Reserve balances available to depository institutions, influencing thereby the so-called federal funds rate[1]. To do so, the Fed has three main tools at its disposal: open market operations, changes in discount rate and changes in reserve requirements.

1.2.4.1. Open Market Operations

Open market operation is the most often-used tool for implementing monetary policies. These operations consist of buying or selling government securities – usually the US Treasury Bills - in the market to bring the supply of Fed balance in line with FOMC's targets. In doing so, it determines the actual level of reserves that financial institutions hold at Federal Reserve Banks, influencing thereby the overall credit (i.e. bank loans) and money (i.e. bank deposits) conditions (Bernanke and Blinder, 1992). As institutions with surplus reserves daily lend their

[1] See below for further details

excess of money to institutions that are in need, changes in credit and money conditions affect in reality the so-called Federal funds rate.

The Fed funds rate corresponds to the interbank short-term interest rate at which these transactions occur on an overnight basis. As this rate is only determined by the open market, the FOMC announces a Fed funds target. If the effective Fed funds rate is pushed too far from the target rate, the Fed will therefore conduct open market operations to readjust it. In this regard, the Fed fund rate is assumed to be a "*good indicator of monetary policy actions […] and extremely informative about future movements of real macroeconomic variables*" (Bernanke and Blinder, 1992).

1.2.4.2. Change in Discount Rate

The discount rate is the interest rate charged to other depository institutions on loans granted by regional Federal Reserve Banks's lending facility: the discount window. By contrast with the Fed fund rate, the discount rate is established by Federal Reserve, and is not a market rate. During each FOMC discussion, the committee decides whether to lower, raise or maintain discount and Fed funds rates, although the latter refers to a target rather than an actual rate.

It is commonly assumed that the discount rate gives a signal to the financial markets of the Fed expectations about the short-term interest rate. Rates for discount window loans set below the actual market rates will encourage depository institutions to borrow more through loans directly granted by the Fed, leading to an increase of the supply of Federal Reserve balance and thereby, banks' reserves. Consequently, the Fed funds rate tends to follow the fluctuation of the discount rate (Cloutier, 2015).

1.2.4.3. Change in Reserve Requirements

All depository institutions have to hold in their reserves a certain amount of liabilities against deposits in bank accounts. Reserves are held either in cash in their vaults and/or in non-interest-bearing bonds at Regional Federal Reserve banks. The level of reserve requirements is set by the Board of Governors and adjustments in reserve requirements can affect the cost of expanding credits. As a result, it represents a useful tool as it helps to "*ensure a predictable demand for Federal Reserve balances and thereby, a control over the Federal funds rate*" (Board of Governors of the Federal Reserve System, 2005).

1.2.5. Limits of the Conventional Policies

When the economic situation is severely affected by a crisis, the conventional monetary policies do not appear to be efficient anymore.

Back to the mid of 2007, the United States was shaken by an unprecedented financial crisis that brought the country into a recession. The real gross domestic product plummeted while the unemployment rate skyrocketed. Concerns about deflation and credit contraction were hotly debated and definitively pushed the Federal Reserve to lower the Fed funds rate to zero in record time. However, as the recession pushed the banks to deleverage and strictly rationalize their credit offers, the higher risk prime in the interbank market – as well as in private loans markets – dampened the effect of lowered fed fund rate (Loisel and Mésonnier, 2009).

Rudebusch (2009) suggests that the Fed funds rate should be cut to below zero but this is impossible because people can always hold currency instead of depositing it in banks. In the literature, it refers to the floor on interest rate at the zero lower bound.

As the traditional transmission mechanism of monetary policy via Fed funds rate showed its limits in 2008, the Federal Reserve began to explore unconventional ways to stimulate the US economy. This is the topic of the next chapter of the thesis.

12.

CHAPTER 2

UNCONVENTIONAL POLICIES TO FACE THE 2008 CRISIS

2.1. Typology of Unconventional Tools

A decade ago, Bernanke et al. (2004) grouped the unconventional monetary policies into three main classes: measures to influence public expectations about the future course of the interest rate (forward policy guidance); measures to increase the size of the central bank's balance sheet (pure quantitative easing); and measures to change the composition of the central bank's balance sheet (credit easing). The classification still remains valid nowadays and represents the alternative policies that the Federal Reserve had at its disposal to provide further accommodative policies at the zero lower bound.

2.1.1. Forward Policy Guidance

What the Fed calls the "forward policy guidance" consists of commitments, explicit or implicit, of central banks to maintain the short-term interest rate to a certain level for a certain period of time. By doing so, it decreases the real *ex ante* interest rate in the mid and long term, and helps to boost the aggregate demand. Gürkaynak et al. (2005) show that statement language has bigger effects on the financial markets than the Fed funds rate target itself. These statements, that try to influence the market expectations of the future interest rate course, provide thus a strong tool to influence long-term interest rates.

Loisel and Mésonnier (2009) point out that when these commitments are explicitly stated, these are typically formulated in a conditional way. Therefore, the commitment is hold until some conditions – usually about inflation or economic growth - are fully satisfied. This conditionality allows central banks to react timely and adequately to any unexpected changes, while still strengthening the credibility of the statements.

An empirical study, initiated by Bernanke et al. (2004), confirms that the forward policy guidance can be conclusive. However, looking back over the past, it has provided historically some mixed outcomes. For instance, to fight the early 2000s recession, the Bank of Japan (or BoJ) initiated a forward policy guidance - called the "Zero Interest Rate Policy" - but it did not work well, as the commitment from the BoJ was not perceived by the market as enough

convincing to be held. It raises the first central issue related to the credibility of the commitment. For the forward policy guidance to be effective, the market has indeed to believe that the central bank will actually carry out the policy they are announcing. Another challenge is that the market may have different expectations about the future interest rate path. Therefore, clear communication is essential, since the forward guidance may not work if the market is confused with the central bank's intended policy path (Reifschneider and Roberts, 2006).

2.1.2. Pure Quantitative Easing

Under the unconventional policy typography, a voluntary substantial increase of the size of the central bank's balance sheet refers to the quantitative easing[2], or simply QE. The difference with the conventional policy is that the target is here the level of excess reserves held by banks - thereby the amount of currency in the market - and no longer the interest rate itself. The objective is to drive down the long-term interest rates by saturating the supply of currency above banks' reserves to maintain the real interbank interest rate close to zero. To do so, under a quantitative easing, central banks buy sovereign bonds with different maturities, but also other assets in the market. The primary goal of a quantitative easing is to inject liquidity into the public and private banking system. In case of pure quantitative easing, it implies that the composition of the central bank's balance sheet on the asset side is incidental.

The effectiveness of monetary policies, and especially the concept of quantitative easing, has been for decades hotly debated. In the 20th century, Keynes (1936) and Hicks (1937) already raised doubt about effectiveness of such a policy by introducing the concept of liquidity trap. A liquidity trap is defined as a situation in which injections of money into the banking system fail to influence the interest rate yield curve. The idea is that if the short-term interest rate is so low (basically near to zero), investors would rather hold the money than invest in assets because they expect either the interest rate to go up soon or an adverse event such as deflation to occur. Eggertson and Woodford (2003) add that in a perfect world without any financial friction, a quantitative easing monetary policy would prove impotent.

[2] The notion of "pure" quantitative easing is important, as the QE program that the media refers may differ the pure. I will provide more explanations in the next section about the US quantitative easing

However, the financial market is imperfect because there are some financial frictions. Quantitative easing may work for two reasons. First, some investors have preferred habitats[3] (or market segmentation) in terms of investments. Money and bond, as well as short- and long-term securities, are close but imperfect substitutes. It implies that markets are to a certain degree segmented. As the quantitative easing also buys a variety of assets, including long-term securities or mortgage-backed assets, the supply for those securities falls, leading therefore to a rise of their price. In that way, the quantitative easing can drive down the interest rate yield curve and a range of other borrowing rates, through the so-called portfolio-rebalancing channel. Second, such a policy can also affect the interest rate yield curve by signalling[4] that the central bank is still committed to ease their market conditions. As a matter of fact, being embarked on a QE also strengthens the credibility of the commitment of maintaining a near-zero Fed funds rate, as the central bank may also be subject to substantial losses (Bernanke, 2004).

From an empirical view, the effectiveness of the pure quantitative easing tried by the Bank of Japan from 2001 to 2006 is subject to debate. Most analysts agree that the pure QE of the BoJ in 2001 was not very successfully as it failed to stimulate aggregate demand sufficiently to eliminate the threat of a persistent deflation (Bowman et al., 2011). They note however that this failure may be the result of the poorly managed forward policy guidance from 1998 to 2003 (Ito and Mishkin, 2006). Although there was eventually a positive effect of liquidity on the supply of credit, the Japanese episode recalls the threat of the liquidity trap, and motivated some central banks to explore other alternatives, by focusing more their actions on some specific markets, rather than simply expanding the amount of money in the banking system.

2.1.3. Credit Easing

The credit easing can be considered as a particular form of the quantitative easing, if it also substantially increases the balance sheet of the central bank. However, in comparison with a pure quantitative easing, a credit easing approach first aims to focus on the composition of the asset side of the central bank's balance sheet, and no longer on the liability side. In other words, the primary objective is to increase the price, thereby to lower the yield, of some assets

[3] Pension funds typically prefer long-term assets to hedge its long-term liabilities. Therefore, pension funds may be less inclined to buy shorten-term securities, even if the long-term asset's price is increasing.
[4] See also the chapter below "*Cross-border Transmission Channels*" for further details about the signalling channel

that the central bank precisely targets (Bernanke, 2002). The targets can be US treasuries, corporate bonds, mortgages-backed assets or any asset-backed assets, whether these assets are in the public or private sector. Depending on which particular market the central bank would like to facilitate its functioning, the credit easing can lead to a quick decrease of the credit spread in the targeted markets. The advantage is that it directly reduces the borrowing cost in some markets, without having to go through the banking system (Williams, 2012).

However, such a monetary policy raises four main issues. First, the communication about the orientation of the monetary policy becomes even more challenging because a credit easing does not rely on only one factor. As a result, it is hard to assess the amount of assets to buy since the price elasticity of assets may vary from one market to another (Bernanke, 2009). Second, the central bank may be exposed to potentially higher credit risk. This risk may however be mitigated if the central bank buys private assets only in times of financial stress. Under these circumstances, the price of private assets is typically undervalued and buying these assets will not substantially increase the credit risk. Third, the credit easing – as also in the case of pure quantitative easing - implies that the demand of currency is above the banks' reserve. Therefore, combining it with the conventional Fed funds rate approach is incompatible. Fourth, the effectiveness of credit easing depends on the financing structure of the economy. Intuitively, one may expect that it is more effective in an economic regime in which securities-related financings are an important part of the overall financings. In this regard, a credit easing should be theoretically more useful in the United States than in Europe that relies more on the banking system (Williams, 2012).

2.2. US Response in Times of Financial Distress

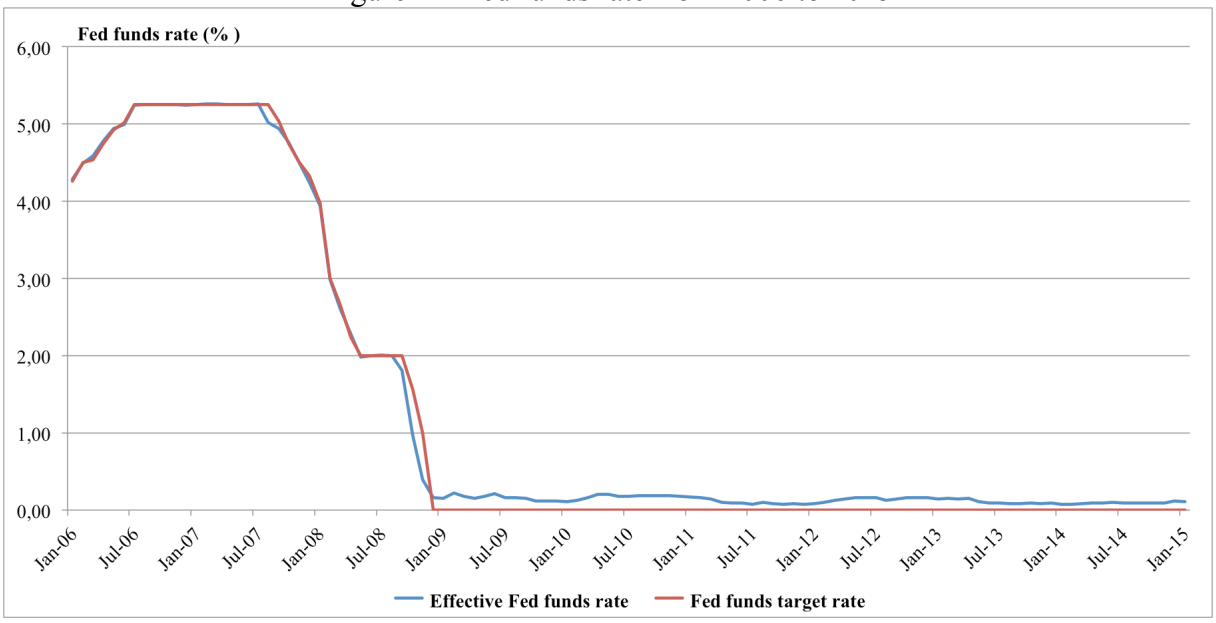
2.2.1. Context of the Financial Crisis

Back to 2008, the impact of the housing bubble collapse and the subprime crisis left the US financial markets impotent. The mistrust that prevailed in the interbank market - intensified by the Lehman Brother's bankruptcy - pushed the Federal Reserve by late 2008 to lower its target of the Fed funds rate to zero in record time. As illustrated in Figure 1, the policy rate is hold toward the zero lower bound since early 2009.

The Fed intention was first to restore a functional financial market, but growing concerns about a recession soon shifted to stimulating economic growth. Given the unprecedented scale

of the financial crisis, the Fed began to pursue less conventional monetary policies, including the US Quantitative Easing program.

Figure 1 – Fed funds rate from 2006 to 2015



Source: Federal Reserve

2.2.2. Reaction of the FED: US Quantitative Easing Programs

"Our approach--which could be described as "credit easing"--resembles quantitative easing in one respect: It involves an expansion of the central bank's balance sheet. However, in a pure QE regime, the focus of policy is the quantity of bank reserves, which are liabilities of the central bank. […] In contrast, the Federal Reserve's credit easing approach focuses on the mix of loans and securities that it holds and on how this composition of assets affects credit conditions for households and businesses" (Bernanke, 2004).

Through this speech, the chairman of the Fed, Ben Bernanke, emphasized the fact that the Fed QE programs in response to the financial crisis had been designed to support and improve the credit conditions, and thereby to reduce some specific interest rates. The Fed's approach, which conceptually differs from the pure QE launched by the Bank of Japan from 2001 to 2006, was driven by differences in the structure of its financial system. Indeed, the bond market played a relatively more important role in the US than in the Japanese economies. It encouraged the Fed to concentrate more on bond purchases, rather than directly to lend to banks (Neely and Fawley, 2013).

In this regard, as stated by Bernanke (2004), the recent US unconventional policy is technically a credit-easing program. However, as the US credit easing involves substantial increases of the Fed's balance sheet, it can be considered as a particular form of the quantitative easing. Consequently, we assume that the US policies undertaken during the financial crisis of 2008 is just called the US Quantitative Easing, or simply QE.

2.2.3. US Quantitative Easing from 2008 to 2013

From 2008 to 2013, the Fed pumped around $3.5 trillion into the US financial system. The bond-buying program can be separated into four distinct programs: QE1, QE2, Operation Twist, and QE3.

2.2.3.1. Fed's QE1 Program

As the housing credit market was the hardest hit by the subprime crisis, the first round of QE was designed to support this market. On November 25, 2008, the Federal Reserve announced that it intended to purchase $100 billion in housing government-sponsored enterprise (or GSE[5]) debt and $500 billion in mortgage-backed securities (or MBS) issued by GSE's.

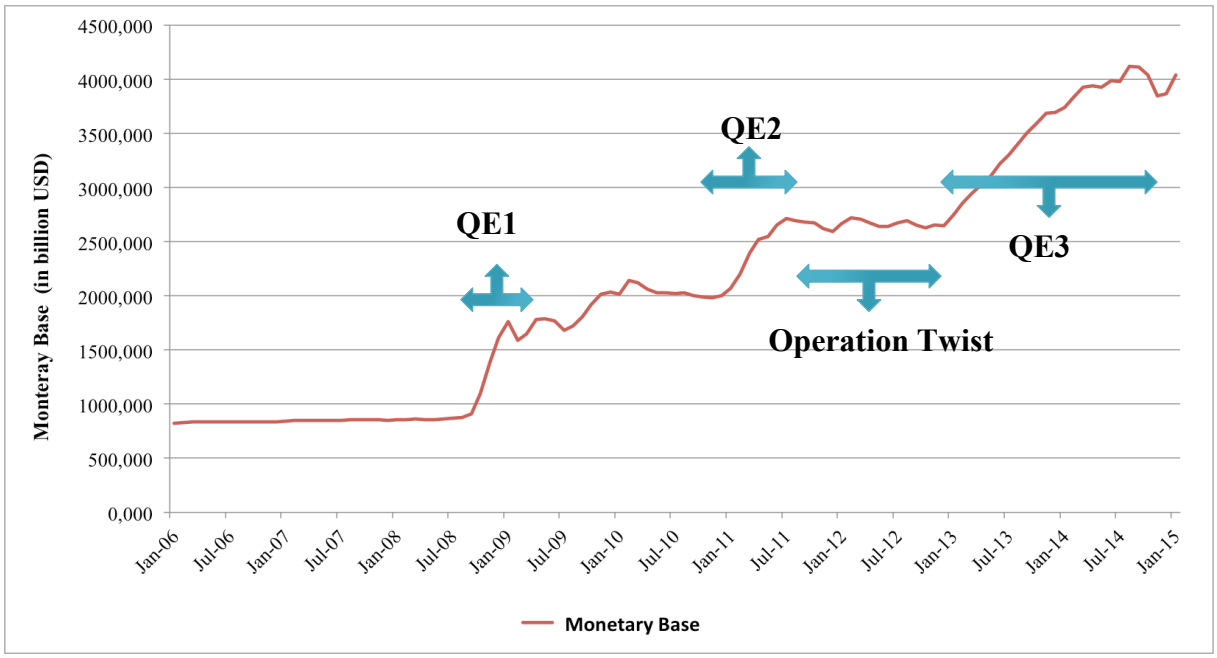
An additional purchase of $100 billion in GSE debt, $750 billion in MBS, but also $300 billion in long-term US Treasuries was announced on March 18, 2009. As illustrated in Figure 2, the growing purchases of MBS and long-term Treasuries in the Fed's balance sheet from November 2008 to March 2009 roughly doubled the size of the monetary base.

Empirical studies showed that the first round of QE managed to significantly lower long-term real interest rates through their term premia[6] (Gagnon et al., 2011). In particular, the second wave of purchases of QE1 surprised the financial actors, as it was unexpected. This surprise move plummeted the dollar against other major currencies, but also sent US equity stocks soaring. Furthermore, it showed that the Fed intended to pursue an aggressive approach, which strengthened their commitment to keep interest rates low for "*an extended period*" (Robb, 2009).

[5] GSE's are privately held companies with public purposes. Created by the US Congress, their intended function is to enhance the flow of credit, and thereby reduce the cost of capital, for certain borrowing sectors (education, agriculture or home finance, etc.) of the economy (Investopedia, 2015)

[6] The term premia refers to the extra return requested by investors to hold longer-term assets instead of holding a number of shorter-term assets.

Figure 2 – Size of the US monetary base from 2006 to 2015



Source: Federal Reserve

2.2.3.2. Fed's QE2 Program

By the second half of 2010, although market condition improved, the Fed was still disappointed with the slow pace of growth. The unemployment rate reached nearly 10% and concerns of possible disinflationary pressures aroused, as the headline inflation decreased below zero.

From August until November 2010, Bernanke expressed several times his concerns about deflation, and introduced the possibility of further actions to sustain the economic growth. On November 3, 2010, the FOMC finally announced the purchase of an additional $600 billion in US Treasury bonds. The so-called Q2 was designed to lower long-term interest rate and increase the inflation to a level consistent with the dual mandate of the US central bank.

Financial markets largely expected the FOMC statement of November. Speeches of former chairman Bernanke before the actual announcement of the QE2 already signalled the markets of his intentions to launch a new round if the US macroeconomic indicators did not improve by the end of 2010. This anticipation led therefore to a pre-adjustment of asset prices before the announcement of November 3 came. Interestingly, Neely and Fawley (2013) point out that the 10-year maturity Treasury yields even slightly rose around the QE2 announcement, while it fell significantly by a cumulative 94 basis points after the official QE1. It underscores thus the importance of assessing monetary policies based on the events that shaped expectations of

future actions undertaken by the Fed, which are not necessarily the events in which these actions were announced.

2.2.3.3. Operation Twist

During the summer of 2011, there were renewed fears of recession in the United States. In response, the Federal Reserve decided to change its strategy and announced on September 21, 2011 the Maturity Extension Program and Reinvestment Policy, or simply Operation Twist. In contrast to the precedent rounds of purchase, the Operation Twist did not expand the monetary base as illustrated in Figure 2. Under the Operation Twist, the purchases of $400 billion in long-term assets were indeed funded by the sale of $400 billion in short-term assets. By doing so, the Fed intended to reduce longer-term interest rates relative to short-term interest rates.

At the same meeting, the FOMC also decided to reinvest principal payments of maturing MBS and GSE debts in MBS rather than in US Treasuries in which it was originally reinvested. This announcement had a strong effect in the MBS market and its credit conditions (Chandra and Strand, 2012).

In the first half of 2012, the US nonfarm payrolls figures were significantly below the Fed's expectations. On June 20, 2012, the Fed announced an extension of the Operation Twist, with additional purchases (and sales) accounting for a total of $267 billion, at the pace of $45 billion per month.

2.2.3.4. Fed's QE3 Program

However, this new attempt to bring down the interest rate yield was moderately successful, as the labour market remained still sluggish. As largely expected, the FOMC announced on September 13, 2012, a third round of the quantitative easing, in addition to the existing Operation Twist. Unlike in the previous QE programs, the FOMC committed to a pace rather than a quantity of purchases. Therefore, the FOMC announced to buy $40 billion MBS per month as long as "*the outlook for the labour market does not improve substantially*" (Bernanke, 2012). Bullard (2010) reminds that this conditional structure is analogous to the forward policy guidance of interest rates, by allowing readjustments to incoming information while reinforcing the trust of market participants. Compared to the two previous rounds, QE3 was an open-ended program, meaning that there was no specific date announced for when it would end.

As said above, the Operation Twist was originally hold but on December 12, 2012, the FOMC announced its intention to stop swapping US Bills with long-term Treasuries, as the unemployment rate was still relatively high. Consequently, the FOMC statement to pursue the purchases at the pace of $45 billion long-term Treasuries per month expanded again the monetary base. In total, QE3 accounted purchases of 85$ billion per month.

2.2.4. US Tapering from 2013 to 2014

As the QE3 was an open-ended program, the market expected that former chairman Bernanke would gradually reduce its bond-buying program in 2013 or later. In the financial jargon, this exit strategy is called the "tapering". In the early 2013, vigorous debates among market participants raise questions regarding the timing and the nature of the US tapering.

2.2.4.1. Tapering talks

In the early 2013, Chairman Ben Bernanke stated that the Fed had adopted a data-driven approach to determine whether it would taper its QE3 programs. It meant that the start of the tapering would depend on the state of US economy and macroeconomic variables like inflation and unemployment rate.

On May 22, 2013, given the improvement in the US economy, Bernanke talked for the first time about a possible tapering of the QE3. These talks about the intention to unwind its unconventional policy surprised the market because the timing of tapering talks occurred sooner than the market expected (Mishra et al, 2014).

2.2.4.2. Implementation of the US Exit Strategy

The official announcement of the US tapering finally occurred on December 18, 2013, at which the Fed committed to reduce its purchases pace at the level of $75 billion per month from its original $85 billion per month. Interestingly, Mishra et al. (2014) show that although the Fed actually announced the tapering by the end of December 2013, the financial markets reacted more strongly after the Fed's meetings in May and September 2013. It confirmed that through the second half of the year, investors felt gradually comfortable with the tapering.

Throughout the year of 2014, the Fed pursued the progressive reduction of the amount of purchases in MBS and Treasuries per month thanks to the continued improvement in economic conditions. The unemployment rate fell dramatically and the inflation converged to its long-term target of 2%, showing the robustness of the US economy despite of the tapering. In addition, the gradual approach adopted by the Fed managed to minimize market disruption

as the process of tapering did not have significant impact on both bond and stock domestic markets (Kenny, 2014).

On October 27, 2014, newly appointed chairwoman Janet Yellen announced the end of the US quantitative easing.

2.2.5. Forward Policy Guidance from 2010 to Now

Another tool has been widely used to influence the interest rate yield curve: the forward policy guidance. Although the literature indicates that the Fed has used forward guidance at various times in the past, the use of statements to provide explicit information about the future policy path became essential by the end of 2010. With the Fed funds rate near zero, forward guidance provides a tool to affect longer-term interest rates. In this regard, Woodford (2012) finds that the "*extended period of time"* language, and thereby the commitment that the end of quantitative easing is not linked with interest rate hike is effective to lower expectations of future interest rates[7].

As a result, in 2012, to influence at most investors' expectations, chairman Bernanke indicated that interest rate would not be raised before the inflation reaches 2% and the unemployment rate stays below 6,5%. As the tapering of QE3 renewed the concerns of an imminent fed funds rate hike, the forward guidance strategy has becomes now widely used.

In this regard, in 2014[8], newly appointed Janet Yellen clarified her new forward guidance strategy by stating that Fed funds rate would be exceptionally low "*for a considerable time after the end of quantitative easing"* in early 2014, by being "*patient"* in December 2014, and finally "*until further improvement*" in March 2015. By gradually giving some indications about the timing of a possible interest rate hike, it actually helped investors to feel comfortable with it, which prevented any unexpected hike of the real interest rate yield.

[7] Woodford measures the expectation with the Overnight Index Swap (OIS) rates
[8] See FOMC statements available on the Federal Reserve website

CHAPTER 3

EFFECT OF THE QE: AN INTERNATIONAL PERSPECTIVE

3.1. US Quantitative Easing Subject to Strong Criticisms

Although the quantitative easing programs were probably necessary to support the US economy[9], these policies had been harshly criticized by the rest of the world. In 2014, the IMF warned that a "*prolonged ease may encourage excessive financial risk taking*" (IMF, 2014). In this regard, the US quantitative easing may have had notably side effects on the rest of the world, and especially on emerging markets. Low interest rates made money cheap to borrow, and many US investors may therefore have sought to alternative assets that offer higher returns, including assets from the emerging markets[10]. However, it may have posed true challenges to emerging market economies - or simply EMEs – to sustain their economic growth.

During the US quantitative easing, policymakers in these economies were concerned with market volatility and risks of financial instability resulting from QE policies. Some have complained explicitly about the pressure on exchange rates that drove up the value of their currencies, leading to the loss in competitiveness of their economies. In 2010, the Brazilian Finance Minister, Guido Mantego, described this situation as a currency war[11]. More recently, concerns about the tapering talks ran the debates of the G20 meeting in September 2013. Many EMEs within Group 20 such as India or South Africa blamed the United States to provoke market turbulence by weakening their currencies and increasing the risk of disruptive capital inflows. In this regard, Indian Prime Minister, Manmohan Singh, was particularly exacerbated by the US monetary policies and emphasized "*the need for an orderly exit from the unconventional monetary policies being pursued by the developed world*"[12].

The purpose of this chapter is to question the relevance of these concerns. A number of studies have been recently published, with various findings. The rest of this chapter reviews the existing literature about the effect of US monetary policies on EMEs.

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[9] The effectiveness of the US QE is beyond the scope of this thesis and will not be discussed

[10] By "emerging economies", we refer to the "regions that are experiencing rapid informationalisation under conditions of limited or partial industrial" (see Emerging Economies Report of 2008).

[11] See the news report on http://www.ft.com/cms/s/0/33ff9624-ca48-11df-a860-00144feab49a.html#axzz3eSbaHvYY

[12] See the news report on http://www.theglobeandmail.com/report-on-business/india-leads-emerging-market-charge-at-g20/article14116891

3.2. Cross-Border Transmission Channels

First, it is helpful to understand how a US monetary policy may have affected asset prices and portfolio decisions, both domestically and internationally.

According to literature, there are 4 international transmission channels through which emerging markets may have been greatly affected by the US QE. These channels are not necessarily mutually exclusive, since it may occur simultaneously (Lavigne et al., 2014).

3.2.1. Portfolio Rebalancing Channel

As the QE involved the purchases of long-term assets such as US Treasuries and mortgage-backed securities, it may have reduced the supply of such assets, and thereby their yields. Gagnon et al. (2011) show that theories about market segmentation still hold under a quantitative easing. Since there are not perfect substitutes for US long-term treasuries, the QE may have influenced the global markets by provoking an increase of the demand for close substitution assets, including emerging-market assets that offer higher risk-adjusted returns. Through this channel, QE may therefore not only provide a portfolio rebalancing towards riskier domestic assets, but also towards foreign assets. Such portfolio balancing would then boost asset prices in emerging markets, easing their financial conditions and lowering their interest rates through the risk premium (Fratzscher et al., 2013).

About the effectiveness of this channel, a number of studies assert that it constitutes the main transmission channel through which the US unconventional monetary policy has affected global markets (Gagnon et al., 2011; Hamilton et al., 2012), while others remain sceptical about the real significance of this channel (Cochrane, 2011).

3.2.2. Signalling Channel

The signalling channel operates through a combination of liquidity and risk-taking channels (Chen et al., 2012). First, an easing policy theoretically injects liquidity in the market. Then, by committing its intention to keep the Fed funds rate near zero, the Federal Reserve signals in fact that large interest rate differentials with respect to emerging markets are expected to persist. In turn, it boosts carry trades[13] and capital flows to emerging economies, since persistent low US interest rates and large liquidity in the market prompt market participants to invest in assets with greater risks (Borio and Zhu, 2008). The commitment is seen as credible

[13] Carry trades refer to an imperfect arbitrage, which consists of acquiring debts in a weaker currency and invest the money in a currency that offers greater interest rates.

because if the Fed raises interest rates later, it will face huge losses on their purchased assets too (Hausken and Ncube, 2013).

Compared to the first channel discussed, Bauer and Rudebusch (2013) highlight the growing importance of the signalling channel since the financial crisis of 2008, arguing that forward policy guidance, which operates through the signal channel, has become one of the main tools used by the Federal Reserve.

3.2.3. Exchange Rate Channel

During money easing conditions, the portfolio flows resulting from the growth and interest rate differentials[14] led to a depreciation of the local against foreign currencies, including the US dollar.

Given the predominance of the US dollar as the major international reserve currency hold in most of the countries of the world, the impact of US QE, and especially its depreciation against other currencies, on emerging economies may then have been adversely large.

Furthermore, the upward pressure on emerging market currencies have been persistent during QE programs, and may therefore have harmfully impacted emerging markets that base their economies on exportation and / or where currencies are pegged to the US dollar (Chen et al, 2012).

3.2.4. Trade-Flow Channel

Also called external demand channel, the fourth transmission channel indicates the channel through which higher demands for emerging economy goods and servicing's may have affected the emerging economies. Thanks to the increase of spending's and easier trade credit in the United Stated, the quantitative easing may have thus positively affected the EMEs. However, the amplitude of demands depends on the level of import elasticity of the United States with respect to the emerging products (Chen et al., 2012).

The net impact of this channel must be however balanced against the potential appreciation of the emerging market currencies resulting from the exchange rate channel.

[14] By most studies, growth and Interest rates are assumed to drive up capital flows into emerging economies. For further details, see below the paragraph "*Drivers of Capital Inflows into Emerging Countries*".

3.3. QE Programs: Evidences of Spillover Effects from 2008 to 2013

To better understand the real transmission mechanism of US monetary policy to foreign economies, it is also now essential to find evidences of a true relationship between FOMC announcements and foreign economies.

In most cases, researches mainly focus on the financial impact - including both asset prices and capital flows - to assess the impact of QE on emerging markets. Impacts on real economic activities may lag in time and is therefore hard to identify. In this regard, the reaction of financial market should theoretically provide the most timely and clearest direct impact of the quantitative easing (Joyce et al., 2011).

In this thesis, we assume that large capital inflows are mostly positively correlated with booms in assets prices, since it is commonly accepted in the literature. Our assumption is based on the paper of Olaberria (2010). He analyses the link between a number of macroeconomic factors and stock index prices by using a panel of 40 countries from 1990 to 2010, and finds that emerging markets are the most likely to experience asset prices booms in times of large capital flows.

3.3.1. Empirical Evidences of International Transmission Before 2008

Well before the crisis of 2008, a number of studies have already investigated the transmission of information across international markets. Given the importance of international trade, information regarding advanced countries should influence emerging-economy asset markets, since most emerging economies rely heavily on trades with developed countries. In the early 2000s, despite an extensive literature, only weak evidences of transmission from advanced countries to emerging-economy asset markets have been found (Bekaert and Harvey, 1997). Finally, in 2003, Wongswan (2003) found some evidences by using high-frequency intraday data. He finds that some US macroeconomic surprise announcements have a significantly short-lived burst of volatility effect on emerging-economy equity assets.

The financial crash of 2008 seems however exceptionally unique, given the magnitude of the crisis and the introduction of unconventional monetary instruments. According to the IMF (2014), global investors have poured more than half a trillion US dollars of capital into emerging market bonds from 2010 until 2012. Although it is premature to assert that the quantitative easing is the main reason that caused this shift of interest to emerging markets,

there are a number of empirical evidences showing that the QE provoked a statistically significant and persistent spillover effect on emerging markets.

3.3.2. Empirical Evidences of Effects on EMEs Asset Prices

All researches about the impact of US unconventional monetary policy from 2008 to 2013[15] on emerging markets find evidence of spillover effects on asset prices.

A recent study conducted by Chen et al. (2012) shows that the Fed announcements significantly influenced prices of a range of emerging market assets. At most of the key announcement dates, equity prices in emerging countries rose while government and corporate yields – as well as credit default swap (CDS) spreads - dramatically decreased. In addition, the impact of emerging markets was in general stronger than the one on the advanced economies, leading to large capital inflows into emerging markets.

In addition, a report of the IMF (2013) suggests that financial spillover effects resulting from unconventional policies were the largest when policies greatly changed the monetary environment at this time. As a matter of fact, the impact of QE1 – which intended to restore market stability – led to substantial financial volatilities in emerging markets, including reductions in bond yields, appreciation of the domestic currency against the US dollar and rises in equity prices. By contrast, later announcements, such as QE2 or Operation Twist, showed mixed or negative effects on all emerging market assets. One explanation suggested by Chen et al. (2012) is that the first announcement was perceived as strong and credible commitment of the Federal Reserve to combat the recession and to lose the financial conditions. Later announcements could have been seen as a recall of the committing, partially offsetting the surprise element.

Note that there are also a few studies that focus on the actual purchases operation, rather the announcements of Fed interventions. Gürkayna et al. (2005) find that announcements contain for most new information on the US markets, while the latter do much less. However, Fratzscher et al. (2013) tests this assumption and finds that Fed announcements had overall smaller effects than actual Fed operations. In case of international transmission, investors may therefore take more time to assimilate new information.

[15] The US monetary policies from 2013 to 2014 that refers to the tapering event will be discussed in the following section

3.3.2.1. The Importance of Country Specific Factors

Bowman et al. (2014) point out, however, that the magnitude and the persistence of the effect may vary significantly across countries. In their paper, they find that the asset prices in emerging countries with weak fundamentals (including high long-term interest rates, inflation rates, or large current account deficit and with a more vulnerable banking system[16]) are in general more affected by US monetary announcements.

Furthermore, Chen et al. (2012) add that international spillovers may also differ across countries in the longer run, partly because of differences in economic and financial conditions, policy environment, capital flows control and exchange rate regimes. In this regard, Hausman and Wongsman (2006) find that stocks and interest rates respond more to US monetary policies in countries with less flexible exchange rate regimes. The discrepancy in outcomes across emerging countries is however particularly significant during the tapering talks. This topic will be thus further developed in the next section.

3.3.3. Empirical Evidences of Effects on EMEs Capital Flows

Changes in asset prices may have major impact on the macro economy of the country. While most studies focus on asset prices, there are also a few that analyse the impact of QE directly on capital flows into or out of the emerging countries. By doing so, it helps to better understand the implications of QE externalities, and to evaluate the concerns expressed by emerging countries.

3.3.3.1. Drivers of Capital Inflows into Emerging Countries

First, a key question is to define the drivers that encourage capital flows to emerging economies. The existing literature does not favour one factor over another.

- ✓ *Improved Fundamentals and Growth Prospects Differentials*

By using a panel-data approach, IMF (2011) finds that improved fundamentals[17] and growth prospects of EMEs are important components in global capital flows to these countries. Consistent with this finding, Ahmed and Zlate (2013) specify that the important factor that

[16] The vulnerability of the banking system is measured by a weighed average of 5-year Expected Default Frequency, and the 5-year Moody's spot credit

[17] According to authors, it may also include current account balance, fiscal balance, inflation or/and foreign exchange reserves.

drove capital inflows to EMEs is rather the growth prospect's differential between advanced and emerging economies, rather than the absolute value of the growth rate itself.

- ✓ *Use of unconventional monetary Policy*

IMF (2011) also points out that the only use of unconventional monetary policies in the advanced economies such as the United States may have exerted strong effects on capital flows. The use of unprecedented measures surprised the market, creating higher uncertainty and volatility in the market.

However, this latter affirmation is questioned by Fratzcher et al. (2013). By using a linear regression with several control variables at key announcement dates, they find that the effects of QE have not been significantly relevant to explain the variations in capital flows in EMEs.

- ✓ *Interest Rates Differential And Global Risk Appetite*

A number of studies also find that the low US interest rate and greater global risk appetite increase the attractiveness of EMEs as an investment (Ghost et al., 2012). Similarly, Ahmed and Zlate (2013) also point out that the policy rate differentials may play a major role.

3.3.3.2. Evidence of Capital Flows Patterns

All studies agree that episodes of QE were accompanied by large waves of capital inflows into emerging countries. However, the amplitude of these inflows may have changed over time.

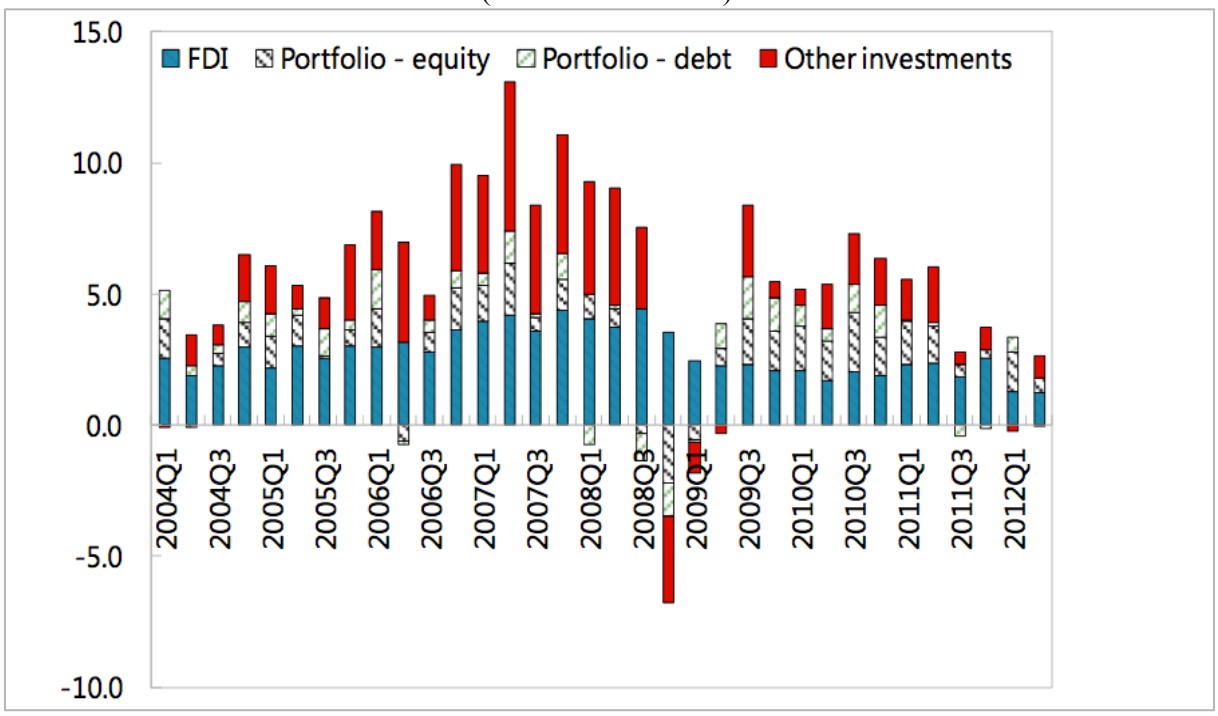
A recent study of Fratzscher et al. (2013) analyses the effect of QE by investigating the effects on portfolio decisions – from primarily the US investor's perspective - into bond and equity mutual funds, and not asset prices. The key finding was that QE1 triggered a strong portfolio rebalancing of capital inflows out of EMEs and into US mutual funds. By contrast, QE2 policies induced a portfolio rebalancing partly into emerging equities, suggesting therefore the existence of the portfolio balance channel.

However, the nature of flows may have changed over time. Fratzscher et al. (2013) also point out that while QE1 mainly induced portfolio rebalancing across countries, QE2 largely triggered portfolio rebalancing across both asset classes and countries, primarily from bonds markets to EME equity markets. This result is consistent with a similar analysis done by the IMF (2013) that also underlines the importance of market conditions when evaluating the impact of monetary policies. In addition, as shows in Figure 3, the IMF (2013) note that after

a brief sudden capital outflow out of EMEs, flows quickly move back to emerging economies, supported by growth and interest rates differentials.

Lavigne et al. (2014) note however that these findings need to be weighed against the fact that without QE1 in the early stages of the crisis, capital outflows across EMEs might have been even larger, since EMEs would have experienced weaker demand for their exports.

Figure 3 – Capital inflows into emerging countries from 2004 to 2012
(In % of own GDP)



Source: IMF estimates © IMF (2013)

3.3.3.3. Net Impact on Capital Flows of Emerging Market

There is no consensus, however, about the real net effect of QE on emerging market flows.

In the existing literature, there are two dominant views regarding the global effect of a subsequent easing policy. The first view, mostly suggested by advanced countries, assumes that there is major effect on global market. Negative externalities caused by easing monetary policies by advanced countries are largely offset by stronger domestic growth, since the QE intends to promote a more stable credit and financial environment, increasing thereby the exports by the emerging economies. On other hand, the second view, held in many EMEs, argues that such monetary policies substantially depreciated domestic currency, and increased the risk-adjusted interest rate differentials vis-à-vis the other markets, which eventually led to large capital inflow but also inflationary pressures in emerging countries.

Interestingly, Chen et al. (2012) indicate that economically speaking, the QE net effect on emerging countries may have changed over time, as the growth expectations of advanced and emerging countries were taking different directions. Initially, the QE1 may have helped emerging countries to stabilize global credit markets and strengthen trade credit, by preventing larger capital outflows resulting from declines of exports. However, at later announcements, emerging economies have quickly returned to strong growth, while the advanced economies including the United States were still sluggish. As a result, the QE programs may have negatively affected EMEs. Later stages of the quantitative easing (QE2 and Operation Twist) may then have encouraged speculative attacks, increasing capital – mostly portfolio[18] rather than direct– inflows into these countries, and worsening the economic and financial conditions in these countries. In this regard, Sahay et al. (2014) analyse the impact of quantitative easing from 2010 until 2012 and find that many emerging countries faced some difficulties to absorb the substantial capital inflows and most met this challenge by allowing their currency to appreciate dramatically, increasing thereby their exposure to inflationary pressures.

Nevertheless, the IMF (2013) recalls that potential negative effects of QE, such as loss of export competitiveness or asset price bubble after speculative attacks, need to be weighed against positive effects, such as improved confidence, higher aggregate demand and globally more sound financial conditions. In addition, as related above, some studies find that the effect of QE1 that aims to restore a more viable financial environment was larger than later announcements, more subject to speculative actions. (IMF, 2013; Chen et al., 2012) As the effect was the largest during the early phase of QE, IMF (2013) suggests that the net overall impact from 2008 to 2013, that includes QE1 and QE2, was generally positive, driven by stronger demands and lowered cost of capital.

[18] IFM (2014b) suggests that portfolio and other investments flows played an increasingly important in post-crisis capital flows, relative to the traditional foreign direct investment. China remained an exception among all emerging countries.

3.3.4. Sources and Channels of Larger Spillover Effects during QE

Besides the growth and interest rate differentials to drive capital inflows to emerging countries, many studies also highlight the importance of the *surprise* component. By analysing specifically announcements that surprise market participants and change their expectations about the future policy path, there are clearer empirical evidences about the channels through which QE affected both asset prices and capital inflows into emerging economies[19].

3.3.4.1. Dimensions of the "Surprise" Component

If an announcement is fully anticipated by the market, it has no immediate effect on the asset prices or portfolio reallocation. Only (full or even partial) surprise announcements matter. However, Fed announcements have not always surprised the markets equally over time. In the existing literature about the effect of monetary policy, a surprise is often described as the difference between the yield of the Fed funds rate announced at the FOMC meeting and the next futures on Fed funds rate (Rigobon and Sack, 2004). These announcements can surprise along two main dimensions (Gürkayna et al., 2005).

The first dimension is related to surprises that impact on the immediate policy rate, described by Sahay et al. (2014) as the *signalling shock*. The *signalling shock* captures information related to current rates and short-term policy rate expectations, associated with the signalling channel. The central bank can surprise the market with a new unexpected policy rate, but these punctual changes in short-term interest rates has however little effect on economic behaviours.

In addition, Gürkayna et al. (2005) find that some surprise announcements might affect long-term rates. Described by Sahay et al. (2014) as *market shock*, the second dimension tends to capture information relative to the degree of policy uncertainty (term premia, associated with portfolio rebalancing channel) and the difference of expectation about the future mid- and long-term policy rate path (also associated with the signalling channel).

Chen et al. (2014) analyse the impact of US monetary policy shocks on both asset prices and capital flows by using an event study[20], and find that the changes in asset prices and capital

[19] All studies find spillover effects due to FOMC announcements, but not all studies in the existing literature applied the methodology related to a surprise component. However, studies usually compensate it by analyzing the impact of QE only at key announcement dates that created large volatility in the financial market.

[20] In the existing literature, methods combining an event study with linear regression are the most commonly used by the experts to measure the impact of Fed announcements on emerging markets

flows after QE announcements (or tapering talks) were more correlated with *market* than *signalling* shocks. It suggests that surprises announcements during QE programs were more likely to be reflected in longer-term bond rates. By contrast, *signalling* and *market* shocks were equally important during conventional monetary policies.

Those studies show in fact that the use of unconventional instruments, including forward guidance and large-scale asset purchases, has widened the monetary policy transmission mechanism. In this regard, besides the portfolio rebalancing portfolio channel, signalling channel plays, as under conventional period, an important role, but over longer period of time than before. This is in line with the introduction of forward policy guidance.

This finding has major implications, since the signalling channel is better understood by central banks and its resulting externalities might therefore be better managed through a clear and credible communication from Fed officials.

3.3.4.2. Evidences of (non) overreaction of the EMEs during The QE

As changes in asset prices capital flows were barely significant during the conventional monetary policy phase, another key finding of Chen et al. (2014) is that the spillover effects – computed per *unit* of monetary surprise – from 2000 to 2014 were stronger during the quantitative easing and tapering phases than under a conventional monetary policy phase. As the spillover per unit does not seem to depend on the size or sign of shocks, one explanation suggested by them is that it might result from the use of new instruments and their resulting liquidity, showing therefore one of the costs of hitting the zero lower bound.

Other studies, however, do not find any significantly larger effects of US QE beyond those of conventional policies would provoke. Ahmed and Zlate (2013) focus on net private capital flows to EMEs and do not find significant positive effects of QE on net inflows into emerging markets. Similarly, Bowman et al. (2014) analyse the effect of monetary shocks on asset prices in many emerging markets by using a vector autoregressive (VAR), and find that the generalized impact of QE on EMEs exchange rates, stock prices and sovereign bond yields has not significantly been unusual in comparison with the impact under conventional easing phases. Currency depreciation may then just be an inevitable consequence of monetary easing (Santor et al., 2013).

3.4. Tapering Talks: Evidences of Spillover Effects in 2013

As discussed above, given the improved recovery of the US economy, former chairman Bernanke talked for the first time about a potential tapering of the QE3 on May 22, 2013. Known as the tapering talks[21], this episode particularly worried many emerging countries because they feared further periods of high volatility in their financial markets and economies.

3.4.1. Drivers of Larger Volatility

In the recently existing literature, studies find two main drivers that might have provoked large volatilities in emerging markets during the tapering talks.

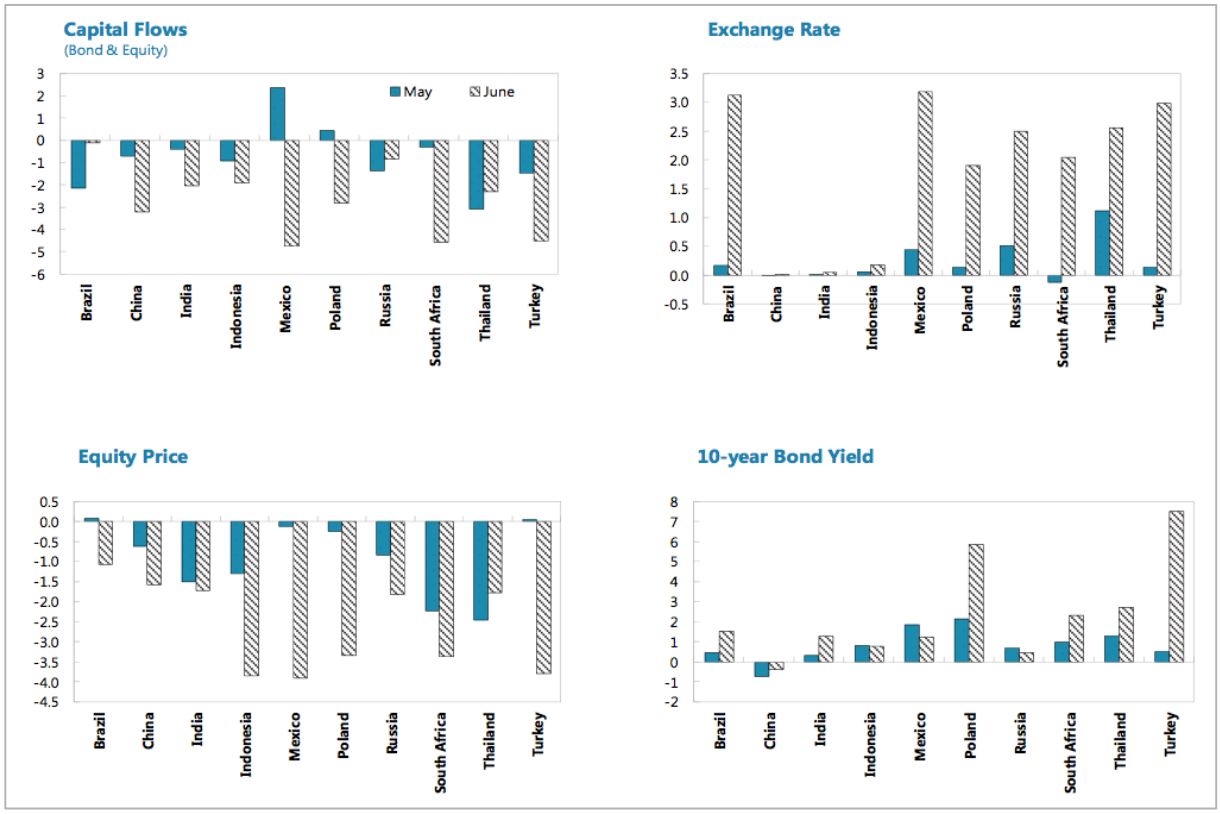
First, as discussed above, the early phases of quantitative easing brought large capital inflows into emerging countries. Many emerging countries allowed their exchange rates to appreciate and their foreign reserves to increase, so that they could absorb large capital inflows. However, Sahay et al. (2014) finds that over time, stronger exchange rate and demand led to a progressive widening (contraction) of current account deficits (surpluses) in most countries. All of these factors led to an erosion of "policy buffers" and higher short-term external financing needs, making thereby some emerging countries more vulnerable to changes in expectation of global financial conditions.

Second, there is little doubt that the first testimony of former chairman Bernanke about a potential tapering did greatly surprise the market. Following this speech, the Fed would begin scaling back their purchases under QE3 earlier than the expectations of many market participants. The market revised their beliefs and advanced the date of an effective tapering, but also the timing of an eventual increase in the Fed funds rate. Despite several attempts by Fed officials to assert that the timing of an increase of Fed funds rate above the zero lower bound was not correlated to the pace of tapering, Bauer and Rudebusch (2013) note that these changes in policy expectations led to an overall reduction in investors' tolerance for risk, which triggered a reassessment of the risk-adjusted return from investing in risky assets.

As growth prospects in EMEs became mixed and long-term interest rates rose strongly due to little global risk appetite, many EMEs experienced sharp asset price volatility and withdrawal of capital flows, as shown in Figure 5.

[21] The tapering talks refer to the episode from the first talk about tapering (May 2013) and the official tapering announcement (December 2013)

Figure 5 – Market reaction across countries following May-June 2013 monetary shocks (expressed in Z-scores)



Source: IMF Estimates © Sahay et al. (2014)

3.4.2. Empirical Evidences on Asset Prices and Capital Flows

A few studies have analysed the impact of tapering announcement on EMEs. All studies find significant volatility in both capital flows into EMEs and asset prices. In this regard, Chen et al. (2014) stated that changes in asset prices and capital flows were the largest during the tapering talks period.

3.4.2.1. Effect on Asset Prices

By using an event-study approach, Rai and Suchanek (2014) analyse the market reaction within a 2-day window around 4 key FOMC announcements related to tapering. Their results suggest that the strongest reaction of EMEs fell upon the first mentions of tapering in May and June 2013, rather than the actual implementation of tapering in December 2013. From May to December 2013, local currencies against the US dollar rapidly depreciated, while sovereign bond yields increased and equity prices declined. In addition, Aizenman et al. (2014) also find that tapering news coming from the former chairman Bernanke provoked more volatility in the market than any other news coming from Fed senior members.

3.4.2.2. Effect on Capital Flows

Similarly, Lavigne et al. (2014) show that many EME's also experienced large withdrawals of capital flows following tapering announcements. The capital outflows were sharper in the early phases of tapering talks, by globally affecting all EME's countries. More interestingly, most studies find that over time, after the initial widespread impact, capital flows became more differentiated, greatly varying from one emerging country to another, as illustrated in Figure 5.

3.4.3. Differentiation across emerging countries

3.4.3.1. Importance of Economic Fundamentals

By covering different phases of the US quantitative easing, Chen et al. (2014) find that the differences in economic fundamentals across countries - including inflation and current and fiscal account balance - matter significantly during the tapering talks.

Mishra et al. (2014) suggest that countries with strong fundamentals, deeper and more integrated financial markets, better growth prospect, as well as tighter capital-flow measures and macroprudential policies experienced smaller local exchange rate depreciation and increases in sovereign bond yields. Similarly, Rai and Suchanek (2014) show that emerging countries with faster growth, smaller current account deficits, lower debt and higher productivity growth faced relatively fewer capital outflows following FOMC announcements about tapering.

3.4.3.2. The Fragile Five

Investors may thus have reacted differently to the tapering news from one country to another, with some countries experiencing sharper depreciation of their currencies because of weaker fundamentals.

In this regard, there are some empirical evidences. Mishra et al. (2014) shows that from May to December 2013, investors particularly focused their attention on the so-called *Fragile Five*, including India, Indonesia, Brazil, Turkey and South Africa, leading to sharp exchange rate depreciations in these countries. This sample of emerging countries highlighted by Morgan Stanley in 2013 have been referred as the *Fragile Five*, because of their overreliance on foreign capital flows to replenish current account deficit, and their higher risks of exchange rate depreciation and inflation. In terms of capital flows, Nechio (2014) finds that during the

tapering talks, the large capital outflows were concentrated countries with weaker fiscal and current account, mainly corresponding to the Fragile Five.

3.4.3.3. Dissenting Views

There are however dissenting views based on empirical evidences. Eichengreen and Gupta (2014) use data's for exchange rates, foreign reserves and equity prices between April and August 2013, and find that better fundamentals did not provide greater buffers against pressure on exchange rate, foreign reserves and equity prices. Instead, another factor in their study appears to matter the most: the depth of the financial markets. Interestingly, they find that in relatively large and liquid systems, investors are more able to rebalance their portfolio if growth prospects or global financial conditions are getting worse. The deeper is their financial markets, the more exposed they are to market fluctuations.

It is not clear why there are contrasting results in the existing literature. The use of different countries, time periods and/or approach may be one of the reasons.

3.4.4. Normalisation of the Federal Reserve Policy

The effective tapering of the quantitative easing started on December 18, 2013. As the episode of the tapering talks showed that changes in capital flows could be greatly correlated to higher financial volatilities in emerging markets, the exit strategy and then the normalisation[22] of Fed policies has brought new concerns and fears among emerging country policymakers.

Only a few studies[23] focus on a potential normalisation of Fed policy. By using a vector autoregressive (VAR) model, Dalhaus et al. (2014) analyse the impact of the normalisation of the Federal Reserve monetary policy on portfolio flows on emerging countries. By defining a policy normalization shock as a shock increasing both the spread of US long-term bonds and monetary expectations[24] while leaving the policy rate unchanged, they find that the effect is expected to be small to emerging countries. Similarly, Lim et al. (2014) also use a VAR approach to generate scenarios where the normalisation of Fed policies occurs over the course

[22] The monetary policy normalization refers to the steps to raise Fed funds rate to more normal levels and to reduce the size of Fed balance sheet.
[23] Up to now, I do not find any paper available that analyses the effective tapering programs from December 2013 until October 2014.
[24] The expectation is derived from the Fed funds rate futures contract, while leaving the policy rate unchanged

of 2014-2016. Their results also indicate a small contraction of capital flows compared to aggregate GDP in emerging countries.

Although their estimations are quantitatively small, it can however still be economically significant and create financial turmoil in EMEs. In other words, even if the exit of quantitative easing is well managed, Dalhaus et al. (2014) show that higher bond yields resulting from normalisation or exit strategy may prompt portfolio rebalancing, increasing borrowing costs of EMEs and capital outflows.

These studies are however subject to important caveats. In particular, their analyses do not take into account country-specific variables, minimizing the potential role of economic fundamentals in driving capital flows to EMEs. Further researches are thus necessary to determine whether economic fundamentals, as well as sound financial policies, may have helped emerging countries to mitigate the negative spillover effects as advanced economies were ending their unconventional monetary policies to normalise it.

Part II

Model & Analysis

40.

CHAPTER 4

METHODOLOGICAL APPROACH

The purpose of the empirical part is to analyse the US quantitative easing through event studies, tools commonly used to identify excessive returns of asset prices around specific events.

The originality of our event study comes from the analysis of the impact of US QE events on foreign asset prices through the abnormal return methodology, bringing thereby a more portfolio - rather than economic - perspective. In recent literature relative to global transmission, papers usually apply linear regressions within a short-term event window to determine whether Fed announcements provoke higher volatilities on foreign asset prices, and whether differences across countries, if any, come from specific country factors. To the best of my knowledge, there is no research using abnormal returns, except the paper[25] of Chen et al. (2014). However, their study does not cover the actual tapering period and rates hike talks. Our event study will cover Fed announcements from 2008 until mid-2015.

The objective is therefore twofold. First, we aim to determine whether there are significant abnormal returns of foreign asset prices after Fed statements, by comparing country asset prices with a global benchmark. The different phases of QE and Tapering are covered in order to determine the critical periods for EMEs. Second, we aim to challenge the relative importance of specific country factors such as strong fundamentals during the actual tapering and forward policy guidance periods. To do so, we select a number of emerging countries, separate it into two groups (fragile against strong fundamentals), and compare it to a benchmark composed of developed European countries. The existing literature shows the importance of these specific country factors during QE programs and tapering talks. In this thesis, we extend the analysis period to mid-2015.

4.1. Market Efficiency Hypothesis

The usefulness of event study to measure the effects of economic events comes from the concept of Efficient Market Hypothesis (EMH), and the importance of information. There is

[25] However, the concept of abnormal return is only used in the appendix in order to check to robustness of their model that analyses the relevancy of a number country-specific factors to explain foreign asset price changes.

no doubt that information play a leading role in asset price valuation, but the key question is to determine the degree of information assimilated by the market. In this regards, EMH assume that markets are efficient, and Fama (1970) defines three forms – or levels - of market efficiency.

4.1.1. Weak-Form EMH

The weak form of EMH implies that the market is efficient if the current price of an asset reflects all market information. It assumes that past information do not provide any relevant predictable power to determine future asset prices.

Therefore, weak-form tests (autocorrelation, econometric or run tests) determine how well past returns predict future returns, and are mostly valid with weak-form EMH (Fama, 1970).

4.1.2. Semi-Strong Form EMH

The semi-strong form of EMH implies that the market is efficient if the current price of an asset reflects all publicly available information. It assumes that stocks adjust quickly to new information. Note that the semi-strong form also includes assumptions of the weak-form EMH, as public news encompasses market information.

The commonly often-used tool to test the semi-strong form EMH is the event study, which consists of measuring the quickness of market adjustment after the release of new information (Fama, 1991). The idea behind the study is that investor is no able to benefit from abnormal return by trading just after the release of information. Empirical evidences show that semi-strong EMH holds, meaning that asset prices appear to absorb quickly newly available information. It provides therefore a powerful tool to determine the relative importance of any new information, and if any under- or overreactions are observed.

4.1.3. Strong Form EMH

The strong-form EMH implies the market is efficient if the current price of an asset reflects all information both private and public, incorporating weak- and semi-strong forms EMH, too. It assumes that no investor can generate profit significantly above the average, whether the investor holds private information or not (Fama, 1970).

However, strong-form tests that determine whether private information is fully reflected in the asset prices were mostly not conclusive, paving the way for developing alternative theories such as behavioural finance, for instance.

4.2. Event Study Approach

As stated above, the thesis uses the event study approach, since it allows us to isolate the direct effects of US monetary policy announcements. However, a rigorous methodology is essential to ensure the relative validity of the model and its outcomes. Figure 6 show the main assumptions made for our event study.

Figure 6 - Summary of our model assumptions

Study Framework	
Event (day)	FOMC announcements
Event Window	11 days
Estimation Window	30 days
Return (R_i)	Daily
Expected Return	
Benchmark - R_M	MSCI World (ACWI)
Country Indices	iShares MSCI ETF's
Parameters - Regression	Ordinary Least Squares (OLS)
β – Estimation Window	30 days
Statistical t-test	
St Error (σ)	Crude Dependence Adjusted

4.2.1. Event Identification

The initial task of conducting event studies is to define the period over which the market indices will be examined (MacKinlay, 1997). In this thesis, the approach to identify Fed announcement dates is qualitative. Selected events correspond to days when the FOMC committee announces further decisive decisions[26]. In total, we select 22 events related to Fed announcements, covering the period of 2008-mid 2015. The details of all selected events are described in Appendix 1.

The selection of events can be summarised as follow: during the quantitative easing programs from 2008 to 2013, we select 7 key announcement dates associated with QE1 (2), QE2 (1),

[26] There is however one exception, as we include the speech of Ben Bernanke on May 22, 2013.

Operation Twist (2) or QE3 (2). These dates have been largely analysed in the existing literature, but we aim to confirm it through our own methodology. Furthermore, to the best of our knowledge, there is no paper about the impact of actual tapering on EMEs yet. Consequently, we select all the 15 FOMC's statements between May 2013 and April 2015, including news related to tapering talks (3), actual tapering (8) or exclusively interest rate hike talks (4).

Note that in an event study context, it is essential that the event is relatively unanticipated. If the information is already in the market on the announcement date, we may only observe limited abnormal returns if any. In this thesis, as we are not able to evaluate the relevancy of each meeting relative to the tapering episode, we decide to select an extensive number of events occurred from 2013 until mid-2015 in order to ensure that key tapering statement dates are all included.

4.2.2. Data Selection

After identifying the events, it is necessary to define the criteria for the inclusion of global market indices. In our study, we select 15 ETFs representing country indices all around the world, and put them together into 3 groups according to their specificities.

The price of indices is retrieved from Yahoo! Finance or Macrobond, and the daily return is computed with the following formula:

$$R_{i,t} = \ln \frac{P_{i,t}}{P_{i,t-1}}$$

The details of all indices are available in Appendix 2, but it can be summarised as follow:

Developed Countries (Europe Five)

We select 5 European countries considered as developed, that will serve as a benchmark to compare it with EMEs.

- ✓ Netherlands
- ✓ Austria
- ✓ Germany
- ✓ France
- ✓ Belgium

Developing countries with strong fundamentals (Best EMEs Five)

We select 5 developing countries with high current account balance (in percent of GDP), high reserves level (in percent of GDP), and low external debt (in percent of GDP). The sample of robust EMEs is extracted from the paper of Aizenman (2014).

- ✓ Peru
- ✓ Israel
- ✓ South Korea
- ✓ Malaysia
- ✓ Philippines

Developing countries with weak fundamentals (Fragile Five)

We select 5 developing countries that have aroused the biggest concerns during the US quantitative easing, getting thereby the most of attention in the media.

- ✓ Brazil
- ✓ Turkey
- ✓ Indonesia
- ✓ South Africa
- ✓ India

In addition, note that there is a fourth group that gathers *Fragile Five* and *Best EMEs Five* together, called *EMEs Ten*.

4.2.3. Event Study Model

In an event study, we compare the historical (or realized) return with the expected return in absence of the event. The abnormal return of market index *i* in each time point *t* is defined mathematically as follows:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

4.2.3.1. Model for Measuring Expected Returns

The expected return can be computed using either a statistical or an economical approach. MacKinley (1997) presents two statistical models: the Constant Mean Return model and the Market model.

As the Market model encompasses the Constant Mean Return, we choose to use this approach to determine the expected return.

The Market model is described as follows:

$$E(R_{i,t}) = \alpha_{i,} + \beta_i * R_{M,t} + \varepsilon_{i,t}$$

where R_M is the market return. In this thesis, MSCI World is defined as the market benchmark.

In determining the expected return, our market model parameters α and β are estimated according to the linear *ordinary least squares* (OLS) regression, providing the *best linear unbiased estimators* (BLUE) under a normal distribution of stock returns.

4.2.3.2. Estimation Window

To estimate market model parameters, we define an estimation window of 30 days (15 days before and after the event window). Shorter window might provide little significant model parameters, and be therefore inefficient due to lack of observations. On other hand, longer window might be biased because it may include the effect of a previous event, as there are 8 FOMC meetings every year.

4.2.3.3. Event Window

The literature about the identification of Fed monetary shocks in the United States commonly uses intraday windows around US announcements (Gürnayak, 2005). But given the exceptional character of the US quantitative easing, studies show that using daily data's remains valid.

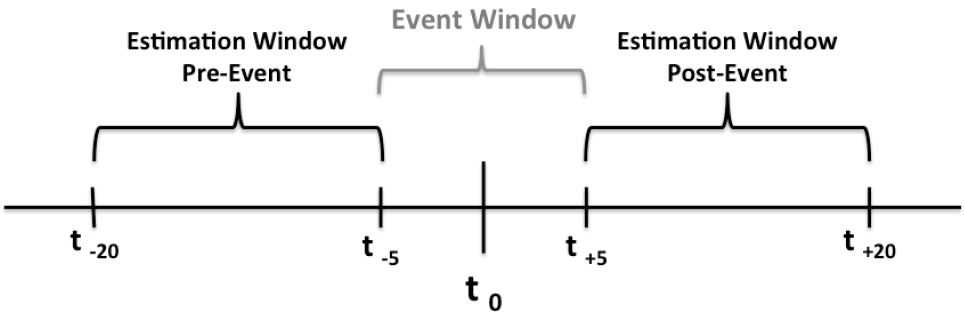
However, a 1-day window might not be able to capture the full effect of the monetary policy shocks. Rather, studies about monetary policy transmission show that the effects to events may persist after the announcement day. In a global integrated market, investors may take time to assimilate new information, especially if it requires revising the expectation about the benefits (or drawbacks), but also the probability of realisation of the actions stated by the Fed. Consequently, we assume in this thesis that Fed announcement shocks would be fully reflected in foreign asset prices within an event window within 11 days. By doing so, we include both the anticipation[27] of market participation before the event and their reactions during and after the event. Longer window would include the effects of other shocks on financial markets.

[27] As FOMC meetings are scheduled, they may have potentially price readjustments before each statement, since investors can anticipate the statements based on already publicly available information.

In addition, we compute cumulate abnormal returns (CAR) with 11, 5 and 3 days. Shorter window, namely CAR(3), captures the immediate reaction to announcement from Fed, while longer window shows the persistence of these effects if any.

Typically, note that the estimation window does not overlap the event window, as illustrated in Figure 7.

Figure 7 – Time line for the event study



4.2.4. Statistical Tests

4.2.4.1. Hypothesis Test

Following the traditional principles of statistics, the testing framework can be described as follows:

$$H_0: AR_{i,t} = 0$$

$$H_1: AR_{i,t} \neq 0$$

The null hypothesis assumes that there is no difference between the realized and expected return of the stock index *i* at time point *t*, whereas the alternative hypothesis suggests the presence of abnormal return within the event window.

Statistical tests aim to specify if abnormal returns are significantly different from zero and thereby not the result of factors independent of the event.

4.2.4.2. Average Abnormal Return

As stated earlier, we select 15 country indices that can be grouped into three distinct portfolios. These portfolios are the focus of our study.

4.2.4.2.1. Definition

For each group, we compute therefore the average abnormal return by using the following formula:

$$\overline{\widehat{AR}_t} = \frac{1}{N}\sum_{i=0}^{N}\widehat{AR}_{i,t}$$

where N corresponds to the number of indices in the portfolio. In our case, all portfolios are composed of 5 indices.

4.2.4.2.2. Significance Test

To test the significance of our AR, there are various ways to conduct a bilateral test with a student distribution. In a parametric approach, it can be traditionally conducted as follows:

$$t_{\overline{\widehat{AR}_t}} = \frac{\overline{\widehat{AR}_t}}{S_{\overline{\widehat{AR}}}}$$

where the computation of $S_{\overline{\widehat{AR}}}$ depends on the type of test we are conducting.

A simple cross-sectional test defines $S_{\overline{\widehat{AR}}}$ as the standard deviation using the time series of portfolio returns (i.e. standard error observed within the group) at time *t*. However, Brown and Warner (1985) show that this test is prone to an event-induced volatility, and may not specify accurately the significance of AR.

To combat heteroskedasticity and cross-sectional dependence, they introduce the crude dependence adjustments, and $S_{\overline{\widehat{AR}}}$ is defined as the standard deviation measured during the whole estimation window. This approach is preferred in this thesis.

A "battery" of other tests – both parametric and non-parametric – can also be conducted to check the robustness of our tests, but it will not be applied in this thesis.

4.2.4.3. Cumulative Abnormal Return

Since the effect of an event may persist over time, it may be interesting to analyse the cumulative abnormal return within a certain period of time.

4.2.4.3.1. Definition

The cumulative abnormal return from time t_0 until time t is described as the following:

$$\overline{CAR_t} = \frac{1}{N} \sum_{\tau=0}^{t} \overline{AR}_\tau$$

4.2.4.3.2. Significance Test

The significance of CAR is analysed through a student test

$$t_{\overline{CAR_t}} = \frac{\overline{CAR}_t}{S_{\overline{CAR_t}}}$$

where $S_{\overline{CAR_t}} = \sqrt{t+6} * S_{\overline{AR}}$ in which t varies from t = -5 (lower bound) to t = +5 (upper bound)

4.3. Asset Price Changes

For each event selected in our study, we also compute the return of local asset prices within a period of 15 days. The calibration of the window is $[t_{-5} ; t_{+10}]$, in which the event day corresponds to time t_0.

These values are for reference only, and substantial changes in value do not necessarily show any presence of abnormal returns or correlation with the event itself.

4.3.1. Changes in Country Indices and Exchange Rate

The daily ($D_{i,t}$) and cumulated ($CD_{i,t}$) differences of both country indices and exchange rate are computed as follows:

$$D_{i,t} = \ln \frac{P_{i,t}}{P_{i,t-1}}$$

$$CD_{i,t} = \sum_{\tau=-5}^{t} D_{i,\tau}$$

4.3.2. Changes in 10-Year Sovereign Bond Yield

As the bond yield is already in terms of percentage, changes in 10-Year bond yield are computed as follows:

$$D_{i,t} = P_{i,t} - P_{i,t_{-1}}$$

$$CD_{i,t} = \sum_{\tau=-5}^{t} D_{i,\tau}$$

CHAPTER 5

EMPIRICAL RESULTS & INTERPRETATION

In total, we conduct 22 study events, and results of all event studies are detailed in Appendix 3. To discuss our results, we show both the presence of abnormal returns if any, and asset price changes within a sizable window. To evaluate the relevancy of our abnormal returns, we apply three levels of significance in our test, as illustrated in Figure 9.

Figure 9 – p-value (of t-test)

20%	*
10%	**
5%	***

The value of the student test depends on the number of degrees of liberty (days or indices), N – 1, that the estimated parameter has.

5.1. Results during the Quantitative Easing From 2008 To 2013

We select 7 events related to the different phases of US quantitative easing. These events have all been discussed in the review of literature, but our objective in this stage of the study is first to confirm (or refute) the observations stated in the existing literature, and second to report the presence of possible abnormal returns.

Note however that due to limited data availability, the effects of QE on capital flows will not be covered.

5.1.1. QE1 to QE2 - Early Phases of Quantitative Easing

5.1.1.1. Presence of Abnormal Return

Our event study does not find any statistically significant abnormal return during the early phases of quantitative easing from 2008 to 2010. The details are available in Appendix 3A (QE1), 3B (QE1-Extended) and 3C (QE2).

There is however one exception at the time of the announcement of QE1 extension. The 3-day cumulative abnormal return - CAR(3) - of the *EMEs Ten* is indeed significant, and posts a negative return of about -5,61% (***). As the *EMEs Ten* includes all the emerging countries

of our study, it may suggest that emerging countries have been slightly more adversely affected in the short-term by the extension of QE1, compared to the rest of the world (MSCI World) and in particular developed countries.

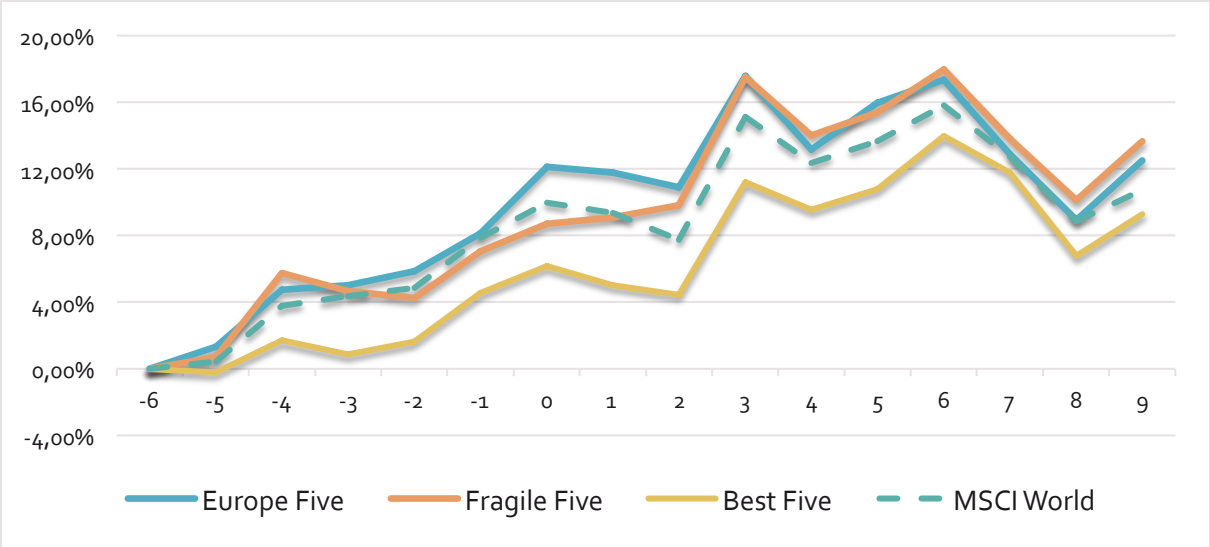
Note however that this finding needs to be weighed with the relatively few number of observations due to limited data availability[28] from 2008 to 2009. In addition, the absence of abnormal return during QE1 and QE2 announcements show that generally speaking, indices tended to move globally together from 2008 to 2009.

5.1.1.2. Asset Price Changes

Our study tends to confirm the theories in the existing literature. Around key dates of QE1 and its extension, all country indices progressively increased, while the bond yield decreased. This phenomenon is particularly clear around the announcement of the QE1 extension, as illustrated in Figure 9. About exchange rates, our study shows however mixed results, as we do not identify any particular trend.

The fact that all indicators move together after early Fed announcements suggests that early Fed decisions helped to restore globally financial and economic stability, as stated in the review of literature.

Figure 9 – 15-day Cumulative changes in equity index prices during QE1 – Extended On March 18, 2009



The announcement of QE2 was largely expected by market participants, and foreign asset prices did not showed any important moves.

[28] We do not find the prices of the indices of Indonesia, India, Peru and Philippines from 2008 until late 2009.

5.1.2. Operation Twist – First Signs of Excessive Market Reactions

After 2 rounds of quantitative easing, the Fed announces in September 2011 the Operation Twist in bid to boost the US economy. Our event study finds strong market reactions after this announcement. The details of the study are available in Appendix 3D (Operation Twist), and 3E (Operation Twist – Extended).

5.1.2.1. Presence of Abnormal Return

The episode of Operation Twist is particularly interesting to analyse as it shows statistically significant abnormal return during the whole event window. Figure 10 summarises our findings, and it indicates that the Operation Twist did not convince the market about its efficiency to bounce back the economy. Rather, investors were increasingly worried about global long-term growth, and over-reacted by divesting subsequently EMEs assets. As illustrated in Figure 10, abnormal negative returns on EMEs seem to persist over time, and the cumulative abnormal returns are significant with an event window of 3, 5 and 11 days.

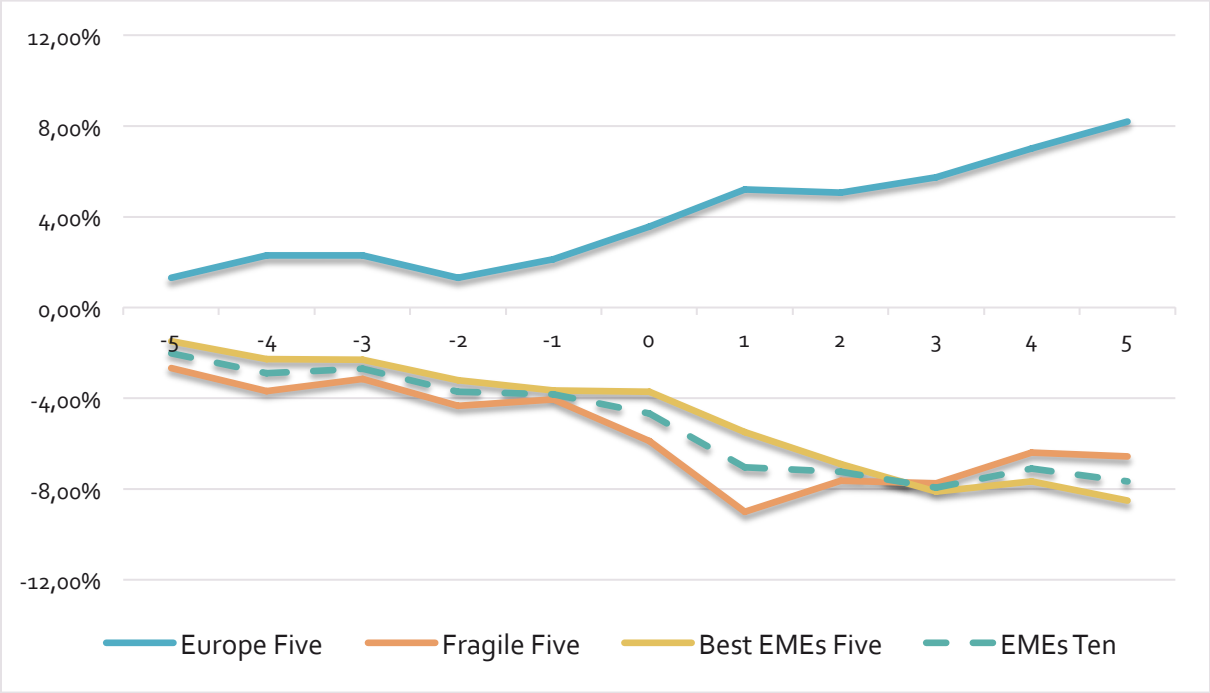
Figure 10 – Event study around Operation Twist

Operation Twist													
21/09/11	t	Europe Five			Fragile Five			Best EMEs Five			EMEs Ten		
AR(t)	-1	0,82%			0,29%			-0,44%			-0,12%		
	0	1,45%	*		-1,83%	**		-0,07%			-0,85%	**	
	1	1,64%	**		-3,12%	***		-1,77%	***		-2,37%	***	
CAR(3)		3,91%	***		-4,66%	***		-2,28%	**		-3,34%	***	
CAR(5)		2,78%	*		-4,49%	**		-4,58%	***		-4,54%	***	
CAR(11)		8,21%	***		-6,58%	**		-8,51%	***		-7,65%	***	

Another finding - illustrated in Figure 11 - is that emerging countries have been particularly badly affected by the announcement, while European countries received the news more positively. It may therefore indicate that emerging markets were henceforth experiencing more price volatilities after Fed announcements, confirming the over-sensitivity of EMEs assets to US news and the speculative nature that capital flows might have taken. This phenomenon refers to the QE-assisted bubble (Kynge, 2014).

Note that the announcement of the extension of the Operation Twist did not provoke any abnormal return, suggesting that speculative attacks toward emerging markets did not persist in the mid and long run, and confirming the short-term speculative nature of flows.

Figure 11 – 11-day Cumulative Abnormal Return of Indices around Operation Twist (September 2011)



5.1.2.2. Asset Price Changes

About country indices, our study finds that in September 2011 after the announcement of the Operation Twist, *Fragile Five* and *Best EMEs Five* faced within a 15-day event window a cumulative historical return of respectively -14,59% and -11,79%. The drop in index prices was particularly sharp on time t_{+1}, with a negative daily return of respectively -7,60% and -5,30%. Furthermore, local currencies of both portfolios depreciated against the US dollar by respectively -7,04% and -4,26%, while the 10-year sovereign bond yield increased on average by +30 basis points at the end of the event window.

Once again, these results tend to indicate a temporary sentiment of risk aversion among market participants towards emerging stock markets, by contrast with European markets that did not face substantial changes in price within the event window.

However, our study about the Operation Twist extension did not find any major changes in equity, bond or foreign exchange markets.

5.1.3. QE3 – Last round of Quantitative Easing

On September 9, 2012, the Fed announced the third and final round of quantitative easing. Although an additional round was expected, the nature of this round – an open-ended program - may have significantly affected the global financial market. Details of our event study are available in Appendix 3F (QE3), and in Appendix 3G (QE3 – Extended)

5.1.3.1. Presence of Abnormal Return

About the announcement of QE3, we find that the 3-day cumulative abnormal return CAR(3) of *Best EMEs Five* is statistically significant, by posting an positive excessive reaction of +2,08% (***). Furthermore, the daily AR in time t_{+1} is about +0,77% (**), which suggests a slight renewed interest in emerging countries with strong fundamentals. Conversely, abnormal returns – daily or cumulative - of *Fragile Five* are close to 0%.

By contrast, the announcement of QE3 extension in December 2012 did not provoke any statistically significant abnormal return, showing once again the importance of the surprise factor when evaluating the effect of monetary policies.

Note that for this event, results of *Europe Five* may be biased because of the launch of the Outright Monetary Transactions by the ECB in September 2012. As both dates are close, we do not take into consideration *Europe Five* in this event study.

5.1.3.2. Asset Price Changes

Around the announcement of QE3, we find a slight short-term burst of equities in terms of cumulative return in all portfolios (with an excess in *Best EMEs Five*), but the increase did not persist over time. Conversely, the local currency of all emerging countries in our portfolios did appreciate against the US dollar within the 15-day event window. About long-term sovereign bond, we do not find any particular trend.

Finally, the extension of QE3 did not provoke any major changes in local asset prices.

5.2. Results during the Tapering Talks in 2013

Between May and December 2013, we select 4 events that may have greatly disrupted the global financial markets.

5.2.1. May's Bernanke Speech - First Mention of Tapering

On May 22, 2013, Ben Bernanke mentioned for the first time a possible tapering of the third round of quantitative easing. Details are available in Appendix 3H.

5.2.1.1. Presence of abnormal return

Surprisingly, we do not find any abnormal return, except one of *Europe Five* (+0,73%; *) in time t_{+1}. It might suggest that investors took time to digest the information, as the news did not provoke any excessive reaction among market participants.

5.2.1.2. Asset Price Changes

Our study finds however that in May 2015, emerging countries faced great changes in all asset prices, in comparison with European countries. Figure 11 shows that indices of *Fragile Five* and *Best EMEs Five* decreased by respectively -10,55% and -7,07% within a 15-day event window, currencies of both portfolios strongly depreciated by respectively -4,19% and -2,63%, while long-term bond yield soared by +50 and +30 basis points.

Figure 11 - 15-day cumulative change in respectively
Equity, Currency & 10Y Bond Yield

5.2.2. FOMC's June Meeting - Confirmation of an Upcoming Tapering

On June 19, 2013, Ben Bernanke confirmed the upcoming tapering of QE3. Details are available in Appendix 3I.

5.2.2.1. Presence of Abnormal Return

Unsurprisingly, we find the presence of abnormal returns around the announcement of an upcoming tapering, as illustrated in Figure 12. Generally speaking, our study shows that emerging countries - represented by *EMEs Ten* - faced greater volatility than European countries. The strong negative - daily and 3-day cumulative - abnormal returns (***) following the announcement indicate that the market badly overreacted towards emerging assets, decreasing thereby their equities prices.

Furthermore, our study also find that under 10% of error margin (**), the portfolio *Fragile Five* has been the most affected by tapering talks, which is consistent with the growing concerns they had by the mid of 2013 regarding the effective tapering of quantitative easing.

Note that due to the short time interval between this event and the previous one (< 1 month), we decide to use an estimation window of 60 - instead of the traditional 30 - days to compute model parameters.

Figure 12 – Cumulative (daily) abnormal returns around Tapering Confirmation

Tapering Talks					
19/06/2013	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
AR(t)	-1	-0,14%	-0,09%	0,47%	0,19%
	0	0,01%	-1,27% *	-0,56%	-0,92% *
	1	0,20%	-1,75% *	-1,74% ***	-1,74% ***
	2	-1,29% ***	2,10% **	0,55%	1,32% **
CAR(3)		0,07%	-3,12% **	-1,82% *	-2,47% ***
CAR(5)		-1,37% *	-1,93%	-1,53%	-1,73%
CAR(11)		-2,75% **	3,69%	-0,41%	1,64%

5.2.2.2. Asset Price Changes

Besides the presence of abnormal returns, we find strong reactions following the June FOMC meeting in all foreign asset prices. Equity indices plunged, local currency depreciated and sovereign long-term bond yield increased, too. In particular, our study shows that *Fragile Five* was facing greater volatility in their assets.

5.2.3. FOMC's September Meeting - Non-Taper Event

On September 18, 2013, the Fed decided not to taper its quantitative easing. Details are available in Appendix 3J.

5.2.3.1. Presence of Abnormal Return

In our study, there is little evidence of abnormal returns, suggesting that the announcement of not to taper immediately did not provoke excessive reaction among market participants. In this regard, one may have not overreacted as the tapering was only delayed but not cancelled.

5.2.3.2. Asset Price Changes

Nevertheless, all local asset prices moved after the non-taper event. The reaction was particularly important for *Fragile Five*. In time[29] t_{+1}, the cumulative return of indices of *Fragile Five* was +8.01%, while *Europe Five* and *Best EMEs Five* posted respectively +3,40% and +3,41%. Furthermore, the currencies and 10-year bond yield of *Fragile Five* have plummeted to a cumulative return of respectively -3,37% (in time t_{+2}) and -70 basis points (in time t_{+1}).

It appears therefore the statement had been positively received by EMEs, and eased temporarily the tensions in the market. However, the reaction was a short-lived burst, which indicates that the launch of the tapering was still considered as imminent by market participants.

5.2.4. FOMC's December Meeting - Effective Tapering Process

On December 18, 2013, the Fed finally announced the tapering in order to end the biggest easing program that firstly aimed to restore a sound financial and banking environment. Details are available in Appendix 3K.

5.2.4.1. Presence of Abnormal Return

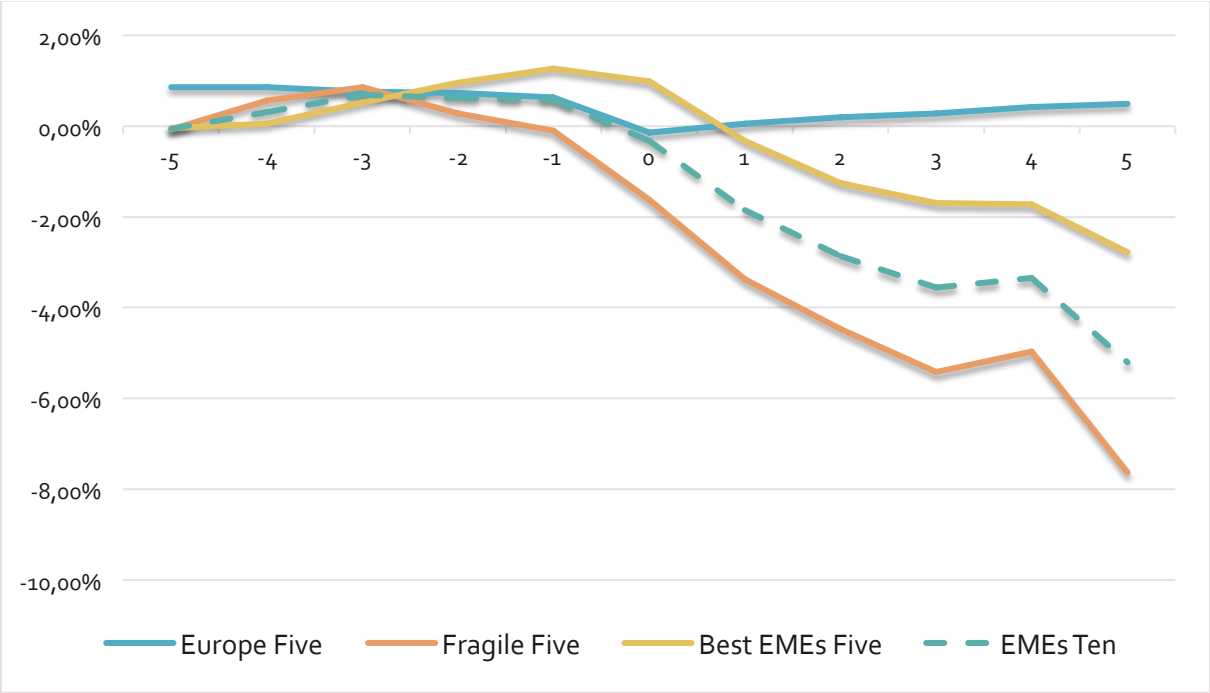
Our event study finds the presence of – daily and cumulative – abnormal return around the announcement of the effective tapering.

[29] Time t_{+1} corresponds to the 6th day of observation in our 15-day event window.

As illustrated in Figure 13, the impact appears to be particularly adverse for *Fragile Five*, for which CAR(11) posts a negative return of -7,63% (***). By contrast, the effect on *Europe Five* and *Best EMEs Five* is relatively marginal, and do not post significant abnormal returns under 5% of margin error (***).

This result has important implications; it indicates that in December 2013 investors were likely to (over)react adversely to *Fragile Five* assets, by divesting strongly in these stocks and thereby provoking greater volatilities.

Figure 13 – 11-Day Cumulative Abnormal Return
On December 18, 2013



5.2.4.2. Asset Price Changes

The simple analysis of changes in local asset prices confirms our event study. Within a 15-day event window, *Fragile Five* faced a continued decline in index prices (-6,31%), strong depreciation of the local currencies (-1,97%), and slight increase of long-term bond yield (+26 basis point). The results of the two other portfolios are mixed, and do not show any understandable trend.

Although the absolute amplitude of asset price changes is smaller than during the tapering talks, our study finds that countries from *Fragile Five* are still exposed to greater volatility due to FOMC announcements. It shows therefore the critical importance of clear communication of the Federal Reserve to mitigate the risk of greater volatility in the market.

5.3. Results during the US Interest Rate Hike Talks from 2014 to Now

Between January 2014 and April 2015, we select 11 events related to the tapering (7) or exclusively to the interest rate hike talks (4).

Although the effect of first FOMC meeting could be explained by the tapering process itself, our event study shows that effects of the following meetings are more correlated to the release of information about the interest rate hike. Consequently, our main focus in this section is on the strategy of forward guidance policy, as it became an essential tool available for influencing the US interest rate yield.

As the reduction of purchases in the tapering process became throughout 2014 regular and commonly expected, the main uncertainty lies on the timing of US interest rate hike.

5.3.1. FOMC's January Meeting – Pursuit of the Tapering Process

The FOMC meeting of January 2014 was widely expected by the market, because there were growing uncertainties regarding the externalities provoked by the US tapering. EMEs saw their currencies depreciating dramatically during the tapering talks, and the robust pace of the tapering process could plunge further these economies. Despite these concerns, Ben Bernanke, for his last statement of Fed chairman, announced the pursuing of the tapering on January 29, 2014. Details of this event study are available in Appendix 3L.

5.3.1.1. Presence of Abnormal Return

Surprisingly, our event study finds positive abnormal returns. Three of them are statistically significant. Indeed, we find a 11-day cumulative returns - CAR(11) - for *Fragile Five* (+7,04%; **) and *EMEs Ten* (+ 4,72%; ***), while we observe negative CAR(5) for *Europe Five* (-1,42%; **).

This unexpected result might be explained by the market interventions operated by some emerging countries to mitigate the effect of the FOMC's January meeting. Since the beginning of tapering talks, emerging markets have come again under pressure, and there was a growing loss of trust in EMEs central banks to take appropriate actions to sustain their economy. In this regard, in January 2014, Turkey, South Africa, India and Brazil surprisingly delivered massive interest rate hikes to defend their currency and rebuild trust in the market (Kynge, 2015). By doing so, these countries placed the stability of monetary policy over the

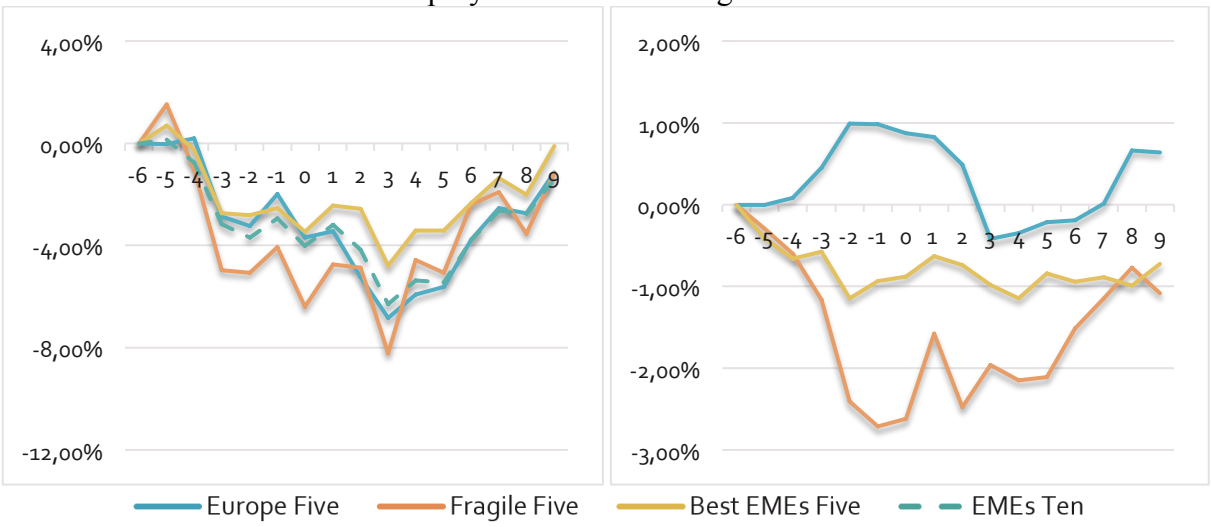
benefits of a weak currency, especially for export-driven countries. In theory, a strengthening of the currency should have a negative impact on local equities – which is the case in our study[30] - but Boyle and Ranasinghe (2014) finds that the actions undertaken by *Fragile Five* particularly managed to re-lift investors' sentiment, partially mitigating thereby the effect of US tapering. As a matter of fact, our results suggest that the impact of January's announcement was below what we might expect according the economic framework at this time. This intuition is reinforced by the negative CAR(5) observed for *Europe Five*.

5.3.1.2. Asset price changes

As implicitly stated above, market intervention from EMEs failed to stop the fall of equities and the appreciation of local currencies against the US dollar, as illustrated in Figure 14. The effect of long-term bond yield is mixed and do not follow any particular trend.

We note also that although a strong adverse effect around time t_0, *Fragile Five* managed to recover to its initial level relatively quickly, suggesting once again that the attempt to dampen the tapering effect through a more aggressive central bank tightening might have been efficient to gain the confidence of investors.

Figure 14 – 15-Day Cumulative Changes in Equity Return & Exchange Rate



[30] See the paragraph "*5.3.1.2 Asset Price Changes*"

5.3.2. FOMC's March Meeting – Introduction of Janet Yellen

The FOMC's March meeting is characterised by the introduction of Janet Yellen as the new Fed chairwoman. On March 19, 2014, she announced that the Fed would pursue the tapering path, and would continue keeping interest rate low. Details regarding this event study are available in Appendix 3M.

5.3.2.1. Presence of Abnormal Return

Our event study shows that the first statement of Janet Yellen provoked 1-day abnormal returns, especially towards emerging markets. Indeed, *Best EMEs Five* and *EMEs Ten* faced an abnormal return of respectively -1,08% (**) and -1,23% (**) in time t_0, suggesting that the markets overreacted to Janet Yellen's remarks regarding the timing of interest rate hike.

One argument raised by the media comes from the reputation of Janet Yellen before her appointment as Fed chairwoman (Davies, 2014; Evans-Pritchard, 2014). In 2014, the market firstly viewed Janet Yellen as dovish, but in the FOMC's March statement, she adopted a hawkish language by defining new forward policy guidance. Besides the willingness to "*maintain the current target range for the Fed funds rate for a considerable time after the asset purchase program ends*", she defined "*considerable*" by "*around six months*", which was shorter than market expectation[31].

Such remarks unintentionally provoked an excessive reaction in the market, but the subsequent assurances of Janet Yellen following the FOMC meeting have eased concerns of a sooner-than-expected interest rate hike. Our event study shows therefore that the overreaction can be considered as a short-lived burst.

5.3.2.2. Asset Price Changes

Another important finding relative to FOMC's March meeting comes from the reaction of emerging markets.

Surprisingly, within a 15-day event window, *Fragile Five* shows a positive cumulative equity return (+10,45%) and strong appreciation of currencies (+2,05%), while the asset prices of *Europe Five* and *Best EMEs Five* did not move greatly.

This observation has important implications as it suggests concerns about the current account deficits and fundamentals of Fragile Five have been eased, since fundamentals of Fragile Five

[31] See minutes of FOMC's March Meeting on the Federal Reserve website.

looked by the beginning of 2014 stronger than ever thanks to major structural adjustments (Gould, 2014). In addition, their aggressive monetary tightening's made their equities and especially currencies - through operations of carry trade - attractive again in the context of low volatility as they had at this time.

5.3.3. FOMC's April & June Meeting – Brief Lull in Financial Markets

As widely expected, the FOMC meetings held in April and June 2014 continued to taper its quantitative easing, and maintained the near-zero interest rate for *"considerable time"*. These statements provoked little market reaction. Details are available in Appendix 3N (FOMC's April Meeting) and Appendix 3O (FOMC's June Meeting)

Between April and June 2014, our study does not find any abnormal return, suggesting that emerging countries do not fear the tapering anymore. Tapering was happening, and the likely effect of the end of QE was already incorporated in emerging asset prices. Attention of investors turned therefore to the timing of interest rate hike.

In addition, as the sentiment towards emerging markets has gradually improved in April 2014, equities of emerging countries, especially *Fragile Five*, increased by 4,84% within the 15-day event window, while the other portfolios did not move subsequently.

5.3.4. FOMC's July & September Meeting –Rate Hike Spectrum

Between July and September 2014, fears of imminent higher US interest rates prompted investors to cut back their investments from emerging markets, creating a new wave of price volatilities and tension in the market. Details are available in Appendix 3P (FOMC's July Meeting) and Appendix 3Q (FOMC's September Meeting).

5.3.4.1. Presence of Abnormal Return

About FOMC's July meeting, our event study finds the presence of significant - ** at best – abnormal returns, indicating that the market may have (over) reacted adversely to the US preparation of lifting interest rates. The event study realized on FOMC's July meeting is summarised in Figure 15, and shows that *Fragile Five* looks fragile again after a brief period of respite. Called the *Formidable Five* in the spring of 2014, our result suggests the comeback

of *Fragile Five*, marked by an increased anxiety of investors and relative loss of attractiveness of emerging assets.

The growing concerns of investors might be confusing at first glance, since the Fed maintained their intentions of keeping the interest rates low for a "*considerable time*" in July 2014. The presence of abnormal returns might however be explained by another factor: the emergence of dissenting views against the Fed's decision among the FOMC committee itself. Some officials believed indeed that the "*considerable time*" guidance overestimate the proportion of time the Fed should wait before hiking interest rate, suggesting that the central bank may have to raise rates sooner than anticipated. These first dissenting voices in the tapering process may have therefore caused excessive reactions in the market.

Figure 15 – Cumulative (daily) abnormal return
On July 30, 2014

July's Tapering					
30/07/2014	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
AR(t)	-1	0,53% *	-0,60%	-0,10%	-0,35%
	0	-0,08%	-1,50% **	-0,06%	-0,78% **
	1	0,54% *	-0,08%	-0,02%	-0,05%
CAR(3)		0,98% *	-2,18% *	-0,18%	-1,18% **
CAR(5)		0,56%	-1,14%	1,12% *	-0,01%
CAR(11)		1,11%	-2,67%	1,03%	-0,82%

The event study on FOMC's September meeting do not show however any significant abnormal return, despite the growing dissenting views within the FOMC committee.

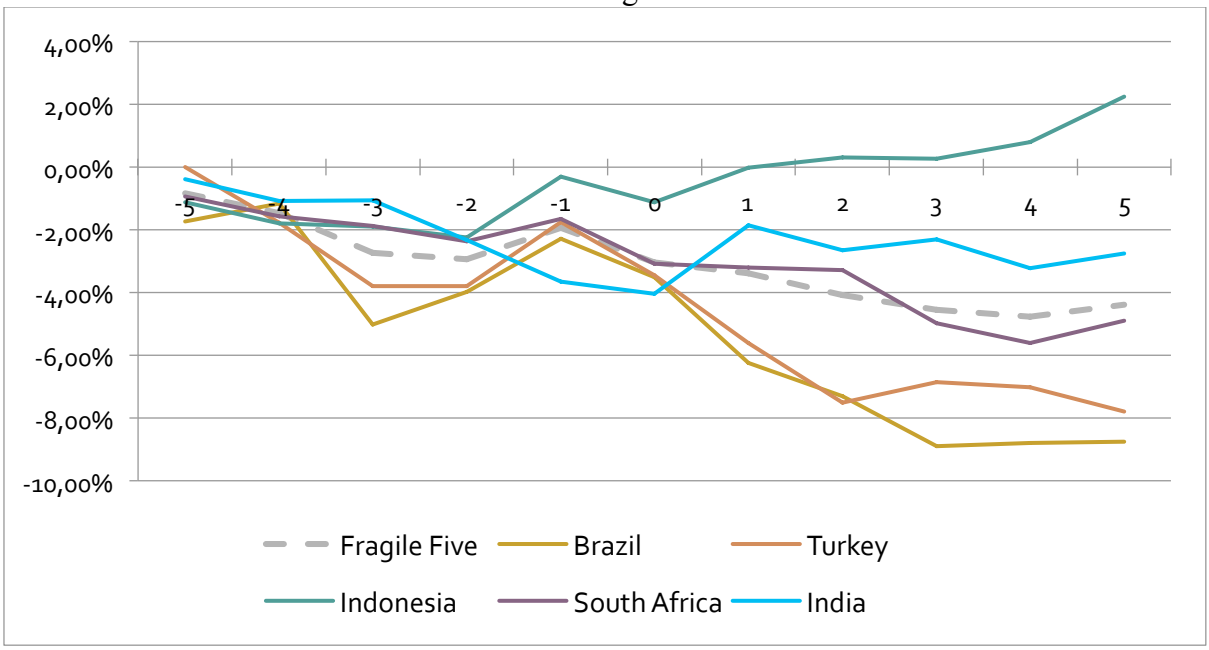
5.3.4.2. Asset Price Changes

Nevertheless, our study shows that asset price changes were the greatest around the Fed's September announcement. In this regard, *Fragile Five* currencies depreciated in total by -4,69% within a 15-day cumulative event window, their indices decreased by -8,36%, and the 10-Year Bond Yield increased by 37 basis points. By contrast, *Europe Five* and *Best EMEs Five* have also been affected, but at much lower rate.

One might be confused not to observe in September 2014 the presence of abnormal returns in *Fragile Five*, because their asset prices were facing a subsequent volatility. It may however be explained by the composition of *Fragile Five* itself. As illustrated in Figure 16, India and Indonesia seemed to perform better than the other members of the *Fragile Five*, which may therefore indicate that grouping these countries together is no longer relevant. This view

shared by many economists comes from the fact that some *fragile* countries – such as India and Indonesia - have enacted enough structural reforms to establish a more viable economic environment (Kennedy, 2014). In addition, the election in both countries of a new president raised optimistic reactions in the market, as they were considered as opposition figures with firm commitments to reform (Beattie, 2014).

Figure 16 – 15-day Cumulative Abnormal Return
Across Fragile Five



5.3.5. FOMC's October Meeting – End of the US Quantitative Easing

On October 29, 2014, the Fed finally announced the end of the US quantitative easing, and maintained their vow to keep interest rate low for "*considerable time*". However, they changed their language regarding the US labour market, signalling its improvements.

However, our event study does not find any major abnormal returns, nor great asset price changes. It shows that the market did little react to the end of tapering, and suggests that the forward guidance strategy managed to dampen the popular expectation that the end of tapering will be automatically followed by interest rate hike. Details are available in Appendix 3R.

5.3.6. Latest FOMC's Meetings – The Essential Use of Forward Guidance

Latest FOMC's meetings selected from December 2014 to April 2015 are marked by the growing importance of the forward policy guidance strategy.

In December 2014, Janet Yellen removed the "*considerable time*" language and replaced it by "*patient*", giving to the FOMC more flexibility. In March 2015, the "*patient*" language was removed from the regular statement, and Fed officials stated that interest rates would be raised if there were "*further improvements in the labour market"*[32]. At the same time, they downgraded the economic growth and inflation projections, signalling thereby that there was no rush to normalise the monetary policy. Since then, the content of Janet Yellen's speech did not greatly change.

For all event studies related to FOMC's meetings (4), we do not find major statistically significant abnormal returns, suggesting that issues faced by individual emerging countries are not explained by Fed actions. The study of emerging asset prices also shows that all 2015's meetings did not provoke any significant changes either. This is line with our expectations, as all statements were largely expected and priced in emerging assets. In this regard, we assume that the Fed did not surprise the market, because they have gradually showed their intentions of lifting the US interest rate throughout 2015.

Details of these studies are available in Appendix 3S (FOMC's December 14), Appendix 3T (FOMC's January 15), Appendix 3U (FOMC's March 15), Appendix 3V (FOMC's April 15).

[32] See minutes of FOMC statements available on their website

CHAPTER 6

LESSONS LEARNT FROM THE PAST

6.1. Summary of the Event Study – Effect on EMEs Equity Market

Event		AR	ΔP	Interpretation
Quantitative Easing				
QE1 to QE2	Early Phases of Quantitative Easing	/	+	Early Fed's announcements helped to restore financial and economic stability, and country indices tended to move together.
Operation Twist	First Signs of Excessive Market Reactions	-	-	The disappointing Operation Twist grew concerns about global long-term growth, and emerging countries experienced excessive reactions, confirming their over-sensitivity to US monetary news.
QE3	Last round of Quantitative Easing	+	+	QE3 provoked a slight renewed interest in emerging countries with strong fundamentals.
Tapering Talks				
May's Bernanke Speech	First Mention of Tapering	/	-	As tapering would mark the end of easing money environment, all indices - especially EMEs including *Fragile Five* - greatly decreased.
FOMC's June Meeting	Confirmation of an Upcoming Tapering	-	-	Among portfolios composed of EMEs, *Fragile Five* was the most affected by the tapering talks.
FOMC's September Meeting	Non-Taper Event	+	+	The delay of the effective tapering temporarily eased the tensions in the markets, but the reaction was a short-lived burst.
FOMC's December Meeting	Effective Tapering Process	-	-	Again, Fragile Five was still exposed to greater volatility due to FOMC announcements, although the amplitude of asset price changes was smaller than during tapering talks.

Interest Rate Hike Talks				
Event		**AR**	**ΔP**	**Interpretation**
FOMC's January Meeting	Pursuit of the Tapering Process	+	-	EMEs, especially *Fragile Five*, still experienced negative asset price changes, as the tapering process continues. But the effect was smaller than expected (positive AR), thanks to aggressive EMEs' central bank tightening's, which brought back confidence of investors.
FOMC's March Meeting	Introduction of Janet Yellen	-	+	Although newly appointed chairwoman Janet Yellen adopted unintentionally a hawkish language that surprised temporarily the market, emerging asset equities were increasing since fundamentals of *Fragile Five* looked stronger than ever.
FOMC's April & June Meeting	Brief Lull in Financial Markets	/	+	As the tapering was happening and the likely effect of the end of QE was already incorporated in prices, the sentiment towards emerging markets has gradually improved.
FOMC's July & September Meeting	Rate Hike Spectrum despite the "*considerable time*" language	-	-	Although the "*considerable time*" language, EMEs prices decreased because of growing dissenting views among FOMC's committee In addition, the group *Fragile Five* may not be relevant anymore, as some of them showed better resilient to monetary shocks.
FOMC's October Meeting	End of QE & maintain of "*considerable time*" language	/	/	The market did little react to the end of tapering, suggesting that the forward guidance policy managed to influence the expectations regarding the timing of interest rate hike.
Latest FOMC's Meetings in 2015	Exclusive Use of Forward Policy Guidance	/	/	As all statement were largely expected by the market, the Fed did not surprise the market, thanks to their strategy of gradually showing their intentions regarding the possible interest rate hike.

6.2. Interest Rates Hike: Towards a new Taper Tantrum?

Our event study finds some episodes of excessive returns on foreign assets. But generally speaking, there are little evidences of abnormal returns during the period of observation. In most cases, our study shows at best short-term bursts, suggesting that markets returned to normal conditions relatively quickly. It also indicates that semi strong form EMH still holds, and that investors tend to be rational even under great pressure.

However, it does not mean that EMEs asset prices have not moved greatly. Great moves occur when FOMC's statements surprise the market by their timing or content, and require investors to revise their market expectations. In this regard, between May and December 2013, our event study shows that emerging markets have experienced great volatility during the tapering talks, because the timing of it was unexpected. By contrast, we find that on average, emerging countries managed to successfully overcome the US tapering in 2014, as asset prices haven't moved greatly.

By the middle of 2014, the interest rate talks initiated by dissenting views against the Fed's decision arose again concerns among EMEs regarding waves of market volatility that might ultimately plunge some of them into an economic crisis. In this regard, in June 2015, IMF and World Bank have warned the US Federal Reserve about the risk to emerging markets of raising US domestic interest rate sooner than 2016, while Janet Yellen has stated that the Fed might raise it by the end of 2015. As the time of writing this thesis, the exact timing remains still unknown, and great volatilities may arise, especially in the emerging markets.

Consequently, it raises one key question, namely how emerging markets will react to the US interest rate hike.

6.2.1. Previous Interest Rate Hike Episodes

One attempt to answer it is by analysing historical episodes of US rate hikes and especially turning points, namely when the policymakers starts a new tightening cycle. In the past few decades, we observe 3 turning points that are illustrated in Figure 17: February 1994, June 1999 and June 2004. Note that Mange (2014) considers the turning point of 1999 as the resumption of the tightening started in 1994, but interrupted by the Asian financial crisis in 1997.

In a comment for Erste Asset Management, Szopo (2015) interestingly finds that the empirical evidences do not suggest that rising the US interest rates necessarily hurt equities

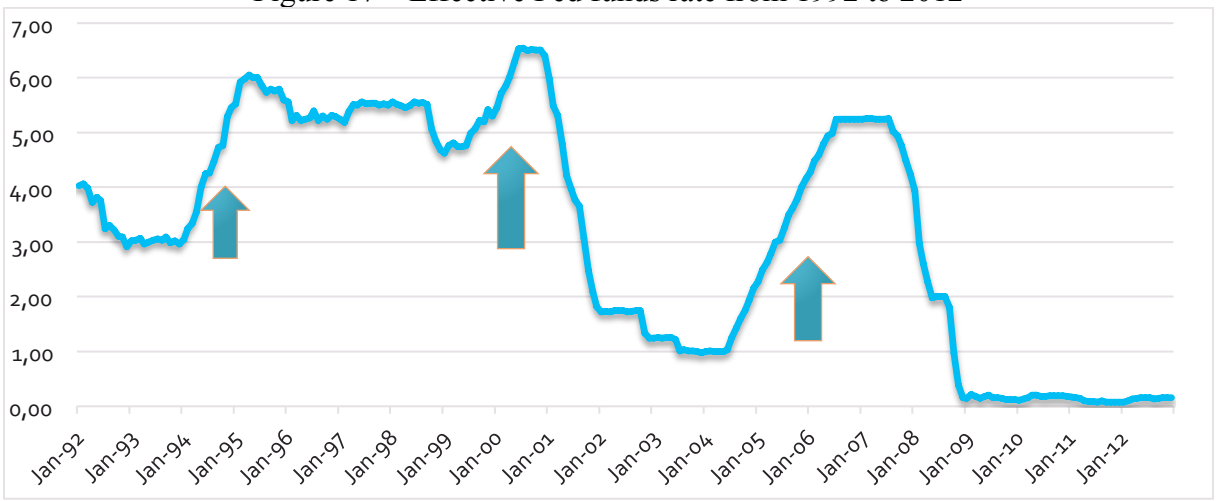
markets in emerging countries. As a matter of fact, emerging equities suffered in 1994, but rallied in 1999 and 2004 after the Fed funds rate was raised by 25 basis points. Two elements help essentially to explain these different outcomes.

First, the interest rate hike in 1994 caught investors by surprise, and was very fast. A wave of panic shock markets throughout the world. All asset classes came under pressure, and EMEs equities plunged in particular. Former Fed chairman Alan Greenspan did not believe in the forward policy guidance at this time, and Fed funds rate was raised quickly, by 3% to 6% within a year (Mange, 2014). In sharp contrast, he showed more transparency in his communication in 2004. As a result, markets were more able to anticipate Fed's moves, and asset classes were less under pressure.

Second, before the rate hike cycle started in 1994, the core inflation was above Fed's target at 2,3%. Risk of overheating the US economy pushed Fed policymakers to apply a fast pace of rates hike, which ultimately provoke a global economic growth deceleration. The fast pace of rates hike distorted the market dynamic, as emerging economies were not flexible enough to make economic adjustments. In addition, at this time, Latin America suffered from hyperinflation, while Asia was under strong inflationary pressures too. These conditions tend to bring more market volatility and higher interest rates (Sahay et al., 2014). By contrast, in 2004, the US core inflation - below Fed's target - or the growth outlook did not justify a quick pace of rates hikes. The incremental process operated in 2004 helped emerging countries to mitigate the impact of US rate hikes (Mange, 2014).

From a purely qualitative view, the situation in 2015 is rather analogous the experience of 2004 than 1999, and suggests a smoother rate hike cycle.

Figure 17 – Effective Fed funds rate from 1992 to 2012



Source: Federal Reserves

6.2.2. Signs of Better Resilience to Rate Hike This Time

Although the prospect of the interest rate hike is likely to create significant turbulence in EMEs markets, the risk of great distress – or even crisis – might be however more limited for two main reasons.

6.2.2.1. Better fundamentals of EMEs

First, emerging economies look more resilient to an interest rate hike than ever, thanks to their stronger fundamentals. Compared to the tapering talks, our study shows that the adjustments made in 2014 by many emerging countries through tighter monetary policies were relatively conclusive to counter the tapering effect. In this regard, countries of *Fragile Five* reinforced their economies by reducing their exposure to foreign exchange reliance, and increasing in taxation. In addition, Flood (2015) note that as many EMEs are large consumer of imported oil, the fall in commodity prices between 2014 and 2015 has reduced the inflationary pressures while boosting the growth prospects in these countries.

Emerging markets do have now stronger macro and structural fundamentals, which can give them greater resilience to US interest rate hikes. It calls EMEs to keep maintaining current and fiscal accounts, reserves holdings, external debts and inflation at a sustainable rate.

6.2.2.2. Strategy of Forward Policy Guidance

Second, the forward policy guidance became an essential tool to influence market expectations. During the interest rate talks, the dovish attitude adopted by the Fed can also greatly help the world to prepare for the Fed's first hike in a decade.

While the tapering talks did surprise the market because of its timing and that emerging asset prices were too high, our event study did not show great market volatility during the interest rates hike talks, suggesting that a price correction has already occurred in most emerging markets and limiting thereby for further major adjustments when the Fed moves. In this regard, the first increase is expected to occur as early as September 2015 and as late as next year, in 2016. It is likely that these expectations have been priced into emerging markets equities, indicating that the Fed has cautiously prepared the move towards higher rates. Consequently, clear and transparent communication of Janet Yellen is still key, as every word and gesture may have a particular meaning.

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CHAPTER 7

LIMITS OF THE MODEL

Besides the weak explanatory power that an event study based on the concept of abnormal returns involves, our model might also show its limits regarding the latter methodology. In this respect, the presence (or absence) of abnormal returns, as well as the validity of them, might be explained by the assumptions we posed to build our model.

7.1. Event Identification

The initial task of identifying events is critical, since the event study is based on events that we have selected.

In our study, to simplify our model, we only select FOMC's announcements[33] provided by Fed chair(wo)man. In fact, any lack of convergence between what the Fed is trying to say and how the markets are interpreting the announcements may result in excessive market reactions. Our event selection implies therefore two major limits.

First, we might miss some important announcements – of Janet Yellen or Ben Bernanke – made outside the FOMC's meeting framework. A perfect example is the speech on May 22, 2013 of Fed chair Bernanke about a possibility of tapering the quantitative easing. For this specific case, we have included in our event study, but other important speeches might be missing. However, we consider the risk of missing important statements as limited, since most of the relevant information is released during FOMC's meetings.

Second, we decide to take into consideration only the statements made by the Fed chair(wo)man, and none of the speeches from other officials. Once again, we consider the risk of missing major information as limited. Aizenman et al. (2014) shows that statements of Fed chair(wo)man may have greater influence on foreign asset prices than any other Fed officials.

7.2. Data Selection

The selection of indices is also essential, and both the quality and quantity of our data's matter.

About the quality of our data's, we select *iShares MSCI ETFs* to represent the local stock markets of each country. By contrast with the existing literature, we do not select the main

[33] There is one exception: the speech of Ben Bernanke on May 22, 2013 did not occur after a FOMC's meeting.

index of local each stock market (i.e. BEL20, CAC40, etc.), because we aim in our empirical framework to explore the effect of the quantitative easing from the investor (namely, portfolio rather than economic) perspective. Note however that the selected ETFs tend to follow the flow of stock markets, and the risk of great divergences is therefore low.

About the quantity of our data's, we select 5 countries per portfolio, which is relatively small. This decision might mainly explain the few evidences of abnormal returns in our event study, since significance tests are more restrictive with small groups. Consequently, average returns tend to be more correlated to individual factors within the group, and small groups are found to be fairly inhomogeneous.

7.3. Event Study Model

To evaluate the presence of abnormal returns, we must compute the expected return. The model used to compute it is therefore critical. In our event study, we use a statistical model, commonly called the Market model. However, there are many other models – either statistical or economic – and outcomes could have been slightly different.

Another factor plays also a major role in defining the expected return: the estimation window. In this regard, we select a 30-day estimation window in our study. Our estimation window is definitively small compared to the 120-day window suggested in the existing literature. However, we check the robustness of our estimated model parameters, and the latter does not move greatly when the estimation window is increased.

Finally, the event window is also important. We select an 11-day window to take into account the anticipations and reactions of the market after FOMC's meeting. However, such a lengthy event window does not isolate the event well. In this regard, one must interpret our results by taking into account the inferences of other events unrelated to the quantitative easing. This is particularly the case between 2013 and 2015, during which we select an extensive number of events. At this time, tensions over Ukraine, the fall in commodity prices, the Chinese economic slowdown, as well as the European debt crisis and the Grexit, are all major events that may have also dramatically affected the emerging markets, but that are not relevant in our thesis.

CONCLUSION

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CONCLUSION

In light of above, it turns out that the American QE has undoubtedly greatly affected - alternatively positively and negatively – emerging market economies (EMEs) assets. Our event study tends to support the existing literature, and gives further evidences of spillover effects regarding the effective tapering and rates hike talks.

Our findings are summarised into three main points, and give keys to answer the research questions presented in the introduction of the thesis.

Drivers and Evolution of QE Effects on Emerging Markets

First, our event study shows that the quantitative easing posed true challenges to emerging economies and their financial markets. The net impact of QE on emerging markets is however not straightforward to evaluate, as our study finds that the effects may have evolved greatly over time.

In line with the existing literature, we find that between 2008 and 2010, all country indices tended to move upward and relatively together, suggesting that early Fed's announcements primarily helped to restore a global financial and economic stability. In this regard, all studies highlighted the growing global risk appetite at that time, as investors gained progressively confidence in the use of unconventional policies to maintain an easy money environment. Another main drivers of rebalancing portfolio compositions into EMEs assets were the interest rate and economic growth differentials between the USA and EMEs, making EMEs assets at that time more attractive thanks to their higher risk-adjusted returns.

However, Sahay et al. (2014) show that the increased demand for EMEs assets led over time to a strong appreciation of the local currency and a progressive widening (contraction) of current account deficits (surpluses), making them eventually more vulnerable to changes in market expectations after FOMC meetings. In this regard, the episode of Operation Twist is particularly indicative, as we find evidences of excessive negative reactions following the FOMC's meeting. Since the Operation Twist did not convince the market and arose concerns regarding global long-term growth prospects, our study shows that EMEs indices greatly decreased, and confirms their oversensitivity to US monetary news.

By contrast, the announcement of QE3 has been positively welcomed but interestingly, we find that only EMEs with strong fundamentals and growth prospects have enjoyed a slight renewed interest of investors.

Importance of Economic Fundamentals

This result highlights the growing importance of specific country factors to cope with the side effects of QE. In this respect, the gap among emerging countries regarding their resilience to US monetary shocks is particularly significant during the tapering talks, and it brings us to our second main finding: the importance of fundamentals to counter the US tapering effect.

Our event study shows that between May and December 2013, emerging countries saw a considerable decline of their equity indices, as the result of the tapering talks and the overall reduction in investor's tolerance for risk. Interestingly, we also find that some EMEs faced greater volatility in their asset prices during that period. In particular, the portfolio *Fragile Five* composed of emerging countries with weak fundamentals experienced sharper fall in equity index and stronger depreciation of their local currency. Due to their overreliance on foreign capital flows to replenish the current account deficit and their higher risk of unsustainable inflation, *Fragile Five* was the most exposed to US monetary shocks during the tapering talks.

However, the situation did not last forever. As the tapering became effective by the end of 2013, most of the countries of *Fragile Five* adopted major reforms and aggressive monetary tightening's to support their currency and bring back the trust of investors in their ability to take appropriate actions to sustain their economy. Consequently, fundamentals of *Fragile Five* looked in early 2014 stronger than ever. Our event study shows that except the FOMC's January meeting, country indices prices of *Fragile Five* actually increased – even more than developed European countries - during the spring 2014, indicating that the sentiment towards emerging economies has gradually improved.

Nevertheless, our study shows that market has (over) reacted adversely when in July 2014 dissenting voices emerged among Fed's officials to support a sooner-than-expected US interest rate hike. Once again, *Fragile Five* was the most affected group. But unlike the tapering talks, the great differentiation observed across countries of *Fragile Five* itself indicates that some *fragile* countries, such as Indonesia or India, still continued to raise optimistic market reactions despite the threat of interest rate hike. Both countries had in common that they enacted major structural reforms to establish a more viable economic environment and elected a new president with firm commitments to reform. Such an observation has important implications, as it calls EMEs to keep maintaining fundamentals,

namely current and fiscal accounts, reserves holdings, external debts and inflation, at a sustainable rate.

One must however bear in mind the weak explanatory power of our model. It does not allow us to establish a true causal link between weak fundamentals and adverse effects of US monetary shocks. Instead, our model only shows at best a trend or correlation between both elements, which means that further researches using for instance regressive models are necessary to support our findings.

Importance of Forward Guidance Strategy

Finally, our study shows that between 2014 and mid-2015, as the tapering was effective and likely to be already priced in EMEs asset prices, financial markets did little react to the tapering process itself, but rather to news relative to a possible US interest rate hike. In this respect, it shed light on the importance of another unconventional tool largely used by the Federal Reserve, namely the forward policy guidance that operates through the signalling channel. Chen et al. (2014) finds that the signalling channel plays, as under conventional period, an important role, but over longer period this time by affecting longer-term interest rates. It implies therefore that strategy of forward guidance under QE has become a crucial tool to influence long-term interest rates, and has greatly widened the monetary policy transmission mechanisms.

Furthermore, generally speaking, our study shows little evidences of excessive reactions (with a few exceptions) during the whole period of analysis from 2008 to mid-2015, and indicates that investors were relatively rational. It implies therefore the forward guidance can have great influence on market expectations regarding the interest rate hike, by preventing any surprising component at FOMC's meetings. Transparent and clear communication of Fed officials - especially Janet Yellen - is therefore essential, because any unexpected word or gesture might be sanctioned by the market. In this context, the short-term bursts observed after the confusing speech at Janet Yellen introduction's meeting and after the emergence of dissenting views at 2014 FOMC's July meeting are reminders of the stake of a clear and transparent communication in their forward guidance. Nevertheless, the Fed demonstrated throughout the years their intentions to use conscientiously the forward guidance in order to gradually prepare the world and the US economy itself for the first rate hike in a decade.

Avenues of reflection for further investigation

Last but not least, one might wonder how the EMEs will react to the actual interest rate hike. Although it might create great turbulence in EMEs markets, the risk of greater distress might be more limited for two reasons mentioned above.

With this in mind, the greatest issue may no longer be the timing of the first rate hike, but rather the pace of interest rate hike cycle. The rate hikes cycle of 1994 shows us that a robust pace of US rate hikes might have dramatic side effects on the rest of the world. This time, EMEs look better prepared and informed, but as the understanding of the international monetary transmission mechanism remains a true challenge, it might be interesting for further research to address this topic.

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Appendix 1: Details of the selected events

Event	Date	Description
QE1	25/11/2008	Fed launches its quantitative easing, by announcing the purchases up to US $100 billion in GSE and $500 billion in MBS
QE1 - Extension	18/03/2009	Fed announces additional purchase of an additional purchase of $100 billion in GSE debt, $750 billion in MBS, but also $300 billion in long-term US Treasuries
QE2	3/11/2010	The FOMC announces the purchase of an additional $600 billion in US Treasury bonds.
Operation Twist	21/09/2011	Fed announces the Operation Twist (purchases of $400 billion in LT assets via the sales of $400 billion in ST assets), and decides to reinvest principal payments of maturing MBS and GSE debts in MBS
Operation Twist - Extension	20/06/2012	Fed announces an extension of the Operation Twist, with additional purchases (and sales) accounting for a total of $267 billion, at the pace of $45 billion per month.
QE3	13/09/2012	The FOMC announced on a third round of the quantitative easing, in addition to the existing Operation Twist. The FOMC announced to buy $40 billion MBS per month as long as "the outlook for the labour market does not improve substantially"
QE3 - Extension	12/12/2012	The FOMC announces its intention to stop swapping US Bills with LT Treasuries.

Event	Date	Description
First Tapering Talk	22/05/2013	Bernanke talks for the first time about a potential tapering of the QE3. He says: "in the next few meetings, we could take a step down in our pace of purchase".
Tap Talks - Confirmation	19/06/2013	Bernanke says: "the central bank may start dialling down its unprecedented bond-buying program this year and end it entirely in mid-2014 if the economy finally achieves the sustainable growth the Fed sought since the recession ended in 2009."
Tap Talks – Non-Taper Eventss	18/09/2013	The FOMC surprises markets by not reducing the pace of purchases, as they are still concerned about the impact of higher interest rates on the economy, particularly of mortgage rates on housing
Tapering Official Statement	18/12/2013	Fed officially announces the US tapering and commits to reduce its purchases pace at the level of $75 billion per month from its original $85 billion per month.
Tapering (jan 14)	29/01/2014	Fed eases up on QE by another $10 billion and gives further clues about policy, saying the unemployment rate probably would have to decline "well past" the original benchmark of 6.5 percent before the FOMC would consider hiking its zero-bound target interest rate.
Tapering (mar 14)	19/03/2014	Newly appointed chairwoman Janet Yellen tapers another $10 billion but unintentionally surprises investors with talk of an interest rate increase before year’s end, by dropping its promise to be “patient” in deciding when to start.

Event	Date	Description
Tapering (apr 14)	30/04/2014	As largely expected, Fed reduces its asset purchases by another $10 billion to $45 billion a month.
Tapering (jun 14)	18/06/2014	The Federal Open Market Committee cuts another $10 billion from its QE programs, bringing the Fed's monthly bond purchases to $35 billion. In addition, Yellen maintains its plan to start raising interest rates as early as next year.
Tapering (jul 14)	30/07/2014	In a widely expected moved, the Fed announces a cut to its bond purchases to $25bn (£15bn) a month from $35bn. The Fed also adds that the labour market continued to be weaker than expected, and says that it planned to keep short-term interest rates low for the foreseeable future, at least until mid-2015.
Tapering (sept 14)	17/09/2014	Fed cuts its bond-buying program down to $15 billion a month and indicates QE will end in October 2014. Chair Janet Yellen reiterates that any move in rates will be "data-dependent" on not based on a calendar projection, by not removing language that says interest rates would rise "a considerable time" after the tapering ends.
Tapering (oct 14)	29/10/2014	Fed says the final tranche of bonds under its quantitative easing programme would be bought this month, but it commits to keeping record low interest rates for "a considerable time".

Event	Date	Description
Fwd Policy Guidance (dec 14)	17/12/2014	Fed chairwoman Janet Yellen announces that the Fed is waiting raise interest rates, and the "considerable time" language has been removed from official statement. The Fed still plans to raise short-term interest rates in 2015
Fwd Policy Guidance (jan 15)	28/01/2015	The Federal Reserve says the U.S. economy was expanding "at a solid pace" with strong job gains in a signal that the central bank remains on track with its plans to raise interest rates this year. The Fed repeats it would be "patient" in deciding when to raise benchmark-borrowing costs from zero, though it also acknowledges a decline in certain inflation measures.
Fwd Policy Guidance (mar 15)	18/03/2015	The US Federal Reserve modifies its stance on interest rates, which have been kept at a record low of 0%, by removing the language "patience" from its regular statement. Instead, the Fed says it would wait until it saw "further improvement" in the US labour market before raising rates.
Fwd Policy Guidance (apr 15)	29/04/2015	The Federal Reserve downgrades its view of the U.S. labour market and economy in a policy statement that suggests the central bank may have to wait until at least the third quarter to begin raising interest rates.

Appendix 2: Details of the selected indices

Region	Country	Index	Description
World	Benchmark	ACWI	iShares MSCI ACWI World ETF
Europe Five	Netherlands	EWN	iShares MSCI Netherlands ETF
	Austria	EWO	iShares MSCI Austria Capped ETF
	Germany	EWG	iShares MSCI Germany ETF
	France	EWQ	iShares MSCI France ETF
	Belgium	EWK	iShares MSCI Belgium Capped ETF
Fragile Five	Brazil	EWZ	iShares MSCI Brazil Capped ETF
	Turkey	TUR	iShares MSCI Turkey ETF
	Indonesia	EIDO	iShares MSCI Indonesia ETF
	South Africa	EZA	iShares MSCI South Africa ETF
	India	INDA	iShares MSCI India ETF
Best EMEs Five	Peru	EPU	iShares MSCI Peru Capped ETF
	Israel	EIS	iShares MSCI Israel Capped ETF
	South Korea	EWY	iShares MSCI South Korea Capped ETF
	Malaysia	EWM	iShares MSCI Malaysia ETF
	Philippines	EPHE	iShares MSCI Philippines ETF

Appendix 3A: Event study on QE1 (25/11/2008)

Event	**QE1 (nov 08)** on **25/11/2008**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
18-Nov-08	-5	0,30%	-0,77%	1,07%	0,15%
19-Nov-08	-4	-1,99%	-1,82%	-1,08%	-1,45%
20-Nov-08	-3	0,70%	1,40%	1,35%	1,38%
21-Nov-08	-2	-0,80%	5,20% *	2,90%	4,05% ***
24-Nov-08	-1	-2,53% *	-2,93%	-6,71% **	-4,82% ***
25-Nov-08	0	**3,06% ***	**2,95%**	**-1,31%**	**0,82%**
26-Nov-08	1	-1,80%	1,92%	1,47%	1,70%
28-Nov-08	2	-1,30%	-1,06%	0,06%	-0,50%
1-Dec-08	3	1,70%	0,68%	1,67%	1,18%
2-Dec-08	4	-0,79%	-2,20%	-0,24%	-1,22%
3-Dec-08	5	0,00%	-1,04%	-0,22%	-0,63%
CAR(3)		-1,26%	1,95%	-6,55% *	-2,30%
CAR(5)		-3,37%	6,09%	-3,60%	1,24%
CAR(11)		-3,44%	2,35%	-1,04%	0,65%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
24/11/2008	5	-4,11%	*5,20%*	1,14%	*7,84%*	-2,41%	*0,76%*	-0,47%	*7,04%*
25/11/2008	6	0,07%	*4,19%*	4,44%	*3,30%*	-3,53%	*-1,12%*	-0,33%	*0,13%*
26/11/2008	7	1,06%	*0,98%*	10,20%	*5,76%*	0,49%	*4,02%*	2,11%	*2,44%*
9/12/2008	15	1,53%	*-0,86%*	6,12%	*-1,26%*	1,60%	*-1,68%*	2,01%	*-1,20%*
Exchange Rate									
24/11/2008	5	-0,11%	*0,59%*	-4,43%	*0,58%*	-1,70%	*0,57%*		
25/11/2008	6	0,66%	*0,77%*	-2,89%	*1,54%*	-2,39%	*-0,69%*		
26/11/2008	7	2,39%	*1,73%*	-1,72%	*1,17%*	-1,88%	*0,51%*		
9/12/2008	15	1,76%	*0,83%*	-2,09%	*1,59%*	-0,79%	*0,60%*		
10Y Bond Yield									
24/11/2008	5	-0,13%	*0,03%*	0,13%	*-0,26%*	0,16%	*0,07%*		
25/11/2008	6	-0,19%	*-0,05%*	0,47%	*0,35%*	0,07%	*-0,09%*		
26/11/2008	7	-0,23%	*-0,05%*	-0,25%	*-0,73%*	0,01%	*-0,05%*		
9/12/2008	15	-0,21%	*0,09%*	-1,12%	*-0,22%*	-0,54%	*-0,11%*		

Appendix 3B: Event study on QE1 - Extended (18/03/2009)

Event	**QE1 - ext. (mar 09)** on **18/03/2009**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
11-Mar-09	-5	0,87%	-0,15%	-0,89%	-0,52%
12-Mar-09	-4	-0,11%	0,41%	-1,69%	-0,64%
13-Mar-09	-3	-0,33%	-2,11% *	-1,65%	-1,88% ***
16-Mar-09	-2	0,24%	-1,41%	0,00%	-0,70%
17-Mar-09	-1	-0,85%	-1,37%	-0,32%	-0,85%
18-Mar-09	0	**1,77% ***	**-1,39%**	**-0,75%**	**-1,07% ***
19-Mar-09	1	0,24%	0,86%	-0,80%	0,03%
20-Mar-09	2	0,79%	2,52% *	0,80%	1,66% ***
23-Mar-09	3	-1,00%	-2,10% *	-0,85%	-1,47% **
24-Mar-09	4	-1,60% *	-0,30%	0,83%	0,27%
25-Mar-09	5	1,46%	-0,59%	-0,28%	-0,43%
CAR(3)		1,16%	-1,90%	-1,88%	-1,89% *
CAR(5)		2,19%	-0,79%	-1,08%	-0,93%
CAR(11)		1,49%	-5,62%	-5,60%	-5,61% ***

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
17/03/2009	5	8,13%	*2,29%*	7,05%	*2,78%*	4,56%	*2,91%*	7,86%	*2,99%*
18/03/2009	6	12,13%	*4,00%*	8,70%	*1,65%*	6,17%	*1,61%*	9,98%	*2,12%*
19/03/2009	7	11,77%	*-0,37%*	9,09%	*0,39%*	5,02%	*-1,15%*	9,37%	*-0,61%*
31/03/2009	15	12,51%	*3,57%*	13,65%	*3,54%*	9,28%	*2,51%*	10,76%	*1,89%*
Exchange Rate									
17/03/2009	5	2,39%	*0,16%*	3,33%	*0,36%*	2,02%	*0,12%*		
18/03/2009	6	2,65%	*0,26%*	3,06%	*-0,26%*	2,72%	*0,71%*		
19/03/2009	7	3,37%	*0,72%*	3,22%	*0,15%*	2,94%	*0,21%*		
31/03/2009	15	4,34%	*-0,64%*	4,17%	*-1,10%*	2,78%	*-1,18%*		
10Y Bond Yield									
17/03/2009	5	0,10%	*0,04%*	-0,09%	*0,03%*	0,00%	*0,00%*		
18/03/2009	6	0,14%	*0,04%*	-0,16%	*-0,07%*	0,00%	*0,00%*		
19/03/2009	7	-0,05%	*-0,20%*	-0,25%	*-0,10%*	-0,06%	*-0,06%*		
31/03/2009	15	-0,06%	*-0,02%*	-0,32%	*0,07%*	-0,09%	*-0,04%*		

Appendix 3C: Event study on QE2 (03/11/2010)

Event	**QE2 (nov 10)** on **3/11/2010**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
27-Oct-10	-5	-0,05%	-0,95% *	0,23%	-0,29%
28-Oct-10	-4	0,31%	-0,10%	-0,25%	-0,18%
29-Oct-10	-3	-0,26%	0,48%	0,18%	0,31%
1-Nov-10	-2	-0,71%	0,40%	0,25%	0,32%
2-Nov-10	-1	0,66%	-0,08%	0,36%	0,16%
3-Nov-10	0	**-0,11%**	**0,02%**	**-0,17%**	**-0,08%**
4-Nov-10	1	-0,93% *	-0,50%	-0,89% *	-0,72% *
5-Nov-10	2	-1,00% *	0,25%	-0,35%	-0,09%
8-Nov-10	3	-0,20%	0,73% *	-0,56%	0,01%
9-Nov-10	4	-0,18%	0,23%	0,35%	0,30%
10-Nov-10	5	0,05%	0,23%	0,11%	0,16%
CAR(3)		-0,39%	-0,56%	-0,70%	-0,63%
CAR(5)		-2,10% *	0,09%	-0,80%	-0,40%
CAR(11)		-2,43%	0,71%	-0,74%	-0,10%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
2/11/2010	5	0,82%	*1,89%*	0,25%	*1,07%*	1,82%	*1,41%*	0,93%	*0,95%*
3/11/2010	6	1,40%	*0,58%*	0,88%	*0,63%*	2,24%	*0,42%*	1,48%	*0,55%*
4/11/2010	7	3,41%	*2,02%*	3,30%	*2,43%*	3,86%	*1,62%*	3,72%	*2,24%*
16/11/2010	15	-4,43%	*-2,28%*	-2,98%	*-2,63%*	-3,13%	*-2,18%*	-1,16%	*-2,14%*
Exchange Rate									
2/11/2010	5	-0,50%	*-0,06%*	-0,54%	*-0,11%*	-0,78%	*-0,37%*		
3/11/2010	6	-0,36%	*0,14%*	-0,14%	*0,41%*	-0,17%	*0,61%*		
4/11/2010	7	0,15%	*0,52%*	0,33%	*0,47%*	-0,16%	*0,01%*		
16/11/2010	15	-2,60%	*-0,29%*	-1,20%	*-0,49%*	-1,70%	*0,20%*		
10Y Bond Yield									
2/11/2010	5	0,00%	*-0,01%*	-0,03%	*-0,03%*	0,05%	*0,06%*		
3/11/2010	6	-0,05%	*-0,05%*	-0,04%	*0,00%*	0,08%	*0,03%*		
4/11/2010	7	-0,04%	*0,01%*	-0,08%	*-0,04%*	0,13%	*0,05%*		
16/11/2010	15	0,17%	*0,06%*	0,19%	*0,01%*	0,01%	*-0,02%*		

Appendix 3D: Event study on Operation Twist (21/09/2011)

Event	**Ope. Twist (sept 11)** on **21/09/2011**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
14-Sep-11	-5	1,30% *	-2,66% ***	-1,50% ***	-2,02% ***
15-Sep-11	-4	1,00%	-1,02%	-0,79% *	-0,89% **
16-Sep-11	-3	0,00%	0,53%	-0,03%	0,22%
19-Sep-11	-2	-1,00%	-1,19% *	-0,90% *	-1,03% ***
20-Sep-11	-1	0,82%	0,29%	-0,44%	-0,12%
21-Sep-11	0	**1,45%** *	**-1,83%** **	**-0,07%**	**-0,85%** **
22-Sep-11	1	1,64% **	-3,12% ***	-1,77% ***	-2,37% ***
23-Sep-11	2	-0,14%	1,36% *	-1,40% **	-0,17%
26-Sep-11	3	0,66%	-0,09%	-1,21% **	-0,71% *
27-Sep-11	4	1,29% *	1,35% *	0,43%	0,84% **
28-Sep-11	5	1,19% *	-0,20%	-0,84% *	-0,55%
CAR(3)		3,91% ***	-4,66% ***	-2,28% **	-3,34% ***
CAR(5)		2,78% *	-4,49% **	-4,58% ***	-4,54% ***
CAR(11)		8,21% ***	-6,58% **	-8,51% ***	-7,65% ***

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
20/09/2011	5	1,91%	*0,19%*	-2,83%	*0,06%*	-2,62%	*-0,49%*	1,18%	*-0,22%*
21/09/2011	6	-0,76%	*-2,68%*	-7,76%	*-4,93%*	-4,92%	*-2,30%*	-1,74%	*-2,92%*
22/09/2011	7	-4,93%	*-4,17%*	-15,35%	*-7,60%*	-9,95%	*-5,03%*	-5,95%	*-4,21%*
4/10/2011	15	-3,05%	*2,14%*	-14,59%	*1,50%*	-11,79%	*1,10%*	-6,23%	*1,90%*
Exchange Rate									
20/09/2011	5	0,45%	*-0,96%*	-2,54%	*-1,42%*	-1,78%	*-0,52%*		
21/09/2011	6	0,42%	*-0,03%*	-3,55%	*-1,01%*	-1,88%	*-0,10%*		
22/09/2011	7	0,64%	*0,22%*	-4,05%	*-0,50%*	-2,35%	*-0,46%*		
4/10/2011	15	-2,14%	*-0,53%*	-7,04%	*-0,55%*	-4,26%	*0,24%*		
10Y Bond Yield									
20/09/2011	5	-0,03%	*0,01%*	0,23%	*0,02%*	0,39%	*0,11%*		
21/09/2011	6	-0,04%	*-0,01%*	0,22%	*-0,02%*	0,30%	*-0,09%*		
22/09/2011	7	-0,11%	*-0,07%*	0,37%	*0,15%*	0,26%	*-0,04%*		
4/10/2011	15	-0,10%	*-0,02%*	0,24%	*0,02%*	0,30%	*-0,03%*		

Appendix 3E: Event study on Operation Twist - Extended (20/06/2012)

Event	**Ope. Twist - ext. (jun 12)** on **20/06/2012**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
13-Jun-12	-5	0,46%	0,86% *	-0,07%	0,39%
14-Jun-12	-4	-0,09%	-1,09% *	-0,75% *	-0,92% **
15-Jun-12	-3	0,30%	-0,44%	-0,72% *	-0,58% *
18-Jun-12	-2	-1,08% *	-0,05%	0,94% **	0,44%
19-Jun-12	-1	0,60%	0,34%	0,21%	0,27%
20-Jun-12	0	**0,28%**	**-0,15%**	**-0,34%**	**-0,25%**
21-Jun-12	1	0,83%	0,60%	-0,38%	0,11%
22-Jun-12	2	-0,20%	-0,54%	0,09%	-0,22%
25-Jun-12	3	0,15%	0,66%	0,17%	0,42%
26-Jun-12	4	-0,54%	0,29%	0,01%	0,15%
27-Jun-12	5	-0,20%	-0,52%	-0,29%	-0,41%
CAR(3)		1,72% *	0,79%	-0,50%	0,14%
CAR(5)		0,44%	0,20%	0,52%	0,36%
CAR(11)		0,53%	-0,04%	-1,13%	-0,58%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
19/06/2012	5	3,55%	*2,36%*	3,04%	*2,00%*	1,87%	*1,41%*	2,80%	*1,37%*
20/06/2012	6	3,99%	*0,44%*	3,03%	*-0,01%*	1,64%	*-0,24%*	2,91%	*0,11%*
21/06/2012	7	1,24%	*-2,75%*	0,49%	*-2,54%*	-1,00%	*-2,64%*	0,32%	*-2,59%*
3/07/2012	15	7,45%	*0,62%*	6,57%	*2,02%*	2,99%	*1,47%*	4,98%	*0,97%*
Exchange Rate									
19/06/2012	5	0,54%	*0,00%*	-0,23%	*-0,34%*	0,71%	*-0,55%*		
20/06/2012	6	0,39%	*-0,15%*	-0,32%	*-0,09%*	0,33%	*-0,38%*		
21/06/2012	7	0,86%	*0,47%*	0,07%	*0,38%*	0,63%	*0,30%*		
3/07/2012	15	0,30%	*-0,40%*	0,61%	*-0,20%*	0,85%	*-0,77%*		
10Y Bond Yield									
19/06/2012	5	0,05%	*0,08%*	-0,01%	*-0,01%*	0,00%	*-0,01%*		
20/06/2012	6	0,11%	*0,06%*	-0,10%	*-0,08%*	0,00%	*0,00%*		
21/06/2012	7	0,07%	*-0,04%*	-0,17%	*-0,08%*	-0,01%	*-0,02%*		
3/07/2012	15	-0,05%	*-0,04%*	-0,25%	*-0,04%*	-0,08%	*-0,03%*		

Appendix 3F: Event study on QE3 (13/09/2012)

Event	**QE3 (sept 12)** on **13/09/2012**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
6-Sep-12	-5	-0,18%	0,08%	-0,72% *	-0,32%
7-Sep-12	-4	0,23%	0,65%	0,41%	0,53% *
10-Sep-12	-3	-0,35%	-0,48%	0,06%	-0,21%
11-Sep-12	-2	0,49%	-0,07%	-0,13%	-0,10%
12-Sep-12	-1	0,00%	-0,43%	0,58% *	0,07%
13-Sep-12	0	**-1,22%** ***	**0,42%**	**0,74%** *	**0,58%** *
14-Sep-12	1	0,11%	-0,07%	0,77% **	0,35%
17-Sep-12	2	0,31%	0,02%	-0,65% *	-0,32%
18-Sep-12	3	-1,01% **	-0,13%	-0,14%	-0,14%
19-Sep-12	4	0,09%	-0,09%	0,41%	0,16%
20-Sep-12	5	-0,04%	0,15%	-0,46%	-0,16%
CAR(3)		-1,12% *	-0,08%	2,08% ***	1,00% *
CAR(5)		-0,32%	-0,14%	1,30% *	0,58%
CAR(11)		-1,58%	0,05%	0,86%	0,46%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
12/09/2012	5	6,21%	*0,75%*	3,40%	*0,02%*	3,62%	*1,00%*	3,65%	*0,43%*
13/09/2012	6	7,68%	*1,47%*	5,58%	*2,18%*	5,89%	*2,27%*	5,38%	*1,73%*
14/09/2012	7	8,93%	*1,25%*	6,22%	*0,65%*	7,30%	*1,42%*	6,07%	*0,69%*
26/09/2012	15	4,61%	*-1,17%*	4,18%	*-0,84%*	4,71%	*-0,56%*	3,13%	*-0,64%*
Exchange Rate									
12/09/2012	5	1,66%	*0,13%*	0,81%	*-0,05%*	0,56%	*-0,45%*		
13/09/2012	6	2,28%	*0,62%*	0,75%	*-0,07%*	0,65%	*0,09%*		
14/09/2012	7	2,59%	*0,31%*	0,39%	*-0,36%*	0,56%	*-0,09%*		
26/09/2012	15	2,67%	*-0,03%*	1,61%	*0,15%*	1,07%	*0,06%*		
10Y Bond Yield									
12/09/2012	5	0,06%	*0,04%*	0,02%	*0,08%*	-0,02%	*0,00%*		
13/09/2012	6	0,01%	*-0,05%*	0,02%	*-0,01%*	-0,01%	*0,01%*		
14/09/2012	7	0,10%	*0,09%*	0,02%	*0,01%*	-0,01%	*-0,01%*		
26/09/2012	15	-0,01%	*-0,06%*	-0,08%	*-0,05%*	0,00%	*0,00%*		

Appendix 3G: Event study on QE3 - Extended (12/12/2012)

Event	**QE3 - ext. (dec 12)** on **12/12/2012**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
5-Dec-12	-5	-0,31%	0,52%	-0,52% *	0,00%
6-Dec-12	-4	-0,27%	0,66%	0,58% *	0,62% **
7-Dec-12	-3	-0,78%	0,03%	-0,19%	-0,08%
10-Dec-12	-2	-0,17%	0,71%	0,20%	0,45% *
11-Dec-12	-1	0,31%	-0,24%	0,31%	0,04%
12-Dec-12	0	**0,10%**	**0,34%**	**-0,32%**	**0,01%**
13-Dec-12	1	0,37%	-0,14%	-0,21%	-0,17%
14-Dec-12	2	0,82% *	0,09%	-0,31%	-0,11%
17-Dec-12	3	-0,58%	0,25%	-0,65% **	-0,20%
18-Dec-12	4	0,06%	0,14%	-0,22%	-0,04%
19-Dec-12	5	0,57%	0,05%	0,65% **	0,35%
CAR(3)		0,78%	-0,03%	-0,22%	-0,12%
CAR(5)		1,42%	0,77%	-0,32%	0,22%
CAR(11)		0,11%	2,42%	-0,68%	0,87%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
11/12/2012	5	1,15%	*0,94%*	2,58%	*0,08%*	1,96%	*0,79%*	1,66%	*0,52%*
12/12/2012	6	1,57%	*0,42%*	3,12%	*0,54%*	1,85%	*-0,11%*	1,87%	*0,21%*
13/12/2012	7	1,45%	*-0,12%*	2,53%	*-0,59%*	1,19%	*-0,66%*	1,31%	*-0,56%*
26/12/2012	15	3,37%	*0,09%*	3,90%	*0,67%*	1,22%	*-0,32%*	2,11%	*-0,27%*
Exchange Rate									
11/12/2012	5	-0,92%	*-0,12%*	0,86%	*-0,22%*	-0,51%	*-0,16%*		
12/12/2012	6	-0,52%	*0,40%*	0,91%	*0,05%*	-0,28%	*0,24%*		
13/12/2012	7	-0,07%	*0,45%*	1,05%	*0,14%*	-0,10%	*0,17%*		
26/12/2012	15	1,18%	*0,00%*	0,64%	*-0,26%*	0,14%	*0,46%*		
10Y Bond Yield									
11/12/2012	5	-0,06%	*0,02%*	-0,06%	*-0,04%*	-0,05%	*-0,02%*		
12/12/2012	6	-0,06%	*0,00%*	-0,05%	*0,01%*	-0,05%	*0,00%*		
13/12/2012	7	-0,06%	*0,00%*	-0,11%	*-0,06%*	-0,04%	*0,01%*		
26/12/2012	15	-0,05%	*0,00%*	-0,11%	*0,03%*	0,03%	*0,02%*		

Appendix 3H: Event study on Tapering Talks - First Mention (22/05/2013)

Event	**Tap Talks (may 13)** on **22/05/2013**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
15-May-13	-5	-0,54% *	0,38%	-0,86% *	-0,24%
16-May-13	-4	-0,02%	0,86%	-0,38%	0,24%
17-May-13	-3	-0,18%	-0,71%	-0,33%	-0,52%
20-May-13	-2	0,08%	-0,27%	0,44%	0,08%
21-May-13	-1	0,07%	0,04%	0,06%	0,05%
22-May-13	0	**0,05%**	**1,03%**	**0,28%**	**0,66%**
23-May-13	1	0,73% **	0,68%	0,08%	0,38%
24-May-13	2	0,30%	0,45%	-0,22%	0,12%
28-May-13	3	0,24%	-0,10%	-0,08%	-0,09%
29-May-13	4	0,31%	-0,76%	0,47%	-0,15%
30-May-13	5	0,47% *	-0,58%	-0,88% *	-0,73%
CAR(3)		0,84% *	1,75%	0,41%	1,08%
CAR(5)		1,22% *	1,93%	0,63%	1,28%
CAR(11)		1,50%	1,01%	-1,43%	-0,21%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
21/05/2013	5	0,94%	*0,34%*	-0,19%	*-0,06%*	-0,59%	*0,16%*	1,12%	*0,22%*
22/05/2013	6	-0,02%	*-0,96%*	-0,93%	*-0,74%*	-1,58%	*-0,99%*	0,13%	*-0,99%*
23/05/2013	7	0,09%	*0,11%*	-1,52%	*-0,59%*	-2,36%	*-0,78%*	-0,49%	*-0,62%*
5/06/2013	15	-1,94%	*-1,29%*	-10,55%	*-1,95%*	-7,07%	*-1,51%*	-4,28%	*-1,55%*
Exchange Rate									
21/05/2013	5	-0,93%	*0,10%*	-1,42%	*-0,13%*	-1,00%	*-0,51%*		
22/05/2013	6	-0,69%	*0,24%*	-1,78%	*-0,36%*	-0,97%	*0,03%*		
23/05/2013	7	-0,50%	*0,18%*	-1,99%	*-0,21%*	-0,96%	*0,01%*		
5/06/2013	15	0,74%	*0,35%*	-4,19%	*0,57%*	-2,63%	*-0,06%*		
10Y Bond Yield									
21/05/2013	5	0,01%	*0,04%*	0,03%	*0,04%*	-0,02%	*0,02%*		
22/05/2013	6	-0,01%	*-0,02%*	0,03%	*0,00%*	-0,01%	*0,01%*		
23/05/2013	7	0,02%	*0,03%*	0,12%	*0,09%*	-0,01%	*0,01%*		
5/06/2013	15	0,18%	*-0,03%*	0,50%	*0,09%*	0,30%	*0,01%*		

Appendix 3I: Event study on Tapering Talks - Confirmation (13/06/2013)

Event	**Tap Talks (jun 13)** on **19/06/2013**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
12-Jun-13	-5	0,24%	1,29% *	0,69%	0,99% *
13-Jun-13	-4	-0,53%	1,20%	-0,47%	0,36%
14-Jun-13	-3	0,30%	1,22%	0,46%	0,84%
17-Jun-13	-2	-0,16%	-0,91%	-0,26%	-0,59%
18-Jun-13	-1	-0,14%	-0,09%	0,47%	0,19%
19-Jun-13	0	**0,01%**	**-1,27%** *	**-0,56%**	**-0,92%** *
20-Jun-13	1	0,20%	-1,75% *	-1,74% ***	-1,74% ***
21-Jun-13	2	-1,29% ***	2,10% **	0,55%	1,32% **
24-Jun-13	3	-0,22%	-0,16%	-0,44%	-0,30%
25-Jun-13	4	-0,74% *	0,40%	0,49%	0,44%
26-Jun-13	5	-0,42%	1,67% *	0,39%	1,03% *
CAR(3)		0,07%	-3,12% **	-1,82% *	-2,47% ***
CAR(5)		-1,37% *	-1,93%	-1,53%	-1,73%
CAR(11)		-2,75% **	3,69%	-0,41%	1,64%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
18/06/2013	5	2,02%	*0,82%*	3,42%	*0,41%*	1,81%	*0,94%*	1,75%	*0,65%*
19/06/2013	6	0,10%	*-1,93%*	-0,22%	*-3,64%*	-0,52%	*-2,33%*	0,04%	*-1,71%*
20/06/2013	7	-3,20%	*-3,30%*	-5,96%	*-5,74%*	-5,30%	*-4,78%*	-3,02%	*-3,06%*
2/07/2013	15	-4,86%	*-1,08%*	-0,75%	*-1,84%*	-2,18%	*-0,79%*	-1,31%	*-0,36%*
Exchange Rate									
18/06/2013	5	0,94%	*-0,07%*	0,56%	*-0,21%*	-0,02%	*-0,23%*		
19/06/2013	6	1,20%	*0,25%*	-0,35%	*-0,90%*	-0,42%	*-0,40%*		
20/06/2013	7	1,26%	*0,07%*	-0,64%	*-0,30%*	-0,78%	*-0,36%*		
2/07/2013	15	-1,37%	*0,18%*	-1,52%	*-0,28%*	-1,12%	*-0,60%*		
10Y Bond Yield									
18/06/2013	5	-0,07%	*0,04%*	-0,23%	*0,10%*	0,04%	*-0,01%*		
19/06/2013	6	-0,08%	*-0,01%*	-0,26%	*-0,03%*	0,08%	*0,04%*		
20/06/2013	7	0,06%	*0,14%*	0,09%	*0,35%*	0,21%	*0,12%*		
2/07/2013	15	0,11%	*-0,03%*	0,18%	*-0,03%*	0,32%	*-0,03%*		

Appendix 3J: Event study on Tapering Talks - Non Taper Event (18/09/2013)

Event	**Tap Talks (sept 13)** on **18/09/2013**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
11-Sep-13	-5	0,43%	-0,56%	-0,02%	-0,29%
12-Sep-13	-4	-0,10%	-0,29%	-0,63%	-0,46%
13-Sep-13	-3	0,09%	0,41%	-0,30%	0,06%
16-Sep-13	-2	0,34%	0,44%	0,52%	0,48%
17-Sep-13	-1	0,04%	-0,47%	-0,79%	-0,63%
18-Sep-13	0	**0,64%** *	**1,79%**	**1,00%**	**1,39%** *
19-Sep-13	1	-0,43%	0,90%	0,38%	0,64%
20-Sep-13	2	0,32%	-2,62% **	-1,07%	-1,85% **
23-Sep-13	3	-0,01%	0,49%	0,82%	0,65%
24-Sep-13	4	0,25%	-0,84%	-0,74%	-0,79%
25-Sep-13	5	0,64% *	-0,93%	-0,43%	-0,68%
CAR(3)		0,25%	2,21%	0,59%	1,40%
CAR(5)		0,91%	0,03%	0,04%	0,04%
CAR(11)		2,21% *	-1,69%	-1,26%	-1,48%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
17/09/2013	5	1,61%	*0,25%*	1,86%	*0,02%*	-0,15%	*-0,49%*	1,13%	*0,24%*
18/09/2013	6	4,17%	*2,56%*	7,62%	*5,75%*	3,38%	*3,52%*	3,15%	*2,01%*
19/09/2013	7	3,40%	*-0,77%*	8,01%	*0,39%*	3,41%	*0,03%*	2,88%	*-0,27%*
1/10/2013	15	3,49%	*0,96%*	2,04%	*2,60%*	0,23%	*1,30%*	1,67%	*0,81%*
Exchange Rate									
17/09/2013	5	1,16%	*0,44%*	1,28%	*0,59%*	1,49%	*0,00%*		
18/09/2013	6	1,08%	*-0,08%*	0,94%	*-0,34%*	1,32%	*-0,17%*		
19/09/2013	7	1,26%	*0,19%*	1,32%	*0,39%*	1,59%	*0,27%*		
1/10/2013	15	2,28%	*-0,11%*	0,35%	*-0,12%*	1,29%	*-0,93%*		
10Y Bond Yield									
17/09/2013	5	-0,13%	*0,01%*	-0,33%	*0,06%*	-0,11%	*-0,02%*		
18/09/2013	6	-0,10%	*0,03%*	-0,36%	*-0,03%*	-0,09%	*0,02%*		
19/09/2013	7	-0,16%	*-0,06%*	-0,70%	*-0,34%*	-0,12%	*-0,03%*		
1/10/2013	15	-0,27%	*0,03%*	-0,37%	*-0,07%*	-0,09%	*0,00%*		

Appendix 3K: Event study on Tapering Talks - Effective (18/12/2013)

Event	**Tapering (dec 13)** on **18/12/2013**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
11-Dec-13	-5	0,86% ***	-0,07%	-0,04%	-0,06%
12-Dec-13	-4	0,00%	0,64%	0,10%	0,37%
13-Dec-13	-3	-0,10%	0,29%	0,46%	0,38%
16-Dec-13	-2	-0,03%	-0,58%	0,43%	-0,07%
17-Dec-13	-1	-0,11%	-0,38%	0,32%	-0,03%
18-Dec-13	0	**-0,77%** **	**-1,53%** **	**-0,29%**	**-0,91%** **
19-Dec-13	1	0,20%	-1,74% **	-1,30% **	-1,52% ***
20-Dec-13	2	0,14%	-1,10% *	-0,94% *	-1,02% **
23-Dec-13	3	0,08%	-0,96%	-0,45%	-0,70% *
24-Dec-13	4	0,14%	0,46%	-0,02%	0,22%
26-Dec-13	5	0,07%	-2,67% ***	-1,06% **	-1,86% ***
CAR(3)		-0,67%	-3,66% ***	-1,27% *	-2,46% ***
CAR(5)		-0,56%	-5,33% ***	-1,78% *	-3,55% ***
CAR(11)		0,50%	-7,63% ***	-2,78% *	-5,21% ***

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
17/12/2013	5	-1,12%	*-0,58%*	-3,57%	*-1,26%*	-0,82%	*-0,14%*	-1,50%	*-0,39%*
18/12/2013	6	0,22%	*1,34%*	-2,00%	*1,57%*	0,72%	*1,54%*	0,12%	*1,61%*
19/12/2013	7	0,30%	*0,08%*	-4,09%	*-2,09%*	-0,73%	*-1,46%*	-0,01%	*-0,12%*
2/01/2014	15	2,29%	*-2,06%*	-6,31%	*-3,74%*	-0,56%	*-1,97%*	1,30%	*-1,43%*
Exchange Rate									
17/12/2013	5	0,32%	*0,08%*	-0,71%	*0,15%*	0,10%	*-0,27%*		
18/12/2013	6	0,34%	*0,03%*	-0,60%	*0,11%*	-0,28%	*-0,37%*		
19/12/2013	7	0,34%	*0,00%*	-0,82%	*-0,22%*	-0,36%	*-0,08%*		
2/01/2014	15	0,54%	*0,15%*	-1,97%	*0,08%*	-0,53%	*0,22%*		
10Y Bond Yield									
17/12/2013	5	-0,01%	*-0,01%*	-0,04%	*0,03%*	-0,03%	*-0,06%*		
18/12/2013	6	0,00%	*0,01%*	-0,04%	*0,00%*	0,03%	*0,07%*		
19/12/2013	7	0,02%	*0,02%*	-0,01%	*0,03%*	0,05%	*0,02%*		
2/01/2014	15	0,08%	*0,01%*	0,26%	*0,09%*	0,12%	*0,08%*		

Appendix 3L: Event study on Tapering - Confirmation (29/01/2014)

Event	**Tapering (jan 14)** on **29/01/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
22-Jan-14	-5	-0,24%	1,47% *	0,58%	1,03% *
23-Jan-14	-4	1,17% ***	-0,72%	-0,02%	-0,37%
24-Jan-14	-3	-0,32%	0,63%	-0,03%	0,30%
27-Jan-14	-2	0,20%	1,06%	0,49%	0,78%
28-Jan-14	-1	0,34%	-0,14%	-0,46%	-0,30%
29-Jan-14	0	**-0,49%** *	**-0,21%**	**0,18%**	**-0,01%**
30-Jan-14	1	-0,74% ***	0,39%	0,25%	0,32%
31-Jan-14	2	-0,73% **	1,81% *	0,85% *	1,33% **
3-Feb-14	3	0,84% ***	0,76%	-0,03%	0,37%
4-Feb-14	4	-0,22%	2,14% **	0,47%	1,31% **
5-Feb-14	5	0,35%	-0,16%	0,10%	-0,03%
CAR(3)		-0,89% *	0,04%	-0,02%	0,01%
CAR(5)		-1,42% **	2,91%	1,32%	2,12% *
CAR(11)		0,15%	7,04% **	2,40% *	4,72% ***

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
28/01/2014	5	-1,99%	*1,24%*	-4,05%	*1,00%*	-2,55%	*0,26%*	-2,94%	*0,74%*
29/01/2014	6	-3,68%	*-1,68%*	-6,40%	*-2,35%*	-3,46%	*-0,92%*	-4,01%	*-1,07%*
30/01/2014	7	-3,44%	*0,24%*	-4,73%	*1,67%*	-2,42%	*1,04%*	-3,19%	*0,81%*
11/02/2014	15	-1,14%	*1,60%*	-1,15%	*2,39%*	-0,09%	*1,92%*	-1,41%	*1,35%*
Exchange Rate									
28/01/2014	5	0,98%	*-0,01%*	-2,72%	*-0,31%*	-0,94%	*0,21%*		
29/01/2014	6	0,87%	*-0,11%*	-2,62%	*0,09%*	-0,88%	*0,06%*		
30/01/2014	7	0,83%	*-0,04%*	-1,58%	*1,05%*	-0,63%	*0,25%*		
11/02/2014	15	0,64%	*-0,03%*	-1,09%	*-0,31%*	-0,73%	*0,26%*		
10Y Bond Yield									
28/01/2014	5	-0,06%	*0,00%*	0,30%	*-0,11%*	0,11%	*0,00%*		
29/01/2014	6	-0,07%	*-0,02%*	0,23%	*-0,07%*	0,11%	*0,00%*		
30/01/2014	7	-0,11%	*-0,04%*	0,36%	*0,13%*	0,11%	*0,00%*		
11/02/2014	15	-0,05%	*0,01%*	0,26%	*0,00%*	0,08%	*-0,02%*		

Appendix 3M: Event study on Tapering - Introduction of Yellen (19/03/2014)

Event	**Tapering (mar 14)** on **19/03/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
12-Mar-14	-5	-0,29%	1,04%	-0,21%	0,41%
13-Mar-14	-4	-0,68% *	0,12%	-0,22%	-0,05%
14-Mar-14	-3	0,55%	1,98% **	0,24%	1,11% *
17-Mar-14	-2	0,27%	0,00%	0,41%	0,20%
18-Mar-14	-1	0,68% *	0,25%	-0,37%	-0,06%
19-Mar-14	0	**-0,23%**	**-1,39%**	**-1,08%** **	**-1,23%** **
20-Mar-14	1	0,08%	0,31%	0,03%	0,17%
21-Mar-14	2	0,02%	-0,28%	-0,40%	-0,34%
24-Mar-14	3	0,29%	0,98%	0,26%	0,62%
25-Mar-14	4	0,37%	0,24%	-0,23%	0,00%
26-Mar-14	5	0,45%	0,79%	-0,15%	0,32%
CAR(3)		0,54%	-0,83%	-1,41% *	-1,12%
CAR(5)		0,83%	-1,11%	-1,40%	-1,26%
CAR(11)		1,51%	4,04%	-1,71%	1,16%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
18/03/2014	5	-0,03%	*1,34%*	4,11%	*1,17%*	0,46%	*0,26%*	-0,10%	*0,66%*
19/03/2014	6	-1,42%	*-1,39%*	1,82%	*-2,29%*	-1,17%	*-1,64%*	-1,05%	*-0,94%*
20/03/2014	7	-1,17%	*0,25%*	2,56%	*0,73%*	-0,84%	*0,34%*	-0,82%	*0,23%*
1/04/2014	15	2,17%	*0,93%*	10,45%	*1,84%*	2,58%	*0,92%*	1,69%	*0,72%*
Exchange Rate									
18/03/2014	5	0,22%	*-0,04%*	0,09%	*-0,11%*	-0,09%	*0,01%*		
19/03/2014	6	0,31%	*0,08%*	-0,01%	*-0,09%*	-0,29%	*-0,19%*		
20/03/2014	7	0,24%	*-0,07%*	0,03%	*0,04%*	-0,44%	*-0,16%*		
1/04/2014	15	-0,80%	*0,11%*	2,05%	*0,24%*	-0,14%	*0,15%*		
10Y Bond Yield									
18/03/2014	5	-0,07%	*0,01%*	-0,08%	*-0,02%*	-0,04%	*0,00%*		
19/03/2014	6	-0,05%	*0,02%*	-0,07%	*0,01%*	-0,03%	*0,01%*		
20/03/2014	7	0,00%	*0,05%*	0,03%	*0,10%*	0,06%	*0,09%*		
1/04/2014	15	-0,05%	*0,01%*	-0,23%	*0,00%*	0,05%	*-0,02%*		

Appendix 3N: Event study on Tapering - Brief Lull 1 (30/04/2014)

Event	**Tapering (apr 14)** on **30/04/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
23-Apr-14	-5	0,12%	-0,68%	-0,51%	-0,60%
24-Apr-14	-4	-0,04%	0,39%	-0,22%	0,09%
25-Apr-14	-3	0,05%	-0,15%	-0,35%	-0,25%
28-Apr-14	-2	0,20%	-0,07%	0,01%	-0,03%
29-Apr-14	-1	0,11%	0,01%	0,31%	0,16%
30-Apr-14	0	**0,32%**	**0,11%**	**0,08%**	**0,10%**
1-May-14	1	0,31%	0,15%	0,39%	0,27%
2-May-14	2	-0,26%	0,97%	-0,45%	0,26%
5-May-14	3	0,03%	-0,68%	-0,22%	-0,45%
6-May-14	4	0,06%	0,77%	-0,14%	0,31%
7-May-14	5	0,27%	0,14%	0,20%	0,17%
CAR(3)		0,74%	0,27%	0,78%	0,53%
CAR(5)		0,69%	1,17%	0,35%	0,76%
CAR(11)		1,18%	0,96%	-0,89%	0,04%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
29/04/2014	5	0,09%	*0,64%*	-0,01%	*0,65%*	-0,34%	*0,78%*	-0,02%	*0,65%*
30/04/2014	6	0,77%	*0,68%*	0,47%	*0,48%*	0,02%	*0,36%*	0,31%	*0,32%*
1/05/2014	7	0,97%	*0,20%*	0,68%	*0,21%*	0,47%	*0,45%*	0,26%	*-0,05%*
13/05/2014	15	0,52%	*-0,55%*	4,84%	*0,19%*	1,79%	*0,04%*	1,14%	*0,13%*
Exchange Rate									
29/04/2014	5	0,26%	*0,08%*	-0,65%	*0,03%*	-0,36%	*-0,12%*		
30/04/2014	6	0,25%	*-0,01%*	-0,25%	*0,41%*	-0,21%	*0,15%*		
1/05/2014	7	0,17%	*-0,08%*	-0,11%	*0,13%*	-0,28%	*-0,07%*		
13/05/2014	15	-0,36%	*-0,01%*	1,09%	*0,01%*	0,58%	*0,07%*		
10Y Bond Yield									
29/04/2014	5	-0,02%	*0,01%*	-0,08%	*-0,03%*	0,01%	*0,00%*		
30/04/2014	6	-0,05%	*-0,03%*	-0,15%	*-0,07%*	0,01%	*0,00%*		
1/05/2014	7	-0,05%	*0,00%*	-0,17%	*-0,02%*	0,01%	*0,00%*		
13/05/2014	15	-0,12%	*-0,03%*	-0,21%	*-0,01%*	-0,04%	*0,00%*		

Appendix 3O: Event study on Tapering - Brief Lull 2 (18/06/2014)

Event	**Tapering (jun 14)** on **18/06/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
11-Jun-14	-5	0,00%	-0,65%	0,27%	-0,19%
12-Jun-14	-4	0,65% *	0,25%	-0,15%	0,05%
13-Jun-14	-3	-0,50%	-0,47%	-0,19%	-0,33%
16-Jun-14	-2	0,20%	-1,43% *	-0,13%	-0,78% *
17-Jun-14	-1	0,21%	0,24%	-0,17%	0,03%
18-Jun-14	0	**-0,10%**	**0,30%**	**0,35%**	**0,33%**
19-Jun-14	1	0,07%	-1,13%	0,02%	-0,55%
20-Jun-14	2	-0,29%	0,03%	-0,23%	-0,10%
23-Jun-14	3	-0,30%	-0,02%	0,40%	0,19%
24-Jun-14	4	0,25%	0,34%	0,66% *	0,50%
25-Jun-14	5	-0,22%	0,08%	0,22%	0,15%
CAR(3)		0,18%	-0,59%	0,21%	-0,19%
CAR(5)		0,09%	-1,99%	-0,15%	-1,07%
CAR(11)		-0,04%	-2,47%	1,05%	-0,71%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
17/06/2014	5	-0,93%	*0,16%*	-2,89%	*0,31%*	-1,18%	*-0,19%*	-0,63%	*0,07%*
18/06/2014	6	-0,12%	*0,81%*	-1,56%	*1,33%*	-0,29%	*0,89%*	0,20%	*0,82%*
19/06/2014	7	0,10%	*0,22%*	-2,41%	*-0,85%*	-0,17%	*0,12%*	0,43%	*0,23%*
1/07/2014	15	-0,89%	*0,51%*	-2,28%	*0,30%*	1,03%	*0,70%*	1,06%	*0,76%*
Exchange Rate									
17/06/2014	5	-0,56%	*0,00%*	-1,01%	*-0,40%*	-0,28%	*0,24%*		
18/06/2014	6	-0,48%	*0,08%*	-1,54%	*-0,53%*	-0,46%	*-0,18%*		
19/06/2014	7	-0,48%	*0,00%*	-1,77%	*-0,23%*	-0,56%	*-0,11%*		
1/07/2014	15	0,27%	*0,07%*	-0,55%	*0,19%*	0,05%	*0,31%*		
10Y Bond Yield									
17/06/2014	5	0,01%	*0,04%*	0,03%	*-0,04%*	-0,02%	*-0,01%*		
18/06/2014	6	-0,01%	*-0,02%*	0,08%	*0,04%*	0,00%	*0,02%*		
19/06/2014	7	-0,07%	*-0,07%*	0,01%	*-0,07%*	-0,02%	*-0,02%*		
1/07/2014	15	-0,15%	*0,00%*	0,03%	*-0,04%*	-0,06%	*0,00%*		

Appendix 3P: Event study on Tapering - Rate Hike Spectrum 1 (30/07/2014)

Event	**Tapering (jul 14)** on **30/07/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
23-Jul-14	-5	0,28%	-0,44%	-0,01%	-0,22%
24-Jul-14	-4	0,47%	0,21%	-0,21%	0,00%
25-Jul-14	-3	-0,35%	-0,14%	0,42%	0,14%
28-Jul-14	-2	-0,30%	0,25%	0,27%	0,26%
29-Jul-14	-1	0,53% *	-0,60%	-0,10%	-0,35%
30-Jul-14	0	**-0,08%**	**-1,50%** **	**-0,06%**	**-0,78%** **
31-Jul-14	1	0,54% *	-0,08%	-0,02%	-0,05%
1-Aug-14	2	-0,12%	0,80%	1,03% ***	0,91% ***
4-Aug-14	3	-0,53% *	0,37%	0,24%	0,31%
5-Aug-14	4	0,31%	-0,47%	-0,12%	-0,30%
6-Aug-14	5	0,37%	-1,08% *	-0,42%	-0,75% **
CAR(3)		0,98% *	-2,18% *	-0,18%	-1,18% **
CAR(5)		0,56%	-1,14%	1,12% *	-0,01%
CAR(11)		1,11%	-2,67%	1,03%	-0,82%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
29/07/2014	5	-1,07%	*-0,23%*	-0,37%	*-0,98%*	0,04%	*-0,40%*	-0,45%	*-0,45%*
30/07/2014	6	-1,28%	*-0,21%*	-1,63%	*-1,26%*	0,02%	*-0,02%*	-0,40%	*0,05%*
31/07/2014	7	-3,30%	*-2,03%*	-3,87%	*-2,24%*	-1,27%	*-1,29%*	-2,26%	*-1,87%*
12/08/2014	15	-5,16%	*-0,41%*	-3,12%	*0,00%*	-1,05%	*-0,13%*	-2,62%	*-0,03%*
Exchange Rate									
29/07/2014	5	-0,69%	*0,03%*	0,44%	*-0,13%*	0,03%	*0,21%*		
30/07/2014	6	-0,74%	*-0,05%*	0,20%	*-0,24%*	0,00%	*-0,03%*		
31/07/2014	7	-0,96%	*-0,21%*	-0,21%	*-0,41%*	-0,09%	*-0,08%*		
12/08/2014	15	-1,00%	*-0,16%*	-1,37%	*0,10%*	-0,86%	*0,46%*		
10Y Bond Yield									
29/07/2014	5	-0,06%	*-0,03%*	-0,02%	*0,00%*	0,09%	*0,09%*		
30/07/2014	6	-0,04%	*0,02%*	0,01%	*0,03%*	0,00%	*-0,09%*		
31/07/2014	7	0,01%	*0,05%*	0,01%	*0,00%*	0,03%	*0,03%*		
12/08/2014	15	-0,09%	*0,00%*	0,27%	*0,01%*	0,03%	*-0,03%*		

Appendix 3Q: Event study on Tapering - Rate Hike Spectrum 2 (17/09/2014)

Event	**Tapering (sept 14)** on **17/09/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
10-Sep-14	-5	-0,17%	-0,84%	-0,08%	-0,46%
11-Sep-14	-4	0,02%	-0,63%	0,08%	-0,28%
12-Sep-14	-3	0,31%	-1,26%	-0,01%	-0,64%
15-Sep-14	-2	0,20%	-0,21%	-0,25%	-0,23%
16-Sep-14	-1	-0,58%	1,01%	0,81% **	0,91% *
17-Sep-14	0	**-0,13%**	**-1,11%**	**-0,29%**	**-0,70%**
18-Sep-14	1	0,35%	-0,34%	-0,31%	-0,32%
19-Sep-14	2	-0,10%	-0,71%	-0,15%	-0,43%
22-Sep-14	3	0,51%	-0,47%	-0,37%	-0,42%
23-Sep-14	4	-0,50%	-0,22%	0,34%	0,06%
24-Sep-14	5	-0,42%	0,38%	1,03% ***	0,70%
CAR(3)		-0,37%	-0,44%	0,22%	-0,11%
CAR(5)		-0,26%	-1,36%	-0,17%	-0,76%
CAR(11)		-0,52%	-4,38%	0,82%	-1,78%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
16/09/2014	5	-0,43%	*-0,02%*	-1,33%	*1,85%*	0,07%	*1,15%*	0,05%	*0,63%*
17/09/2014	6	-0,91%	*-0,48%*	-2,68%	*-1,35%*	-0,51%	*-0,58%*	-0,25%	*-0,30%*
18/09/2014	7	-0,01%	*0,91%*	-2,19%	*0,49%*	-0,48%	*0,03%*	0,38%	*0,63%*
30/09/2014	15	-4,11%	*-0,15%*	-8,36%	*0,05%*	-3,11%	*-0,07%*	-2,51%	*-0,25%*
Exchange Rate									
16/09/2014	5	0,04%	*-0,16%*	-2,38%	*-0,60%*	-0,80%	*-1,26%*		
17/09/2014	6	0,06%	*0,03%*	-2,17%	*0,20%*	-1,07%	*-0,27%*		
18/09/2014	7	0,08%	*0,01%*	-2,18%	*-0,01%*	-1,07%	*0,00%*		
30/09/2014	15	-1,97%	*-0,01%*	-4,69%	*-0,54%*	-2,45%	*-0,70%*		
10Y Bond Yield									
16/09/2014	5	0,06%	*0,01%*	0,08%	*-0,03%*	-0,01%	*-0,02%*		
17/09/2014	6	0,04%	*-0,02%*	0,08%	*0,00%*	0,00%	*0,01%*		
18/09/2014	7	0,07%	*0,03%*	0,10%	*0,03%*	-0,02%	*-0,02%*		
30/09/2014	15	-0,04%	*0,00%*	0,37%	*0,03%*	-0,09%	*-0,02%*		

Appendix 3R: Event study on Tapering - End of QE Programs (29/10/2014)

Event	**Tapering (oct 14)** on **29/10/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
22-Oct-14	-5	-0,45%	-0,17%	-0,17%	-0,17%
23-Oct-14	-4	-0,02%	-0,95%	-0,71% *	-0,83%
24-Oct-14	-3	0,01%	0,47%	-0,11%	0,18%
27-Oct-14	-2	-0,06%	-1,59%	0,00%	-0,79%
28-Oct-14	-1	0,20%	0,74%	-0,07%	0,33%
29-Oct-14	0	**-0,87% ***	**0,15%**	**-0,01%**	**0,07%**
30-Oct-14	1	-0,21%	0,72%	-0,13%	0,30%
31-Oct-14	2	-0,52%	-0,99%	-0,98% **	-0,98% *
3-Nov-14	3	-0,34%	-0,81%	-0,05%	-0,43%
4-Nov-14	4	0,51%	0,76%	-0,19%	0,29%
5-Nov-14	5	-0,39%	-1,74% *	-0,83% **	-1,28% **
CAR(3)		-0,88%	1,62%	-0,21%	0,70%
CAR(5)		-1,47%	-0,96%	-1,18%	-1,07%
CAR(11)		-2,15%	-3,39%	-3,24% **	-3,32% *

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
28/10/2014	5	2,07%	*1,64%*	1,19%	*2,15%*	0,16%	*0,78%*	1,89%	*1,25%*
29/10/2014	6	0,71%	*-1,36%*	1,07%	*-0,13%*	-0,17%	*-0,33%*	1,45%	*-0,44%*
30/10/2014	7	1,37%	*0,66%*	2,70%	*1,63%*	0,20%	*0,37%*	2,20%	*0,75%*
11/11/2014	15	2,38%	*0,71%*	0,35%	*0,60%*	-0,95%	*-0,16%*	3,72%	*0,34%*
Exchange Rate									
28/10/2014	5	-0,59%	*0,18%*	0,31%	*0,11%*	0,15%	*0,69%*		
29/10/2014	6	-0,41%	*0,18%*	-0,21%	*-0,53%*	0,21%	*0,06%*		
30/10/2014	7	-0,32%	*0,09%*	0,48%	*0,70%*	0,33%	*0,11%*		
11/11/2014	15	-2,42%	*0,06%*	-1,54%	*0,12%*	-1,24%	*-0,46%*		
10Y Bond Yield									
28/10/2014	5	-0,01%	*0,00%*	-0,06%	*-0,03%*	-0,02%	*0,00%*		
29/10/2014	6	-0,02%	*0,00%*	-0,06%	*0,00%*	-0,03%	*-0,01%*		
30/10/2014	7	-0,05%	*-0,03%*	-0,06%	*-0,01%*	-0,03%	*0,00%*		
11/11/2014	15	-0,09%	*0,01%*	-0,13%	*0,02%*	-0,05%	*0,01%*		

Appendix 3S: Event study on Rate Hike Talks 1 (17/12/2014)

Event	**Fwd Policy Guid. (dec 14)** on **17/12/2014**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
10-Dec-14	-5	0,66%	0,56%	0,14%	0,35%
11-Dec-14	-4	-0,65%	-1,20%	-0,49%	-0,85% *
12-Dec-14	-3	-0,32%	-0,12%	0,32%	0,10%
15-Dec-14	-2	-0,85% *	-2,35% ***	0,34%	-1,01% *
16-Dec-14	-1	0,92% *	-0,87%	-0,42%	-0,64%
17-Dec-14	0	**-0,72%**	**1,97%** **	**-0,20%**	**0,89%** *
18-Dec-14	1	-0,57%	0,42%	-0,95% *	-0,26%
19-Dec-14	2	-0,72%	-0,19%	0,08%	-0,06%
22-Dec-14	3	0,24%	-0,05%	-0,17%	-0,11%
23-Dec-14	4	0,09%	-0,68%	-0,45%	-0,56%
24-Dec-14	5	0,30%	0,06%	-0,06%	0,00%
CAR(3)		-0,37%	1,53%	-1,56% *	-0,02%
CAR(5)		-1,93% *	-1,02%	-1,15%	-1,08%
CAR(11)		-1,61%	-2,43%	-1,87%	-2,15%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
16/12/2014	5	-4,66%	*0,66%*	-8,71%	*-1,12%*	-3,63%	*-0,78%*	-4,55%	*-0,30%*
17/12/2014	6	-3,62%	*1,04%*	-4,73%	*3,98%*	-2,53%	*1,10%*	-2,86%	*1,68%*
18/12/2014	7	-1,94%	*1,68%*	-1,76%	*2,97%*	-1,82%	*0,71%*	-0,71%	*2,15%*
31/12/2014	15	-3,32%	*-0,66%*	-0,57%	*0,08%*	-1,45%	*0,07%*	-1,07%	*-0,90%*
Exchange Rate									
16/12/2014	5	1,27%	*-0,15%*	-2,18%	*-0,69%*	0,54%	*0,26%*		
17/12/2014	6	1,56%	*0,29%*	-2,71%	*-0,54%*	0,80%	*0,26%*		
18/12/2014	7	1,42%	*-0,14%*	-2,80%	*-0,09%*	0,78%	*-0,02%*		
31/12/2014	15	-1,08%	*-0,23%*	-2,13%	*0,05%*	0,55%	*0,00%*		
10Y Bond Yield									
16/12/2014	5	-0,09%	*-0,02%*	0,31%	*0,09%*	0,04%	*0,06%*		
17/12/2014	6	-0,10%	*-0,01%*	0,26%	*-0,05%*	0,06%	*0,02%*		
18/12/2014	7	-0,08%	*0,02%*	0,10%	*-0,17%*	0,08%	*0,02%*		
31/12/2014	15	-0,11%	*0,00%*	0,06%	*0,01%*	0,02%	*0,01%*		

Appendix 3T: Event study on Rate Hike Talks 2 (28/01/2015)

Event	**Fwd Policy Guid. (jan 15)** on **28/01/2015**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
21-Jan-15	-5	-0,17%	1,64% *	0,16%	0,90% *
22-Jan-15	-4	-1,47% ***	0,90%	0,17%	0,54%
23-Jan-15	-3	-0,19%	-1,18%	0,07%	-0,55%
26-Jan-15	-2	1,21% **	-0,51%	-0,01%	-0,26%
27-Jan-15	-1	0,73%	0,03%	0,22%	0,12%
28-Jan-15	0	**-0,44%**	**0,22%**	**0,11%**	**0,17%**
29-Jan-15	1	1,04% *	-1,00%	-0,38%	-0,69%
30-Jan-15	2	0,28%	-1,83% **	-0,15%	-0,99% *
2-Feb-15	3	-0,14%	0,74%	0,22%	0,48%
3-Feb-15	4	0,18%	-0,30%	-0,04%	-0,17%
4-Feb-15	5	-1,26% **	-1,77% **	0,41%	-0,68%
CAR(3)		1,32%	-0,76%	-0,04%	-0,40%
CAR(5)		2,81% **	-3,09% *	-0,20%	-1,65%
CAR(11)		-0,24%	-3,07%	0,79%	-1,14%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
27/01/2015	5	1,96%	*-0,16%*	2,42%	*-0,61%*	1,19%	*-0,30%*	1,27%	*-0,70%*
28/01/2015	6	-0,21%	*-2,17%*	1,38%	*-1,05%*	0,34%	*-0,84%*	-0,07%	*-1,34%*
29/01/2015	7	2,11%	*2,32%*	1,37%	*-0,01%*	0,57%	*0,23%*	0,88%	*0,94%*
10/02/2015	15	3,17%	*1,32%*	-3,02%	*-1,36%*	1,34%	*-0,38%*	2,49%	*0,84%*
Exchange Rate									
27/01/2015	5	-3,23%	*0,10%*	0,28%	*-0,09%*	-0,36%	*-0,03%*		
28/01/2015	6	-2,59%	*0,64%*	0,28%	*0,00%*	-0,22%	*0,14%*		
29/01/2015	7	-2,09%	*0,50%*	0,13%	*-0,15%*	-0,22%	*0,00%*		
10/02/2015	15	-2,29%	*0,03%*	-2,53%	*-0,08%*	-0,55%	*0,16%*		
10Y Bond Yield									
27/01/2015	5	-0,08%	*0,00%*	-0,11%	*0,00%*	-0,09%	*-0,01%*		
28/01/2015	6	-0,08%	*-0,01%*	-0,15%	*-0,04%*	-0,12%	*-0,04%*		
29/01/2015	7	-0,08%	*0,00%*	-0,09%	*0,06%*	-0,17%	*-0,05%*		
10/02/2015	15	-0,04%	*0,03%*	0,20%	*0,04%*	-0,07%	*0,05%*		

Appendix 3U: Event study on Rate Hike Talks 3 (18/03/2015)

Event	**Fwd Policy Guid. (mar 15)** on **18/03/2015**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
11-Mar-15	-5	0,29%	0,91%	0,59% *	0,75% *
12-Mar-15	-4	-0,57%	-1,16% *	-0,21%	-0,69% *
13-Mar-15	-3	0,23%	-1,37% *	-0,29%	-0,83% *
16-Mar-15	-2	0,20%	-0,04%	-0,75% *	-0,40%
17-Mar-15	-1	-0,55%	2,07% ***	0,75% *	1,41% ***
18-Mar-15	0	**-0,32%**	**0,56%**	**-0,28%**	**0,14%**
19-Mar-15	1	-0,38%	-1,04% *	-0,09%	-0,57%
20-Mar-15	2	0,44%	0,10%	-0,55%	-0,23%
23-Mar-15	3	0,60% *	1,14% *	0,53%	0,83% *
24-Mar-15	4	0,56%	0,73%	0,79% *	0,76% *
25-Mar-15	5	0,79% *	-0,43%	-0,08%	-0,25%
CAR(3)		-1,25% *	1,58%	0,37%	0,98%
CAR(5)		-0,61%	1,64%	-0,93%	0,35%
CAR(11)		1,28%	1,46%	0,40%	0,93%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
17/03/2015	5	1,59%	*-0,73%*	1,90%	*1,76%*	1,46%	*0,65%*	1,67%	*-0,10%*
18/03/2015	6	3,31%	*1,71%*	4,55%	*2,64%*	2,71%	*1,25%*	3,28%	*1,61%*
19/03/2015	7	1,76%	*-1,54%*	2,13%	*-2,42%*	1,81%	*-0,90%*	2,42%	*-0,86%*
31/03/2015	15	2,66%	*-1,40%*	3,86%	*0,10%*	3,14%	*-0,57%*	2,09%	*-1,03%*
Exchange Rate									
17/03/2015	5	-2,94%	*0,39%*	-2,14%	*0,29%*	-0,66%	*0,43%*		
18/03/2015	6	-2,49%	*0,45%*	-2,04%	*0,10%*	-0,50%	*0,17%*		
19/03/2015	7	-2,05%	*0,44%*	-1,70%	*0,34%*	-0,61%	*-0,11%*		
31/03/2015	15	-0,03%	*-0,39%*	-1,19%	*-0,11%*	0,04%	*0,06%*		
10Y Bond Yield									
17/03/2015	5	0,02%	*0,03%*	0,01%	*-0,02%*	-0,04%	*0,00%*		
18/03/2015	6	-0,03%	*-0,05%*	-0,05%	*-0,06%*	-0,03%	*0,00%*		
19/03/2015	7	-0,05%	*-0,02%*	-0,12%	*-0,07%*	-0,06%	*-0,03%*		
31/03/2015	15	-0,02%	*0,00%*	-0,06%	*-0,03%*	-0,10%	*0,01%*		

Appendix 3V: Event study on Rate Hike Talks 4 (29/04/2015)

Event	**Fwd Policy Guid. (apr 15)** on **29/04/2015**

Abnormal Return

AR(t)	t	Europe Five	Fragile Five	Best EMEs Five	EMEs Ten
22-Apr-15	-5	-0,75% *	0,16%	0,02%	0,09%
23-Apr-15	-4	0,05%	0,22%	0,66%	0,44%
24-Apr-15	-3	0,14%	-0,30%	0,26%	-0,02%
27-Apr-15	-2	1,28% ***	-0,45%	0,26%	-0,10%
28-Apr-15	-1	-0,22%	0,43%	0,41%	0,42%
29-Apr-15	0	**-0,44%**	**-0,54%**	**-0,49%**	**-0,52%**
30-Apr-15	1	1,52% ***	-0,45%	-0,70%	-0,57%
1-May-15	2	-0,07%	-0,92%	-0,06%	-0,49%
4-May-15	3	-0,52%	0,48%	0,65%	0,56%
5-May-15	4	0,44%	1,70% **	0,78%	1,24% **
6-May-15	5	1,20% ***	-0,73%	-0,23%	-0,48%
CAR(3)		0,86%	-0,56%	-0,78%	-0,67%
CAR(5)		2,08% **	-1,92%	-0,59%	-1,26%
CAR(11)		2,64% *	-0,38%	1,54%	0,58%

Cumul. Asset Price Change (Within 15 days)

Cumulative (*daily)*

	t	Europe Five		Fragile Five		Best EMEs Five		MSCI World	
Equity Price									
28/04/2015	5	1,92%	*-0,03%*	1,26%	*0,58%*	2,07%	*0,45%*	1,32%	*0,19%*
29/04/2015	6	0,62%	*-1,30%*	-0,12%	*-1,39%*	1,05%	*-1,02%*	0,74%	*-0,58%*
30/04/2015	7	0,63%	*0,01%*	-2,02%	*-1,90%*	-0,54%	*-1,59%*	-0,31%	*-1,05%*
12/05/2015	15	1,73%	*-0,12%*	-1,44%	*0,02%*	-1,22%	*0,05%*	0,06%	*-0,21%*
Exchange Rate									
28/04/2015	5	0,90%	*-0,11%*	0,19%	*0,24%*	0,65%	*0,03%*		
29/04/2015	6	1,37%	*0,47%*	0,91%	*0,72%*	0,88%	*0,23%*		
30/04/2015	7	2,40%	*1,03%*	1,07%	*0,16%*	1,14%	*0,26%*		
12/05/2015	15	3,60%	*-0,41%*	-0,34%	*-0,47%*	-0,14%	*0,05%*		
10Y Bond Yield									
28/04/2015	5	0,05%	*-0,01%*	0,15%	*-0,13%*	0,04%	*0,03%*		
29/04/2015	6	0,18%	*0,12%*	0,20%	*0,05%*	0,06%	*0,02%*		
30/04/2015	7	0,25%	*0,08%*	0,18%	*-0,02%*	0,12%	*0,06%*		
12/05/2015	15	0,61%	*0,09%*	0,38%	*0,05%*	0,23%	*0,05%*		