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The impact of unconventional monetary policy announcements on emerging market asset prices

MWAMBA NGUMBWE

STUDENT ID: 1390437

Submitted in fulfilment of the requirements for the Master of Management in Finance and Investments

Supervised by Prof. Paul Aligidede

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Declaration

I *Mwamba Ngumbwe*, hereby declare that this work is solely my own and all the work of other persons has been duly acknowledged, and the work has not yet been presented for any academic purposes elsewhere. I further do hereby declare responsibility for any mistakes that may arise of this view.

SIGNATURE ……..

DATE ……..

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Abbreviations

AAIIBEAR	American Association of Individual Investors Bearish sentiments
AAIIBULL	American Association of Individual Investors Bullish sentiments
BIS	Bank for International Settlements
BOE	Bank of England
BOJ	Bank of Japan
ECB	European Central Bank
EME	Emerging Market Economies
FED	Federal Reserve Bank of the United States
FOMC	Federal Open Market Committee
IMF	International Monetary Fund
LASP	Large Scale Asset Purchases
QE	Quantitative Easing
QQE	Quantitative and Qualitative Easing
UMP	Unconventional Monetary Policy
VIX	CBOE Volatility Index

ABSTRACT

Advanced central banks have increased their balance sheets after the financial crisis which has raised concerns amongst market participants. However, there is no empirical evidence to provide guidance to on the optimal point of asset purchases. This paper examines spillover effects of unconventional monetary policy announcements from four advanced central banks on emerging market asset prices for the period 2009 to 2016. Vast amount of literature so far has focused on the spillover effects on advanced economies and mainly concentrates on announcements from the Federal Reserve. The research estimates the two day change on 15 emerging market economies' asset prices. The results show that emerging market currencies exhibit higher returns against the Japanese Yen during the two day window period of the announcement being made. Bonds were more reactive to unconventional monetary policy than equities on days that announcements were made. Expectations of market participants were considered which showed that announcements made by the Bank of Japan (BOJ) were more anticipated by market participants which is an indication of how effective implementation of forward guidance has been over the years. The words and phrases used in making unconventional monetary policy announcements have had a significant effect on asset prices after the financial crisis.

CHAPTER ONE

1.1 Background and context

As feedback from the global financial crisis, major central banks have loosened their monetary policy from using conventional monetary policy to unconventional monetary Policy (UMP) which has prompted a global search for yield with investors flocking into Emerging Market Economies (EME). This has contributed to a broader mispricing of emerging market asset prices. Rey and Agrippino (2014) found that monetary policy in the United States is connected to a global factor in risky asset prices, cross border credit flows and specifically to U.S and European banks leverage. For the purpose of this study, the advanced economy central banks that were chosen were U.S Federal Reserve Bank (FED), Bank of England (BOE), Bank of Japan (BOJ) and European Central Bank (ECB) whose currencies are the most traded by value.

After the financial crisis, monetary policies tools such as the Taylor rule have proven to be ineffective, hence, the major central banks turned to use UMP. The continuous implementation of conventional monetary policy meant that the short term interest rate could not be altered as recommended by the Taylor rule; the expectations on the markets rates were different from the actual impact which meant that the monetary transmission mechanism wasn't working. Hofmann and Bogdanova (2012), assess the level of monetary policy rates from a global perspective since the mid-1990s and find that the policy rates in advanced economies and EMEs were in totality below the rates recommended by the Taylor over the past 10 years. During the recession of 2008 – 2009, policy rates were within the recommendations of the Taylor rule but deviated and narrowed again in the first quarter of 2012 during the European debt crisis. Taylor (2012) argues that the deviation from the recommendation of the Taylor rule suggests a change in policy regime which is a conclusion rejected by Bernanke (2010)[1]. The findings of Taylor (2012) are at odds with the findings of Hofmann and Bogdanova (2012) who caution that the Taylor rules involve assumptions about unobservable concepts, hence, must be taken with caution. The Taylor rule does not account for changes in the reserve requirements which occurred after the crisis[2].

[1] Bernanke (2010) argues that the consistent mismatch between policy rates and Taylor recommendations is erased when inflation forecasts and real time output gap are used in the setting of the benchmark.
[2] BIS (2012), indicates that the Taylor rule might exercise a level of downside bias in the bust resulting from side effects of prolonged low interest rates.

There are different kinds of UMP but during the period post the financial crisis, Quantitative Easing (QE) has taken the high profile form in major central banks. The phrase QE was first applied in the Japanese economy during the 1990s as it handled the real estate bubble and the deflationary pressures. When interest rates reached the zero lower bound, the BOJ aimed at supporting the banking sector by buying government securities in order to increase liquidity in the market. The FED, the ECB and BOE all followed the same stance in adopting policies even though there are significant differences in the way that UMP such as QE have been implemented in the different jurisdictions.

Empirical results strongly find that UMP implemented in developed countries post the financial crisis exert overabundance effects on global financial markets. Glick and Leduc (2012), Chen, Griffoli & Sahay (2012), and IMF (2013b) found that the yields on long term and short corporate and government bonds drop in response to expansionary announcements. Due to the inverse relationship that exists between bond prices and yields, bond prices rise as yields drop. The drop in the yields stimulates aggregate demand domestically while enabling investors to search for higher yields in foreign markets transferring capital away from the country that has announced accommodative monetary policy. This appreciates the spot exchange rate in the country to which the capital is transferred relative to the country that is implementing an expansionary UMP as investors demand the local currency, while data on the spillover effects on gross capital flows and equity prices is blended (See IMF, 2013a; Fratzscher *et al.*, 2013; Glick & Leduc, 2012; Ahmed & Zlate, 2014). Shin & Bruno (2013) reported results that showed a reduction in international banking flows since 2008 while there was a significant increase in equity flows and bonds to emerging markets.

There has been a disruption in the trends in emerging markets whenever the major central banks signal to unwind or scale up UMP. For instance, tapering of QE caught the markets by surprise and created bouts of volatility across emerging markets due to signs of higher global rates which led to capital flights after investors realised the transition. IMF (2013a) evidence shows that, the implementation of UMP in advanced economies initiated capital flights to EMEs in search for higher yields and stronger growth[3]. The series of volatility

[3] During the period 2010-2013 IMF (2013a) finds that, gross capital funds transfers to advanced economies declined substantially particularly to the euro area, while EMEs received almost half of all global capital flows. Contrary to the occurrence in other continents, EME in Europe received fewer capital flows due to the high debt levels that was built before the crisis which they endeavored to deleverage. This evidence is consistent with the findings of Ahmed and Zlate (2013) who conclude that portfolio flows, particularly debt, was a significant factor in determining the level of capital flows to EMEs.

in emerging markets witnessed a rise in global risk aversion with sharp correction as currencies depreciated, equity prices declined and there was also a reversal in capital flows (Sahay *et al.*, 2014).

Generally, the magnitude of the spillover effects is a function of the UMP that is being implemented and how it has been characterised by the announcing central bank (See Fratzscher *et al.*, 2013; Chen *et al.*, 2012; IMF, 2013b). Domestic pull factors are equally important in explaining the differences of the observed scope and size of cross border effects of foreign monetary policy across recipient countries. The cyclical and structural factors are essential such as the presence of domestic financial markets, the extent of global economic and financial integration, the domestic macroeconomic policies and the domestic business cycle.

Given the strong financial and trade linkages between advanced economies and emerging markets, an analysis of UMP announcements and the spillover effects is relevant. Advanced economies are becoming part of the shrinking world economy, this is likely to cause a change in the weight of portfolios investments as investors search for high economic growth rates which lead to higher returns and increased demand for capital. With interest rates at their zero lower bounds, advanced economies will continue to foster UMP in order to boost economic growth. Spillover and spillback effects are expected to continue affecting EMEs and advanced economies.

In spite most of the UMP being set for the domestic economy in which they are implemented, a significant number of scholars argue that they create a ripple effect in international markets which is best captured in asset prices. Currently, most policy debates and contributions concentrate on UMP spillovers on emerging markets and not the announcements (See Bowman *et al.*, 2015; Chen *et al.*, 2012). Vast amount of the research focuses on the effect of FED UMP announcements on emerging markets and mainly focus on quantitative easing. There is limited evidence of the impact of the other big three central bank UMP announcements on emerging markets.

This research seeks to fill in the gap by empirically assessing the impact of UMP announcements of the four main central banks which have the highest traded currencies (the FED, BOE, BOJ and ECB) on a wide range of emerging markets asset prices (exchange rates, equities and corporate and government bond yields).

1.2 Problem statement

During the aftermath of the financial crisis, emerging market policy makers have continued to deal with uncertainty on the exit strategies and continuous application of UMP from advanced economies. The FED led other central banks in developed economies to aggressively pursue UMP in order to stabilize the financial system. There is no empirical evidence that provides the optimal point to which UMP must be implemented or the optimal point at which a central bank should begin unwinding its UMP.

During the first 5 years after the crisis, the FED announced three rounds of QE in order to restore liquidity in the economy. The implementation of QE was not a new phenomenon to the BOJ after having faced deflation for over a decade. In April 2013, the BOJ doubled the amount of liquidity it injected in the market through the Qualitative and Quantitative Easing Programme (QQE). During the same month of 2013, the BOE announced that it was going to extend the Funding for Lending Scheme by one year, which it further extended by another two years in November 2015. During the month of May 2013, Ben S. Bernanke made two announcements in which he stated that the FED would either step up or step down its QE programme depending on the economic indicators while he only emphasized on the trimming of the programme during the second announcement. During the fall of 2013, the FED announced that it would begin tapering its QE programme in the following year. The ECB reduced its interest rates to as low as -0.2% in 2015 while the BOJ enhanced its UMP by announcing negative interest rates in January 2015.

The inconsistent announcements in the different advanced central banks has brought about mixed expectations in different emerging market economies. The mixed announcements that were announced in 2013, witnessed a sell-off in emerging market currencies due to the fear of rising global borrowing costs. In the same year, emerging markets also fell by 13% (Reuters Business news, 2013). With the continuous slow global economic recovery, monetary policy in the advanced central banks remains stimulatory and will continue being implemented for an uncertain period especially for the BOJ and ECB. The accommodative monetary policy (UMP) is unprecedented with limited empirical evidence and theoretical underpinning making it less understood both by policy makers and market participants. The composition of the FED's balance sheet, more specifically the level of bonds is catching the market's attention and raising sentiments as to when the downsizing will begin. There remains uncertainty on the impact of the shrinking of the balance sheet both by policy makers and market participants (Bloomberg, 2017). Announcements from the advanced central banks will continue having spillover effects

on prices on emerging market assets. Due to the continuous injection of excess liquidity in the global economy, emerging market asset prices will continue changing not based on fundamentals which can cause a bubble in these assets.

Exit from the UMP will occur at different rates and times while emerging markets will be at different stages in their economic cycles. The unavoidable lack of consistency in the economic cycles across jurisdictions will have an impact on asset prices both in emerging markets and advanced economies. Individual central banks have domestic mandates embedded in their laws, therefore, advanced central banks are expected to exit UMP provided their domestic objectives are met. Implementation of policy based on domestic objectives has a ripple effect on emerging markets asset prices due to the linkages that exist between emerging market economies and advanced economies[4]. This will create a feedback mechanism as emerging markets will adjust their monetary policy to an optimal point in response to changes in the newly announced policy.

To date, empirical evidence and policy debates concentrate predominantly focuses on the impact of US Unconventional Monetary Policy on emerging economies (See Chen *et al.*, 2011, 2015; Bowman *et al.,* 2015), while only limited evidence exists on the impact of UMP announcements to emerging markets. In an effort to complement literature, we empirically examine the impact of UMP announcement by Central banks with the four mostly traded currencies against emerging market asset prices.

1.3 Research objectives

- To examine the extent to which financial markets anticipate content of the UMP statements. The degree to which market participants anticipate the contents of monetary policy announcements have an impact on the pricing of assets. If the contents of the monetary policy announcements are anticipated, asset prices reflect the content of the announcements in an efficient market and will not affect the asset prices. If the market is inefficient the monetary policy announcements will not be factored in the process of price discovery. Asset prices are expected to change *ceteris paribus* if the content of the announcements is

[4] Emerging market business cycles are increasingly characterised by a sudden stop or reduction in capital inflow, counter cyclical current accounts and income volatility that is less than consumption volatility (Aguiar and Gopinath, 2007). On the other hand, developed markets have stable trends and reduced business cycle fluctuations due to the strong regulatory framework of the financial sector and the availability of vast securities such as put and call options for market participants or the central banks to resort to whenever their financial shocks.

not expected in an efficient market. The increase or decrease in the price will depend on whether the announcement is accommodative, restrictive or neutral.

- To examine the changes in emerging market asset prices over a two day window period when UMP is announced.

  Unlike other studies done by other scholars that focus on advanced economies, this research analyses how asset prices in emerging markets react to unconventional monetary policy announcements. It concentrates on a time after the 2008 financial crisis and uses a two day window period unlike other scholars in order to provide enough time for asset prices in emerging markets to reflect the information. Advanced economies have more efficient financial markets than emerging markets.

- To examine the impacts of unconventional monetary policy on investor sentiments.

  Different scholars have measured the impacts of monetary policy announcements on investor sentiments. To date, there is no standard measure that captures investor sentiments, hence, different proxies are used for estimation. Theory and empirical evidence both indicate mispricing of assets can be catalyzed by sentiments.

CHAPTER TWO

LITERATURE REVIEW

2.1 The Evolution of Central Bank Communication

Central bank policy makers concealed most of the techniques that they used to implement monetary policy. Central bank conventional wisdom held that individuals involved in the formulation of monetary policy making should reveal as little as possible and should announce it in a way that it is not easily understood. Brunner (1981) provides the evidence to show that the art of central banking was only limited to superior individuals[5]:

> *Central banking… thrives on a pervasive impression that [it]… is an esoteric art. Access to this art and its proper execution is confined to the initiated elite. The esoteric nature of the art is moreover revealed by an inherent impossibility to articulate its insights in explicit and intelligible words and sentences.*

More than decade later, Alan Blinder presented his view on how the intentions of the central bank must be communicated at the London School of Economics. Blinder (1998, p. 70-72), stated that the communication was entangled and far from the main stream:

> *Greater openness might actually improve the efficiency of monetary policy… [because] expectations about future central bank behaviour provide the essential link between short rates and long rates. A more open central bank… naturally conditions expectations by providing the markets with more information about its own view of the fundamental factors guiding monetary policy…, thereby creating a virtuous circle. By making itself more predictable to the markets, the central bank makes market reactions to monetary policy more predictable to itself. And that makes it possible to do a better job of managing the economy.*

During a Federal Reserve gathering at the Jackson Hole, Woodford (2001, p. 307 and 312) stated that:

[5] Brunner (1981), p5. The absurd words of Brunner catalyzed the evolution of central bank transparency. Central banks have transformed to make their policy understood by the public.

successful monetary policy is not so much a matter of effective control of overnight interest rates… as of affecting… the evolution of market expectations… [Therefore,] transparency is valuable for the effective conduct of monetary policy… this view has become increasingly widespread among central bankers over the past decade.

These ideas from different scholars have reshaped the manner that central banks communicate their monetary policy. The BOE began to show transparency before most major central banks and was enthusiastic about the transformation while the ECB has endeavoured to be more transparent in communication to market participants than the FED since it began its operation in 1998.

2.2 The Importance of Communication of Monetary Policy

Central bank communication can be defined as a monetary policy tool that is used by central banks to convey information to financial markets participants and the general public concerning the objectives of monetary policy, the economic outlook, monetary policy strategy and the outlook for future policy decisions (Blinder *et al*., 2008).

The ability of central banks to impact future market expectations of long term direction of overnight interest rates and not merely the level of short term interest rates determines its ability to impact the economy. Most market participants use long term interest rates to make their investment decisions. The Term Structure of interest rates shows the relationship between short term interest rates and long term interest rates on default free pure discount bonds (Westerfield, Ross & Jordan, 2006)[6]. By providing a schedule of interest rates overtime, the term structure incorporates markets expectations of future events. For instance, the future interest rates should approximately be:

$$R_t = \alpha_n + (1/n)\,(r_t + r^e_{t+1} + r^e_{t+2} + \ldots + r^e_{t+n-1}) + u_t \qquad (2.1)$$

Where R_t is the future rate, r_t is the current short term interest rate, r^e_{t+1} is today's market expectations of long term interest rates (i.e. in period t+1, t+2… t+n-1), α_n is a premium term and u_t indicates a stochastic error term. Equation (2.1) explicitly indicates that medium and long term interest rates depend significantly on the general public's expectations of future

[6] Term structure of interest rates combines the effects of interest rate risk premium, real rate of interest and inflation premium. Ross *et al*. (1985) find that different factors play a role in determining term structure of interest rates which are risk aversion, preference about timing of consumption, anticipations and investment alternatives.

central bank policy. After the financial crisis of 2008, the major's Central banks have had interest rates close to zero. According to equation (2.1), it means that the current rate does not matter, hence, the major central banks have shifted their focus on long term interest rates. Eggertsson & Woodford (2003) find that if short term interest rates are near zero or at zero, central bank communication becomes the pivotal role of monetary policy. The importance of communication is emphasized by central bankers as it is vital for the general public to be well informed (Yellen, 2014).

Real activity and inflation dynamics are influenced by inflation expectations according to predictions of economic theory. For instance, the New Keynesian Phillips curve states that inflation π_t, is a function of the labour market α_t, expected inflation π^e_{t+1} and a supply shock u_t:

$$\pi_t = \alpha_t + \pi^e_{t+1} + u_t \qquad (2.2)$$

For a specific nominal interest rate, an increase in inflation expectations implies a higher real interest rate which should in turn imply lower consumption.

Economic agents who receive the information communicated by central banks have different expectations. Expectations among economic agents are not homogeneous with major variations among participants of financial markets, professional forecasters and households (Carroll, 2003; Coibion & Gorodnichenko, 2015). Theoretically, π^e_{t+1} represents the expectations of price setters in equation (2.2). This implies that typical households' inflation expectations have an impact on inflation dynamics since they play a role in setting of wages and prices. The majority of wholesalers and retailers do participate in the setting of prices and wages even though they are not reliant on inflation forecasts of professionals (Blinder *et al.*, 1998). Misunderstanding the information that is conveyed by central banks can lead to mispricing of assets. With interest rates having reached their lower bound, there is an increase on the premium of announcements made by central banks. Advanced economies have invested heavily on research trying to understand the impact of accommodative monetary policy when interest rates are at their lower bound as compared to emerging market economies. Central banks generally devote more in trying to estimate the economic outlook than other players in the financial market, hence, they are privy to more information than the general public. When the public is still in the learning process or do not know how to estimate the reaction function of the central bank (Taylor rule), the economy may not converge with the rational expectations equilibrium. Therefore, the central bank's learning process can have a feedback effect on the

economy which can create indeterminate or unstable outcomes which can be avoided by ensuring that communication is more effective (Eusepi & Preston, 2007).

2.3 Content of Unconventional Monetary Policy Announcements

Central bank announcements contain at least four aspects of monetary policy i.e. the rationale behind the formulation of certain monetary policy, the mandate and strategy, the economic projections and future monetary policy decisions.

The independence of the central bank is vital for the financial sector to remain sound. The government enacts a given set of rules or laws which can be quantitative or qualitative. Quantitative targets such as inflation targets enable central banks to manage expectations of market participants. Quantitative targets provide a platform for the performance of the central bank to be assessed against its target (Eijffinger & Haan, 2000). We formulate a model to represent expectations of agents;

$$r^{e}_{t+j} = H_j\,(y_t, R_t, r_t, \ldots, s_t) + \varepsilon \qquad (2.3)$$

which is better understood by being informed of the quantitative targets of the central banks, which are used to assess the central bank's performance of the central bank as shown in (2.4).

$$r_t = G\,(y - y^*_t, \Pi_t, \Pi_t - \Pi^*_t, \ldots) + \varepsilon \qquad (2.4)$$

Knowing and understanding Π^*_t and y^*_t that enter the policy rule (2.4) is crucial in anchoring expectations of economic agents. Inflation expectations and the output gap have an impact on actual inflation which creates shocks that have an impact on short term interest rates. This can be prevented by anchoring of inflation expectations through communication of monetary policy. However, very few central banks if any communicate a correct policy rule (Blinder *et al.*, 2008)[7]. This makes market participants to learn about the policy rule by listening, watching and monitoring the central bank's actions. Therefore, the best way of improving policy predictability is for the central bank to enlighten financial market participants and the general public its way of thinking. This entails that the developments in the economy should feed into the relevant news for financial market participants to have a consensus as news is announced.

[7]Svensson (2003) finds that no central bank has committed to an instrument rule. Credibility of a central bank that makes a promise to the public to follow the Taylor rule would be enhanced if in addition it also publishes the output gap, Taylor coefficients and inflation, etc. Therefore, he questions why such a commitment is not made.

Coibion and Gorodnichenko (2015) use inflation expectations from the Michigan Survey of Consumers (MSC) and from the professional forecasters to estimate an augmented Philips curve. They find that the coefficient on consumer expectations is statistically significant and larger, suggesting that the expectations of price setters are similar to households' expectations. The two argue that poor anchoring of household inflation expectations assists in explaining the missing disinflation of the Great Recession. Nalewaik (2016) argues that there exists a strong causality effect between inflation expectations and wages and prices before the 1990s. After 1990, there has been an expectations causality break which explains the decline in inflation. Akerlof *et al.* (2000) found similar results and posits that the coefficient on expected inflation in the Philips curve has evolved with time.

The central bank's communication strategy includes estimates of future inflation, levels of unemployment, economic activity and its views regarding future monetary policy (forward guidance). The four central banks differ on how they communicate the different aspects of the economic outlook. Central banks periodically provide their forecasts of expected future inflation in different reports which are produced monthly or quarterly. This applies to inflation targeting central banks such as the BOE. Other central banks have adopted the elements of inflation targeting such the BOJ, FED, and ECB even though they do not announce it explicitly. In the case of the FED, assessments of each member of the Federal Open Market Committee (FOMC) is published using blue dots which indicates their view on the direction of future rates and maximum employment. The ECB introduced staff projections in 2001, which involve ECB staff submitting their macroeconomic projections to the governing council who then make a forecast of the economic outlook. In the context of the BOE, a fan chart is used which represents a probability distribution of projections[8].

2.4 Conventional and Unconventional Monetary Policy

Woodford (2003) gives a broad spectrum of what is still considered as conventional monetary policy which is still being practised in countries like emerging market economies where interest rates are above the zero lower bound. Conventional monetary policy became ineffective after the financial crisis as the amount of liquidity increased which reduced interest rates to their

[8] The fan chart is a method of communicating risks or uncertainty in forecasts which was initially used by the BOE. In March 2017, the FED for the first time published examples of chats that indicated uncertainty in its economic projections. This method has also been adopted by more than 20 central banks. The essence of fan charts is to make the market participants and the general public understand the degree of uncertainty around the forecasts without explicitly stating the accuracy.

zero lower bound. This became known as the zero lower bound problem[9]. Agents can hold non-interest bearing cash which makes the Taylor rule ineffective as it would recommend nominal interest rates to fall below zero while markets interest rates are bounded by zero. Previous research before the financial crisis indicated that the zero lower bound constraint on policy interest rates is likely to be short lived and occur infrequently provided the inflation target is around 2% as the case with most advanced economies (Reifschneider and Williams, 2000; Coenen *et al.*, 2004). The events after the crisis have invalidated this view. For instance, QE has frequently been used in Japan while interest rates have modestly been low which indicates that the zero lower bound can occur for a longer time and more frequently. Central banks need to turn to unconventional monetary policy such as large scale asset purchases in order to reduce term premium and reduce risk, use of negative interest rates forward guidance about the future direction of policy, exchange rate intervention in order to boost exports and credit easing in order to stimulate the economy (Svensson, 2001; Bernanke, 2004). In spite of the several measures being taken up by central banks in advanced economies, returning their economies to full employment has been a struggle and reaching the optimal inflation target of 2% has equally been challenging. The large scale asset purchase programme known QE has taken the highest form and has been used by the four central banks. Asset purchases made by the central bank can either be in the form of assets issued by corporates or government bonds. Asset purchases expand a central bank's balance sheet and cause the portfolio rebalancing effect on assets held by the private sector.

2.5 Mechanisms of Unconventional Monetary Policy

Literature on UMP has shown a number of possible channels through which QE is likely to have an effect on interest rates which causes a ripple effect on the willingness of companies to recruit and invest or expand their operations, individuals' propensity to spend and availability of bank credit facilities (Joyce *et al*., 2011). Implementation of UMP has an influence on the level of expected inflation, inflation and economic growth which also affect asset prices. The mechanisms listed are international portfolio re balancing, investor sentiments, liquidity, exchange rate and the signalling channel.

[9] Due to sluggish economic growth and low inflation in different advanced economies, central banks such as the BOJ and ECB have introduced negative interest rates on deposits made by bank so that they can inject credit into the economy. Therefore, zero lower bound in this study is used to define the unusual situation were policy rates have been adjusted to below zero, at zero and slightly (0.25%) above zero.

2.5.1 International Portfolio Re-Balancing Channel

This channel is based on the rationale that investor's preference is skewed towards bonds with certain characteristics such as their yields (Vayanos and Villa, 2009)[10]. The portfolio rebalancing channel is set in motion by the purchase of long term securities which act on the term premium of long term nominal interest rates. Chen *et al.* (2012) states the notion that when nominal short term interest rates are at their zero lower bound, interest rates of different maturities can be reduced by purchasing assets, therefore affecting different segments of the yield curve. Therefore, a reduction in the risk premium as assets are purchased could be the most effective in flattening the yield curve.

As foreign central banks implement accommodative UMP as they purchase bonds with their preferred characteristics, they reduce the amount of bonds held by the private sector and increase the level of cash. The increase in the sale of bonds increases the amount of statutory reserves held by commercial banks as liabilities in the central bank account. As the supply of the preferred bonds reduces it drives up the prices while there is a drop in the yield. The asset side of the central bank's balance sheet increases as they purchase assets from the commercial banks or private sector which increases the degree of duration risk in the portfolio of optimal investor's. The adjustment in the structure of assets held by optimal investors enables them to rebalance their portfolio in search for higher yields internationally for assets with sufficiently similar characteristics. Mortgage backed securities and government bonds sold by the commercial banks and the private sector are not perfect substitutes of base money (proceeds from the sale) hence stimulates the portfolio re balancing (Joyce *et al.*, 2011).

Investors exchange a long dated asset (government bond or mortgage backed security) for a short dated asset (money). Pension funds and insurance companies have portfolio that consists of long term liabilities that needs to be matched with long term assets after the composition of the portfolio has changed[11]. The increase in asset prices increases the wealth for risky asset holders as the capital gains rise while yields decline both internationally and domestically (Bauer and Neely, 2014). The Preferred Habitat (Modigilani & Sutch, 1966) best

[10]This channel was first described by Tobin (1961) who advocated how Central banks through changing quantities of assets with different maturities and liquidity, could influence the yield curve on different assets due to assets being imperfect substitutes.

[11] The portfolio gets exposed to duration risk as investors sell their assets. Interest rate sensitivity is created between the assets held in the portfolio and the present value of liabilities held on the portfolio. Investors seek to shield their liabilities from interest rate fluctuation by searching for assets with similar characteristics and higher yields through a process called immunization (Bodie, Kane, & Marcus, 2011, p.528)

describe the portfolio rebalancing mechanism that has been explained, where optimal investors prefer a certain segment of the yield curve.

2.5.2 International Signaling Effect

The international signaling channel is the second mechanism through which UMP announcements exert global financial markets. This channel postulates to the belief that monetary policy announcements transmit vital information regarding the commitment of a central bank to a given direction of the policy rate including its outlook of the economic situation (Eggertsson and Woodford, 2003; Bauer and Neely, 2014; Bauer and Rudebusch, 2014). It captures the variations in the expected direction of future short term interest rates that arise from monetary policy announcements that might relay new information about the central bank's reaction function and the global economic outlook. The signalling channel depends and operates on the standard expectation hypothesis concerning the relation between long term interest rates and short term rates. A policy announcement in an advanced economy can signal to market participants that the central banks across borders will subsequently implement similar policies, hence, driving up assets prices through the signalling channel as discussed in Chen *et al.* (2012). Other scholars also find that central banks are able to influence the economy through communication of future policy such as forward guidance which affects market expectations[12]. The new announcement may also signal the change in the assessment of global risk and change in the view of the global economic outlook by the central bank.

Through the signalling channel, domestic asset prices across borders adjust their prices as UMP is announced by foreign central banks. Different asset classes have different responses to foreign UMP announcements and largely depends on the interpretation of the announcement i.e. whether it is optimistic or pessimistic. For equities, a pessimistic interpretation of the announcement of UMP in view of a downgrade in the economic outlook negatively affects the expected earnings. Domestic equity prices are a function of expected earnings, therefore, the decline in expected earnings weighs on domestic share prices. As discussed in Chen *et al.* (2012) and Caruana (2012), domestic asset prices can be driven up by formulating comparable policies as those implemented in foreign economies. Such an action can compensate the fall in share prices though a positive change lower than expected rates of domestic policy. For exchange rates, the direction of the domestic currency depends on the currency risk. If the

[12] The ability to stabilize expectations using inflation expectations is discussed in Welsh (2009). The ability of a central bank to commit to its promise of future inflation under inflation targeting framework can reduce a crisis at zero lower bound. The commitment signals to the market participants that it is willing to keep monetary policy accommodative and thereby generate an increase in inflation expectations.

domestic currency is a safe heaven, UMP announcements that indicate a negative economic outlook appreciate the domestic currency as market participants convert foreign currency to local currency. This appreciation can be dampened as domestic central banks adjust their pull factors in response to foreign announcements. If the currency is not a safe heaven, the degree of change is not expected to be pronounced when there is a negative global economic outlook.

2.5.3 International Liquidity Channel

The international liquidity channel focuses on the fact that the sale of assets by the private sector increases the level of liquidity to the private sector and reduces the amount of liquidity held by the counterparty (Korniyenko and Loukoianova, 2015). Rationale investors will seek a broad spectrum of assets both domestically and internationally in order to invest the proceeds from the sale of assets. Long term investors will search for similar assets in order to mitigate duration risk by matching their long term liabilities and long term assets. Short term investors will increase their risk appetite and invest in other international markets that offer higher yields. The tapping of rational investors into the international market exposes them to currency risk which differs in various markets. The degree to which asset prices react is a function of the risk premium, hence, the change in asset prices domestically differs from the change in assets prices on the international market due to the extra risk investors have to bear.

2.5.4 Exchange Rate Channel

Both foreign conventional monetary policy announcements and UMP announcements can have a significant impact on domestic financial asset prices through an exchange rate channel. An accommodative monetary policy by a foreign central bank induces a depreciation of the nominal spot exchange rate in the domestic economy while the domestic currency appreciates (Krugman *et al.,* 2011)[13]. The domestic monetary policy response to announced foreign monetary policy depends on the ability of the domestic Central bank to use alternative policy instruments such as debt swaps, foreign exchange intervention[14]. Taylor (2001) argues that the temporal disturbance of exchange rate resulting in the depreciation of the domestic currency does not affect interest rates. This is because temporal disturbances do not have a significant

[13] This corresponds to the notion of the Mundell Fleming model which is an extension of the IS – LM model. Advanced economies and emerging markets are open to trade amongst each other, hence, monetary policy announcements in one country will lead to a spillover effects in another country linked to the announcement origin. The model facilitates the assessment of monetary policy in a flexible and fixed exchange rate regime. It is worth noting that the LM curve is backward looking and has been replaced by the forward looking TR curve which is now used for the analysis of monetary policy when interest rates are above the zero lower bound.

[14] Ho and McCauley (2003) provide some of the unconventional policy instruments that can be used in response to foreign monetary policy announcement.

effect on the market expectations of inflation and a central bank that has an inflation targeting regime include the volatility of its currency as it formulates policy[15].

As the domestic spot exchange rate appreciates, it results in the enhancement of restrictive monetary conditions. A foreign UMP announcement will have different effects on asset prices when monetary conditions are restrictive. For equities that have an exposure or operations in foreign markets, an appreciation of the domestic currency against its major trading currencies (or currency in which its foreign operation denominated) reduces a firm's expected earnings. The share price is a function of future dividend estimates, growth and the required rate of return, hence, a reduction in a firm's expected earnings has a negative impact on the share price. There are possibly further offsetting effects for the assets considered. An appreciation of the domestic spot exchange rate means that the price of foreign assets decreases relative to similar or comparable assets locally. On the other hand, if rational investor's sentiments are that the local currency will further appreciate overtime, it implies that domestic assets will provide currency appreciation induced valuation gains. This makes foreign assets less attractive relative to domestic assets.

2.5.5 Investor Sentiments

Investor sentiment is an ambiguous concept that has no standard measure, hence, different investor estimates are captured by different proxies. Baker and Wurgler (2006) develop a raw sentiment index which is used as a proxy for measuring sentiments as a first principle of other indices. UMP announcements may drive prices either upwards when optimistic or downwards when pessimistic depending on how market participants react. Lutz (2015) studies the effects of monetary policy before and after the crisis on investor sentiments and finds that an unexpected drop in the FED's funds rate during conventional monetary policy announcements has a positive impact on investor sentiments which is the same effect of UMP announcements on economic sentiments[16]. The findings are in line with Kurov (2010) who suggests that US investor sentiments is substantially affected by monetary policy announcements of the FED. There is a negative impact short term effect which becomes positive in the long term which is at odds with earlier findings and argue that it is due to the difference in the UMPs implemented

[15] Continuously and heavily reacting to exchange rate volatility raises the risk of changing the objective reaction function. For countries that are inflation targeting, it means that the Central bank's stop focusing on the inflation target making the exchange rate the de facto anchor for policy.

[16] A surprise announcement of a reduction of the FED's funds rate by 50 basis points in Baker and Wurgler (2006, 2007) causes a 1.5 increase in standard deviation of the stock market index after 2 years.

by the different central banks after the crisis. Furthermore, they find sentiment spillover effects to both advanced economies and EMEs which form part of our focus of study.

Investor sentiments have the ability to exert irregular impact on equity returns. Following the recovery from the financial crisis, there have been optimistic sentiments in advanced economies which have been transmitted to EMEs as it was witnessed from the increase in equity prices until 2015. After 2015, EMEs experienced capital out flows as oil prices declined and fluctuations in other macro-economic variables has left investors with pessimistic sentiments over their direction. Individual stock performance and the expected returns on equity across different boarders can be explained by investor sentiments.

2.6 Capital Flows from Advanced Economies to Emerging Markets

The aftermath of the financial crisis had been preceded with trade imbalances and capital flows such as portfolio debt, portfolio equity, banking flows and foreign direct investments. Obstfeld (2012) finds that most capital flows occur between advanced economies in absolute terms while they play a significant role in EME by stabilizing financial markets which are often exposed to fluctuations in their foreign currency reserves. The push-pull framework has been instrumental in explaining movement of capital flows during the financial crisis and during the aftermath. It is important to highlight that this research focuses on gross capital flows which are different from net capital flows. Gross capital flows encompass domestic investments by foreigners or locals abroad and foreign investments by residents. They involve movement of capital in two ways as central banks adjust their monetary policy which makes it relevant for this research. The two way capital flows of lending, international investments and financial intermediation attribute to a country's integration into global financial markets as it was found in Borio and Disyatat (2011).

In the past couple of years, the implementation of UMP in advanced economies has led to equity and bond flows to EMEs. There is growing consensus among several scholars (See Shin & Bruno, 2013; Rey, 2013) on the role U.S monetary policy has played in capital inflows to EME in an effort to mitigate global risk and supply liquidity. Anaya, Hachula and Offermanns (2017) find that accommodative policy in the US has a significant impact on capital flows to EME for almost two quarters which is followed by continuous shifts in real and financial variables in EMEs. Policy makers among emerging market economies have expressed concern on rising capital inflows not backed by fundamentals which they caution may raise bubbles and other negative effects. Eichengreen, Rajan and Prasad (2011) propose that more consideration should be put on the spillover effects during the formulation of

monetary policy frameworks. The proposition and conclusion is at odds with Svensson (2001) who argues that the U.S Federal Reserve acts within its mandate of maximum employment and price stability. Responsibility lies within the authorities across borders of recipient EME's monetary policy makers. A flexible exchange rate regime acts as a buffer during periods when there are global imbalances enabling emerging market economies to respond appropriately to changes in interest rates and other macro-economic variables across the globe. Other countries endeavor to stabilize their currency or peg their currency to the U.S dollar or other advanced economy currency such as the euro and also implement comparable accommodative monetary policy[17]. A comparable monetary policy may be unsustainable and can overheat the economy with negative effects[18].

2.7 Summary

The literature gives a background on how transparency of monetary policy announcements has evolved over the years. It further explains the channels through which monetary policy affects asset prices. Due to the financial and trade linkages that exist between advanced economies and emerging markets, it is expected that monetary policy announcements in one country will cause a spillover effect and later a spillback effect through a feedback mechanism from the recipient country. This provides an interesting area of study because existing literature mainly focuses on advanced economies.

[17] This corresponds to the findings of Taylor (2013); Chen *et al.* (2012); Caruana (2012) as they explain the impact of monetary policy in a foreign economy and its transmission to the domestic economy through the signaling channel. They argue that the domestic economy will implement comparable policy thereby driving up asset prices in the domestic economy.

[18] The Swiss Central bank introduced a peg on its currency in September 2011 to protect it from appreciation as investor's found it to be a safe haven compared to the dollar or the euro. The Swiss franc was pegged at 1.20 per euro which was scrapped off after 3 years in 2015. This drove down Swiss asset prices. The Swiss central bank attempted to stabilize its currency but found the move to be unsustainable.

CHAPTER 3
DATA AND METHODOLOGY

3.1 The Data

The data comprises asset prices from fifteen EME across the globe. The first consideration that was put in place is the existence of trade and financial linkages that exists amongst different countries across the globe. Bernard & Ebner (2017) use US long term government bond yields to determine evidence on the importance of cross border financial linkages which they found to covary positively with Swiss bond yields. The second factor that was considered was the type of exchange rate regime used in the EME. Like other studies on exchange rate regimes (Fischer, 2001), selection of countries shall be based on the Official classification of exchange rate regimes of the International Monetary Fund (IMF). IMF countries are self-identified using the official classification. Due to capital flows from advanced economies to EMEs that surged after the crisis of 2008, selection of sustainable currency regimes was vital in selecting the countries[19]. Therefore, the EME were selected from four categories which are: free floating, managed exchange rate or residual, floating and stabilized arrangement. The research lastly considered countries that have sufficient financial and economic data. The sample of EME selected resembles other studies on EME (Bowman *et al.*, 2015; Bernhard & Ebner, 2017).

The research focuses on daily data which makes it easier to zero in on the window period to which UMP announcements are the only information that are being transmitted.

The research focuses on three types of asset classes i.e. equity prices, bonds, and currencies. In order to obtain unbiased results from the selection of assets, using the emerging market indexes was considered appropriate to represent the market. The main EM equity indexes; bilateral nominal EM exchange rates versus U.S dollar, Japanese yen, British pound and the Euro; yields on local currency denominated bond index[20]. All asset prices and yields will be extracted from the Bloomberg terminal.

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[19] Unsustainable exchange rate regimes have historically been linked to having been one of the factors that have caused a series of economic crisis such as the Exchange Rate Mechanism crisis in 1992, Mexican Peso crisis, 1994 – 1995 and the East Asian crisis 1997-1998.

[20] Given the expected growth in emerging markets, we collect asset prices data in the local currencies in order to give investors and prospective investors a view of how local asset prices are affected by Unconventional Monetary Policy as they take positions in different asset classes. See Ojah (1999) for an example of studies that used foreign currencies.

Table 3.1: List of selected Emerging market countries

MONETARY POLICY FRAMEWORK			
EXCHANGE RATE REGIME	**Monetary Aggregate Target**	**Inflation Targeting**	**Other**
Stabilised Arrangements	Republic of Czechoslovakia	Nigeria	
Other Managed	China		Pakistan
Floating		Hungary	Kenya
		Brazil	
		South Africa	
		Thailand	
		Turkey	
		South Korea	
		Peru	
Free Floating		Mexico	
		Poland	
		Chile	

Source: IMF Annual Report on Exchange Arrangements and Exchange Restrictions, 2016.

3.2 Outline of Methodology

The research shall be conducted in three steps in order to achieve the research objectives.

3.2.1 Determination of market Expectation

The study first gathers UMP announcements to determine the extent to which market participants anticipate the content of the announcements in order to examine the first objective. A relatively larger number of announcements that covers a period of seven years beginning from 2009 eliminates restrictions of interpretations that is faced by earlier studies on UMP announcements. However, this does not mean all announcements are surprising to market participants. Market participants have improved their ability to anticipate UMP announcements after the crisis. Two examples of surprise UMP announcements are: the announcement by the Federal Open Market Committee (FOMC) to end the Large Scale Asset Purchase (LASP) earlier than anticipated on 19th June, 2013; the announcements to purchase British gilts and U.S Treasuries in March 2009 by the FOMC and BOE.

We use two day movement in the yields of 10 year government bond futures as a proxy for the extent to which markets participants anticipate the UMP announcements. The change in the yields are compared to the one day change in the yields in order prove the findings of Joyce *et al.* (2012). In order to ensure comparability amongst different countries, we standardise the surprise measure using standard deviation as stated in equation (3.1). This will allow us to have a standard proxy despite the difference in the bond futures contracts. A good proxy should have larger deviations on the days that have been selected as announcement dates from our event set. A positive change in the yields indicates that the UMP is restrictive while a negative change indicates an expansionary monetary policy. Due to the inverse relationship that exists between bond yields and bond prices, restrictive UMP will lead to a drop in the bond prices while accommodative UMP will result in the increase of bond prices.

$$\Delta S_t = \frac{f_t^{10y} - f^{10y}_{t-1}}{\sigma \Delta f_t} \tag{3.1}$$

There is an important caveat to this way of measuring surprises as it does not decompose the effects of specific policies on asset prices. Most of the announcements that have been made after the crisis contain various policies making it difficult to separate the effect.

3.2.2 The Fixed Effects Model

Having established a surprise measure, we estimate, the spill over effects of UMP on EME asset prices. Let y_{it} denote the asset price in the *i*th country in the *t*th time period described by equation

$$y_{it} = \alpha + \beta S_{it} + \varepsilon_{it} \qquad i = 1, \dots, N; \; t = 1, \dots, T \tag{3.2}$$

Where α is the intercept, S_{it} represents a surprise component and ε_{it} represents a random error term. The error term ε_{it} decomposed into a country specific effect, μ_t, and a disturbance term, υ_{it}, that varies over time and countries which we describe in equation

$$\varepsilon_{it} = \mu_t + \upsilon_{it} \tag{3.3}$$

So we substitute equation (3.3) into equation (3.2) and rewrite it as:

$$y_{it} = \alpha + \beta S_{it} + \mu_t + \upsilon_{it} \tag{3.4}$$

The model (3.4) could be estimated using dummy variables using a Least Dummy Variable Approach.

$$y_{it} = \beta S_{it} + \mu 1d1t + \mu 2d2t + \mu 3d3t + \ldots + \mu tdTt + \upsilon_{it} \quad (3.5)$$

Where d1 is a dummy variable that takes the value of 1 on the day of the announcement and 0 on days without announcements. In order to estimate the parameters β, α and μ of interest we use OLS. An assumption that is considered is that, there is no correlation between the surprise component S_{it} and the unobserved effect μ_t in order to obtain a consistent estimator β. Another assumption that is considered is that, the intercepts vary over time but assume that they remain the same across countries at each given point in time. The first difference operator is applied to equation (3.4) in order for the model to explain the changes in y_{it} and not the level of y_{it}. Therefore, we subtract the asset price in period t1 from the price of t3 in country *i.*

$$y_{it3} = (\beta_0 + \alpha_0) + \beta_1 S_{it3} + \mu z_{t3} + \upsilon_{it3} \qquad t = 3$$

$$y_{it} = \beta_0 + \beta_1 S_{it} + \mu z_t + \upsilon_{it} \qquad t = 1$$

$$y_{it3} - y_{it} = (\beta_0 + \alpha_0 - \beta_0) + \beta_1 (S_{it3} - S_{it}) + \mu(z_{t3} - z_t) + (\upsilon_{it3} - \upsilon_{it})$$

$$\Delta y_{it} = \alpha_0 + \beta_1 \Delta S_{it} + \mu z_t + \upsilon_{it} \quad (3.6)$$

We allow variation of intercepts amongst the countries by introducing a dummy variable in model (3.6). The model shall only include one dummy variable in order to avoid the dummy variable trap (i.e. Perfect collinearity). Therefore, we choose the announcement date as the baseline date which will take the value of one on the day of the announcement and zero otherwise. Hence, we analyse the impact of UMP announcements on EME asset prices using the model:

$$\Delta y_{it} = \alpha + \beta \Delta S_{it}.d_{t,\ events} + \mu z_t + \upsilon_{it} \quad (3.7)$$

$$\Delta y_{it} = \alpha + \beta \Delta S_t + \mu z_t + \upsilon_{it} \quad (3.8)$$

$$\Delta y_{it} = \alpha + \beta\ d_{t,\ events} + \mu z_t + \upsilon_{it} \quad (3.9)$$

The response variable Δy_{it} in equation (3.7) represents the two day movement in EM asset prices. Equation (3.8) represents the change in asset prices without considering the days when announcements are made. Equation (3.9), indicates the change in asset prices including the announcement day but it excludes the surprise, the extent to which market participants anticipates the content of the news. A two day window period shall be used as in Joyce *et al.* (2012). A longer period may incorporate other factors driving the movement in prices while

shorter period may miss the reaction in the change in the price. The window shall be measured as the change in the closing price the day before (t – 1) the announcement and the closing price the day after the announcement (t +1).

ΔS_t represents a quantitative estimate of the UMP surprise by market participants, the degree to which it differs from expectations by the market participants. The 10 year future bond yields are used as a proxy to measure the surprise two day window period.
$d_{t,\ events}$ is a dummy variable that takes the value of zero on days that have no announcements and takes the value of one on days that have announcements. The control variables are denoted by z_t which comprises the one day lagged change in the VIX, commodity price index and the US unemployment (non-farm payroll). We estimate the equations by OLS taking heteroscedasticity into consideration based on White (1980).

3.2.3 Selection of UMP announcements

This will involve, a robust identification of UMP shocks that are a result of UMP. Faust *et al.* (2007) propose that the timing of when the policy is announced must be pinned down. The difference in the time zones of the four advanced Central banks under study must be considered. The selected EME are equally picked from different time zones. An announcement made by the BOJ will affect EME asset prices on the same day. Announcements made by the ECB and BOE will affect asset prices in Europe, Africa and America on the same day. Announcements made by the ECB and BOE will affect asset prices in Europe, Africa and America on the same day, while asset prices in Asia will only be affected if the markets are open at the time of the announcements otherwise they will only be affected the following day. Announcements made by FED affect EME asset prices in America on the same day, while asset prices in Africa, Europe and Asia are affected on the following day due to trading hours, but they can affect asset prices on the same day in certain parts of Europe and Africa if the announcement is made before 10.30am eastern time[21].

The selection UMP announcements starts from 2nd January, 2009 which differs from other studies (Glick and Leduc, 2012) which begin from the last quarter of 2008, in order to avoid the period when conventional policy was still being implemented and future use of UMP was being signalled.

[21] This is based on the assumption that the content of the announcements is not anticipated by market participants and the general public.

Romer and Romer (1989) outline a narrative approach which shall be relied on to identify policy shocks. This approach will involve constructing a series of announcements and the responses it evoked. A list a of UMP announcements that shall be considered for the purpose of this research is indicated in the Appendix and states the dates the announcements are made which is vital for our analysis. Announcements shall be extracted from media conferences, press releases and speeches of governors. Some of the announcements made may be anticipated by market participants while others may not which is our area of interest.

Having collected the UMP announcements, the study focuses on announcements that aim at restoring liquidity as the purpose of the UMP announcements after the crisis has been to restore monetary and macro-economic stability.

The second set of announcements that shall be considered is announcements that do not confirm what was previously stated in earlier meetings because they are not anticipated by market participants. This approach differs from Rogers *et al*. (2014), who use both anticipated and unexpected announcements to conduct their analysis on exchange rates. The selected approach enables us to separate the noise that may be contained in announcements that may not contain any news which is capable of weakening identification. Theoretically, it is possible to argue that our approach excludes the situation were the central bank had earlier indicated that intentions to make changes but does not do so due to certain factors such as targets not being consistent. This argument is vital though after the crisis, policy makers have endeavoured to communicate in advance in order anchor the expectation of market participants.

3.3 Assessment of Investor Sentiment

In order to assess the effects on investor sentiments after the financial crisis, we employ an event study methodology as structured in Glick and Reduc (2012) and Krishnamurthy and Vissing-Jorgensen (2011). The event study allows us to assess changes in UMP announced by the central banks and account for the effects.

Investor sentiments can be defined as the propensity to speculate which drives or dampens demands for risky or riskless investments. In this study, we select different types of sentiment indicators because there is no measure of sentiment that is completely accurate. Different sentiment indicators capture different investor behaviour. Therefore, we select the consumer sentiment index, US investor sentiment index and the volatility index (VIX).

The VIX is a forward looking indicator which captures the market's view of the future volatility of an underlying asset at different investment horizons. Consumer sentiment index is a proxy that is used to estimate consumer expectations on the economy while the US investor

sentiment index captures the expectation of individual investors on the direction of the stock market.

3.4 Summary

In conclusion, this is how the impact of UMP announcements on emerging market asset prices will be assessed. Announcements were first selected for a period of seven years and determined the extent to which market participant expected the content of the announcements. A regression was later performed on the data. The study used Stata software to perform the regression analysis.

CHAPTER 4

RESULTS, ANALYSIS AND DISCUSSIONS

4.1 Descriptive Statistics on two day changes in asset prices

We begin our analysis by assessing the two day changes in the asset prices of the 15 selected EME asset prices. Table 4.1 represents the two day returns on the asset prices. The descriptive statistics indicate that bonds have had a higher two day change in the price compared to equities except for Thailand which recorded a maximum return of 13.14 on a two day period and a minimum of -10.15 on a two day period. In absolute terms, Nigeria, Hungary, Kenya, Mexico, South Korea, Chile, Poland and Czechoslovakia bonds recorded higher two days averages than equities over the sample period. For the same period, equities in South Africa, Pakistan, China, Peru, Thailand, Brazil and Turkey recorded higher two day returns than bonds in absolute terms.

In terms of currency, the results indicate that EMEs local currencies all had a maximum two day return against the Japanese Yen except Nigeria and Mexico which had their maximum return against the British pound. Similarly, all EME local currencies had their minimum two day return against the pound sterling except Poland, South Africa and Hungary which had minimum returns against the Japanese Yen. Furthermore, the results show that during the sample period Czechoslovakia, Poland, Chile, Peru, Mexico, Brazil, Kenya, Turkey, South Africa, Nigeria and Hungary local currencies gained on average in absolute terms against the U.S dollar while the Chinese yuan had the highest mean during the period against the yen, the South Korean won and Pakistani rupee gained against the pound sterling and the Thai baht against the euro. Additionally, the results indicate stronger deviations of EME local currencies against the Yen except the Kenyan shilling and Pakistani rupee which had stronger deviations against the pound sterling.

Table 4.1: Country descriptive statistics of two day changes in asset prices

		Asset Price					
Country	**Statistic**	**Bond**	**Equity**	**JPY**	**USD**	**EUR**	**GBP**
Czech	Mean	-0.23469	0.06442	0.006507	0.027442	0.00078	0.01031
	Std.Dev	16.2568	1.763226	1.280003	1.078834	0.483427	0.945924
	Min	-239.79	-12.3409	-6.55795	-4.91714	-3.35223	-8.23782
	Max	219.7225	9.02742	8.425622	5.560978	4.481077	5.18984
Pakistan	Mean	-0.03623	0.137978	-0.0191	0.021481	-0.05714	-0.06686
	Std.Dev	1.616634	1.246657	0.937605	0.26542	0.867285	0.961209
	Min	-5.95084	-6.20589	-4.52428	-1.50987	-3.67928	-11.7808
	Max	25.74099	5.638823	5.845629	2.200874	5.026307	3.527045
Poland	Mean	0.159493	0.072636	-0.00143	0.027365	0.0042	0.026185
	Std.Dev	29.3999	1.66691	1.601447	1.372722	0.865876	1.145061
	Min	-346.574	-10.1859	-8.57022	-6.44471	-5.18799	-5.55438
	Max	352.6361	7.98213	11.39358	7.529521	5.332866	7.468525
China	Mean	0.034031	0.059089	-0.0376	0.020768	-0.0224	-0.03125
	Std.Dev	1.319038	2.316533	0.931422	0.224792	0.751979	0.823206
	Min	-7.40704	-16.8107	-4.67301	-1.19507	-2.874	-10.4335
	Max	12.30445	10.0453	5.059869	2.796419	4.367105	4.083406
Chile	Mean	-0.07288	-0.00235	0.028261	0.066552	0.023662	0.022454
	Std. Dev	0.980423	1.161475	1.191139	0.84471	1.013183	1.053706
	Min	-6.02779	-4.23775	-3.95442	-2.96197	-4.0611	-9.88877
	Max	7.380496	4.871331	6.376296	2.976559	5.202985	4.221124
South Korea	Mean	-0.15802	0.005226	0.00192	0.035688	-0.03974	-0.04823
	Std.Dev	1.932504	1.012651	1.102407	0.771199	0.882696	0.934961
	Min	-7.38199	-4.52705	-5.23004	-2.61343	-3.94288	-8.42634
	Max	12.18898	4.345102	6.724548	2.736937	3.894858	4.630437
Peru	Mean	0.012285	0.028979	-0.02599	0.039296	0.008879	-0.00151
	Std.Dev	1.415996	1.232154	1.017846	0.437611	0.821553	0.866063
	Min	-10.791	-5.85731	-4.76921	-3.14958	-3.5931	-10.4006
	Max	10.36284	6.843727	5.244388	1.756864	3.556905	3.151771
Mexico	Mean	0.461779	0.033416	0.020676	0.065827	0.029705	0.03469
	Std.Dev	11.28101	1.300767	1.432296	1.062562	1.121232	1.082231
	Min	-98.9452	-6.93292	-6.20354	-4.01145	-4.78617	-6.775
	Max	157.6794	5.444076	10.36349	11.59609	10.38521	13.0199
Thailand	Mean	-0.08615	0.095373	-0.01469	0.004471	-0.02457	-0.0219
	Std.Dev	1.76751	1.706308	0.910427	0.404728	0.796434	0.800584
	Min	-8.60681	-10.1594	-5.04451	-2.10299	-3.57774	-11.1096
	Max	8.804566	13.14337	4.417845	1.5923	3.516312	3.163704
Brasil	Mean	-0.01552	0.037195	0.011737	0.034274	0.008745	0.017396
	Std.Dev	2.955421	2.070001	1.689929	1.364243	1.337845	1.375655
	Min	-14.72	-8.17624	-8.75869	-6.28572	-9.31117	-10.0879
	Max	15.53906	8.925827	9.3019	6.848358	7.466349	7.984081
Kenya	Mean	0.094951	-0.06355	0.043688	0.044399	0.00423	-0.03665

	Std.Dev	2.281574	1.984482	0.971652	0.331624	0.91237	1.070088
	Min	-11.9698	-8.01495	-4.00074	-1.72121	-2.92075	-11.4797
	Max	15.52387	7.841833	4.533263	1.651224	3.547969	3.310874
Turkey	Mean	0.027222	0.10006	0.05767	0.079836	0.054189	0.063377
	Std.Dev	5.029076	2.087114	1.402637	1.031751	1.021428	1.079218
	Min	-33.3348	-12.6367	-7.64238	-4.42061	-4.03621	-8.73671
	Max	45.95323	8.100307	9.260293	5.48477	5.63362	5.605073
South	Mean	0.018519	0.080701	0.014477	0.039931	0.013626	0.022437
Africa	Std.Dev	1.306965	1.491828	1.713048	1.455378	1.326367	1.358001
	Min	-8.47846	-6.7524	-7.31469	-6.26982	-6.77385	-7.29878
	Max	16.18717	7.207296	11.00623	9.055079	7.303603	8.298331
Nigeria	Mean	0.040884	-0.0143	0.07219	0.079271	0.053073	0.062794
	Std.Dev	2.475392	1.825131	1.842023	1.353159	1.673377	1.638478
	Min	-16.2789	-9.80594	-9.32352	-5.24686	-9.13421	-12.2346
	Max	35.85529	11.79866	35.13979	35.74284	36.06465	38.30755
Hungary	Mean	-0.18853	0.08955	0.018937	0.041013	0.014844	0.024082
	Std.Dev	3.517668	2.029294	1.622997	1.402984	0.876307	1.210135
	Min	-18.5752	-9.96052	-7.31701	-6.13641	-4.5556	-7.231
	Max	85.56661	9.140016	9.064852	7.052457	4.708587	9.062499

Source: Author's calculations from data collected from the Bloomberg Terminal.

Note: Std Dev stands for standard deviation, Min stands for minimum, Max stands for maximum. Bond represents the bond index yields, Equity represents the equity index in the local currency, JPY represents the Japanese yen against the local currency, USD represents the United States dollar against the local currency, EUR represents the euro against the local currency and GBP represents the pound sterling against the local currency.

4.2 Surprise element of the announcement

This section of the analysis reports the changes in the 10 year government bond futures prices of advanced economies which in this research are the countries announcing UMP. The 10 year government bond futures price is used as a proxy to represent the surprise element in the announcements that causes the change in the asset prices. Panel 1 of Table 4.2 represents the changes in the futures prices on all days that are considered as the sample days. The 10 year US government bond futures price has the highest standard deviation while the 10 year UK government bond futures price has the highest mean. The high standard deviation indicates the expectations of US government bond holders do not have a strong consensus with the unconventional monetary policy and other macroeconomic announcements that are made hence find the news surprising.

Table 4.2: Descriptive Statistics: Changes in the 10 Year Government Futures Prices

10 Year Futures Price	UK	US	JP	EUR
Panel 1: All Sample days				
Mean	0.005789	-0.003029	0.001667	-0.000287
Standard Deviation	0.651405	1.552331	1.140655	0.261464
Observations	2088	2088	2088	2088
Panel 2: One Day Change on UMP event days				
Mean	0.002298	-0.040299	0.044834	-0.003583
Standard Deviation	0.070251	0.626207	1.159396	0.27278
Observations	163	163	163	163
Panel 3: Two Day Change on UMP event days				
Mean	0.007671396	-0.123162503	0.134480739	-0.013255755
Standard Deviation	0.136361752	1.086988406	1.179888308	0.113312023
Observations	163	163	163	163
Panel 4: Non UMP event days				
Mean	0.006076	0.00346	0.044834	6.08E-05
Standard Deviation	0.47015	1.596853	1.159396	0.248404
Observations	1922	1922	1922	1922

Source: Author's calculations

Panel 2 reports the one day change in the 10 year government futures prices. The results show that the announcements are less surprising compared to the results obtained in Panel 1. Following the Efficient Market Hypothesis, we expect that the futures prices to have factored in the announced news in the process of price discovery within a one day period. The research considers the two day change in the asset prices, therefore, Panel 3 reports the changes in the futures prices over a two day period, i.e. the change in the closing price on the day before the announcement is made and the closing price the day after the announcement has been made. The results show stronger deviations compared to other panels. This indicates that the days selected as event days are unique and contain surprising announcements or reflect some sort of news. Joyce *et al.* (2011) posits that selecting a one day change halves the effects which is supported by the results in Panel 3. In addition, central bank decisions are made in closed door meetings which involve a voting process at the end were members affirm or negate a decision. Hence, we expect the announcements to be surprising.

This section endeavours to hedge the risk of capturing other announcements if the window period is extended longer or capturing an overreaction by market participants if the

window period is reduced. In the concluding remarks of their research, Maheshwari & Dhankar (2014) find that there is evidence of overreactions in developed markets which in this study refers to the markets announcing UMP. The Overreaction Hypothesis (Debondt and Thaler, 1985) posits that market participants overreact to surprising and dramatic news. Panel 4 indicates the prices when no UMP announcements were made. However, it must be noted that these days contain other news macroeconomic news that may affect asset prices. It must be highlighted that the focus of this research is announcements that affect liquidity of the financial markets

Taking the descriptive statistics at face value, the study observes that the high deviations in the 10 year Japanese government futures price is passed onto EME currencies. From the selected sample of fifteen countries, thirteen EME currencies recorded a maximum against the Japanese yen which has been discussed in Section 4.2.

4.3 Expectations of market participants

It is vital to take into consideration the expectation of bond holders as we analyse the movement in the bond prices in order to avoid bias results. Therefore we analyse the intentions of the Central banks in announcing UMP and compare them with the perception of market participants. Initially, we analyse the expectations of bond holders of local currency of the announcing Central banks and compare it with the intention of the central bank which is represented in Table 4.3. From the selected announcements in our study, the Federal Reserve made the most accommodative UMP announcements relative to other central banks during the period of study. There were more US government bond holders who thought restrictive policy would be announced when expansionary monetary policy was being announced. When the Federal Reserve made restrictive UMP announcements, 67% of bonder holders expected the announcements to be made.

The results indicate that the BOE made more neutral UMP announcements, i.e. they maintained their policies for longer periods without making adjustments to monetary policy. The results indicate divided perception among UK government bond holders. 50% of UK government bond holders' perception did not have a consensus with the intention of the BOE when both UMP was both restrictive and when it was maintained.

The results further indicate that there was more uncertainty among Euro bond holders when the ECB made restrictive UMP announcements. From the six restrictive announcements

made by the ECB, the statistics show that the bond holders perceived five of the announcements to be accommodative. This uncertainty was a result of the Euro zone debt crisis. In an effort to save the Euro area, the ECB president (Mario Draghi) pledged to do "whatever it takes" during a speech in July 2012 which began to give market participants more confidence in the Euro zone asset prices. Table 4.3 lastly indicates that there was stronger consensus between Japanese government bond holders and the BOJ when accommodative UMP announcements were made.

Table 4.3: Announcing central bank's intention & market perception of local currency denominated bond holders

ECB UMP ANNOUNCEMENTS: Central Bank's Intention & Market Perception of Euro Bond holders					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Restrictive	3	1	1	1
	Expansionary	4	2	5	4
	∑	7	3	6	5
BOE UMP ANNOUNCEMENTS: Central Bank's Intention & Market Perception UK Govt Bond holders					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Restrictive	2	3	1	1
	Expansionary	4	3	1	4
	∑	6	6	2	5
BOJ UMP ANNOUNCEMENTS: Central Bank's Intention & Market Perception BOJ Govt Bond Holders					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Restrictive	2	0	0	0
	Expansionary	7	1	1	7
	∑	9	1	1	7
FED UMP ANNOUNCEMENTS: Central Bank's Intention & Market Perception US Govt Bond Holders					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Restrictive	6	2	4	3
	Expansionary	5	1	2	5
	∑	11	3	6	8

Source: Author's own analysis.

Note: Table 4.3 represents the UMP announcements made by the four Central banks and their intentions as they make the policy announcements. An accommodative intention refers to an announcement to expand the money supply in order to boost economic growth. A restrictive intention refers to an announcement to reduce money supply in order to restrict economic growth. Neutral intention refers an announcement that keeps monetary policy the same confirming or repeating policy that was stated during a previous meeting, conference, speech or publication. Consensus refers to the ability of market participants to anchor their expectations towards the

intention of the Central bank. Perception indicates the market participants' expectations. The perception relies on the change in the 10 year yield curve explained in Chapter 3 (i.e. Positive yield change = Restrictive policy, Negative yield change = Expansionary policy).

The analysis on market expectation of bond holders continues by considering the perception of holders of other foreign government (i.e. central banks not announcing unconventional monetary policy) bond holders. Recall that the portfolio rebalancing channel is a transmission mechanism that affects the financial markets as was discussed in Chapter 2. Therefore, when investors hold a portfolio of different bonds, they will continuously adjust their portfolio in order to ensure that it remains optimal. Considering the different SWAP facilities that were made amongst the four major Central banks in order to provide lines of liquidity after the financial crisis, an announcement of UMP by a Central bank is expected to have an impact on a portfolio of foreign currency denominated bonds. Swap facilities were also provided in the last year of the sample period amongst the major central banks in an effort to provide liquidity in the market during the Brexit vote.

Therefore, Table 4.4 represents the announcing central bank's intention and compares it to the perception of bond holders of foreign denomination. The results indicate that when the BOJ made restrictive UMP announcements, market participants did not expect the announcements. There was a stronger consensus between the FED and foreign government bond holders when UMP announcements were made. Relative to other central banks, the BOE had a weak consensus with foreign denominated government bond holders. The results indicate that 69% of foreign government bond holders did not expect the ECB UMP to be restrictive which is similar to holders of Euro government bond holders in Table 4.3. It can be depicted from Table 4.4 that, whenever the four central banks maintained their policy, most foreign denominated currency holders had a perception that the announcing central bank was restricting its UMP. Table 4.4 further depicts that whenever Central banks made expansionary UMP announcements more foreign government bond holders expected the announcements to be expansionary expect for announcements made by the BOE which showed eleven out of the eighteen announcements were expected to be restrictive.

Table 4.4 Announcing central bank's intention & market perception of foreign denominated bond holders.

BOJ UMP ANNOUNCEMENT: Central Bank's Intention & Market Perception of Other Bond Holder's					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Contractionary	10	3	0	0
	Expansionary	17	0	3	15
	∑	27	3	3	15
ECB UMP ANNOUNCEMENT: Central Bank's Intention & Market Perception of Other Bond Holder's					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Contractionary	6	5	5	8
	Expansionary	15	1	11	15
	∑	21	6	16	16
FED UMP ANNOUNCEMENT: Central Bank's Intention & Market Perception of Other Bond Holder's					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Contractionary	12	6	6	7
	Expansionary	21	3	12	21
	∑	33	9	18	28
BOE UMP ANNOUNCEMENT: Central Bank's Intention & Market Perception of Other Bond Holder's					
Intention		Accommodative	Neutral	Restrictive	Consensus
Perception	Contractionary	11	8	3	2
	Expansionary	7	7	3	7
	∑	18	15	6	9

Source: Author's own analysis

Note: Table 4.4 takes a different approach from Table 4.3. The study considers the perception of bond holders that have positions on bonds in a different currency (foreign currency) from the announcing Central bank's local currency. The meaning of central bank intention and market perception remain the same as in Table 4.3.

4.4 Panel data regression data results

The regression analysis begins by focussing on emerging market currencies. The tables 4.5, 4.6 and 4.7 represent the results for equation (3.7). This equation constitutes a dummy variable which was obtained by multiplying the surprise element and 1 on days of the announcement, while the surprise component is multiplied by 0 on days without an announcement. The results indicate that the models fit the data as can be observed from the R statistics. The results of the F test for the fixed effect model and probability values indicate that the models are well estimated.

Table 4.5 currency Panel Data Regression Results for Equation (3.7)

	JPY	USD	EUR	GBP
CONST	0.6015854 (1.356494)	2.093663 (1.327518)	2.034246 (1.654019)	2.71166 (2.358998)
BOE				21.7934 (12.86432)
ECB			-22.88003 (16.11186)	
FED		10.77563 (7.086711)		
BOJ	-6.943512 (0.9035647)			
VOL	0.3739794 (0.0416867)	2.96094 (0.4527479)	5.954603 (0.42542)	6.742063 (0.6954124)
COMM	0.0329833 (0.0074713)	0.4931967 (0.0943992)	1.272679 (0.1095101)	1.1406 (0.1137313)
NON FARM	-0.2407635 (0.0640059)	-0.4951376 (0.7222518)	-4.203936 (0.7380033)	-3.77558 (0.9858134)
Within R^2	0.9498	0.7486	0.15	0.7806
Between R^2	0.9285	0.8214	0.8211	0.8212
Overall R^2	0.944	0.5886	0.7241	0.6771
F Stat	1.06	26.27	25.47	21.9
corr(u_i, Xb)	0.1414	0.3709	0.3927	0.4235
Prob	0.3984	0.0000	0.0000	0.0000

The regression results begin by focussing on emerging market currencies. Table 4.5 represents the results for equation (3.7). In order to avoid the dummy trap and multi collinearity, the dummy variables were separated. FED announcements and BOE announcements are positive and statistically significant at 5 % level while ECB and BOJ announcements are negative and statistically significant at 5% level. The results further indicate that there is a significant change

in the currencies when announcements are made relative to other assets as can be observed from the higher coefficients.

Emerging market economies that have a wide budget deficit and rely on financing from advanced economies or have debt denominated in foreign currency are more exposed to capital flow reversals whenever UMP announcements are made. The results also show that the non-farm payroll significantly affects the emerging market currencies over the two day window period.

Table 4.6: Equity Panel Data Regression Results for Equation (3.7)

	EQUITY	**EQUITY**	**EQUITY**	**EQUITY**
CONST	1.07E+07 0.01693383	2.39E+07 0.01253289	9.0999915 2.179004	2.67E+07 896169.6
BOE				-3.450547 3.96880.6
ECB			-2.57497 1.138264	
FED		9.203272 5.541799		
BOJ	2.956159 1.127968			
VOL	0.04756443 0.005203972	0.02932009 0.003540483	0.04034017 0.003005489	0.06742063 0.000695412
COMM	0.005039925 0.08972891	0.005098098 0.007477165	0.00724542 0.008948751	0.005719876 0.006337353
NON FARM	-0.2592143 0.0858828	-0.9645207 0.6067645	-0.3014438 0.5004059	-0.1669267 0.5341327
Within R^2	0.8264	0.8196	0.8236	0.8148
Between R^2	0.9891	0.9891	0.9891	0.9891
Overall R^2	0.8344	0.7122	0.7904	0.741
F Stat	5.11	18.75	11.92	12.33
corr(u_i, Xb)	0.5134	0.4488	0.5359	0.4837
Prob	0.763	0.0000	0.0000	0.0000

Table 4.7: Bond Panel Data Regression Results for Equation (3.7)

BOND	BOND	BOND	BOND	BOND
CONST	0.376581 (0.06593165)	0.4903127 (0.04883876)	0.3830232 (0.0444594)	0.4297408 (0.04649632)
BOE				-0.08045472 (0.02535583)
ECB			0.08757728 (0.04330805)	
FED		0.1241017 (0.01739596)		
BOJ	-0.04211362 (0.04391728)			
VOL	0.0154214 (0.0202616)	-0.0367572 (0.0111137)	0.0142949 (0.0114351)	-0.0053616 (0.0137067)
COMM	-0.0021282 (0.002968)	-0.0062892 (0.0022193)	-0.0009892 (0.002645)	-0.0003587 (0.0022802)
NON FARM	-0.0274868 (0.0247804)	0.050834 (0.0148903)	-0.0221139 (0.0132768)	-0.0055993 (0.0150182)
Within R^2	0.2352	0.47	0.2578	0.2971
Between R^2	0.9255	0.9255	0.9255	0.9255
Overall R^2	0.2402	0.0574	0.228	0.1158
F Stat	3.85	9.66	6.72	7.61
corr(u_i, Xb)	0.2509	-0.2283	0.2137	-0.0004
Prob	0.0000	0.0000	0.0000	0.0000

The FED and BOJ announcements are positive and statistically significant at 5% level while ECB and BOE announcements are negative and statistically significant at 5%. The results indicate that the FED announcements have higher impacts on emerging markets equities. This shows the concern in the pricing of emerging market equities. Even though Svensson (2001) argues that advanced central banks announce policies according to their mandate, it has been observed from the higher coefficient that, the FED which spear head accommodative UMP after the financial crisis has an effect on equity prices in emerging markets. This has led to an

increase in equity prices in emerging markets after the financial crisis which hasn't been based on strong fundamentals but as a result of an increase in liquidity. Hence, as advanced central banks begin to reduce their balance sheet sizes, a capital flight is expected from emerging market equities.

Table 4.8: Panel Data Regression Results for Equation (3.8)

	BOND	**EQUITY**	**JPY**	**USD**	**EUR**	**GBP**
CONST	0.1381 (0.0416)	1.6554 (1.2144)	-0.5403 (0.1322)	0.5607 (0.1845)	0.5470 (0.2193)	0.6185 (0.2507)
BOE	-0.05304 (0.02678)	0.3296 (0.0782)	-0.0612 (0.0851)	0.4953 (0.1191)	0.3564 (0.1411)	0.2813 (0.1614)
ECB	-0.0339 (0.02752)	-0.5292 (0.0804)	0.2285 (0.8751)	-0.6916 (0.1225)	-0.4828 (-0.1451)	-0.7080 (0.166)
FED	0.04284 (0.03241)	0.8720 (0.09467)	-0.4949 (0.103)	0.9958 (0.1442)	0.8806 (0.151)	0.1544 (0.1955)
BOJ	-0.1652 (0.01552)	-0.3781 (0.04536)	-0.3571 (0.0494)	-0.3805 (0.06911)	-0.5000 (0.08191)	-0.7627 (0.09365)
VOL	0.0136 (0.09784)	0.0451 (0.002858)	0.0844 (0.03111)	0.0444 (0.04355)	0.0639 (0.05161)	0.0820 (0.05901)
COMM	0.0022 (0.0003709)	0.0065 (0.000125)	0.0014 (0.01847)	0.0060 (0.1476)	0.0013 (0.0164)	0.0014 (0.2152)
NON FARM	-0.0721198 (0.008998)	0.0257 (0.002636)	-0.6121 (0.09975)	0.2411 (0.03547)	-0.3615 (0.004359)	-0.4676 (0.5167)
Within R^2	0.8593	0.9419	0.889	0.885	0.9204	0.8236
Between R^2	0.8212	0.9891	0.9285	0.8214	0.8211	0.8212
Overall R^2	0.8138	0.9622	0.8462	0.8296	0.8492	0.8199
F Stat	5.85	3.8	4.12	26.02	29.2	16.25
corr(u_i, Xb)	0.5083	0.6519	-0.3893	0.3133	0.1702	0.1703
Prob	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 4.9: Panel Data Regression Results for Equation (3.9)

	BOND	EQUITY	JPY	USD	EUR	GBP
CONST	-0.0238 (0.05582)	-3.2205 (1.05091)	0.0174 (0.009696)	-0.0389 (0.1912)	-0.1816 (0.2048)	-0.1108 (0.263)
BOE	-0.3643985 (0.04701)	-0.3607 (0.08857)	-0.0068 (0.0008174)	-0.0491 (0.01612)	-0.0305 (0.01721)	-0.0276 (0.02216)
ECB	0.7270 (0.0935)	0.4471 (0.176)	0.0154 (0.001624)	0.1888 (0.3202)	0.0601 (0.03431)	0.1404 (0.04406)
FED	0.1948 (0.03255)	0.8490 (0.06128)	0.0093 (0.005651)	0.1101 (0.01115)	0.0956 (0.01194)	0.1018 (0.01534)
BOJ	-0.7688 (0.08464)	-1.7280 (0.1593)	-0.0043 (0.00147)	-0.1568 (0.02899)	-0.2420 (0.03106)	-0.3913 (0.03986)
VOL	0.0001235 (0.00004)	0.0081 (0.000268)	0.0041 (0.000247)	0.0089 (0.004877)	0.0012 (0.005225)	0.0014 (0.006706)
COMM	0.0006626 (0.00023)	0.0007 (0.000794)	0.0005 (0.000323)	0.0078 (0.000102)	0.0013 (0.000952)	0.0014 (0.000139)
NON FARM	0.06869 (0.05387)	0.0427 (0.002421)	0.0562 (0.01253)	0.0462 (0.02876)	0.1276 (0.03452)	0.1115 (0.0428)
Within R^2	0.7487	0.9694	0.9921	0.9135	0.9511	0.9323
Between R^2	0.9255	0.9891	0.9285	0.8214	0.8211	0.8212
Overall R^2	0.8547	0.982	0.9871	0.8495	0.8679	0.8556
F Stat	3.35	4.61	5.66	33.38	46.37	42.03
corr(u_i,Xb)	0.2386	0.1666	0.0003	0.0484	-0.0078	0.0292
Prob	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.5 Effect on Investor Sentiment

Lastly, we analyse the effects of UMP surprise announcements on weekly proxies of investor sentiments. Unfortunately, we cannot use daily data available because the data with higher frequency is limited to dates out of our sample period while the data within our sample dates contain structural breaks due to the changes in calculations. As stated earlier we, we use an event study to analyse the effects of the surprise announcements. The announcements were selected from the different central banks in figures 1, 2, 3 and 4 of the Appendix. This section focussed on eight particular announcements of which six are accommodative and two are restrictive.

On 18 December 2013, the FED announced that it would begin reducing (tapering) its asset purchases the following month. This marks an important date in monetary policy as this was the first date when large scale asset purchases were being reduced by an advanced central bank, therefore the outcome was uncertain. Our results on market expectations indicate that

there was a positive change in the yield curve which indicates that the markets expected the announcements to be restrictive. The sentiment indicators show a drop by 1250 basis points in the VIX, a drop by 2607 basis points in the AAIIBEAR, while the bullish investors remained optimistic, hence, a rise by 1601 basis points in the AAIIBULL. The Federal Reserve increased interest rates for the first time after the financial crisis on the 14th December 2016. Our results on market expectations indicate that bond holders were expecting the announcement to be made. This announcement resulted in a drop in all investor sentiment indicators in our sample.

Next, the research analyses the effect of accommodative UMP which shows that there was an increase in all investor sentiment indicators. The AAIIBULL Index showed the strongest increase in basis points whenever accommodative monetary policy was announced. Our results on market expectations show that the bond holders did not expect the announcement made by the BOJ to increase asset purchases by ¥5tn. The yields on the 10 year government bond futures were positive but still caused an increase in investor sentiments. A similar reaction was observed on the 8th December 2011, when the ECB announced a reduction in the reserve ratio from 2% to 1%. This measure caused an increase in investor sentiment indicators.

The research results are consistent with the findings of Lutz (2015) who assess the impact of unconventional monetary policy on investor sentiments using an event study but with a different sample and frequency.

Table 4.10: One week change in basis points the sentiment indexes and central bank intention

Date	Central Bank Intention	AAIIBEAR Index	AAIIBULL Index	VIX Index	DIREXICON
18/03/2009	Accommodative	2974.114	1316.023	1056.875	0
27/10/2009	Accommodative	1848.222	1687.253	2167.944	0
08/12/2011	Accommodative	1392.598	1673.729	14.24419	507.5758
09/05/2013	Accommodative	692.4198	3162.31	202.3346	85.43651
22/11/2013	Accommodative	417.232	3753.998	57.42412	49.07975
18/12/2013	Restrictive	-2607.66	1601.349	-1250	196.196
04/08/2016	Accommodative	-577.262	503.5247	-404.381	30.50398
14/12/2016	Restrictive	-983.607	-11.1957	-622.951	-110.701

Source: Author's calculation

Note: Central bank intention indicate the direction of monetary policy whether accommodative, neutral or restrictive. AAIIBEAR Index represents the American Association of Individual Investors who are bearish. AAIIBULL Index represents the American Association of Individual Investors who are bullish. VIX Index represents the volatility index. DIREXICON represents the Direxicon All Cap Insider Sentiment Index. Date represents the date on which the announcement was made.

4.6 Summary

As advanced central banks reduce the size of their balance sheets, caution must be taken on the spillover effects of unconventional monetary policy announcements. The BOE, BOJ and ECB have not yet embarked on an easing programme, therefore due to the financial linkages that exist with emerging market economies uncertainty on the unwinding or prolongation of low interest rates is expected among market participants. Our results indicate that a change in unconventional monetary policy has an effect on investor sentiments and asset prices. Other scholars also show that it has an effect on leverage and risk taking. The changes in

unconventional monetary policy in the three advanced central banks i.e. BOE, BOJ and ECB will occur at different emerging market business cycles, therefore the spill over effects are not expected to be consistent across regions.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

5.1 Research Summary

The increase in the size of balance sheets of central banks has gained much attention after the financial crisis amongst most market participants. There remains a concern on how a continuous increase or decrease in the size of balance sheets of advanced central banks have an impact on asset prices. This study, starts with determining the expectations of market participants using 10 year government bond futures. Using panel data on 15 emerging market countries over the period 2009 – 2015, the research examined how unconventional monetary policy announcements affect asset prices in a two day window period. The research further uses an event study to assess how unconventional monetary policy announcements affect investor sentiments.

5.2 Summary of Descriptive Statistics

It was observed that bond prices are more reactive than equity prices in the window period that was selected. Emerging market currencies have had higher returns against the Japanese yen on most selected event days while they exhibit lower returns against the British pound on most event days. In absolute terms, there have been more gains of emerging market currency against the US dollar over the whole sample period.

The results show that the effects of the announcements are better captured over a two day period as found by other scholars. Higher deviations on days that are selected as event days indicate the announcements are surprising to market participants. The 10 year government bond future prices were used as a proxy to represent the extent to which market participants anticipate the announcements. How fast bond holders' price in the announced information into the government bond futures prices indicates how efficient the advanced financial markets are. Changes in the 10 year government bond futures yield has resulted in gains of emerging market local currencies against the Japanese yen on selected event days while there have been more absolute gains over the whole period against the U.S dollar.

5.3 Summary on expectations of market participants

The U.S Federal Reserve has taken a leading role in changing monetary policy after the financial crisis. During this period, forward guidance is one of the unconventional monetary policy tools that has extensively been used by advanced central banks in an effort to try and make the general public and market participants understand the future direction of monetary

policy. This has been done in order to anchor inflation expectations of market participants. The degree of consensus between the intention of the central banks and market participants has shown us the extent to which forward guidance has been effective after the financial crisis.

The analysis shows that forward guidance has been effective but more effort still needs to be made in making the public understand the direction of monetary policy and how to estimate the policy rule in order to improve the consensus with market participants. The BOE announcements have had the weakest consensus with market participants. The BOJ has implemented accommodative unconventional monetary policy for the longest period of time in an effort to eliminate the deflationary pressures faced by the economy. Hence, it can be observed from the results that it has been more successful in making the public and market participants understand the future path of monetary policy. The results also show that there was more consensus when the FED announced restrictive monetary policy. Even though the results show that there was stronger consensus, when the FED made the announcement to begin tapering in December 2013, it caused a selloff in various asset classes.

To this effect, the research alludes that more consideration must be put in the formulation of monetary policy as was proposed in Eichengreen *et al.* (2011). The research findings are at odds with the findings of Svensson (2011) who argue that the U.S Federal Reserve acts within its mandate despite the spill over effects that are evident across borders. Through the portfolio rebalancing channel, announcements do cause a spill over effect as investors may hold a portfolio of different asset classes denominated in different currencies.

Also, our results on market expectations show that the words or pharases used by central banks has a significant effects on market expectations. In July 2012, Mario Draghi (ECB president) used the words “whatever it takes” in his speech at a London conference which gave investors more confidence in the Euro. Following the commitment of the ECB president, bond yields fell across the Euro zone.

5.4 Summary on effects on asset prices

The study finds that the effect of unconventional monetary policy are more pronounced in emerging markets currencies. Other studies (Bernhard and Ebner, 2017) find that UMP has an effect on currencies of advanced economies but have lower coefficients which indicates that the spill over effects on the days that announcements are made is amplified in emerging market economies. Equities in emerging market economies do show that they experience spill over effects on the days that announcements are made. The spill over effects is stronger on equities

and bonds. Both equities and bonds exhibit stronger spill over effects on days with unconventional monetary policy relative to other spill overs in advanced economies.

5.5 Summary on the effect of Investor Sentiment

This study lastly examines the effect of unconventional monetary policy announcements on investor sentiments. An event study was employed to assess the impact of unconventional monetary policy. Our results are consistent with other studies (See Lutz, 2015) who use a different data set and time period. The results indicate that an accommodative unconventional monetary policy announcement increases investor sentiments. Whereas a restrictive unconventional monetary policy reduces investor sentiments. Our results further indicate that unprecedented announcements such as the tapper tantrum result in speculation among investors as it was observe from varying direction of the sentiment indicators. The study also finds that words or phrases used when making announcements (Such as: dovish, hawkish, whatever it takes) have an effect on the investor sentiments.

Therefore, it is vital for central banks in emerging markets to inform or teach the general public (i.e. market participants and investors) its way of thinking considering the spillover effects observed on emerging market asset prices on the selected event days. In addition, market participants need to understand the words and phrases contained in central bank announcements in order for them to understand the direction of the local or global economy as they make their decisions.

As earlier stated, Akerlof *et al.* (2000) finds that the coefficient on expected inflation in the Philips curve has evolved. Recent studies (Coibion and Gorodnichenko, 2015; Nalewaik, 2016) have found that consumer expectations is statistically significant in the setting of prices and wages. A consideration of market expectations was put in place before examining the investor sentiments. Market expectations of advanced central banks has improved with the provision of forward guidance. This entails that emerging market economies must endeavour to make the public understand monetary policy in order to anchor inflation expectations which has an effect on the setting of asset prices.

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APPENDIX

Figure 1: BOJ UMP announcements and forward guidance

Date	Announcement Description
18/12/2009	Clarification of medium to long term inflation
18/03/2009	Changes in the amount of Japanese government bonds from ¥16.8 tn to ¥21.6tn
19/02/2009	Purchase of corporate bonds and extension of commercial paper buying scheme
28/01/2010	Completion of temporal reciprocal currency arrangements.
03/08/2010	Introduction of a six month term in the fixed funds rate in an effort to reduce market interest rates.
05/10/2010	Maintenance of uncollateralized overnight call rate 0% to 0.1% and the establishment of an asset purchase programme
05/11/2010	Framework for purchase of assets in total of ¥35tn including risky assets.
14/03/2011	Increases in asset purchases in Japanese government bond, Discount bills, Corporate bonds, ETFs & Japanese REITS.
21/05/2011	Private financial institutions initiative to support fund provisioning.
27/10/2011	Increase in the asset purchase programme by ¥5tn.
20/12/2012	New additional funds to be provided in the form of asset purchases and loan support program.

Source: The announcements were collected from the Bank of Japan website.

Figure 2: ECB UMP announcements and forward guidance

Date	Announcement Description
15/01/2009	Interest rate reduced by 50 basis points to 2%.
05/02/2009	Maintained interest rates on Refinancing operations, marginal lending facility & deposit facility 2%, 3% and 1% respectively.
04/06/2009	Purchase of Euro covered bonds amounting to €60bn.
27/01/2010	E.C.B and other Central banks end the temporal Swap arrangements with the FED.
03/05/2010	Changes in the eligibility of debt instruments issued or guaranteed by the Greek government.
10/06/2010	Maintained interest rates on Refinancing operations, marginal lending facility & deposit facility 1%, 1.75% and 0.25% respectively.
16/12/2010	Decision to increase its subscribed capital from €5bn to €10.76bn.
06/10/2011	Additional financing by purchasing covered bonds of €40bn.
07/07/2011	Increase by 25 basis points on refinancing operations, lending facility deposit facility.
08/12/2011	Reduction of the reserve ratio from 2% to 1% and conduct longer term refinancing operations.
08/03/2012	Acknowledgement of the eligibility of bonds guaranteed or issued by the Greek government.
31/10/2012	The end of purchases of covered bonds.

22/03/2013	Adoption on the prevention of use of collateral of certain uncovered government guaranteed bank bonds
08/11/2013	Gives its opinion on the Single Resolution Mechanism.
22/11/2013	Suspension of early repayments of 3 year Long Term Refinancing Operations. A
16/09/2013	Extension of the Swap facility with BOE for a further one year

Source: The announcements were collected from ECB website.

Figure 3: BOE UMP announcements and forward guidance

Date	Announcement Description
08/01/2009	Reduction of the bank rate by 50 basis points to 1.5%.
05/03/2009	Reduction of the Operational standing deposit facility from 0.75% to 0%, purchase of assets at £75bn.
05/11/2009	Increase asset purchases by £25bn and maintain the bank rate at 0.5%.
10/06/2010	Maintain the bank rate at 0.5% and asset purchases worth £200bn.
09/12/2010	Maintain the bank rate at 0.5% and asset purchases worth £200bn.
06/10/2011	An increase in asset purchases by £75bn implying a total of £275bn.
08/12/2011	Maintain the bank rate at 0.5% and asset purchases worth £275bn.
07/06/2012	Relaxation of regulatory liquidity requirements and additional Funding for Lending Scheme
06/12/2012	Maintain asset purchases at £375bn and maintain the bank rate at 0.5%.
09/05/2013	Extension of the Funding for Lending Scheme until 2015.
01/08/2013	Forward guidance on maintenance of the bank rate depending on the improvement of the labour market.
05/12/2013	Forward guidance was given even as unemployment remained above 7%.
13/04/2016	Increase in the countercyclical capital buffer rate for UK exposures to 0.5%.
04/08/2016	Reduction of the bank rate by 25 basis points to 2.5% and introduction of a Term Funding Scheme.

Source: The announcements were collected from BOE website.

Figure 4: FED UMP announcements and forward guidance

Date	Announcement Description
28/01/2009	Federal funds rate target range reduced to 0% to 0.25%.
04/06/2009	FED, BOE, ECB, BOJ & SNB announce Swap arrangements.
16/01/2010	Authorisation of the FED of New York to purchase $175bn in housing related agency debt and 1.25 Mortgage Backed Securities.
28/04/2010	Closure of liquidity facilities leaving only Asset Backed Securities loan facility.
10/08/2010	Additional purchases of longer term treasury securities and reinvestment of principal repayments of large scale asset purchases
03/11/2010	An additional $600bn purchases of long term treasuries
22/06/2011	Completion of purchases worth $600bn of long term treasury securities by the end of June 2011.
21/09/2011	Intention to purchase $400 bn of Treasury Securities by June 2012.
13/03/2012	Forward guidance on interest rates and inflation expectations which were expected to remain low until 2014.
31/07/2013	Continuation of Mortgage Backed Securities and Treasury Securities.
30/10/2013	Continuation of asset purchases until stronger evidence of economic recovery was achieved.
18/12/2013	Reduction of asset purchases beginning January 2014.

19/03/2014	Forward guidance as the unemployment approaches 6% to 6.5%
18/06/2014	A reduction in asset purchases to $35bn in July 2014.
28/10/2015	Federal funds rate target range maintained at 0% to 0.25%.
14/12/2016	Federal funds rate raised to 0.5% to 0.75%.

Source: The announcements were collected from the Federal Reserve Bank website.