



Domestic and Foreign Announcements on Unconventional Monetary Policy and Exchange Rates

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Abstract:

This brief studies the effects that announcements about unconventional monetary policies (large-scale asset purchases, refinancing operations, and forward guidance) have on nominal exchange rates. To this end, the authors use high-frequency intra-daily data and look at the variations in government future yields and in nominal exchange rates over a narrow window around the time of the announcements. They find that expansionary monetary policy shocks embedded in announcements made by the Federal Reserve depreciate the U.S. dollar. In contrast, the authors also find that similar unexpected expansionary announcements by foreign central banks result in an appreciation of the U.S. dollar.

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1 Overview

Central banks usually employ short-term nominal interest rates to conduct their monetary policies. Since the financial crisis of 2008–2009, however, the short-term interest rate has become ineffectual by essentially reaching its zero lower bound. As a result, most central banks have adopted *unconventional* monetary policy tools in order to stimulate economic growth. These tools include large-scale asset purchases (LSAPs), refinancing operations, and forward guidance about the future path of monetary policy.

This brief examines the effects of monetary policy announcements on nominal exchange rates in a period characterized by unconventional monetary policies. To this end, we use high-frequency intra-daily data and look at the variations in government future yields and nominal exchange rates over a narrow window around the time of the announcements.

The main results are as follows. First, we find that a one standard deviation expansionary surprise following an announcement by the Federal Reserve yields an average depreciation of the U.S. dollar of around 0.4 percent. Moreover, this same shock is associated with a decrease in interest rates, both in the United States and abroad. Second, we find that foreign central bank announcements about unconventional monetary policies are associated with an appreciation of the U.S. dollar: a one standard deviation expansionary monetary policy surprise appreciates the U.S. dollar against the major foreign currencies, by a range of 0.09 to 0.3 percent.

Our work contributes to a growing literature about the effects of unconventional monetary policies. On a broad level, this brief is related to several papers that use an event-study approach to look at the effectiveness of these monetary policies—see, for example, Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), and Swanson (2011). Given the focus on the effects of these policies on exchange rates, the brief is most closely related to Wright (2012), Neely (2013), and Glick and Leduc (2013). Similar to these papers, we use asset price variations over a tight window around the time of the policy announcements. But in contrast, we also explore the effects of policy announcements by foreign central banks. In particular, we consider announcements made by the European Central Bank (ECB), the Bank of England (BoE), the Bank of Japan (BoJ), and the Bank of

Canada (BoC).

The rest of the brief is organized as follows. In section 2, we provide a brief description of the programs followed by the five central banks. In section 3, we describe our dataset. In section 4, we identify the effects of Fed announcements on exchange and interest rates. In section 5, we study the effects of foreign central banks' announcements on the nominal exchange rates. Section 6 concludes.

2 Description of the Programs

In recent years, with short-term interest rates at the zero lower bound, central banks in most advanced economies have conducted a wide variety of unconventional monetary policies that have differed in nature and size. For instance, the Fed purchased short and long-term U.S. Treasuries and mortgage-backed securities (MBS), as well as provided forward guidance. The ECB mainly carried out refinancing operations to improve bank lending and credit conditions, while other central banks such as the BoE, as well as the BoJ from late 2010 onwards, targeted large amounts of asset purchases in government and private debt markets to lower long-term interest rates. In all cases, unconventional monetary policies led to a significant expansion of the central banks' balance sheets, as shown in Figure 1, as well as a considerable change in their composition.¹

In what follows, we briefly describe the monetary programs undertaken by the five central banks in consideration.²

Federal Reserve

At the onset of the financial crisis, the Fed responded aggressively by lowering the federal funds rate to its zero lower bound. From the end of 2008 onwards, in the

¹The Swiss National Bank (SNB) provides another interesting example of unconventional monetary policies. In Summer 2011, the SNB established a new policy in response to the strong appreciation of the Swiss franc. Specifically, the SNB announced that it would buy unlimited foreign currency to maintain the exchange rate at a floor of 1.20 euros per Swiss franc. This led to a massive increase of the SNB's balance sheet, whose assets accounted for 75 percent of the GDP in 2012. We do not consider the SNB case in our empirical work due to the lack of data on Swiss bond futures.

²See Fawley and Neely (2013) for a review of the programs undertaken by the Federal Reserve, the BoE, the ECB, and the BoJ.

context of a disruption in credit markets, the Fed resorted to unconventional monetary policies in order to lower long-term interest rates and spur domestic demand. These policies can be broadly divided into three categories: LSAPs or quantitative easing (QE), Operation Twist, and forward guidance.³ The QE programs pursued by the Fed consisted of large-scale purchases of assets without credit risk—that is, Treasury securities and MBS—as permitted by the Federal Reserve Act. With a specific goal of improving the conditions in the residential mortgage market, on November 25, 2008 the Fed announced the first round of asset purchases (QE 1): \$1.75 trillion in MBS, agency debt, and long-term Treasuries. The Commercial Paper Funding Facility (CPFF) was also created in late 2008 to provide back-stop liquidity in order to revive short-term funding markets. In October 2010, the Fed initiated QE 2 by buying an additional \$600 billion in long-term government bonds. Almost a year later, in September 2011, the Fed embarked on Operation Twist—officially known as the Maturity Extension Program—announcing that it will sell \$400 billion of short-term Treasuries to buy the same amount of longer-term Treasuries. This program was later extended by continuing these operations in the range of \$45 billion each month. In contrast with the previous QE programs, which roughly tripled the Fed’s balance sheet by 2012, Operation Twist did not alter its size but it did change the average duration of the Fed’s portfolio. Finally, in September 2012 the Fed announced the QE 3 program through which it increased policy accommodation by purchasing \$40 billion of MBS each month, provided that labor market conditions showed no substantial improvement in the context of price stability. Operation Twist’s \$45 billion monthly purchases of long-term Treasuries were continued but not followed any longer by the inverse transaction in short-term Treasuries.

Since December 2008, the Fed has also engaged in forward guidance on the future path of the federal funds rate, as well as announcements of other future policies and the economic projections of FOMC participants. Through these announcements, long-term rates could potentially be affected by influencing expectations of future short-term rates. Initially, the Committee used time periods or calendar dates to specify how long the federal funds rate would remain at zero. In December 2012, it switched to specifying threshold conditions on unemployment,

³By QE we mean the increase in the supply of bank reserves beyond the level required to push down the overnight target rates to the floor established by the interest rate on bank reserves.

inflation and long-term inflation expectations that would warrant a change in conventional policy. The FOMC argued that this approach enhanced the public's understanding of the Fed's strategy and conveyed more clearly the rationale for the lift-up.

European Central Bank

The collapse of Lehman Brothers in September 2008 caused unprecedented distress in short-term funding markets in the United States and Europe. To provide U.S. dollar liquidity in the euro area, the Fed and the ECB agreed to double their currency swap lines from \$120 billion to \$240 billion. A few days later, as financial conditions deteriorated and the three-month Euribor-OIS spread hit historical high levels, the ECB adopted extraordinary liquidity measures by carrying out new refinancing operations with banks. Through these refinancing facilities, the ECB started to provide now unlimited funding to banks at a fixed-rate tender against collateral, while also expanding the list of assets eligible as collateral. It also proceeded to persistently cut the main refinancing rate—its policy rate—which over the next seven months was lowered by 3.25 percentage points. In March 2009, the policy rate was reduced to 1 percent and the ECB introduced its long-term refinancing operations (LTRO) with a one-year maturity. In June 2009, it began purchasing a total of €60 billion in euro-denominated covered bonds from commercial banks. Both the LTRO and the Covered Bond Purchase Program (CBPP) were aimed at easing credit conditions, improving market liquidity in important segments of the private debt security markets, and alleviating the maturity mismatch for commercial banks.

By the end of 2009, a crisis of confidence emerged in the European sovereign debt markets and government bond yields soared after the massive Greek budget deficit was revealed. In May 2010, the ECB launched the Security Markets Programme (SMP) to start buying government and private debt securities in secondary markets. These SMP purchases were sterilized to prevent a surge in inflation. Even though it was not their main objective, as alleged by the ECB authorities, the SMP purchases seemed to have helped reduce sovereign debt yields in distressed economies. At the same time, the currency swap lines with the Fed were reactivated. In October 2011, the ECB embarked on a second CBPP program to buy an additional €40 billion in euro-denominated covered bonds. In December 2011,

the ECB decided to conduct two LTRO with a 36-month maturity.

As the severity of the eurozone sovereign debt crisis escalated and solvency concerns spread to Spain and Italy, in September 2011 the ECB announced the details for the program of Outright Monetary Transactions (OMTs) that would replace the SMP. As with the SMP, this new program allowed the ECB to buy unlimited quantities of government bonds in secondary sovereign debt markets followed by appropriate sterilization. Bond purchases through the OMT, however, would be unlimited and conditioned on the individual country meeting specified conditions on economic and fiscal policy. At the end of 2012, the ECB's stock of sovereign debt was over €200 billion.

In July 2013, the ECB announced that it expected key interest rates to remain at the present or lower levels for an extended period of time.

Bank of England

In March 2009 the BoE cut its official bank rate to 0.5 percent, its lowest level ever, and initiated QE by announcing a first round of asset purchases through its Asset Purchase Facility (APF). The initial purchases were directed to medium- and long-term gilts to spur nominal demand and totaled £75 billion. Over the next months the total amount of purchases was increased, reaching £200 billion by early November 2009. To improve liquidity in private debt markets, the BoE also conducted purchases of commercial paper and high-quality corporate bonds, which were financed by the issuance of Treasury bills and hence did not expand the monetary base.

In October 2011 the BoE increased its target of asset purchases by a further £75 billion to meet its 2 percent inflation target, and again by additional £50 billion in February 2012 (reaching a total of £325 billion). In July 2012, following two consecutive quarters of negative economic growth, the BoE decided to expand its bond purchases by £50 billion to provide more stimulus. Since 2008, the BoE's balance sheet has roughly quadrupled, as depicted in Figure 1, and currently its vast majority is comprised of asset holdings of the APF.

Bank of Japan

After a decade of persistent deflation and feeble economic growth, the BoJ pioneered the implementation of QE programs by changing its main operating target from the overnight call rate to the supply of bank reserves, which were expanded significantly in an environment with interest rates already close to zero. By 2004 Bank reserves were increased from ¥4 trillion to ¥35 trillion through purchases of public and private assets. In March 2006 the BoJ announced that it was discontinuing the QE program and re-adopting the call rate as its main operating target.

Shortly after the Fed's initial LSAP announcement on November 25, 2008, the BoJ initiated an unlimited liquidity provision to banks through three-month collateralized loans. In December, the call rate was lowered to 0.1 percent and the BoJ announced the purchase of Japanese government bonds (JGB), eventually extending these purchases to corporate bonds and commercial paper. One year later, the unlimited liquidity provided to banks was replaced by fixed-quantity loans with a broader list of assets eligible as collateral.

In October 2010, the BoJ launched the Asset Purchase Program (APP) aimed at lowering long-term interest rates and several risk premiums through outright purchases of various public and private financial assets. From Fall 2011 through the end of 2012 the APP program was expanded, especially with the purchases of an additional ¥60 trillion in JGB and Treasury bills, which significantly increased the BOJ's balance sheet; see Figure 1. In October 2012, after a quarter in which the Japanese economy contracted, the BoJ decided to increase again its total asset purchases from ¥80 trillion to ¥91 trillion. In addition, a new facility was introduced to provide unlimited liquidity to banks in order to stimulate lending to the nonfinancial sector.

In April 2013 the BoJ started its aggressive monetary easing measures, as part of a broader agenda promised in his campaign by newly elected Prime Minister Shinzo Abe. The BoJ committed to open-ended purchases of long-term securities of approximately ¥7.5 trillion each month, which would raise the average maturity of its asset holdings from three to seven years. These purchases are projected to nearly double the monetary base by the end of 2014. In addition, the BoJ returned to targeting the supply of bank reserves instead of the call rate and

firmly set a two-year target of 2 percent annual inflation rate. It is worth noting that, simultaneously with this assertive QE program, the yen has significantly depreciated against the U.S. dollar, as shown in Figure 2.

Bank of Canada

Among the five central banks considered in this brief, the BoC was perhaps the least aggressive in implementing unconventional monetary policies. Indeed, the BoC's policies amounted to providing forward guidance and implementing extraordinary liquidity facilities. Not surprisingly, as a result the BoC's balance sheet did not increase as much as those of other central banks (see Figure 1).

The BoC was among the first to make use of “extraordinary forward guidance [as it] is one unconventional policy tool” (Carney 2012). Specifically, on April 21, 2009, the BoC set its so-called conditional commitment policy by pledging to maintain its target overnight rate at its current low level until the end of June 2010, conditional on the inflation outlook. This announcement changed the market expectations on the future path of the rates, lowering the yield curve. In April 2010, the BoC decided to remove the conditional commitment before the set date of June 2010, while keeping the target rate level. He (2010) finds some evidence (although not conclusive) that the conditional commitment policy had a persistent effect in lowering longer-term interest rates relative to the historical relationship with inflation and unemployment rates.

The BoC also launched some extraordinary liquidity facilities during the 2008-2009 financial crisis. The most important of these was the introduction of term Purchase and Resale Agreements (term PRAs); initially, for one-month term, but later 3-, 6-, 9-, and 12-month term PRAs were introduced. In contrast to conventional policies, term PRAs offer a longer term for these transactions. Additionally, the BoC increased the number of assets it accepted as collateral under the Standing Liquidity Facility (including asset-backed commercial paper, U.S. Treasury securities, and nonmortgage loan portfolios). Finally, the eligible participants included not just primary dealers but also participants in the Large Value Transfer System. The goals of these policies were to provide liquidity to the financial markets and to reinforce the conditional commitment for the overnight target rate. By the end of 2009, as financial conditions improved, the BoC began to remove some of these policies, specifying sunset dates for the extraordinary liquidity operations.

3 Data Sources and Description

In order to compute the surprise component of the monetary policy announcements, we use high-frequency intra-daily data on bond futures. Specifically, we observe the price of government bond futures for every minute of each event date. In the case of announcements by the Fed, the bond futures considered include the 2-, 5-, 10-, and 30-year U.S. Treasuries. Additionally, we also have data on foreign bond futures—these are the 2-, 5-, 10-, and 30-year euro bond futures for the ECB announcements; the long gilt future for the BoE announcements; the Canadian 10-year bond future for the BoC announcements; and the Japanese 10-year bond TSE future for the BoJ announcements. The source for all these data is Tickdata. Moreover, we have high-frequency data for the exchange rates. For each event date, we observe the intra-daily U.S. dollar bilateral exchange rates and the U.S. dollar index.⁴ These data come from Pi Trading.

The time frame we consider spans from the beginning of the financial crisis in 2008 until the end of the first half of 2013. Our event dates include all scheduled central banks meetings and relevant speeches by monetary policymakers. In the appendix we list the full set of events.

These detailed data allow us to look at the behavior of exchange rates at the exact moment an announcement takes place and at its immediate surrounding time. For instance, the announcement made by the Fed on March 18, 2009 regarding further asset purchases was seen as an expansionary announcement that surprised the market.⁵ In Figure 3 we can see our data “in action”: until the moment of the announcement, the U.S. dollar index was essentially flat, but we observe that at the announcement’s exact moment, the index experienced a sharp drop (that is, a depreciation). In Figure 4, we have the opposite case: the announcement on June 19, 2013 was a contractionary surprise, and we observe that the U.S. dollar index was flat but began increasing after the announcement (that is, an appreciation).

⁴The U.S. dollar index (DXY) is a measure of the value of the dollar relative to a basket of six foreign currencies. The weights are the following: euro 57.8 percent, Japanese yen 13.6 percent, British pound 11.9 percent, Canadian dollar 9.1 percent, Swedish krona 4.2 percent, and Swiss franc 3.6 percent. An increase in the value of the index corresponds to an appreciation of the U.S. dollar relative to this basket of foreign currencies.

⁵In the next section we explain in detail the way we measure how the market was surprised.

4 Fed Announcements

We follow an event-study approach to analyze how announcements in times of unconventional monetary policy affect nominal exchange and interest rates. In particular, we look at changes over a 30-minute window around the time of each event.⁶ Our event dates comprise of statements after FOMC meetings and speeches by the Chairman signaling possible policy changes. Table A-1 presents the full list of events considered in the brief.

The idea underlying the event-study approach is that policy announcements are the sole drivers of asset prices within the time window considered—that is, it is assumed that within the time window, all of the variation can be attributed to the announcement surprising market participants.

In order to measure the surprises, we follow Wright (2012), and we focus on 2-, 5-, 10-, and 30-year bond futures trading at the Chicago Mercantile Exchange. We obtain the surprise shocks as the first principal component of yield changes between 10 minutes before the announcement and 20 minutes after it.⁷ The shocks are rescaled to have a standard deviation of one and signed in such a way that a positive shock implies a fall in yields. The last column of Table A-1 presents the estimated policy surprise shock for each event date.

Next, we use these shocks to estimate the effect of the monetary policy announcements on different nominal exchange and interest rates. Specifically, we compute (log) nominal exchange rate returns and yield changes over the same 30-minute windows, and then we regress these changes on the estimated surprises.

Table 1 presents the effects of a monetary policy shock on nominal exchange rates.⁸ As can be seen, a one standard deviation surprise shock depreciates the U.S. dollar against all the other major currencies. For example, the euro appreciates around 0.43 percent whereas the yen appreciates 0.42 percent. These results are in line with the findings of Wright (2012) and Glick and Leduc (2013).

⁶Additionally, we looked at an alternative window length of 2 hours. Our results remain qualitatively unchanged; quantitatively, the results change only modestly.

⁷We use 30 minutes as our default window length to make it comparable to the one used for foreign announcements, for which we must use this narrow window to avoid announcement window overlaps. Moreover, this window length is also used by Glick and Leduc (2013) and D’Amico and Farka (2011).

⁸An increase in the bilateral exchange rate corresponds to a depreciation of the U.S. dollar. For consistency with the bilateral exchange rates, in our regressions we use the reciprocal of the U.S. dollar index.

Table 2 shows the effects of monetary policy surprises on different 10-year zero-coupon government bond yields. In addition to the U.S. Treasuries, we also consider Canadian, German, and British sovereign bonds. The bond data, obtained from the different central banks' webpages, are at a daily frequency so we are only able to consider one-day yield changes. A one standard deviation monetary policy shock lowers the yield of the 10-year Treasury by almost 10 basis points, and it decreases the yields of equivalent foreign government bonds by slightly more than 4 basis points.⁹

Using the UIP Benchmark

In order to assess whether these results are mutually consistent, we turn to the uncovered interest parity (UIP) as a benchmark. If the parity (in differences) were to hold, then for any given period there should be a one-to-one relationship between the decrease in the interest rate differential and the change in the expected nominal depreciation. Specifically, we should expect the following equality to hold in the data:

$$k * (\Delta i^{US} - \Delta i^F) = E_t \Delta s_{t+k} - \Delta s_t, \quad (1)$$

where k is the bonds' duration, i^{US} and i^F are the domestic and foreign interest rates, and s is the log of the spot nominal exchange rate. Following Kiley (2013), we assume that the change in the long-term nominal exchange rate due to monetary policy surprises is negligible.¹⁰ Hence, under this assumption, equation (1) can be approximated by

$$k * (\Delta i^{US} - \Delta i^F) \approx -\Delta s_t. \quad (2)$$

Next, we estimate the effect of a one standard deviation surprise shock on the differential change in yields between the U.S. and the foreign zero coupon bonds; that is, the left-hand side term of condition (1). The results are presented in Table 3: the estimated average is -0.052 percentage points. Additionally, recall that the estimated depreciation of the U.S. dollar index is 0.4 percent, and the

⁹In three cases, there was no data available for the following day. The reported results use the change of the next available date. The results remained practically unchanged if we drop these cases.

¹⁰The permanent change in the nominal exchange rate due to a monetary policy surprise should reflect the permanent change in the domestic and foreign price levels, which presumably will be tiny (see Kiley 2013).

average duration of long-term interest rates is roughly eight years. Thus, since $0.4 \approx 0.42 = 8 * 0.052$, it follows that our results seem to be consistent with the UIP.

However, given that we work with the first difference of the UIP condition, it is worth noting that this does not mean that we find evidence in favor of the UIP itself.¹¹ We abstract from the discussion around the overall validity of the UIP on the data since it is not the main objective of the brief.¹²

In summary, our findings suggest that the Fed’s announcements about unconventional monetary policies not only depreciated the U.S. dollar, but also reduced long-term interest rates in the United States and abroad. This is not entirely surprising since the government bonds of these advanced economies are considered imperfect substitutes.¹³ All else equal, these movements should have a stimulating effect on the U.S. economy as well as on the rest of the world.¹⁴

5 Foreign Central Bank Announcements

We now turn our focus to the effects of foreign central banks’ announcements on nominal exchange rates. Since we consider announcements made by several central banks around the world, the choice of the specific asset prices we use for identifying

¹¹Our simple exercise is consistent with any general model that posits this condition:

$$\log(1 + i^{US}) - \log(1 + i^F) = \log(E_t S_{t+k}) - \log(S_t) + v.$$

Notice that the UIP holds if and only if $v = 0$. A sufficiently large $v > 0$ implies that high interest rate countries would observe their currencies appreciate over time, which is aligned with the findings of Backus, Foresi, and Telmer (2001) for short-term horizons. The variable v could be interpreted, for example, as a risk premium and is allowed to be time varying. In our analysis we assume that v does not vary within the time window around the FOMC announcements.

¹²The empirical literature has found that the UIP fails to hold for short-term horizons (see, for example, Backus, Foresi, and Telmer 2001), whereas it seems to work better for longer horizons (see Chinn and Meredith 2004).

¹³For the co-movement of international interest rates see, for example, Sutton (1997) and Henriksen, Kydland, and Sustek (2013).

¹⁴The lower international interest rates have been used to deny beggar-thy-neighbor motives behind the recent implementation of accommodative monetary policies. While these policies influence nominal exchange rates and, hence, international trade flows, they also lead to a reduction of long-term interest rates everywhere, stimulating domestic demand in the U.S. as well as in the rest of the industrialized economies (see Bernanke 2013). Moreover, the G7 ministers of finance and central bank governors issued a joint statement in February 2013 reaffirming that their policies do not target exchange rates (available at <http://www.bankofengland.co.uk>).

the shocks is of paramount importance. We identify the magnitude of the surprise shocks using government bonds denominated in local currency, as detailed below. One could potentially use U.S. Treasuries instead. However, there are several reasons to prefer using local bonds. First, local long-term rates are the main targets of unconventional monetary policies and therefore the underlying assets are more likely to react to the announcements. Second, and more importantly, one could argue that the United States is a large economy in which interest rates are mainly driven by local fundamentals and thus are not as responsive to foreign monetary policies—therefore, identifying foreign shocks using changes in U.S. rates may not be adequate. The events considered include regular central bank policy meetings as well as relevant monetary policy announcements. The events are listed in Tables A-2 through A-5.

To begin with, we follow Wright (2012) and measure the surprise by focusing on bond futures trading. In particular, we use the 2-, 5-, 10-, and 30-year euro bond futures for the ECB’s announcements; the long gilt future for the BoE’s announcements; the Canadian 10-year bond future for the BoC’s announcements; and the Japanese 10-year bond TSE future for the BoJ’s announcements.

As in the case of the Fed’s announcements, we obtain the surprise shock as the first principal component of yield changes between 10 minutes before the announcement and 20 minutes after it.¹⁵ The shocks are again rescaled to have a standard deviation of 1 and are signed in such a way that a positive shock implies a fall in yields. The last column of Tables A-2 through A-5 presents the estimated policy surprise shock for each event date.

The width of the window is chosen as the largest one possible in order to prevent overlapping windows for any two different announcements from any of the central banks in our sample. Note that most announcements by the BoE and ECB differ by only 45 minutes in time (compare Tables A-4 and A-5).

Next, we use these shocks to estimate the effect of the monetary policy announcements on different nominal exchange rates. Specifically, we regress the (log) nominal exchange rate returns (computed over the 30-minute windows) on the estimated surprises.

¹⁵Precisely, we use principal component analysis in the case of ECB announcements, where we have data on four bonds. For the other cases, we simply use the change in the price of the future.

Table 4 repeats the exercise of Table 1 using the foreign central banks' announcement shocks. The results are conclusive: a one standard deviation positive monetary shock by any of the four central banks in the sample generates a statistically significant appreciation of the U.S. dollar. Specifically, the estimated appreciation ranges between 0.09 and 0.3 percent.

In Table 5 we repeat the same exercise but using the DXY dollar index instead of the bilateral exchange rates. While the theory does not pin down what sign to expect, the idea is to learn what the effect is of a surprise shock caused by a given central bank announcement on the overall value of the dollar—that is, relative to all major foreign currencies—as approximated by the DXY. We observe a pattern similar to the previous case. In most cases, a one standard deviation positive shock caused by a foreign central bank's announcement appreciates the DXY, although this change is not always statistically significant.

6 Conclusion

In this brief, we show how exchange rates are affected by announcements of unconventional monetary policy. Since the financial crisis, and with the policy rates effectively reaching the zero lower bound, the world's main central banks have had to resort to unconventional monetary policies to stimulate the economy. These measures include large-scale asset purchases, refinancing operations, and forward guidance.

We make use of high-frequency intra-daily data to measure how the markets were surprised by these kinds of announcements. We then look at the effects of the surprise shocks on the exchange rates.

Our findings suggest that a Fed expansionary surprise announcement is associated with a depreciation of the U.S. dollar on impact. In contrast, an expansionary announcement by a foreign central bank is associated with an appreciation of the U.S. dollar.

We do not evaluate the effects of the exchange rate movements on the real economy. However, we also find that the Fed's announcements lower U.S. and foreign interest rates, thereby stimulating the aggregate demand both at home *and* abroad.

There are several ways to expand this research agenda. For instance, a thor-

ough analysis of how the announcement surprise-exchange rate link translates into the real economy through changes in net exports remains to be addressed. Additionally, it would also be interesting to assess how other types of economic announcements affect the nominal exchange rates.

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Table 1: Fed Announcements and Exchange Rates

	(1)	(2)	(3)	(4)	(5)	(6)
	EUR	GBP	CAD	CHF	JPY	DXY
<i>Surprise</i>	0.43*** (0.06)	0.39*** (0.06)	0.28*** (0.05)	0.44*** (0.04)	0.42*** (0.05)	0.40*** (0.05)
<i>constant</i>	0.05 (0.05)	0.04 (0.04)	0.08* (0.04)	0.02 (0.05)	-0.03 (0.04)	0.05 (0.04)
<i>N</i>	42	42	42	42	42	42
<i>R</i> ²	0.61	0.65	0.49	0.65	0.75	0.67

Notes: Robust standard errors in parentheses. ***, ** and * refer to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The table reports the results of regressing the 30-minute window (10 min before and 20 min after the monetary announcement) exchange rate (100 times log gross) returns on the monetary policy surprises, measured as described in the text. EUR: Euro, GBP: British Pound, CAD: Canadian Dollar, CHF: Swiss Franc, JPY: Japanese Yen, DXY: U.S. Dollar Index.

Table 2: Fed Announcements and Zero Coupon Yields

	(1)	(2)	(3)	(4)
	Germany	UK	Canada	USA
<i>Surprise</i>	-0.0392*** (0.01)	-0.0480*** (0.02)	-0.0453*** (0.01)	-0.0962*** (0.02)
<i>constant</i>	-0.0089 (0.01)	-0.0194* (0.01)	-0.0032 (0.01)	-0.0103 (0.01)
<i>N</i>	41	41	42	42
<i>R</i> ²	0.34	0.32	0.48	0.58

Notes: Robust standard errors in parentheses. ***, ** and * refer to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The table reports results of regressing daily government zero coupon bond yield changes on the monetary policy surprises, measured as described in the text. To accommodate time differences, changes in German and British government yields are calculated as the difference in yield between the day after the announcement day and the announcement day.

Table 3: Fed Announcements and Zero Coupon Yields Differentials

	(1)	(2)	(3)
	$\Delta R^{US} - \Delta R^{Ger}$	$\Delta R^{US} - \Delta R^{UK}$	$\Delta R^{US} - \Delta R^{Can}$
<i>Surprise</i>	-0.0576*** (0.02)	-0.0486* (0.03)	-0.0508*** (0.01)
<i>constant</i>	0.0003 (0.01)	0.0099 (0.02)	-0.0072 (0.01)
<i>N</i>	41	41	42
<i>R</i> ²	0.37	0.20	0.51

Notes: Robust standard errors in parentheses. ***, ** and * refer to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The table reports results of regressing (U.S. minus foreign) daily government zero coupon bond yield changes on the monetary policy surprises, measured as described in the text. To accommodate time differences, changes in German and British government yields are calculated as the difference in yield between the day after the announcement day and the announcement day.

Table 4: Foreign Announcements and Bilateral Exchange Rates

	(1)	(2)	(3)	(4)
	BoC	BoE	ECB	BoJ
<i>Surprise</i>	-0.30*** (0.04)	-0.18*** (0.04)	-0.09** (0.04)	-0.13** (0.06)
<i>constant</i>	-0.03 (0.04)	0.08** (0.03)	-0.02 (0.02)	0.04 (0.03)
<i>N</i>	53	66	69	83
<i>R</i> ²	0.01	0.35	0.18	0.20

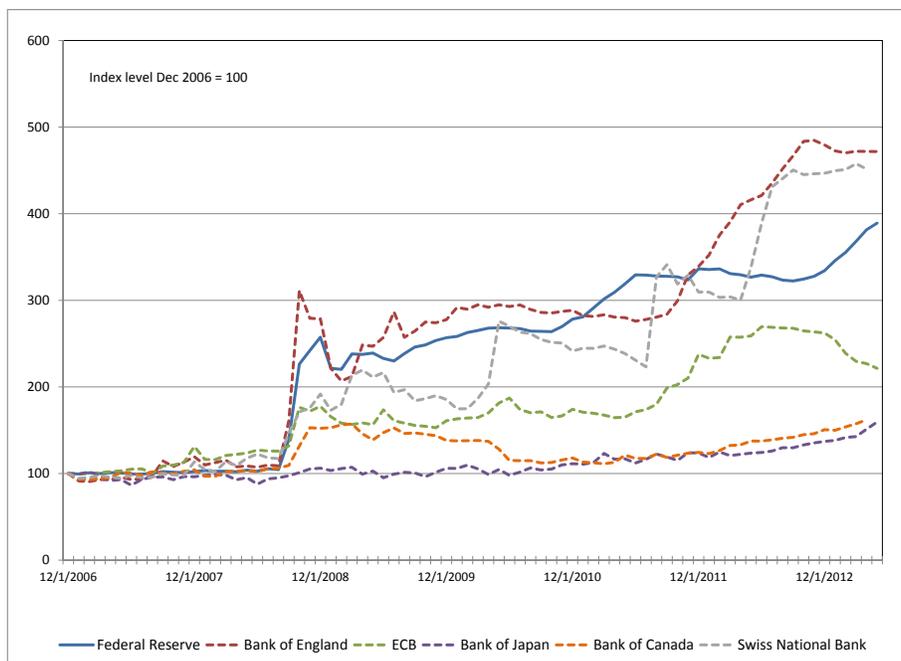
Notes: Robust standard errors in parentheses. ***, ** and * refer to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The table reports the results of regressing 30-minute window bilateral exchange rate (100 times log gross) returns on the monetary policy surprises, measured using local bonds futures. Each column considers the announcement of a different central bank.

Table 5: Foreign Announcements and the U.S. Dollar Index

	(1)	(2)	(3)	(4)
	BoC	BoE	ECB	BoJ
<i>Surprise</i>	-0.01 (0.02)	-0.04*** (0.01)	-0.07*** (0.02)	-0.02 (0.02)
<i>constant</i>	-0.06*** (0.02)	0.01 (0.01)	-0.02 (0.02)	0.03* (0.01)
<i>N</i>	53	66	60	83
<i>R</i> ²	0.01	0.12	0.18	0.02

Notes: Robust standard errors in parentheses. ***, ** and * refer to statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The table reports the results of regressing 30-minute window U.S. dollar index DXY (100 times log gross) returns on the monetary policy surprises, measured using local bonds futures. Each column considers the announcement of a different central bank.

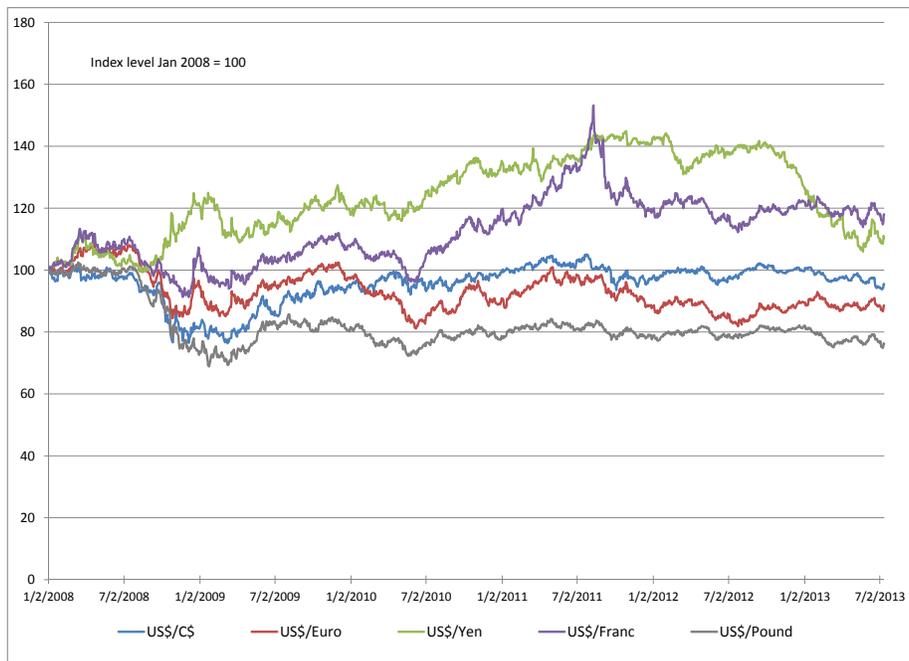
Figure 1: Central Banks' Asset Holdings



Source: Federal Reserve System, European Central Bank, the Bank of England, the Bank of Japan, the Bank of Canada, and the Swiss National Bank.

Notes: Evolution of the assets held by the different central banks since 2006.

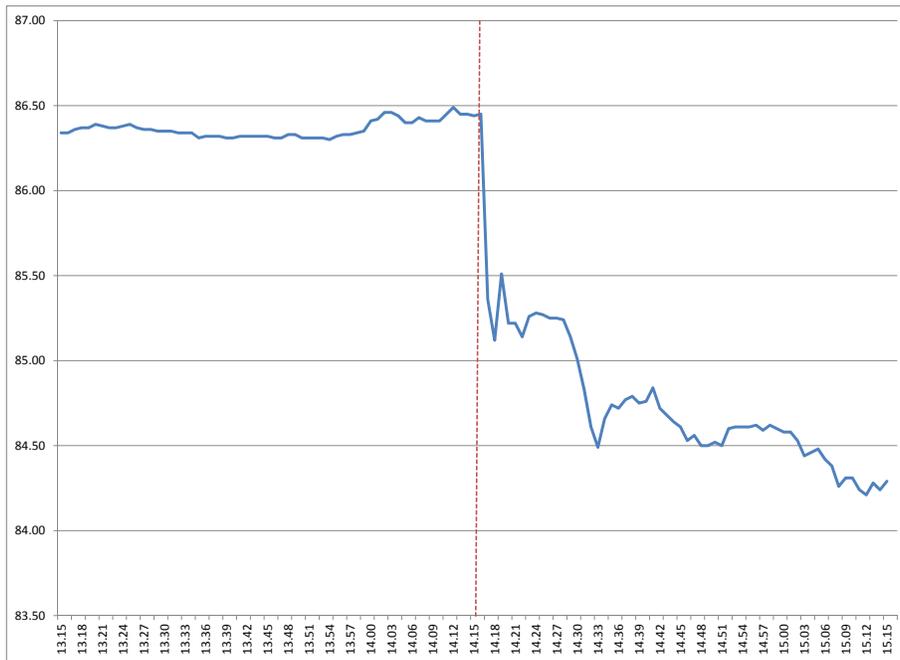
Figure 2: Bilateral Exchange Rates



Source: Haver Analytics.

Notes: Evolution of bilateral exchange rates against the U.S. dollar since 2008.

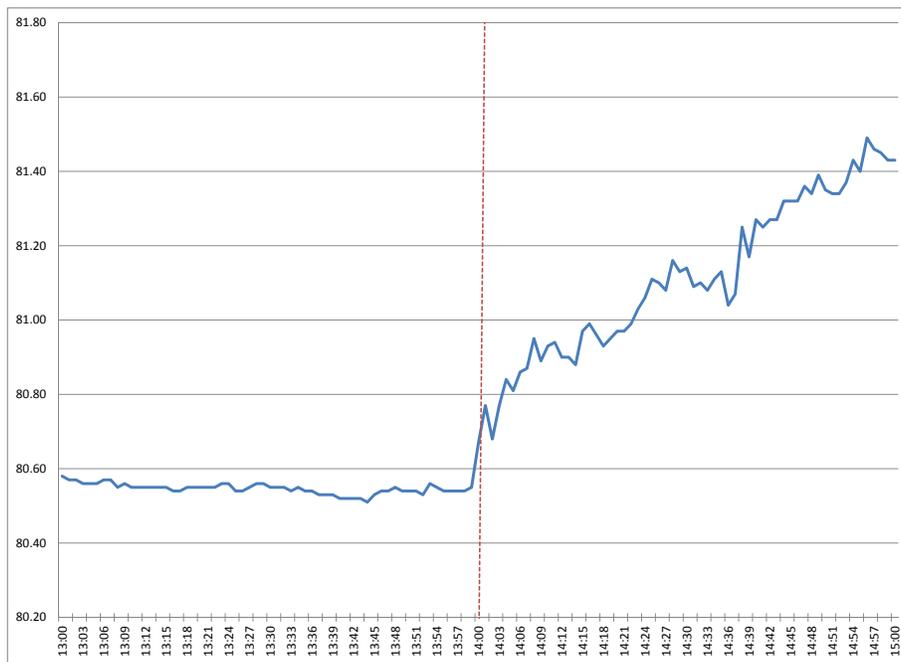
Figure 3: DXY around the Fed's announcement on March 18, 2009



Source: Pi Trading.

Notes: U.S. Dollar Index (DXY) spot values around the time of the FOMC announcement on March 18, 2009. The red line signals the exact moment of the announcement.

Figure 4: DXY around the Fed's Announcement on June 19, 2013



Source: Pi Trading.

Notes: U.S. Dollar Index (DXY) spot values around the time of the FOMC announcement on June 19, 2013. The red line signals the exact moment of the announcement.

APPENDIX

Central Bank Announcements

Table A-1: Fed Announcement Dates

Date	Event	Local Time	Surprise
25-Nov-08	FOMC Meeting	8:15	0.37
1-Dec-08	FOMC Meeting	13:45	1.49
16-Dec-08	FOMC Meeting	14:15	2.50
28-Jan-09	FOMC Meeting	14:15	-0.20
18-Mar-09	FOMC Meeting	14:15	3.94
29-Apr-09	FOMC Meeting	14:15	-1.08
24-Jun-09	FOMC Meeting	14:15	-1.73
12-Aug-09	FOMC Meeting	14:15	-0.28
23-Sep-09	FOMC Meeting	14:15	1.44
4-Nov-09	FOMC Meeting	14:15	-0.02
16-Dec-09	FOMC Meeting	14:15	-0.68
27-Jan-10	FOMC Meeting	14:15	-1.00
16-Mar-10	FOMC Meeting	14:15	0.50
28-Apr-10	FOMC Meeting	14:15	-0.25
23-Jun-10	FOMC Meeting	14:15	-0.09
10-Aug-10	FOMC Meeting	14:15	0.65
27-Aug-10	Bernanke Speech at Jackson Hole	10:00	-0.51
21-Sep-10	FOMC Meeting	14:15	0.24
15-Oct-10	Bernanke Speech at Boston Fed	8:15	0.10
3-Nov-10	FOMC Meeting	14:15	-0.36
14-Dec-10	FOMC Meeting	14:15	-0.12
26-Jan-11	FOMC Meeting	14:15	0.00
15-Mar-11	FOMC Meeting	14:15	-0.67
27-Apr-11	FOMC Meeting	12:30	0.26
22-Jun-11	FOMC Meeting	12:30	-0.62
9-Aug-11	FOMC Meeting	14:15	1.39
26-Aug-11	Bernanke Speech at Jackson Hole	10:00	-0.41
21-Sep-11	FOMC Meeting	14:15	-0.17
2-Nov-11	FOMC Meeting	12:30	-0.42
13-Dec-11	FOMC meeting	14:15	-0.08
25-Jan-12	FOMC Meeting	12:30	0.81
13-Mar-12	FOMC Meeting	14:15	-0.69
25-Apr-12	FOMC Meeting	12:30	-0.38
20-Jun-12	FOMC Meeting	12:30	-0.18
1-Aug-12	FOMC Meeting	14:15	-0.60
13-Sep-12	FOMC Meeting	12:30	-1.16

Table A-1: (Fed, continued)

Date	Event	Local Time	Surprise
24-Oct-12	FOMC Meeting	14:15	-0.04
12-Dec-12	FOMC Meeting	12:30	-0.38
30-Jan-13	FOMC Meeting	14:15	0.03
20-Mar-13	FOMC Meeting	14:00	-0.09
1-May-13	FOMC Meeting	14:00	-0.35
19-Jun-13	FOMC Meeting	14:00	-1.17

Table A-2: Bank of Canada Announcement Dates

Date	Event	Local Time	Surprise
22-Jan-08	GC meeting	9:00	-0.34
4-Mar-08	GC meeting	9:00	1.14
11-Mar-08	BoC announces new Term PRA Transactions	8:30	-1.30
22-Apr-08	GC meeting	9:00	-0.42
10-Jun-08	GC meeting	9:00	-4.18
25-Jun-08	US Treasuries accepted as collateral for SLF	15:30	0.30
15-Jul-08	GC meeting	9:00	0.01
3-Sep-08	GC meeting	9:00	-1.01
6-Oct-08	BoC announces 91 Day Term PRA Transaction	9:00	0.94
8-Oct-08	BoC announces coordinated interest rate reductions	9:00	0.47
21-Oct-08	GC meeting	9:00	0.76
5-Nov-08	Temporary eligibility of non-mortgage loan portfolios	15:30	0.48
12-Nov-08	BoC introduces Term Loan Facility	8:00	-0.04
9-Dec-08	GC meeting	9:00	1.14
20-Jan-09	GC meeting	9:00	0.89
6-Feb-09	BoC announces 28 Day TLF	15:00	-0.30
3-Mar-09	GC meeting	9:00	0.77
21-Apr-09	GC meeting	9:00	0.41
4-Jun-09	GC meeting	9:00	-0.59
21-Jul-09	GC meeting	9:00	-0.36
10-Sep-09	GC meeting	9:00	0.10
22-Sep-09	BoC announces end to certain TLFs	16:00	0.00
20-Oct-09	GC meeting	9:00	1.45
8-Dec-09	GC meeting	9:00	-0.13
19-Jan-10	GC meeting	9:00	-0.13
2-Mar-10	GC meeting	9:00	0.62
20-Apr-10	GC meeting	9:00	-2.28
1-Jun-10	GC meeting	9:00	2.20

Table A-2: (BoC, continued)

Date	Event	Local Time	Surprise
29-Jun-10	BoC announces Term Repo Operation	15:30	0.38
20-Jul-10	GC meeting	9:00	1.14
8-Sep-10	GC meeting	9:00	-1.63
19-Oct-10	GC meeting	9:00	0.72
7-Dec-10	GC meeting	9:00	-0.68
18-Jan-11	GC meeting	9:00	-0.45
1-Mar-11	GC meeting	9:00	0.01
12-Apr-11	GC meeting	9:00	0.38
31-May-11	GC meeting	9:00	-0.52
19-Jul-11	GC meeting	9:00	0.06
7-Sep-11	GC meeting	9:00	-0.78
25-Oct-11	GC meeting	9:00	0.40
6-Dec-11	GC meeting	9:00	-0.95
17-Jan-12	GC meeting	9:00	0.35
8-Mar-12	GC meeting	9:00	0.14
17-Apr-12	GC meeting	9:00	-1.54
5-Jun-12	GC meeting	9:00	0.50
17-Jul-12	GC meeting	9:00	-0.22
5-Sep-12	GC meeting	9:00	-0.18
23-Oct-12	GC meeting	10:00	-0.02
4-Dec-12	GC meeting	10:00	0.06
23-Jan-13	GC meeting	10:00	1.13
6-Mar-13	GC meeting	10:00	0.56
17-Apr-13	GC meeting	10:00	0.63
29-May-13	GC meeting	10:00	-0.10

Table A-3: Bank of Japan Announcement Dates

Date	Event	Local Time	Surprise
22-Jan-08	MP meeting	12:19	0.07
15-Feb-08	MP meeting	12:51	0.50
7-Mar-08	MP meeting	12:52	-0.12
9-Apr-08	MP meeting	12:24	0.16
30-Apr-08	MP meeting	13:28	0.66
20-May-08	MP meeting	12:04	0.22
13-Jun-08	MP meeting	12:23	0.06
15-Jul-08	MP meeting	13:34	-0.76
19-Aug-08	MP meeting	12:30	-0.81

Table A-3: (BoJ, continued)

Date	Event	Local Time	Surprise
17-Sep-08	MP meeting	12:47	-0.28
18-Sep-08	MP meeting	16:00	-0.28
29-Sep-08	MP meeting	23:00	0.32
7-Oct-08	MP meeting	12:58	-1.37
31-Oct-08	MP meeting	13:58	-0.52
21-Nov-08	MP meeting	12:34	-0.63
2-Dec-08	MP meeting	14:34	-0.82
19-Dec-08	MP meeting	14:05	6.27
22-Jan-09	MP meeting	13:43	2.26
19-Feb-09	MP meeting	13:52	-0.82
18-Mar-09	MP meeting	12:27	0.76
7-Apr-09	MP meeting	12:22	-0.74
30-Apr-09	MP meeting	13:37	0.03
22-May-09	MP meeting	12:33	-0.65
16-Jun-09	MP meeting	12:34	0.43
15-Jul-09	MP meeting	13:35	-0.28
11-Aug-09	MP meeting	11:51	-0.02
17-Sep-09	MP meeting	12:39	-0.05
14-Oct-09	MP meeting	13:14	-0.05
30-Oct-09	MP meeting	13:05	-0.05
20-Nov-09	MP meeting	12:35	-0.75
1-Dec-09	MP meeting	15:38	-2.67
18-Dec-09	MP meeting	12:13	0.24
26-Jan-10	MP meeting	12:26	0.27
18-Feb-10	MP meeting	11:45	-0.18
17-Mar-10	MP meeting	12:49	-0.43
7-Apr-10	MP meeting	12:03	-0.18
30-Apr-10	MP meeting	13:18	0.11
10-May-10	MP meeting	12:11	-0.33
21-May-10	MP meeting	12:42	-0.35
15-Jun-10	MP meeting	12:56	-0.28
15-Jul-10	MP meeting	12:45	-0.12
10-Aug-10	MP meeting	12:28	-0.36
30-Aug-10	MP meeting	12:11	-0.32
7-Sep-10	MP meeting	12:39	0.64
5-Oct-10	MP meeting	13:38	1.52
28-Oct-10	MP meeting	13:31	1.11
5-Nov-10	MP meeting	11:36	-0.15
21-Dec-10	MP meeting	12:55	-0.05
25-Jan-11	MP meeting	12:29	-0.54
15-Feb-11	MP meeting	12:37	-0.14

Table A-3: (BoJ, continued)

Date	Event	Local Time	Surprise
14-Mar-11	MP meeting	14:48	0.47
7-Apr-11	MP meeting	13:10	-0.75
28-Apr-11	MP meeting	13:31	-0.59
20-May-11	MP meeting	12:14	-0.24
14-Jun-11	MP meeting	12:42	-0.05
12-Jul-11	MP meeting	13:20	-0.20
4-Aug-11	MP meeting	14:00	-0.35
7-Sep-11	MP meeting	12:21	-0.16
7-Oct-11	MP meeting	12:37	-0.35
27-Oct-11	MP meeting	13:31	-0.50
16-Nov-11	MP meeting	12:49	-0.27
30-Nov-11	MP meeting	22:00	-0.84
21-Dec-11	MP meeting	12:16	0.05
24-Jan-12	MP meeting	12:31	-0.02
14-Feb-12	MP meeting	12:43	1.01
13-Mar-12	MP meeting	14:07	-0.12
10-Apr-12	MP meeting	12:09	-0.28
27-Apr-12	MP meeting	12:46	-0.65
23-May-12	MP meeting	11:37	0.03
12-Jul-12	MP meeting	12:51	1.03
9-Aug-12	MP meeting	12:19	0.09
19-Sep-12	MP meeting	12:44	0.18
5-Oct-12	MP meeting	12:14	0.00
30-Oct-12	MP meeting	14:46	-0.53
20-Nov-12	MP meeting	12:14	-0.11
20-Dec-12	MP meeting	13:01	-0.42
22-Jan-13	MP meeting	12:47	0.92
14-Feb-13	MP meeting	12:39	0.33
7-Mar-13	MP meeting	12:24	-0.07
4-Apr-13	MP meeting	13:40	3.05
26-Apr-13	MP meeting	13:35	0.03
22-May-13	MP meeting	12:07	-0.62
11-Jun-13	MP meeting	11:48	-0.61

Table A-4: European Central Bank Announcement Dates

Date	Event	Local Time	Surprise
10-Jan-08	GC meeting	13:45	0.47
7-Feb-08	GC meeting	13:45	0.40
6-Mar-08	GC meeting	13:45	1.10
28-Mar-08	ECB announces supplementary LTROs	13:45	0.09
10-Apr-08	GC meeting	13:45	0.07
8-May-08	GC meeting	13:45	0.08
5-Jun-08	GC meeting	13:45	0.75
3-Jul-08	GC meeting	13:45	0.71
7-Aug-08	GC meeting	13:45	0.13
4-Sep-08	GC meeting	13:45	0.37
2-Oct-08	GC meeting	13:45	0.26
7-Oct-08	ECB increases LTRO allotment amount	13:45	0.77
8-Oct-08	GC meeting	13:45	-0.07
6-Nov-08	GC meeting	13:45	-1.57
4-Dec-08	GC meeting	13:45	-3.96
15-Jan-09	GC meeting	13:45	1.25
5-Feb-09	GC meeting	13:45	1.27
5-Mar-09	GC meeting	13:45	-0.04
2-Apr-09	GC meeting	13:45	-3.98
7-May-09	GC meeting	13:45	-1.97
4-Jun-09	GC meeting	13:45	0.79
2-Jul-09	GC meeting	13:45	-0.61
6-Aug-09	GC meeting	13:45	-0.34
3-Sep-09	GC meeting	13:45	0.22
8-Oct-09	GC meeting	13:45	0.18
5-Nov-09	GC meeting	13:45	0.32
3-Dec-09	GC meeting	13:45	0.11
14-Jan-10	GC meeting	13:45	0.14
4-Feb-10	GC meeting	13:45	0.31
4-Mar-10	GC meeting	13:45	0.10
8-Apr-10	GC meeting	13:45	-0.25
6-May-10	GC meeting	13:45	0.12
10-May-10	ECB announces SMP	13:45	0.50
8-Jul-10	GC meeting	13:45	-0.61
5-Aug-10	GC meeting	13:45	-0.11
2-Sep-10	GC meeting	13:45	0.18
7-Oct-10	GC meeting	13:45	-0.18
4-Nov-10	GC meeting	13:45	0.12
2-Dec-10	GC meeting	13:45	-0.86
13-Jan-11	GC meeting	13:45	0.40
3-Feb-11	GC meeting	13:45	-0.29

Table A-4: (ECB, continued)

Date	Event	Local Time	Surprise
3-Mar-11	GC meeting	13:45	0.14
7-Apr-11	GC meeting	13:45	-0.04
5-May-11	GC meeting	13:45	0.01
9-Jun-11	GC meeting	13:45	0.31
7-Jul-11	GC meeting	13:45	0.66
4-Aug-11	GC meeting	13:45	0.05
8-Sep-11	GC meeting	13:45	1.51
6-Oct-11	GC meeting	13:45	0.90
3-Nov-11	GC meeting	13:45	1.45
8-Dec-11	GC meeting	13:45	0.03
12-Jan-12	GC meeting	13:45	0.17
9-Feb-12	GC meeting	13:45	0.57
8-Mar-12	GC meeting	13:45	-0.25
4-Apr-12	GC meeting	13:45	-0.05
3-May-12	GC meeting	13:45	0.16
6-Jun-12	GC meeting	13:45	0.88
5-Jul-12	GC meeting	13:45	2.26
2-Aug-12	GC meeting	13:45	-1.91
6-Sep-12	GC meeting	13:45	-0.74
4-Oct-12	GC meeting	13:45	-1.04
8-Nov-12	GC meeting	13:45	0.35
6-Dec-12	GC meeting	13:45	-0.16
10-Jan-13	GC meeting	13:45	-1.01
7-Feb-13	GC meeting	13:45	0.65
7-Mar-13	GC meeting	13:45	-0.25
4-Apr-13	GC meeting	13:45	0.40
2-May-13	GC meeting	13:45	-0.87
6-Jun-13	GC meeting	13:45	-0.56

Table A-5: Bank of England Announcement Dates

Date	Event	Local Time	Surprise
10-Jan-08	MPC meeting	12:00	-0.12
7-Feb-08	MPC meeting	12:00	0.07
6-Mar-08	MPC meeting	12:00	-0.25
10-Apr-08	MPC meeting	12:00	0.33
8-May-08	MPC meeting	12:00	0.01
5-Jun-08	MPC meeting	12:00	0.15

Table A-5: (BoE, continued)

Date	Event	Local Time	Surprise
10-Jul-08	MPC meeting	12:00	-0.49
7-Aug-08	MPC meeting	12:00	0.20
4-Sep-08	MPC meeting	12:00	0.33
8-Oct-08	MPC meeting	12:00	-0.42
6-Nov-08	MPC meeting	12:00	0.88
4-Dec-08	MPC meeting	12:00	-1.12
8-Jan-09	MPC meeting	12:00	-0.07
5-Feb-09	MPC meeting	12:00	0.07
5-Mar-09	MPC meeting	12:00	4.04
9-Apr-09	MPC meeting	12:00	-0.10
7-May-09	MPC meeting	12:00	2.00
4-Jun-09	MPC meeting	12:00	-0.36
9-Jul-09	MPC meeting	12:00	-2.66
6-Aug-09	MPC meeting	12:00	4.43
10-Sep-09	MPC meeting	12:00	0.25
8-Oct-09	MPC meeting	12:00	-0.56
5-Nov-09	MPC meeting	12:00	-1.61
10-Dec-09	MPC meeting	12:00	-0.61
7-Jan-10	MPC meeting	12:00	-0.11
4-Feb-10	MPC meeting	12:00	-1.43
4-Mar-10	MPC meeting	12:00	0.10
8-Apr-10	MPC meeting	12:00	0.10
10-May-10	MPC meeting	12:00	-0.49
10-Jun-10	MPC meeting	12:00	0.24
8-Jul-10	MPC meeting	12:00	0.02
5-Aug-10	MPC meeting	12:00	0.02
9-Sep-10	MPC meeting	12:00	-0.16
7-Oct-10	MPC meeting	12:00	-0.33
4-Nov-10	MPC meeting	12:00	-0.31
9-Dec-10	MPC meeting	12:00	0.15
13-Jan-11	MPC meeting	12:00	-0.28
10-Feb-11	MPC meeting	12:00	-0.36
10-Mar-11	MPC meeting	12:00	0.37
7-Apr-11	MPC meeting	12:00	0.25
5-May-11	MPC meeting	12:00	-0.11
9-Jun-11	MPC meeting	12:00	0.17
7-Jul-11	MPC meeting	12:00	0.39
4-Aug-11	MPC meeting	12:00	0.14
8-Sep-11	MPC meeting	12:00	-0.42
6-Oct-11	MPC meeting	12:00	1.67
10-Nov-11	MPC meeting	12:00	-0.37

Table A-5: (BoE, continued)

Date	Event	Local Time	Surprise
8-Dec-11	MPC meeting	12:00	0.30
12-Jan-12	MPC meeting	12:00	0.07
9-Feb-12	MPC meeting	12:00	-0.75
8-Mar-12	MPC meeting	12:00	0.07
5-Apr-12	MPC meeting	12:00	-0.13
10-May-12	MPC meeting	12:00	-0.33
7-Jun-12	MPC meeting	12:00	-0.94
5-Jul-12	MPC meeting	12:00	-1.28
2-Aug-12	MPC meeting	12:00	0.31
6-Sep-12	MPC meeting	12:00	0.07
4-Oct-12	MPC meeting	12:00	0.10
8-Nov-12	MPC meeting	12:00	-0.56
6-Dec-12	MPC meeting	12:00	0.19
10-Jan-13	MPC meeting	12:00	0.17
7-Feb-13	MPC meeting	12:00	-0.23
7-Mar-13	MPC meeting	12:00	-1.16
4-Apr-13	MPC meeting	12:00	-0.08
9-May-13	MPC meeting	12:00	0.17
6-Jun-13	MPC meeting	12:00	0.35