Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes

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Abstract

In this paper we investigate the impact of UK macroeconomic news announcements on selected futures contracts and exchange rates. We include a wide set of scheduled public news announcements in our study, including: official interest rate decisions, the publication of the Bank of England's *Inflation Report*, and the minutes of the Bank's Monetary Policy Committee meetings. We investigate whether the reaction to these announcements has changed since the Bank of England was granted operational independence in May 1997. Our results indicate that there may well have been changes in the way that financial markets incorporate key economic data into securities prices. In particular, we document an increase in the speed of the reaction to interest rate announcements, but also some evidence of a fall in the size of the full reaction.

1. Introduction

A number of researchers have focused on the role of macroeconomic and public news announcements as a source of financial market volatility. A large number of such studies investigate the impact of macroeconomic news announcements on foreign exchange rates (see Almeida, Goodhart and Payne (1998), Andersen and Bollerslev (1998) or Kim (1998)), while others look at the impact of macroeconomic announcements on stock prices (see Mitchell and Mulherin (1994)), bond prices (see Fleming and Remolona (1997), Jones *et al* (1994) or Clare *et al* (1999)), interest rates (Becker *et al* (1995)) and derivative prices (see Ederington and Lee (1993, 1995) or ap Gwilym*et al* (1998)). In this paper we study the impact of scheduled UK macroeconomic news announcements on three of the most popular futures contracts traded on LIFFE—the short sterling, long gilt and FTSE 100 contracts—and on the dollar/sterling and Deutsche Mark/sterling foreign exchange rates, using a methodology due to Ederington and Lee (1995).

The purpose of this paper relates to the granting of operational independence to the Bank of England on 6 May 1997 by the UK Government. This decision by the new Labour Government changed the monetary policy environment in the United Kingdom. Prior to this date, interest rate decisions were taken by the Chancellor of the Exchequer after a monthly meeting with the Governor of the Bank of England, where the Governor offered advice to the Chancellor. The minutes of these meetings were subsequently published. Following the announcement of operational independence, interest rate decisions are now made by the Bank of England's Monetary Policy Committee (MPC), which consists of nine members: five from the Bank itself (the Governor, two Deputy Governors, the Chief Economist and the Executive Director responsible for financial market operations) and four external members, chosen from industry and academia. The Committee's decisions are taken with the aim of keeping inflation close to a target rate of 2½% a year, set by the Chancellor. Another stated aim of this change in regime was that monetary policy should be more transparent than under previous regimes. This change in the monetary policy framework gives us a rare opportunity to study how such a change can influence the way that key economic data are impounded into financial

prices, and perhaps the extent to which the Bank of England has been successful in making UK monetary policy more transparent.[1]

We use two sets of intra-day data on UK assets. The first set comprises intra-day data from LIFFE on FTSE 100, short sterling and long gilt futures contracts spanning the period from January 1994 to June 1999. The second data set comprises intra-day quotes on the dollar/sterling and Deutsche Mark/sterling exchange rates, over the same period. Using these two data sets we investigate whether there has been a change in the way that key UK scheduled macroeconomic news announcements impact on these markets. Crucially, the announcements that we consider include the key monetary policy announcements – official interest rate decisions, the publication of the Bank of England's *Inflation Report* and the minutes of the Monetary Policy Committee's monthly meeting – which have not been considered previously.

In anticipation of our conclusions, a comparison of the reactions pre and post operational independence does not reveal simple, definitive conclusions about whether monetary policy is now better understood by financial market participants as a result of this regime change. The total (cumulative) reaction of the LIFFE contracts and exchange rates to interest rate changes appears to be either unchanged or lower in the post Bank independence period, depending on the market observed, although these differences are rarely significant in a statistical sense. However, the immediate reaction in the first five minutes is larger in all of the markets studied here. With respect to other key macroeconomic data, the short sterling, long gilt and FTSE 100 contracts exhibit a smaller reaction to these data releases in the post Bank independence period, while conversely the exchange rates studied here exhibit a larger reaction.

The remainder of this paper is organised as follows. In Section 2 we consider briefly the way in which the impact that economic data has on

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[1] In a similar vein, McQueen and Roley (1993) and Fleming and Remolona (1997) investigate whether the reaction to US scheduled macroeconomic announcements varies systematically with the state of the US economy.

financial prices might be expected to change following a change in monetary policy; in Section 3 we undertake a review of some of the related academic literature; in Section 4 we introduce the data; in Section 5 we present simple results designed to highlight some key stylised facts; in Section 6 we employ a variant of the Ederington and Lee (1995) methodology to determine whether the announcements in our study have a significant impact on asset prices using the whole sample period, while in Section 7 we use the same methodology to determine the degree to which the change in the United Kingdom's monetary policy regime has led to a systematic change in the way that economic data now impacts on financial markets; and, finally, we conclude in Section 8.

2. The impact of news on financial prices

The reaction of financial prices to news should be determined by the extent to which the news changes market perceptions about the future payoff of the relevant security. For example, an announcement that changes expectations about long-term economic growth and inflation should, other things being equal, have some effect on the values of long-term assets. The announcement of Bank independence caused UK 20-year bond yields to fall by around 40 basis points on the day.

If the aims of monetary policy are clear, and it is possible to predict interest rate decisions accurately using publicly available macroeconomic data, then the interest rate decisions themselves will usually be less newsworthy and so will, on the whole, provoke little reaction in financial prices. News will, however, be conveyed in macroeconomic data releases. Over a period when the monetary policy process becomes more transparent, the reaction to these macroeconomic announcements could therefore increase while the reaction to interest rate decisions declines.

But monetary policy will never be completely devoid of news. This is because the process of converting raw, publicly available data into an interest rate decision can never be a mechanical one. Many judgments must be made before a policy stance can be taken. To the extent that the people making those judgments, and the analysis upon which they are based, 'add value' to the raw data, the decision may always contain some useful news

for the market and hence cause market agents to revise asset prices on the release of the decision. In that case increased transparency will allow more information to be extracted from the interest rate decision, and hence may provoke reactions that are large relative to the reactions to other macroeconomic data releases.

In summary, any improvement in the transparency of monetary policy might bring about a change in the way that both interest rate decisions and other macroeconomic announcements are incorporated into securities prices. And it is possible that changes in the reactions to these two types of announcements may be in opposite directions.

3. Related literature

Previous research has found that scheduled public announcements have a significant impact on securities prices in the United States. Using regression analysis, where announcements are represented by dummy variables in OLS regressions, Ederington and Lee (1993) used intra-day data for T-bond, eurodollar and dollar/Deutsche Mark futures contracts to identify those US macroeconomic news announcements that had the greatest impact on these contracts. They found that the most important announcements for the interest rate contracts were scheduled news announcements relating to employment, PPI, CPI, durable goods orders, industrial production – capacity utilisation, construction activity, the NAPM survey and the Federal budget. For the Deutsche Mark contract the US merchandise trade deficit, GNP and retail sales were also important. Ederington and Lee also found that the majority of the price adjustment in their sample occurred within the first minute, with subsequent price movements seemingly independent of this first-minute change.[(2)] Price volatility remained much higher than usual for around 15 minutes after the announcements, statistically and significantly higher for around 40 to 45 minutes and slightly higher for

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[(2)] This was in contrast to many studies prior to this date which had used lower-frequency data. For example, using US stock market data both Patell and Wolfson (1984) and Barclay and Lintzenberger (1988) identified significantly higher levels of volatility over a much longer post-announcement period.

several hours following the announcement. Using the same set of contracts but a different methodology, involving the comparison of securities prices around news announcements with the behaviour associated with equivalent periods that did not involve announcements, Ederington and Lee (1995) focused on price behaviour from the 2 minutes prior to the announcements to 10 minutes after. They found that the price reaction began within the first 10 seconds after the announcement and was over after another 40 to 50 seconds.[3]

Fleming and Remolona (1997), also employing a regression approach, used inter-dealer data for the US T-bond market, focusing on the possible implications that a particular market microstructure might have on the absorption of scheduled macroeconomic news announcements. To highlight some of the potential market microstructure issues they monitored the reactions of trade volume as well as price changes to the announcements. They found that 9 announcements had a statistically significant effect upon T-bond prices and 14 had an effect on trading activity. By decomposing the announcements into their expected and unexpected components using MMS forecast data they identified a further 6 announcements that had a significant impact upon the US T-bond market. As it is possible that the reaction of a market to a particular news announcement may vary depending upon the state of the world, Fleming and Remolona (1997) controlled for the economic cycle by using either a measure of implied volatility or the expected change in the Fed funds rate as a proxy for market conditions. They found that durable goods orders, GDP, housing starts and employment announcements had a more significant impact upon T-bond prices and trading volumes once the economic cycle had been accounted for. In a similar vein, and using daily data, McQueen and Roley (1993) found that by classifying economic activity as being either 'high', 'medium' or 'low' relative to trend, it was easier to identify reactions of the US stock market to US macroeconomic announcements.

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[3] The Ederington and Lee (1993, 1995) data set only contained price change data, preventing an analysis of trading activity around announcements.

Far less work of this nature has been conducted using UK-specific securities market data. Using high-frequency derivatives data from LIFFE, ap Gwilym *et al* (1998) investigated the impact of UK scheduled macroeconomic news announcements on LIFFE's FTSE 100 and short sterling futures contracts. They considered the impact of nine different announcement types, finding that the RPI, PPI and PSBR announcements all had a significant impact on FTSE 100 contracts, and that RPI, PPI, labour market statistics and retail sales announcements had a significant impact on short sterling contracts. Using the Ederington and Lee approach with a 12-minute window around the announcements, they found less price volatility than had been found in equivalent US studies in the 2 minutes prior to announcements, and a sharp reaction which peaked in the first 90 seconds, and which subsequently remained significantly higher for another 5 to 6 minutes. The number of transactions remained high for around 10 minutes. The authors also found some evidence to suggest that price overreaction existed in the LIFFE pits in the first minute after the announcement. Clare *et al* (1999) extended the Ederington and Lee approach to examine the impact of scheduled UK macroeconomic news announcements on gilt market volatility and trading volumes. They found tentative evidence to suggest that the increase in volatility that follows these announcements is associated with an increase in both the size of price changes and the average size of trades, but not with an increase in the number of gilt market trades.

While the studies cited above all use high-frequency data, there are two studies that use daily data to address issues of monetary policy transparency as seen by market participants. Haldane and Read (1999) look at the response of the UK yield curve to official interest rate changes, using daily data from January 1984 to May 1997 (the start of the Bank independence period). They conclude that the response of the UK yield curve to a 1% change in official interest rates fell following the adoption of inflation targeting in October 1992, particularly at maturities up to two years. In a related study, Joyce and Read (1999) look at the reaction of UK bond prices to RPI announcements from January 1982 to April 1997. They found that over the inflation targeting period beginning in October 1992 bond prices became less responsive to RPI announcements, and they interpret this as a sign of improved monetary policy credibility.

4. Data

4.1. LIFFE data

The tick-by-tick futures contract data used in this study are provided by LIFFE for the FTSE 100, short sterling and long gilt futures contracts traded on this exchange between January 1994 and June 1999. The data contain details of all trades in the contracts, and give the time to the nearest second, the price and the number of contracts traded. Most bids and asks are also recorded, but these are not matched, and at times of heavy trading the pit observers do not record all of these.[(4)]

The data used are generally for the most heavily traded contract. For the short sterling contract the nearest-to-maturity contract is used at all times. For the long gilt and FTSE 100 contracts we use the nearest-to-maturity contract until the trading volume on the next contract becomes greater. This generally occurs about three to four weeks prior to maturity for the former and at maturity for the latter. Since the futures price is linked by an arbitrage condition to the spot value of the index, the move to a new contract has virtually no implications for this study. We therefore pay no regard to contract changeovers in what follows. The close link between futures markets and the markets for the underlying asset also indicates that the results will be a good proxy for the reaction of the underlying asset.

4.2. Foreign exchange data

The foreign exchange data used here were provided by *Olsen & Associates* and consist of foreign exchange quote data gathered from Reuters, Knight-Ridder and Telerate. Foreign exchange quote data of this kind has been used extensively in the past to investigate: the behaviour of foreign exchange market volatility (see for example Andersen and Bollerslev (1997));

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(4) Over our sample period, and for the times of the day that we consider here, only a small percentage of total trades were conducted off-floor.

issues relating to foreign exchange market liquidity (see for example Hartmann (1996)); and issues relating to foreign exchange market volume (see for example Melvin and Yin (1996).[5]

We use the dollar/sterling and Deutsche Mark/sterling exchange rates between January 1994 and June 1999. The data are available on the tapes provided by Olsen on a 24-hour basis. We have deleted those days from the data set which correspond to a UK bank holiday. Even though the currency pairs are still traded elsewhere in the world, trading volume is substantially lower. Each line on the data file for each cross rate contains: a time stamp of the quote entry (GMT); bid and offer quotes; and codes denoting the country, city and institution of the dealer submitting the quote. In the analysis which follows we use the mid-prices of these cross rates.

4.3. Data transformation

We transform the irregularly spaced data in both data sets into calendar time intervals. For example, when we calculate returns over a five-minute interval, this return is defined as the log of the ratio of the closing price of the previous five-minute interval to the opening price for the subsequent five-minute interval. For the first window in each day the opening price is taken to be the first transaction of that day. When we calculate the number of trades using the LIFFE contracts we simply count the number of trades that occur in each five-minute interval.

4.4. Macroeconomic announcement data

The macroeconomic announcement data consist of those announcements listed in the MMS database, supplemented by the inclusion of: MPC interest rate decisions (including 'no change' decisions) since the Bank of England was granted operational independence on 6 May 1997; official interest rate changes up to (and including) 6 May; the publication of the minutes of MPC meetings and the equivalent minutes from pre Bank

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[5] Although see Danielsson and Payne (1999) for criticisms relating to the use of such data to test market micro-structural issues.

independence (BI) period's monetary meetings; and the publication of the *Inflation Report*. The full set of macroeconomic announcements that we use in our study is presented in Table A, along with their release times and the number of times they were released during our sample period.

The announcements reach the market at the official announcement time, which is generally 9.30 am for macroeconomic data releases and is currently 12.00 pm for interest rate decisions. The *Inflation Report* and the MPC minutes are made available to journalists in a secure location within the Bank an hour and half an hour respectively before the official announcement time. This allows Press reports to be made, and hence an informed reaction to take place, within a very short time of the official announcement.

5. Preliminary data analysis

We begin our empirical analysis here by identifying the 'top 20' macroeconomic announcements over the 5½-year sample period, in terms of their impact on LIFFE prices and exchange rates in the first five minutes. By looking at only the first five minutes we are restricting our analysis to the initial reaction only, but are also minimising the amount of 'noise' that is included. The exercise is similar in spirit to the one carried out by Fleming and Remolona (1997) using high-frequency US bond market data. Fleming and Remolona, however, began by identifying the largest (absolute) price changes and trading surges and then attempted to match these events with announcements. We however, look at only those periods that follow known macroeconomic announcements.

5.1. LIFFE contract top 20 reactions

In Tables B to D we present the top 20 announcements over our 5½-year sample in terms of their impact on futures contract prices (in either direction) over the five minutes following the announcements in our database. For short sterling price changes (Table B) the largest five announcement-related changes were brought about by interest rate changes – two in the pre-BI period and three in the post-BI period. The post-BI announcements make up a total of 7 of the top 20 price reactions in total. Among the other key

market-movers were the average earnings and unemployment figures. Only 2 of the pre-BI period interest rate changes make it into this top 20. In Table C we can see that, for the long gilt contract, the average earnings, unemployment and RPI figures appear to be the main market movers. This table indicates that interest rate changes, over the whole sample, have had a much smaller effect at the long end of the yield curve than at the short end, as one might expect. However, given that equities also represent a long-term real investment, it is somewhat surprising that the price change top 20 table for the FTSE stock index futures contract (Table D) is dominated, in much the same way as in Table B, by interest rate announcements – almost exclusively post-BI changes. The top 5 all relate to post-BI interest rate changes. These 5 reactions all occurred between June 1998 and February 1999. It is possible that these reactions to interest rate changes were related to the financial market turbulence at the time, ie reflecting the equity market's uncertainty about the way policy-makers would respond to the crises.

Given their importance, it is worth reviewing these 'top 5' FTSE 100 events with the aid of the Bloomberg survey of economists, which canvasses the opinions of professional economists about the forthcoming interest rate decision. The largest reaction occurred in February 1999 when the MPC reduced rates by 50 basis points. Only two respondents to the survey had predicted this change, 15 had predicted a 25 basis points cut, while the remaining 5 respondents had expected no change. The second-largest reaction occurred in June 1998 when rates were raised by 25 basis points: the Bloomberg survey indicated that 19 of the 20 respondents were expecting no change. The third-largest in November 1998 followed a 25 basis points cut surprising 19 of the 20 respondents who had expected no change. The fourth-largest reaction in October 1998 occurred when only 4 of the 14 respondents correctly anticipated the 25 basis points cut. Finally, the fifth-largest reaction in September 1998 followed an announcement to leave rates unchanged, but perversely the Bloomberg survey indicated that this decision had been correctly anticipated by all 20 respondents. Overall, however, there clearly are times when City economists are unable to anticipate the interest rate decision.

In the second column of Tables B to D we also present the rank of the announcement in terms of its impact on trading activity, where we measure

trading activity as the number of trades that occur in the five minutes following the announcement. For example, in Table B the announcement that leads to the greatest amount of trades in our sample in the following five minutes was the release of the industrial production statistics in January 1995. This announcement ranks equal 17th in terms of its impact on price. It is clear from the second column in these tables that there is a fairly low correlation between announcements that generate large price changes and large amounts of subsequent trading. Why is there such a low correlation between the two measures of reaction? It is possible that when there is a strong consensus relating to the scheduled news release that prices adjust quickly, with little impact on trading volumes. Alternatively, when there is little consensus, the price discovery process involves a greater degree of trading, but with little direct impact upon the market price, for example if there was a relatively equal split between traders who thought the news was 'good' and those that thought it was 'bad'.

5.2. Foreign exchange top 20 reactions

A more complex picture emerges when we consider the top 20 exchange rate price movements over our sample. Tables E and F show that average earnings, unemployment, industrial production and retail sales figures all figure prominently as market-movers. The July 1998, November 1998 and February 1999 post-BI interest rate announcements all appear in the dollar/sterling table. The February 1999 interest rate decision also appears in the Deutsche Mark/sterling table along with the November 1997 decision. No other interest rate decisions were amongst the most important market-movers over our sample period. Also note that the announcements which move one exchange rate also tend to move the other (not surprisingly). In the second column of Tables E and F we present the rank of the announcement with respect to the other cross rate. So, for example, the retail sales announcement in January 1998 is ranked first in terms of price reaction for both exchange rates.

5.3. Summary

The 'top 20' tables show that interest rate decisions, particularly those made since Bank of England independence, have often had a large impact on the short sterling and FTSE 100 contracts, although these announcements seem to have a relatively smaller impact upon the long gilt contract and on the dollar/sterling and Deutsche Mark/sterling exchange rates. Other announcements that appear to have a large effect on the market are the RPI inflation, average earnings/unemployment, retail sales and industrial production statistics.

6. Announcement versus non-announcement behaviour

In Section 5 above we presented an informal analysis of the impact of scheduled announcements upon the assets in this study. In this section we present a more formal analysis of the impact of these announcements. To this end we employ the announcement versus non-announcement day methodology of Ederington and Lee (1995)[(6)] by splitting the sample period into days when the announcements listed in Table A were made (announcement days) and those days when they were not (non-announcement days). We use the split between announcement and non-announcement days to investigate the pattern of price volatility (mean absolute returns)[(7)] and trading activity around the macroeconomic announcements. The differences in the mean absolute returns and mean number of trades between announcement and non-announcement days are tested using a non-parametric statistic.[(8)]

[(6)] ap Gwilym *et al* (1998) and Clare e*t al* (1999) also used this methodology.

[(7)] All returns given in this paper are log returns (ie $\ln[P_t/P_{t-1}]$), multiplied by 10,000 for notational convenience.

[(8)] We also calculate a parametric test for the difference in these means, but given the highly non-normal nature of the data we prefer to use and report the non-parametric statistic in expression **(1)**. The parametric results are available on request from the authors.

The non-parametric test which we use is the Kruskall-Wallis test which is given by:

$$H = \frac{12}{N(N+1)} \sum_{j=1}^{J} \frac{S_j^2}{m_j} - 3(N+1) \qquad \textbf{(1)}$$

where J=2, since there are only two series, ie the announcement and non-announcement series; N is the total number of observations from both series combined; m_j is the number of observations from series j; and S_j is the rank sum for series j. This test statistic is distributed $\chi^2(J\text{-}1)$ under the null hypothesis of equal medians.

We prefer to use this approach rather than the more commonly used dummy variable regression approach. High-frequency data such as these generally have highly persistent conditionally heteroskedastistic components and outliers, which make parametric inferences inappropriate (see Andersen, Bollerslev and Das (1999) for a critique of parametric inference with such data). The methodology we use should give a more statistically reliable framework for comparing the differences between announcement and non-announcement day behaviour.

In order to determine the size and speed of the impact of macroeconomic news announcements on the sterling exchange rates and LIFFE futures prices, we compared the behaviour in the period around announcements, with the behaviour on 'non-announcement' days, for a sequence of one-minute windows. Since announcements occur at different times of day we used event time rather than calendar time to construct the data set for the periods around the announcements, with all announcements said to occur at time zero.[9]

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[9] Working in 'event time' simply involves looking at the pattern of behaviour around incidences of a particular type of event. In this case the events are announcements, at whatever time of day these occur. Note that some researchers use the term 'event time' in the context of time series of high-frequency data, to indicate that each trade (event) is treated as a sequential observation regardless of the elapsed time between each trade.

Also, since market behaviour changes throughout the day, we constructed the non-announcement data set so that its time-of-day profile matched its announcement counterpart. In other words, we constructed the non-announcement data set so that it had the same proportion of observations around each announcement time (eg 9.30 am, 12.00 pm etc) as the announcement data set.

Two measures of the reaction were assessed: first, the mean absolute return, which captures the volatility of the price over the five-year period for each window; and second, trading activity, given by the mean number of transactions over the period for each window. Charts 1(i)-(iii) shows the mean absolute returns for one-minute windows around announcements for the LIFFE contracts. The results of the Kruskall-Wallis test used to assess the significance of the difference between announcement and non-announcement levels of the variables of interest are given in Table G. The sign attached to each number is determined by the sign of the mean rank of non-announcement sample minus the mean rank of announcement sample; therefore a positive (negative) number for a significant statistic indicates that the test for equality failed because the non-announcement reactions tended to be higher (lower) than announcement reactions. For all three LIFFE contracts the mean absolute returns peak in the first minute following the announcements, and then decline sharply. For the short sterling contract, the non-parametric statistics given in Table G show that mean absolute returns on announcement days remain significantly higher than on non-announcement days at the 1% level of significance for 15 minutes (and 22 minutes at the 5% level). For the long gilt contract the abnormal behaviour lasts for around 11 minutes at the 1% level of significance. For the FTSE 100 contract the abnormal activity lasts for around 8 minutes. Volatility in the short sterling contract appears to increase in the 2 minutes prior to announcements, whereas volatility in the long gilt contract appears to decrease 1 minute prior to announcements.

The length of the reaction for the short sterling and FTSE 100 contracts found here of 15 and 7 minutes respectively is longer than the 6 and 5 minutes documented by ap Gwilym *et al*. Also, we find less evidence of lower volatility prior to the announcements, as reported in that study.

In Charts 1(iv)-(v) we present the announcement and non-announcement activity for the two exchange rates. The results indicate a peak in volatility in the 5 minutes following announcements and a decline thereafter. The graphs indicate that the higher volatility lasts for our entire 60-minute window for the sterling/dollar rate and for at least 30 minutes for the Deutsche Mark/sterling rate. The tests statistics in Table G show that the volatility is statistically significant at the 1% level for about 25 minutes and 20 minutes for the sterling/dollar and Deutsche Mark/sterling rates respectively. In general, the announcements have a longer impact in the foreign exchange markets than at LIFFE.

In Chart 2 we present the pattern of trading activity, in terms of numbers of trades, around macroeconomic announcements for the three LIFFE contracts. For all three contract types trading activity increases strongly in the first minute, reaches a peak in the second minute, and subsequently falls away over the following 5 to 10 minutes, and then more gradually after this period. Trading activity appears to remain at higher than usual levels for around one hour after an announcement. Table G shows how this increase in trading activity is significantly different for the short sterling contract for the full 60-minute period; for 25 minutes for the long gilt contract; and for 40 minutes for the FTSE 100 contract.

For the short sterling and long gilt contracts, trading is statistically significantly higher than usual (at the 1% level) for 3 and 7 minutes prior to the announcements respectively. There is less evidence of such anticipatory trading for the FTSE 100 contract, indeed trading appears to be lower for at least 10 minutes before announcements, although not significantly so. ap Gwilym *et al* (1998) limit their analysis to a period stretching from 2 minutes before announcements to 10 minutes after. A visit by the authors to LIFFE in 1998 to observe the reaction of the short sterling pit to an MPC interest rate decision revealed that activity was very low prior to the announcement but increased at the announcement, with high trading levels persisting for some period afterwards. A LIFFE official informed us that increased trading levels tended to persist for around an hour after the announcement, consistent with our results.

7. Reactions pre and post Bank independence

In this section of the paper we investigate the hypothesis that there has been a systematic change in the way that scheduled macroeconomic news announcements are now absorbed into securities prices with the advent of the Bank of England's operational independence. As noted above, this independence was granted on 6 May 1997 by the UK Government with the remit that the Bank should aim to achieve an inflation target of 2½% a year; monetary policy decisions are now taken by the MPC.

In our empirical analysis we monitor the pattern of price reactions by calculating returns for each one-minute window from 10 minutes before announcements to 60 minutes after. We make similar calculations for a control sample of days when no macroeconomic announcements occur, which we refer to as 'non-announcement' days. The returns are used to calculate mean absolute returns (a measure of volatility) and mean cumulative absolute returns over the same period. We compare the mean absolute returns series for announcement and non-announcement days and test for differences between the two. We also subtract the mean cumulative absolute returns on non-announcement days from the mean cumulative absolute returns on announcement days to produce mean cumulative absolute abnormal returns (CAARs). Any systematic difference in the behaviour of the asset prices on announcement and non-announcement days can be used as a measure of the 'abnormal' behaviour that occurs around these announcements. To determine whether a pre-defined set of announcements has a larger or smaller impact upon asset prices following Bank independence (BI), we compare the abnormal behaviour in the pre-independence period with that in the post-independence period.

7.1. Pre and post-BI reactions to macroeconomic announcements

Charts 3(i)-(iii) show the reaction of the three LIFFE contracts to the set of macroeconomic announcements. The post Bank independence reactions are lower than the pre Bank independence reactions at all the horizons considered.

This is in sharp contrast to the results for the exchange rates, which are shown in Charts 3(iv)-(v). There appears to have been a clear post Bank independence increase in reactions in the foreign exchange (FX) market following macroeconomic announcements at all horizons. The differences between the two sets of results are puzzling. They suggest at face value that there has been an upward shift in the perceived importance of macroeconomic data to FX markets relative to other markets.

These results are supported by the test statistics presented in Panel B of Table A for the 5-minute period following the announcements. It is also clear that for the long gilt and FTSE 100 contracts there is still significantly lower volatility 60 minutes after the announcements (and after 15 minutes for the short sterling contract).

7.2. Pre and post-BI reactions to monetary policy related releases

In Charts 3(vi)-(x) we can see that for each of the futures contracts the *immediate* reaction to interest rate announcements in the post Bank independence period is higher than in the pre Bank independence period. This finding is consistent with the fact that the timing of interest rate announcements was known in advance post independence, whereas between 1994 and 1997 the timing was at the Bank of England's discretion. One might expect a faster reaction to an event whose timing is completely anticipated compared with one where there is some uncertainty. However, when we look beyond the initial period we can see that after approximately 10 minutes the reaction is lower for the two interest rate contracts and approximately the same for the equity index contract.

For the exchange rates Charts 5 and 6 show that the immediate reaction is also greater in the post Bank independence period than in the pre Bank independence period. But after approximately 30 minutes, the total impact of the interest rate announcements is very similar in both periods. These results suggest that for the period considered here the overall impact of Bank independence on the different markets was either to reduce the reaction to interest rate changes, or to have little noticeable impact.

The test statistics in Panel A of Table H indicate that for the 5 minutes following the interest rate announcements, the increase in volatility in the interest rate contracts is statistically significant.[10]

However, this is not true for the FTSE 100 contract or for the exchange rates. Looking further ahead, we also provide test statistics for the difference in volatility between the two periods after both 15 and 60 minutes. The non-parametric test indicates that none of these observed differences is significant. May 1997 to June 1999 was a period when the market had to learn about the MPC's reaction function, and this learning process was complicated by the fact that membership of the Committee changed substantially during its first year, with one member standing down and four new members joining. So, given these changes, it is encouraging that Chart 3(vi) is indicative of a reduction in the market reaction to an interest rate change in the hour after the announcement of a decision.

We also considered the impact of the releases of the minutes of the monetary meetings and of the Bank's quarterly *Inflation Report*. With respect to the former, there has been an increase in volatility for most of the asset prices that we study after five minutes, significantly so for the long gilt and Deutsche Mark/sterling at the 95% level of confidence. The exception is the FTSE 100 contract where the minutes have a significantly lower impact in the post-BI period, not just for the first 5 minutes but out to at least 60 minutes. In general then, the release of the minutes has had a larger impact upon the financial markets studied here in the post-BI period, although this increase is not always significant. This general result clearly does not hold for the FTSE 100 contract. The cumulative return is presented in a slightly different way: Chart 4(i) shows the difference between the CAARs in the pre and post independence periods (post minus pre), rather than the post and pre CAARs themselves, and the results for all five contracts are shown on the same chart. It should be borne in mind that the monetary meeting

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[10] We use 'changes' and do not include 'no changes' because 'no change' decisions did not exist prior to BI.

minutes often occurred simultaneously with other announcements, which may have affected the results.

Finally, the test statistics relating to the release of the *Inflation Report* – the MPC's keynote, quarterly assessment of the UK economy – has had a higher impact on the short sterling and foreign exchange markets after five minutes, although this is only statistically significant for the Deutsche Mark/sterling exchange rate. Its release has had a lower impact on the long gilt (significant after 60 minutes at the 95% level of confidence) and the FTSE 100 (significant after 5 minutes at the 99% level of confidence) contracts. In general it appears that the *Inflation Report* has had a higher impact in the post-BI period on the shorter-term assets, but a lower impact on the longer-term assets. The excess cumulative abnormal returns relating to the *Inflation Report* releases are presented in Chart 4(ii), and confirm the results in Panel B of Table H.

7.3. Pre and post-BI reactions to key macroeconomic announcements

We now consider the pre and post-BI market reactions to five of the key macroeconomic data releases that were identified as being particularly important in the 'top 20' tables. The excess cumulative abnormal returns relating to the RPI, PPI, labour market statistics, retail sales and industrial production announcements are presented in Charts 4(iii)-(vii), while the test statistics are presented in Panel C of Table H. As one might expect given the results in Panel A of Table H, the volatility following the announcements is generally lower in the post-BI period for the LIFFE contracts and higher for the exchange rates.

With respect to determining whether monetary policy is now more or less credible, we can see that long gilt prices have reacted less to RPI announcements post-BI (although this difference is not statistically significant). This could be taken as weak evidence to suggest that monetary policy is now more credible since RPI announcements now move the market less, perhaps implying that the expectation of longer-term inflation remains firmly anchored to the target rate. These results also confirm those of Joyce and Read (1999) who find that UK bond prices responded less to RPI announcements following the start of the United Kingdom's

inflation-targeting period between September 1992 and April 1997.

7.4. Change versus no change interest rate announcements

An interesting hypothesis with respect to scheduled interest rate announcements is the extent to which a 'no change' decision impacts on asset prices compared with decisions which result in a change. Using the post independence sub-sample we can use the announcement/ non-announcement methodology to investigate whether there is a difference between these two types of interest rate announcement. In Chart 5 we present the post-announcement behaviour of the LIFFE contracts where we have differentiated between 'no change' and 'change' decisions. The chart shows clearly that the two types of information have no systematically different effect in the short sterling and long gilt futures market. However, there is a strong differential impact on the FTSE 100 futures market for up to six minutes after the announcement, with the 'change' decisions leading to higher volatility. These results are confirmed using the Kruskall-Wallis test at the 95% level of confidence. In Chart 4 (ii) there is some evidence to suggest that a 'change' decision also has a marginally greater impact on the foreign exchange markets than equivalent 'no change' decisions. However, the application of the Kruskall-Wallis test shows that the differences are never statistically significant at conventional levels of confidence. In Chart 5 we present evidence which largely confirms the results presented in Chart 4 using trade data for the LIFFE contracts. The 'change' decisions have a differential impact only on the FTSE 100 futures contract; a difference which is confirmed by the Kruskall-Wallis test at the 95% level of confidence.

These results provide some evidence to suggest that 'change' decisions actually have a greater impact on some asset prices compared with those decisions which involve no interest rate change.

7.5. Pre and post-BI trading activity

In Charts 6(i)-(ix) we present the excess cumulative trades that follow scheduled macroeconomic news announcements in the post-BI period relative to the pre-BI period. Thus negative (positive) values for these series indicate that trading activity is lower (higher) in the post versus the pre-BI

period. These data are only calculated for the LIFFE contracts in our sample, as we do not have equivalent data for the F/X series. The significance or otherwise in the differences between the pre and post-BI trading activity following the announcements can be ascertained by examining the Kruskall-Wallis tests in Table I.

For the short sterling and FTSE 100 contracts there now appears to be statistically significantly lower activity following macroeconomic announcements (excluding monetary policy related announcements). This is most pronounced for the FTSE 100 contract. In Panel B of Table I and in Charts 6(ii)-(iv), there appears to be generally higher trading activity following monetary policy announcements in the post-BI period. Graphically this appears to be particularly true for the long gilt contract, although it is only statistically significant following interest rate changes. A number of points are worth making with respect to the individual announcements presented in Panel C of Table I, and in Charts 6(v)-(ix). First, generally speaking it is clear that trading activity following these announcements is lower in the post-BI period relative to the pre-BI period, although the results are not always statistically significant. Second, there is a uniformly significant reduction in post-BI trading activity following all of these announcements relative to pre-BI levels for the FTSE 100 contract. Finally, for all three contracts, the RPI, PPI and industrial production announcements now cause significantly lower trading activity relative to the pre-BI period.

7.6. Summary

The results presented in this section of the paper indicate that the LIFFE contracts now react more quickly to interest rate decisions, but that the final magnitude of the reaction is possibly less. The LIFFE contracts appear to react less to macroeconomic data releases in the post-BI period relative to the pre-BI period. The exchange rates also react more rapidly to interest rate decisions in the post-BI period, but also appear to react more to macroeconomic data releases. For the LIFFE contracts there appears to be less reaction, in terms of trading activity, to macroeconomic data releases, and more to interest rate changes. This latter result, combined with the potential reduction in the size of the price reaction, may indicate a wider

range of expectations amongst traders about interest rate changes in the post-BI period.

8. Conclusions

In this paper we have examined the extent to which the change in the United Kingdom's monetary policy arrangements, which occurred in 1997, has changed the way in which UK economic announcements are impounded into financial prices. The total (cumulative) reaction of the LIFFE contracts and exchange rates to interest rate changes appears to be either unchanged or lower in the post-Bank independence period, depending on the market observed. This supports the idea that the news content of monetary policy announcements may have fallen. However, while the total reaction supports this view, the differences in pre versus post-independence behaviour are rarely significantly different from one another in a statistical sense at these longer (30 to 60 minute) horizons. The immediate reaction to interest rate changes in the first 5 minutes is larger in all of the markets studied here and the differences between the pre and post-independence reactions at this horizon are frequently very significant. With respect to interest rate changes then it appears that the news contained in the decisions is incorporated into financial prices more quickly than in the pre Bank independence era. One possible explanation for this is that pre-positioning in the financial markets ahead of the decision has become more sophisticated since Bank independence, with the publication of a clear, unambiguous timetable for the announcements of interest rate decisions. Another explanation that has been suggested to us is that financial market technology has been improved in a way that allows for a faster reaction. Although we cannot rule this explanation out completely, we believe that the technology during this period did not change sufficiently (if at all in some cases) to account for these changes.

We also tested for a change in the way that the markets studied here absorbed macroeconomic data following Bank independence. Looking at exchange rate responses, there is very clear evidence to support the idea that FX market agents now pay more attention to macroeconomic data announcements than in the pre-independence period. This evidence appears to suggest that the underlying economic data have become more

important in these markets relative to the key monetary policy announcement. A different picture emerges when we consider the impact of the same set of announcements on all three LIFFE contracts, which is lower in the post Bank independence period. If we consider this evidence along with the fact that the immediate impact of interest rate changes on these contracts was higher in the post-independence period, then we might conclude that, relatively speaking, the macro data were less important than the key monetary policy decision and therefore that the markets were still learning about the MPC's reaction function over this period. This seems to be a reasonable possibility given that prior to independence market agents were only having to 'second-guess' one person – the Chancellor – whereas after the change they had to play the game with the nine members of the committee, whose votes and therefore opinions all carried (and continue to carry) the same weight. However, if we consider this evidence along with the fact that the overall impact of interest rate changes on these financial prices was lower, or unchanged, in the post-independence period, this could be taken to imply that both the key interest rate decision and the general UK macroeconomic data were both relatively less important, or at least no more important, in the post-independence period. If one is willing to accept this interpretation of our results, then this may suggest that the UK economic environment has become of less importance to the sterling-denominated financial prices considered here – a distinct possibility given the globalisation of financial markets and the world's larger economies in general. This might in turn imply that, relatively speaking, UK domestic economic news will be of less relevance than international economic news in the future.[(11)]

[(11)] We intend to pursue this question in future work of this kind.

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Table A: Announcement set

	No. of observations	Release time(s)
Interest rate change (pre BI)	10	09:40, 09:45, 11:00, 12:00
Interest rate decision (post BI)	25	12:00
(Of which interest rates changes)	12	
Inflation Report (pre BI)	13	10:30, 11:30
Inflation Report (post BI)	9	10:30
Minutes of monetary policy meetings (pre BI)	25	09:30
Minutes of MPC meetings	25	09:30
RPI M/M	66	09:30
RPIX Y/Y	65	09:30
PPI input M/M	66	09:30
PPI output M/M	66	09:30
Average Earnings	61	09:30
Unemployment	65	09:30
Prel. GDP Q/Q	22	09:30
Revised GDP Q/Q	22	09:30
Final GDP Q/Q	21	09:30
Ind Prod M/M	66	09:30
Retail sales M/M	66	09:30
PSBR	66	09:30
M0 M/M	66	09:30
M4 M/M	64	09:30
Consumer credit	67	09:30
Current Account	21	09:30
Global visible trade	67	09:30
Ex-EU visible trade	66	09:30
CIPM	38	09:30
CBI Dist trades	40	09:30, 10:00, 11:00, 11:30
CIPS services survey	26	09:30
CBI Ind Trends	40	11:00, 11:30

BI = Bank of England independence

Table B: Top 20 short sterling price change reactions

Rank	#	Date	Time	Return*	No. trades	Announcement(s)
1	-	04/02/99	12:00	21.17	8	Interest rates (post BI)(-0.50)
2	-	04/06/98	12:00	-17.31	11	Interest rates (post BI)(+0.25)
3	-	06/06/96	09:45	17.02	7	Interest rates (pre BI)(-0.25)
4	8=	05/11/98	12:00	13.93	17	Interest rates (post BI)(-0.50)
5	-	30/10/96	12:00	-12.79	8	Interest rates (pre BI)(+0.25)
6	-	15/07/98	09:30	-11.93	8	Average earnings / Unemployment / MPC minutes
7	-	17/12/98	09:30	-10.60	6	Retail sales
8	8=	10/06/99	12:00	10.55	17	Interest rates (post BI)(-0.25)
9	-	12/10/94	09:30	9.63	12	Average earnings / Unemployment / RPI
10	2	16/11/94	09:30	9.61	26	Average earnings / Unemployment / PSBR / RPI
11	-	06/08/98	12:00	8.67	7	Interest rates (post BI)(n.c.)
12	-	06/11/97	12:00	-8.64	9	Interest rates (post BI)(+0.25)
13	-	14/01/98	09:30	-8.64	13	Average earnings / Unemployment / MPC minutes
14	-	24/05/95	09:30	8.58	10	GDP revised
15	-	06/06/97	12:00	-8.57	9	Interest rates (post BI)(+0.25)
16	-	18/01/96	09:45	8.53	5	Interest rates (pre BI)(-0.25)
17=	-	18/06/98	09:30	-7.60	8	M4 / Retail sales
17=	1	11/01/95	09:30	7.55	27	Industrial production
19	-	08/03/95	09:30	7.53	9	Industrial production
20	-	11/05/95	11:30	-7.53	8	Inflation report (pre-BI)

# indicates the rank for short sterling in terms of trading activity (Top 20 only)

* all returns quoted in this paper are 10000 times the actual log returns

BI = Bank of England independence

Table C: Top 20 long gilt price change reactions

Rank	#	Date	Time	Return*	No. trades	Announcement(s)
1	-	12/10/95	09:30	-79.32	35	RPI
2	-	20/04/94	09:30	-78.52	46	Average earnings / Unemployment / PSBR
3	19=	21/04/94	09:30	-77.64	57	Retail sales
4	-	12/10/94	09:30	77.52	46	Average earnings / Unemployment / RPI
5	-	16/11/94	09:30	76.75	51	Average earnings / Unemployment / RPI / PSBR
6	-	19/03/97	09:30	-76.59	31	Average earnings / Unemployment / Retail sales / Monetary meeting minutes
7	-	15/11/95	09:30	76.18	44	Average earnings / Unemployment / Retail sales
8	15=	18/05/94	09:30	-75.70	64	Average earnings / Unemployment / RPI / PSBR
9	-	20/06/94	09:30	-73.99	9	M4
10	-	18/03/98	09:30	72.44	43	Average earnings / Unemployment / Retail sales
11	-	30/10/96	12:00	-72.04	37	Interest rates (pre BI)(+0.25)
12	-	18/08/94	09:30	-71.54	26	Retail sales
13	-	18/05/95	09:30	71.01	22	Retail sales
14	-	14/11/96	09:30	-70.88	35	RPI
15	-	16/01/97	09:30	70.21	34	RPI
16	-	07/12/94	09:30	-69.54	13	Industrial production
17	-	18/06/97	09:30	-69.52	37	Retail sales / Monetary meeting minutes
18	-	24/05/95	09:30	69.40	27	GDP revised
19	-	06/09/95	09:30	69.37	29	Industrial production
20	-	31/03/95	09:30	-69.16	8	Consumer Credit

# indicates the rank for long gilt in terms of trading activity (Top 20 only)

* all returns quoted in this paper are 10000 times the actual log returns

BI = Bank of England independence

Table D: Top 20 FTSE 100 price change reactions

Rank	#	Date	Time	Return*	No. trades	Announcement(s)
1	-	04/02/99	12:00	79.72	49	Interest rates (post BI)(-0.50)
2	6	04/06/98	12:00	-74.87	68	Interest rates (post BI)(+0.25)
3	-	05/11/98	12:00	66.03	49	Interest rates (post BI)(-0.50)
4	18=	08/10/98	12:00	-63.09	50	Interest rates (post BI)(-0.25)
5	18=	10/09/98	12:00	-59.04	50	Interest rates (post BI)(no change)
6	-	17/08/94	09:30	56.37	48	RPI / Average earnings / Unemployment
7	-	14/09/94	09:30	-51.68	37	RPI / Average earnings / Unemployment
8	-	23/03/94	09:30	-49.49	48	RPI
9	-	08/09/98	09:30	-47.63	31	Industrial production
10	5	02/06/99	09:30	44.52	71	M4 / Consumer Credit
11	-	15/09/98	09:30	41.83	37	RPI
12	-	16/09/94	09:30	-41.66	23	PSBR
13	-	06/11/97	12:00	-40.65	33	Interest rates (post BI)(+0.25)
14	-	19/01/94	09:30	40.28	49	RPI / PSBR / Retail sales
15	-	08/04/99	12:00	-38.42	37	Interest rates (post BI)(-0.25)
16	-	16/11/94	09:30	38.16	38	RPI / Average earnings / Unemployment / PSBR
17	17	30/10/96	12:00	-37.31	51	Interest rates (pre BI)(+0.25)
18	-	13/04/95	09:30	-37.17	34	Global trade / RPI
19	-	23/07/98	09:30	-35.13	49	Global trade / Trade excl EU
20	-	18/12/98	09:30	34.90	13	M4

# indicates the rank for FTSE 100 in terms of trading activity (Top 20 only)
* all returns quoted in this paper are 10000 times the actual log returns
BI = Bank of England independence

Table E: Top 20 sterling / dollar price change reactions

Rank	#	Date	Time	Return*	Announcement(s)
1	1	21/01/98	09:30	-42.66	Retail sales / M4
2	-	05/11/98	12:00	-42.27	Interest rates (post BI)(-0.50)
3	4	10/02/98	09:30	-31.31	RPI
4	11	16/06/98	09:30	30.43	RPI / PSBR
5	3	07/07/97	09:30	-29.31	Industrial production
6	5	04/02/99	12:00	-28.44	Interest rates (post BI)(-0.50)
7	-	14/01/98	09:30	26.36	Average earnings / Unemployment / MPC minutes
8	13	15/07/98	09:30	26.28	Average earnings / Unemployment / MPC minutes
9	7	18/03/98	09:30	-24.51	Average earnings / Unemployment / Retail sales
10	-	17/09/98	09:30	24.31	Retail sales
11	-	09/07/98	12:00	-23.63	Interest rates (post BI)(n.c.)
12	10	18/06/98	09:30	23.42	Retail sales / M4
13	-	10/01/97	09:30	-23.05	Industrial production
14	17	20/01/99	09:30	-22.98	Retail sales / MPC minutes
15	19	21/04/94	09:30	22.42	Retail sales
16	-	26/02/98	09:30	22.28	Global trade / Trade excl EU
17	-	21/08/97	11:00	-21.34	CBI Industrial Trends
18	-	30/10/96	09:30	20.95	M0 / Consumer credit
19	20	06/02/98	09:30	-20.61	Industrial production
20	-	05/12/96	11:30	20.41	CBI Distributive Trades

# indicates the Sterling / DM rank of the same announcement (Top 20 only)

* all returns quoted in this paper are 10000 times the actual log returns

BI = Bank of England independence

Table F: Top 20 sterling / DM price change reactions

Rank	#	Date	Time	Return*	Announcement(s)
1	1	21/01/98	09:30	-45.27	Retail sales / M4
2	-	06/11/97	12:00	42.93	Interest rates (post BI)(+0.25)
3	5	07/07/97	09:30	-37.36	Industrial production
4	3	10/02/98	09:30	-37.26	RPI
5	6	04/02/99	12:00	-36.29	Interest rates (post BI)(-0.50)
6	-	24/07/97	09:30	33.90	Global trade / Trade excl EU / (& Harmonised CPI)
7	9	18/03/98	09:30	-32.65	Average earnings / Unemployment / Retail sales
8	-	13/05/98	09:30	31.30	Average earnings / Unemployment / MPC minutes
9	-	08/07/97	09:30	30.37	RPI
10	12	18/06/98	09:30	30.28	Retail sales / M4
11	4	16/06/98	09:30	29.44	RPI / PSBR
12	-	06/07/98	09:30	-27.92	Industrial production
13	8	15/07/98	09:30	27.52	Average earnings / Unemployment / MPC minutes
14	-	18/02/98	09:30	26.47	Retail sales
15	-	12/08/98	09:30	-25.67	Average earnings / Unemployment / MPC minutes
16	-	05/08/98	09:30	25.17	Industrial production / CIPS Services
17	14	20/01/99	09:30	-24.27	Retail sales / MPC minutes
18	-	21/05/98	09:30	-23.81	Retail sales / M4
19	15	21/04/94	09:30	23.79	Retail sales
20	19	06/02/98	09:30	-23.64	Industrial production

# indicates the Sterling / Dollar rank of the same announcement (Top 20 only)

* all returns quoted in this paper are 10000 times the actual log returns

BI = Bank of England independence

Table G: Non parametric statistics, all announcements vs non announcements

End of 1 min. period rel. to announcement	Mean Absolute Returns					Mean Number of Trades		
	Short Sterling	Long Gilt	FTSE	GBP-USD	GBP-DEM	Short Sterling	Long Gilt	FTSE
-9	-0.01	0.08	-0.22	0.15	0.17 **	0.13	0.04	-0.03
-8	0.03	-0.02	-0.11	0.09	0.18	0.07	0.04	0.04
-7	0.07	0.12	0.17	0.06	-0.06	0.04	0.10 ***	-0.15
-6	0.02	-0.16	-0.05	0.10	-0.07	-0.02	0.10 **	-0.03
-5	0.02	0.78	-0.04	0.04	0.24 **	0.15	0.12 ***	-0.17
-4	0.10 **	-0.10	-0.08	-0.04	0.15	0.22 **	0.15 ***	-0.04
-3	0.07	0.43	0.21	0.07	0.06	0.20 ***	0.19 ***	-0.10
-2	0.09 **	-0.14	-0.14	0.20	0.08	0.41 ***	0.27 ***	-0.10
-1	0.12 ***	-0.10 ***	0.20	-0.05	0.30	0.49 ***	0.28 ***	0.20
0	0.14 ***	0.29 ***	0.42	0.13	0.20	0.68 ***	0.38 ***	0.05
1	0.80 ***	2.70 ***	2.59 ***	0.80 ***	0.57 **	2.74 ***	0.80 ***	1.38 ***
2	0.61 ***	2.12 ***	1.68 ***	0.93 ***	1.31 ***	3.05 ***	0.81 ***	1.57 ***
3	0.43 ***	1.41 ***	1.22 ***	0.65 ***	0.95 ***	2.62 ***	0.69 ***	1.44 ***
4	0.30 ***	0.70 ***	1.05 ***	0.98 ***	0.85 ***	2.15 ***	0.62 ***	1.31 ***
5	0.22 ***	0.81 **	0.53 ***	0.81 ***	0.86 ***	1.85 ***	0.46 ***	1.03 ***
6	0.24 ***	0.51 ***	0.41	0.64 ***	0.58 ***	1.64 ***	0.41 ***	0.95 ***
7	0.20 ***	0.03 **	0.75 ***	0.54 ***	0.62 ***	1.48 ***	0.33 ***	0.97 ***
8	0.13 ***	0.89 ***	0.36 **	0.39 ***	0.60 ***	1.45 ***	0.34 ***	1.08 ***
9	0.12 ***	0.92 ***	0.38	0.53 ***	0.79 ***	1.43 ***	0.29 ***	0.86 ***
10	0.12 ***	0.84 ***	0.24	0.44 ***	0.60 ***	1.27 ***	0.32 ***	0.67 ***
11	0.12 ***	0.56 ***	0.30	0.31 ***	0.66 ***	1.02 ***	0.28 ***	0.64 ***
12	0.12 ***	0.10 **	0.25	0.39 ***	0.38 ***	1.10 ***	0.30 ***	0.65 ***
13	0.12 ***	0.76 **	0.57 ***	0.50 ***	0.25 ***	1.17 ***	0.32 ***	0.68 ***

Table G: Non parametric statistics, all announcements vs non announcements-continued

End of 1 min. period rel. to announcement	Mean Absolute Returns					Mean Number of Trades		
	Short Sterling	Long Gilt	FTSE	GBP-USD	GBP-DEM	Short Sterling	Long Gilt	FTSE
14	0.11 ***	0.64 **	0.35 **	0.31 ***	0.48 ***	0.97 ***	0.22 ***	0.75 ***
15	0.11 ***	-0.22 **	0.22	0.17 **	0.22 ***	0.97 ***	0.17 ***	0.61 ***
16	0.07 **	-0.31	0.19	0.37 ***	0.36 ***	0.83 ***	0.19 ***	0.62 ***
17	0.07	0.22	0.38	0.28 **	0.35 ***	0.74 ***	0.16 ***	0.66 ***
18	0.07 **	1.17 ***	0.10	0.24 ***	0.22 **	0.81 ***	0.17 ***	0.72 ***
19	0.09 **	0.33	0.22	0.21 ***	0.28 ***	0.73 ***	0.15 ***	0.49 ***
20	0.09 **	0.61 ***	0.35 **	0.30 ***	0.18	0.89 ***	0.17 ***	0.54 ***
21	0.11 **	0.71	0.32	0.09	0.08	0.96 ***	0.16 ***	0.66 ***
22	0.11 ***	0.17 ***	0.09	0.14 ***	0.24 **	0.83 ***	0.16 ***	0.69 ***
23	0.08	1.16 ***	0.25	0.20 ***	0.39 ***	0.82 ***	0.15 ***	0.40 ***
24	0.03	-0.15	0.28	0.28 ***	0.37 ***	0.85 ***	0.13 **	0.53 ***
25	0.08 **	0.13	0.27 **	0.21 ***	0.17	0.85 ***	0.13 ***	0.62 ***
26	0.05	0.22 ***	0.48 ***	0.32 ***	0.30 **	0.71 ***	0.13 **	0.52 ***
27	0.07	-0.09	0.05	0.12 **	0.12	0.69 ***	0.18 ***	0.32 **
28	0.07 **	0.12 **	0.28	0.31	0.21	0.69 ***	0.15 ***	0.40 ***
29	0.08	0.25	-0.10	0.38 ***	0.22 **	0.63 ***	0.08	0.18
30	0.04	-0.36 ***	0.17	0.01	0.36 ***	0.77 ***	0.09	0.28 **
31	0.05	-0.51	0.02	0.05	0.23	0.63 ***	0.11 **	0.37 ***
32	0.07	0.33 ***	0.19	0.27 **	0.24	0.79 ***	0.08	0.44 ***
33	0.07	0.37	0.03	0.25 ***	0.22	0.56 ***	0.11	0.43 ***
34	0.08 **	-0.01 **	0.22	-0.05	0.36 **	0.58 ***	0.10 **	0.40 ***
35	0.07	0.22 ***	0.14	0.36 ***	0.31 ***	0.59 ***	0.10 **	0.50 ***
36	0.07	-0.07	-0.17	0.02	0.25 ***	0.53 ***	0.11 **	0.34 **
37	0.05	-0.53	0.02	0.18 ***	0.18 ***	0.52 ***	0.07	0.22

Table G: Non parametric statistics, all announcements vs non announcements-continued

End of 1 min.		Mean Absolute Returns				Mean Number of Trades		
period rel. to announcement	Short Sterling	Long Gilt	FTSE	GBP-USD	GBP-DEM	Short Sterling	Long Gilt	FTSE
38	0.03	0.34	0.41 **	-0.01	0.21 **	0.54 ***	0.12 ***	0.33 ***
39	0.04	-0.03	0.12	0.25 **	0.23 **	0.47 ***	0.11 **	0.40 **
40	0.08 **	-0.39	0.07	0.27 ***	0.29 **	0.49 ***	0.20 ***	0.28 **
41	0.07	0.15 ***	0.05	0.26 **	0.08	0.57 ***	0.11 **	0.32 ***
42	0.02	-0.09 **	0.32	0.11	0.21	0.52 ***	0.13 ***	0.42 ***
43	0.06	-0.29	-0.11	0.31 ***	0.33 ***	0.53 ***	0.10 **	0.30 **
44	0.03	0.23	-0.01	0.22	0.23 ***	0.33 ***	0.11 **	0.20
45	0.03	0.25 ***	-0.01	0.10	0.11	0.60 ***	0.08	0.38 ***
46	0.09 **	-0.16	-0.03	0.24	-0.02	0.57 ***	0.08	0.35 **
47	0.05	-0.31 **	0.13	0.12	0.24 **	0.37 ***	0.10	0.37 **
48	0.06	0.11	0.00	0.07	0.17	0.51 ***	0.10 **	0.19
49	0.06	-0.15	0.14	0.16	0.23 **	0.53 ***	0.06	0.16
50	0.05	0.26 ***	0.19	0.28 ***	0.23 **	0.55 ***	0.08	0.31 ***
51	0.01	-0.35	-0.04	0.12	0.21 **	0.50 ***	0.05	0.33 **
52	0.02	-0.56 ***	0.23	-0.02	0.23 ***	0.45 ***	0.00	0.41 **
53	0.04	-0.82	0.11	0.09	0.19 **	0.54 ***	0.06	0.25
54	0.01	-0.53	0.19	0.32 **	0.19	0.37 **	0.04	0.20 **
55	0.04	-0.08 **	0.13	0.30 ***	0.14	0.45 ***	0.10	0.23
56	0.04	0.07	0.15	0.18	0.09	0.45 ***	0.08	0.20
57	0.01	-0.14 **	0.08	0.03	0.22 ***	0.37 ***	0.01	0.22
58	0.03	0.15	-0.14	0.06	0.17 **	0.36 **	0.10 **	0.11
59	0.05	0.16 **	0.05	0.04	0.17	0.26 **	0.10 **	0.01
60	0.03	-0.52	0.10	0.11	0.27 ***	0.37 ***	0.08	0.18

** = Significance at the 95% level *** = Significance at the 99% level

Table H: Abnormal reactions to announcements post- vs. pre-BI

5, 15 and 60 minutes after announcements

Announcement type	mins.	Short Sterling	Long gilt	FTSE-100	GBP-DEM	GBP-USD
			Panel A			
All macroeconomic data announcements[1]	5	-0.08 ***	-1.58 ***	-2.19***	2.74 ***	2.52 ***
	15	-0.31 **	-3.90	-3.87***	1.99	1.43
	60	-0.60	-2.74 ***	-7.90***	0.80	1.10
			Panel B			
Interest rate changes	5	2.06 **	5.58 **	15.23	4.76	5.81
	15	-2.61	-18.45	-3.45	8.28	11.60
	60	-2.29	-10.24	6.30	-2.90	-9.10
Monetary Meeting minutes	5	0.57	1.01 **	-6.40***	5.79 **	4.20
	15	0.00	-1.94	-8.22**	9.39 ***	7.52 **
	60	0.29	5.04	-18.60***	3.75	3.33
Inflation Report	5	0.05	-10.58	-7.88***	4.36 **	4.35
	15	1.04 **	-11.34	-7.71	6.02	7.21
	60	-0.20	-8.89**	-10.03	14.16	10.27
			Panel C			
RPI	5	-1.29	-9.35	-11.42***	6.37 ***	4.95 **
	15	-1.93	-12.31	-15.28***	3.68	5.31
	60	-2.58	-8.11	-23.09***	7.17	6.99 **
PPI	5	-0.10	-0.34	-0.73	0.78	0.99
	15	-0.53	-3.62	-3.54	1.29	-0.11
	60	-1.41	-3.16	0.82	4.90	2.19
Unemployment	5	-0.56	-5.11 ***	-9.62***	4.76	4.34 **
	15	-1.29	-13.59	-14.67 ***	4.39	4.64
	60	-1.09	-3.67	-22.38 ***	3.31	5.39
Retail Sales	5	-0.50	3.09 **	-3.76**	6.34	6.52 ***
	15	0.18	-7.36	-4.26	7.60	7.27 **
	60	-0.56	-4.77	-7.87	5.13	5.68
Industrial Production	5	-0.22	-4.15	0.78	6.17 ***	3.71 ***
	15	-0.79	-3.90	-5.37	2.44	1.64
	60	-1.68 **	-14.81	-13.79	-1.64	1.93

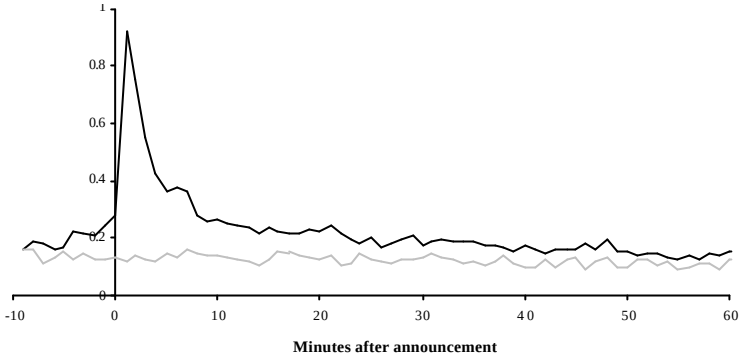
** = Significance at the 95% level *** = Significance at the 99% level

The figures are given by the reactions in the pre-BI period minus the reactions in the post-BI period where the reaction is defined as the excess mean absolute return in the 5 minutes following the announcement on announcement days relative to non-announcement days. The significance of the difference between the pre- and post-BI behaviour is tested using the (non-parametric) Kruskall-Wallis test.

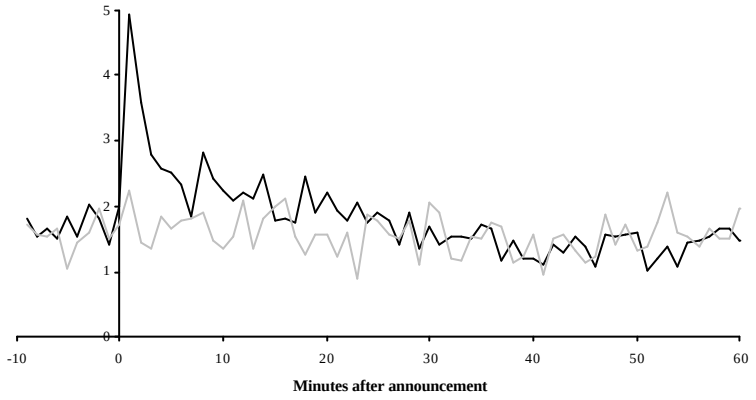
[1]All announcements other than those in Panel B

Chart 1 : Mean absolute returns around announcements

i) Short Sterling



ii) Long gilt



iii) FTSE 100

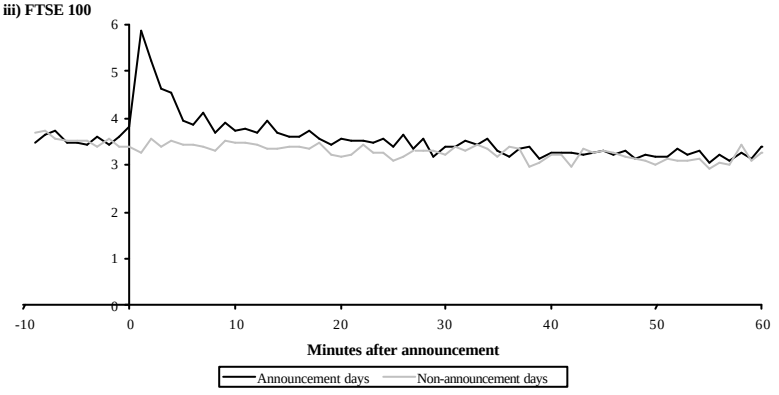
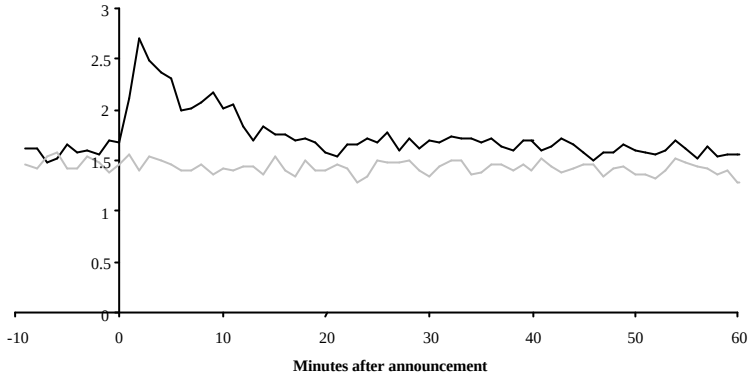


Chart 1 : Mean absolute returns around announcements - continued

iv) Sterling/Dollar



v) Sterling/DM

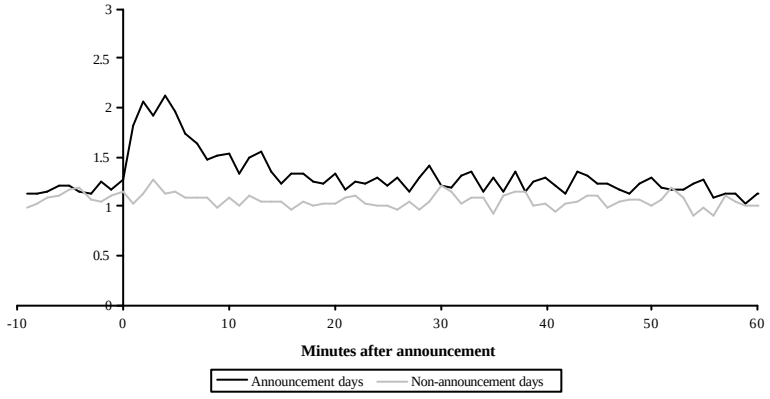


Chart 2: Mean number of trades around announcements

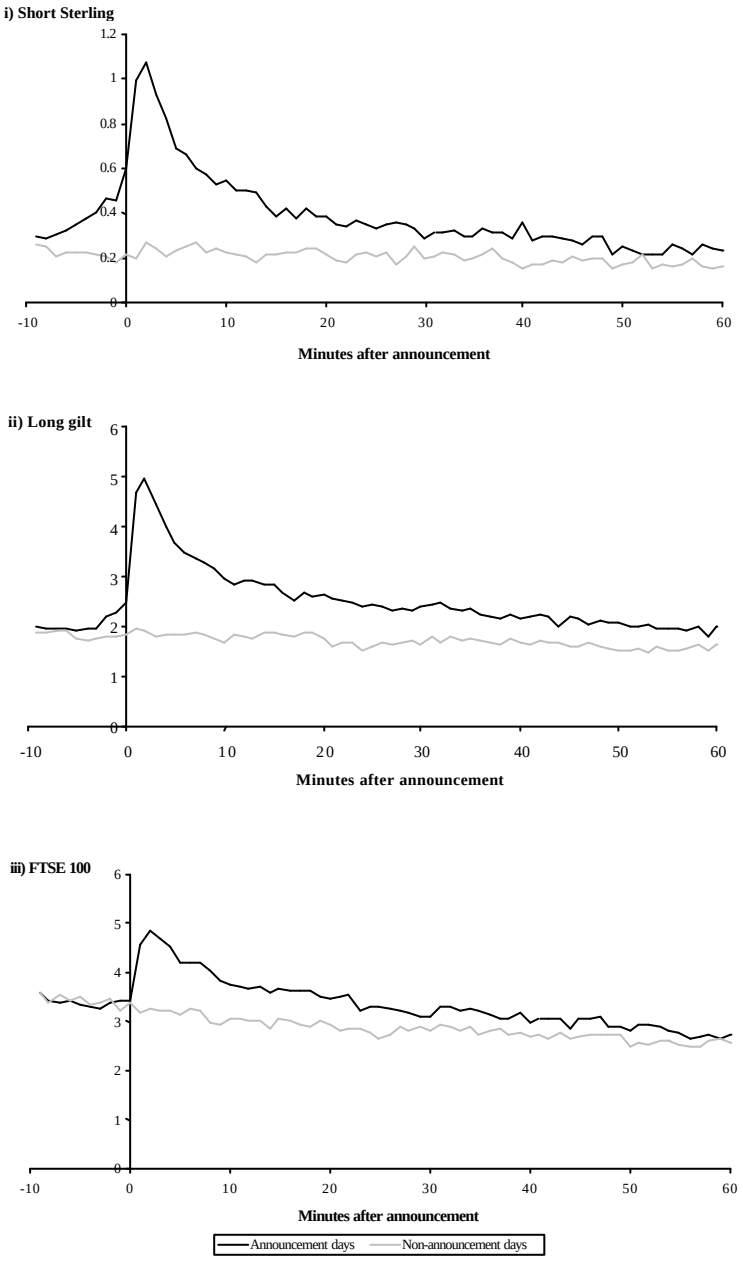
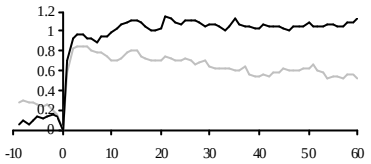


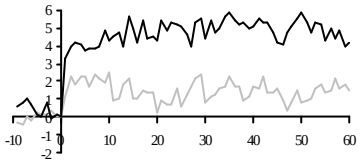
Chart 3 : Cumulative abnormal returns

All macroeconomic data releases

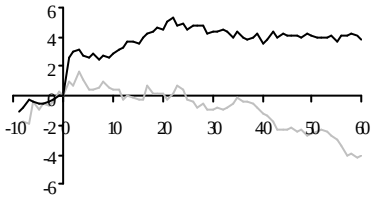
i) Short Sterling



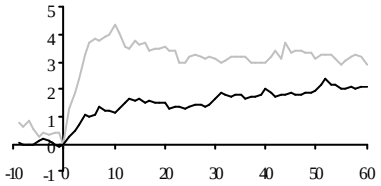
ii) Long Gilt



iii) FTSE-100

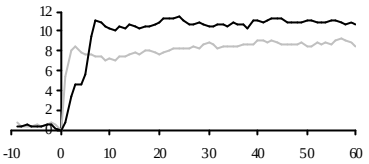


iv) DEM/£

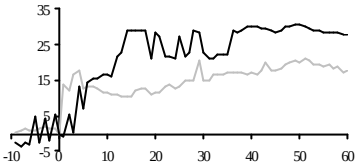


Interest rate changes

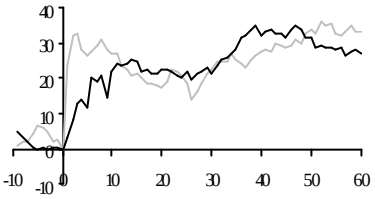
vi) Short Sterling



vii) Long Gilt



viii) FTSE-100



ix) DEM/£

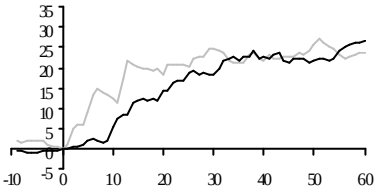
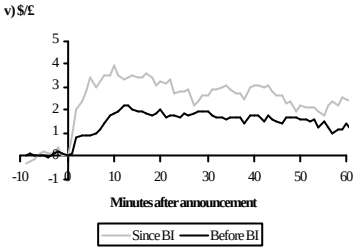


Chart 3: Cumulative abnormal returns - continued

All macroeconomic data releases



Interest rate changes

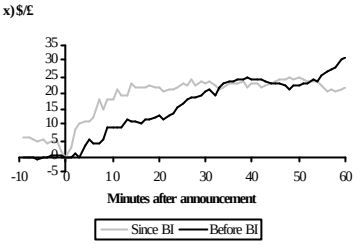
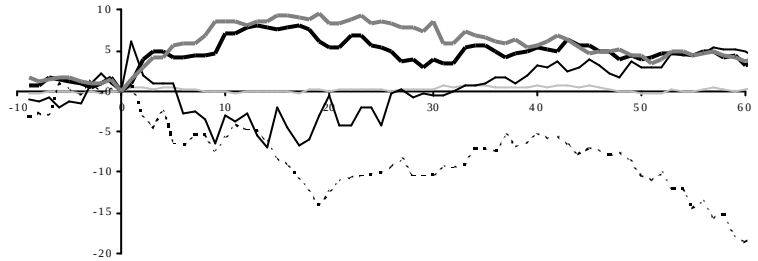


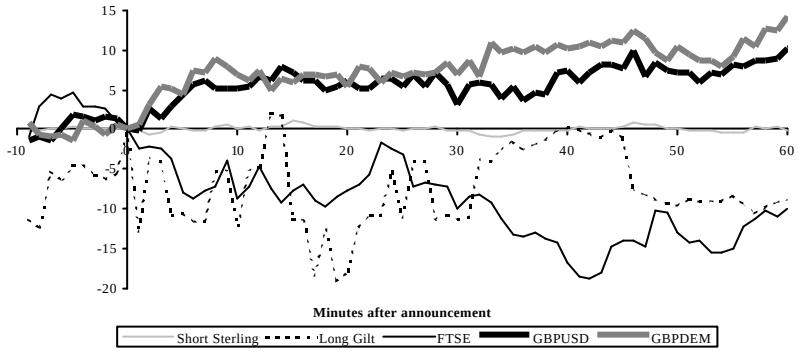
Chart 4: Cumulative abnormal returns around announcements

Difference between announcement and non announcement days Pre and Post BI

i) Monetary Meeting Minutes



ii) Inflation Report



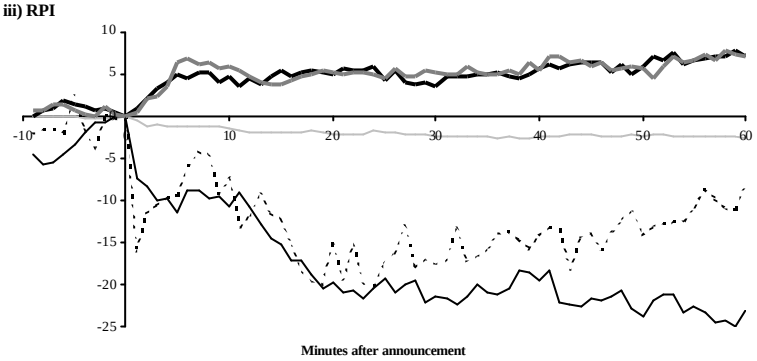
Minutes after announcement

Short Sterling Long Gilt FTSE GBPUSD GBPDEM

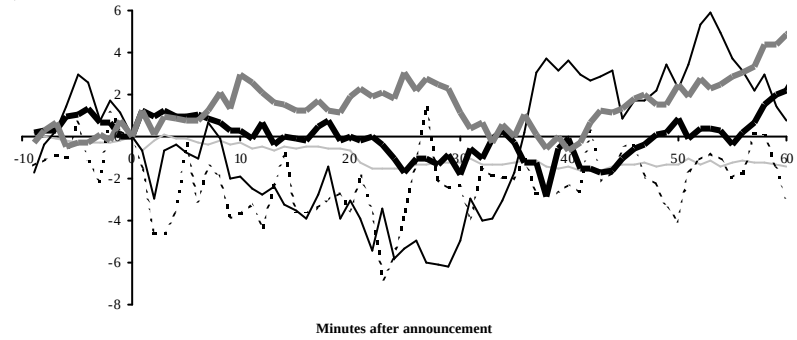
Chart 4: Cumulative abnormal returns around announcements - continued

Difference between announcement and non announcement days Pre and Post BI

iii) RPI



iv) PPI



v) Unemployment

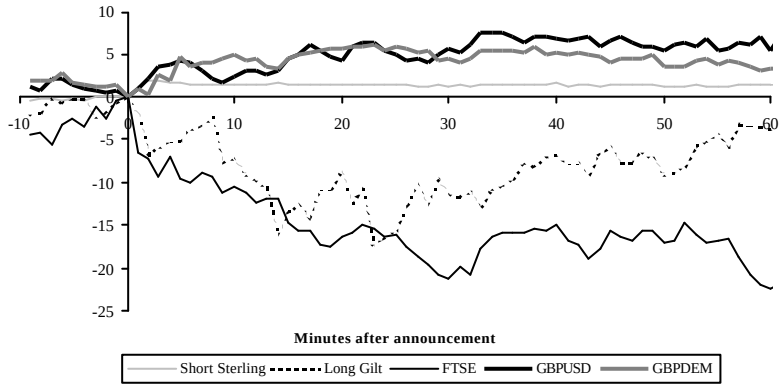
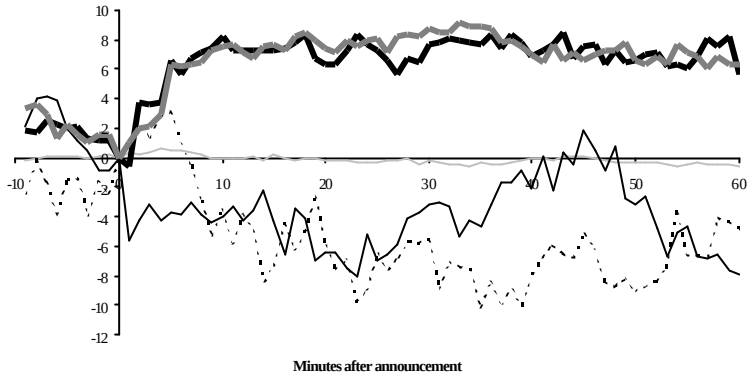


Chart 4: Cumulative abnormal returns around announcements - continued

Difference between announcement and non announcement days Pre and Post BI

vi) Retail Sales



vii) Industrial Production

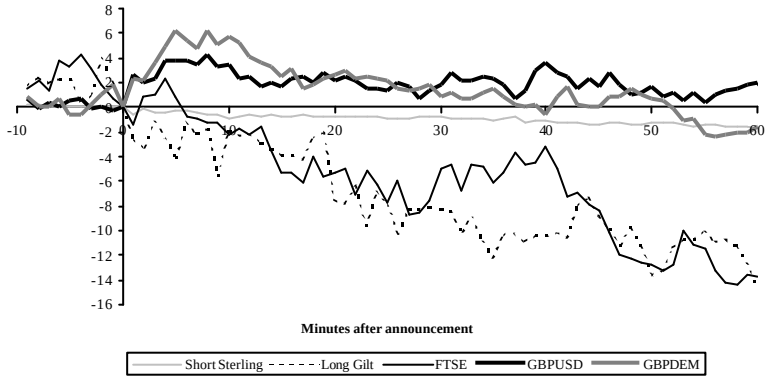
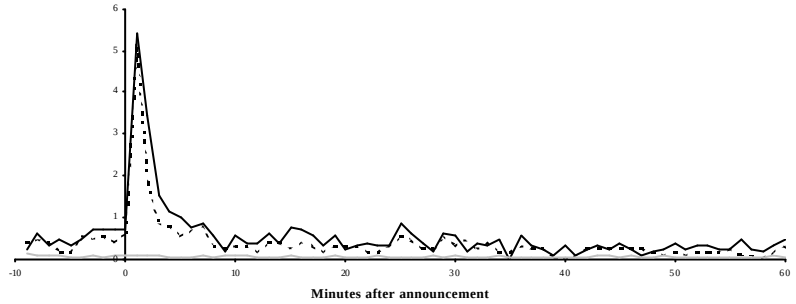
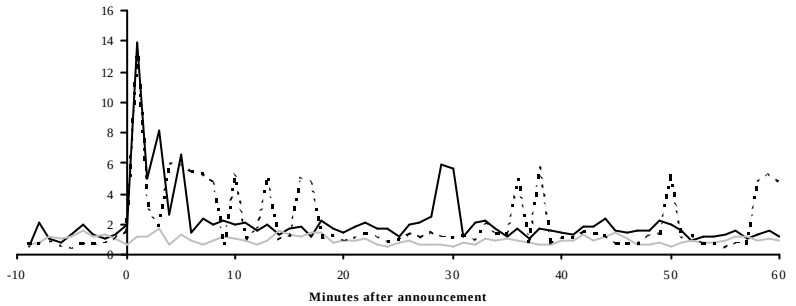


Chart 5: Mean abs. returns, MPC Interest Rate Changes vs. No Change

i) Short Sterling



ii) Long Gilt



iii) FTSE-100

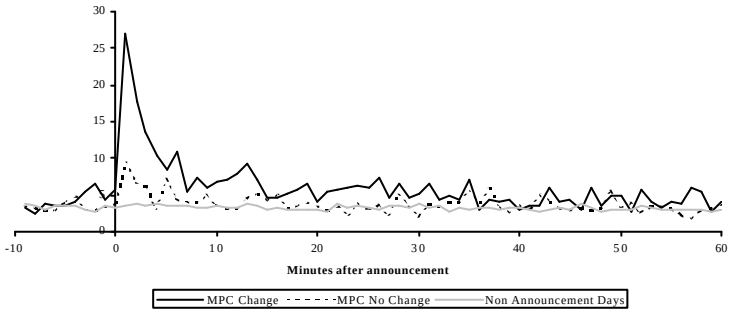
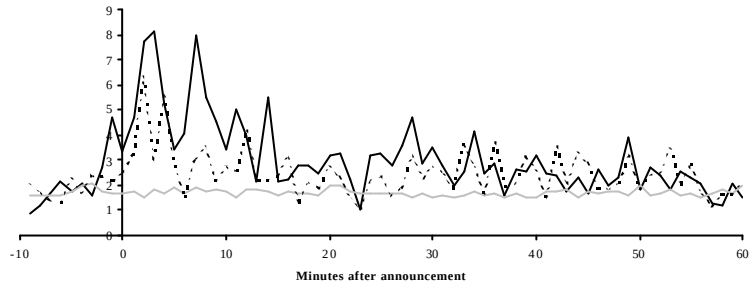


Chart 5: Mean abs. returns, MPC Interest Rate Changes vs. No Change - continued

iv) Sterling/Dollar



v) Sterling/DM

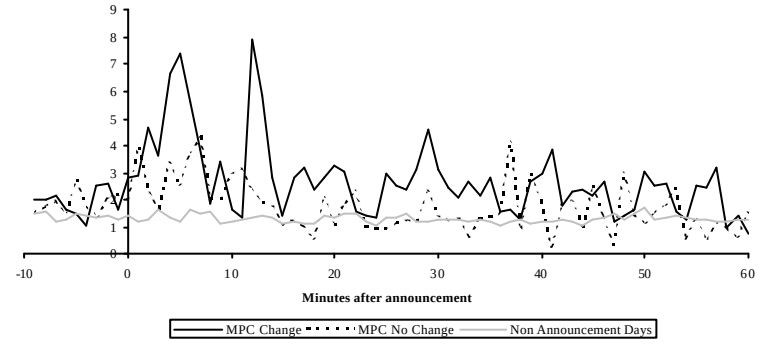
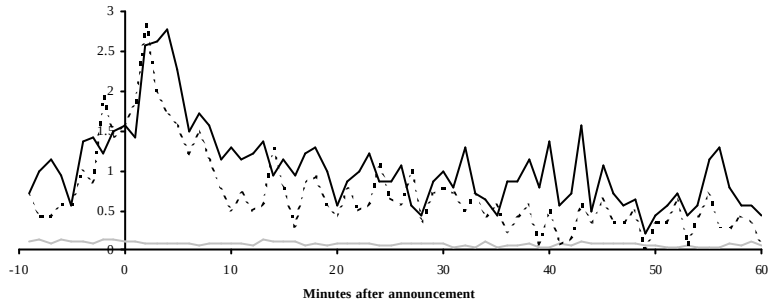
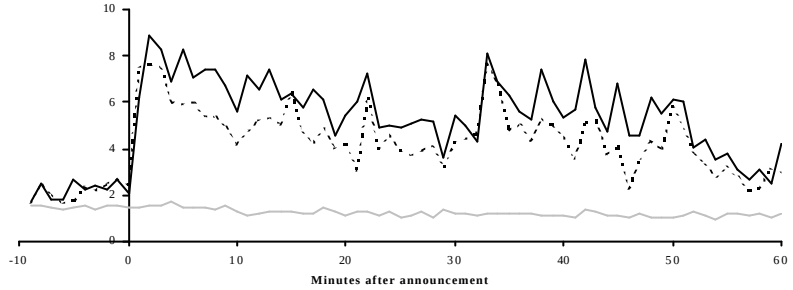


Chart 6: Mean no. of trades, MPC interest rate changes vs. no change

i) Short Sterling



ii) Long Gilt



iii) FTSE-100

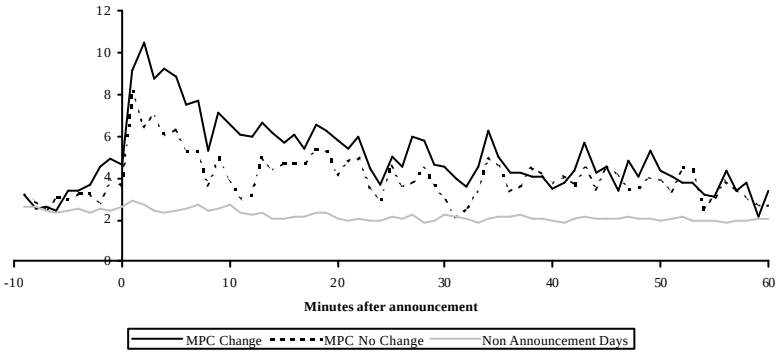
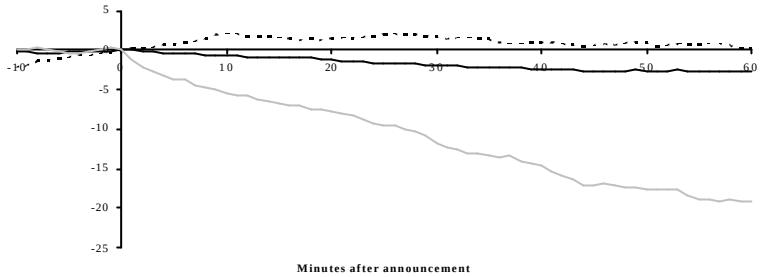


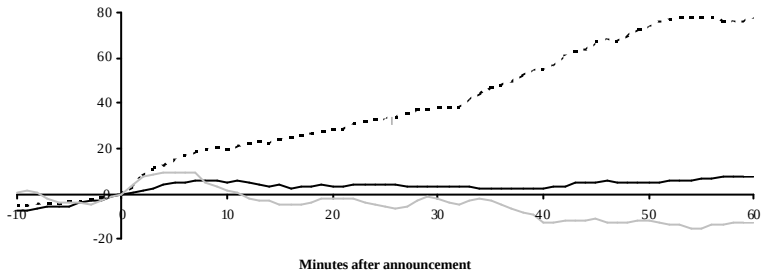
Chart 7: Mean no. of trades around announcements

Difference between announcement and non-announcement days Pre and Post BI

i) All macroeconomic data announcements



ii) Interest Rate Changes



iii) Monetary Meeting Minutes

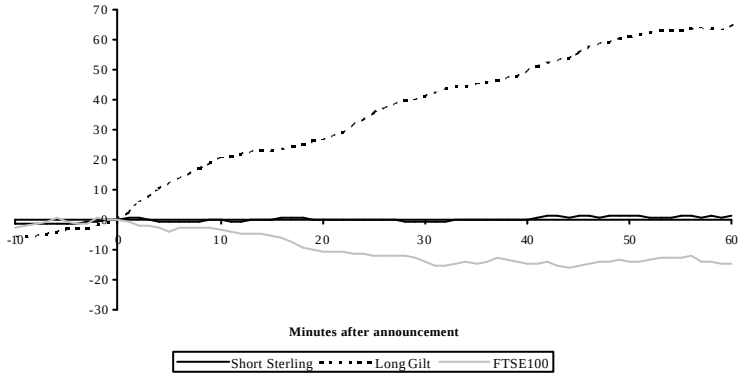
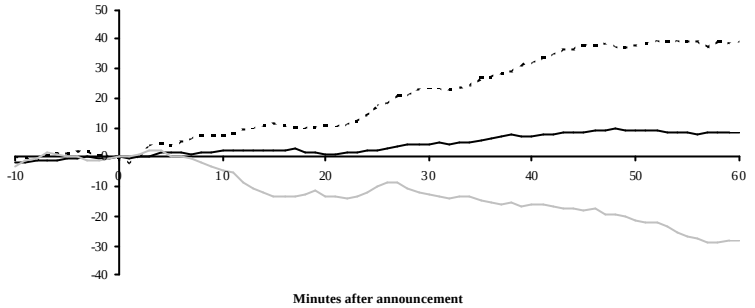


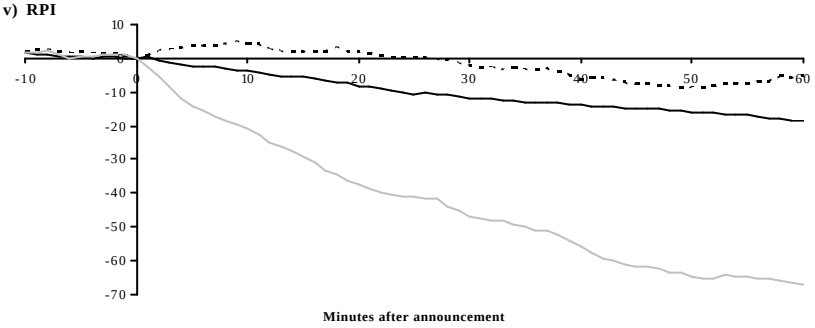
Chart 7: Mean no. of trades around announcements - continued

Difference between announcement and non-announcement days Pre and Post BI

iv) Inflation Report



v) RPI



vi) PPI

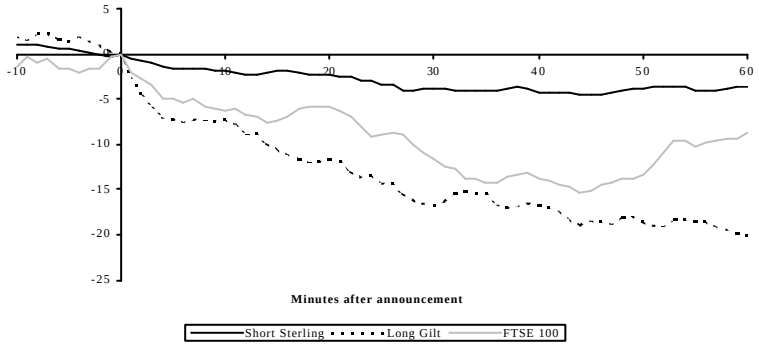
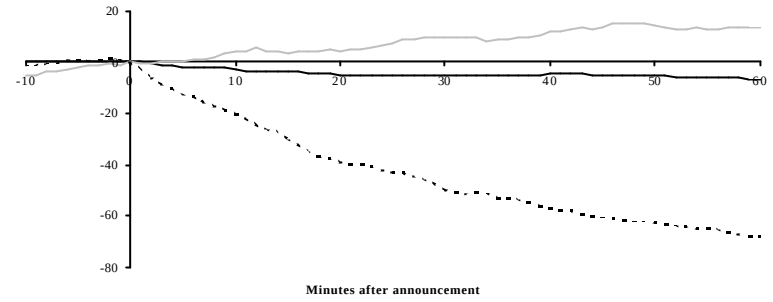


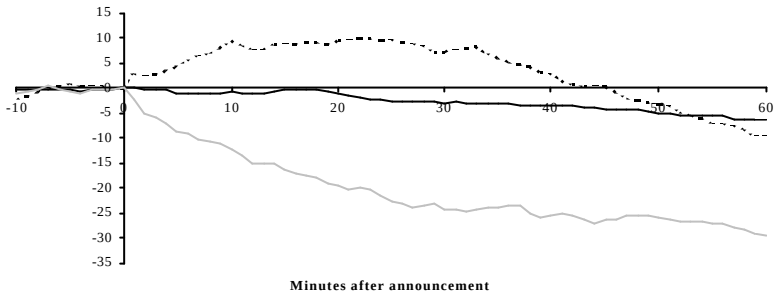
Chart 7: Mean no. of trades around announcements - continued

Difference between announcement and non-announcement days Pre and Post BI

vii) Unemployment



viii) Retail Sales



ix) Industrial Production