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Abstract

We investigate the impact that the publication of the Bank of England's Financial Stability Report (FSR) has on the stock returns and credit default swap spreads of UK financial institutions. Examining a sample of 73 UK-listed banks and other financial institutions, we find that publication of the FSR is, on average, associated with no abnormal returns. We extend our analysis to examine the extent to which policies and the sentiment in the FSR are predictable, which would explain the observed lack of abnormal returns. We find that both sentiment and announced policies are predictable. We also examine the extent to which the release of the FSR reduces information asymmetry in financial markets, but do not find strong evidence.

Key words: Event studies, Financial Stability Reports, central bank communication, market reaction.

JEL classification: G14, G18, G21, G22, G23, G24.

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1. Introduction

Amongst a series of regulatory reforms such as higher capital and liquidity requirements since the financial crisis, many central banks have received an explicit financial stability mandate. Over 40 countries have instituted committees whose exclusive focus is financial stability (Liang, 2017). These are usually located within a central bank as a financial stability counterpart to monetary policy. Communication has become an important tool of such committees and has been suggested as a macroprudential tool in its own right (CGFS (2016)). Nevertheless, while communication has been recognised as an important aspect of monetary policy for over three decades (Blinder (2008)) and received an enormous amount of attention in the academic literature, there has been almost no attention paid to the importance and effects of financial stability communication.

We examine the effects of financial stability communication on financial markets. This is considerably more challenging that for monetary policy. Although over 60 countries publish financial stability reports (FSRs) which outline recent developments in financial markets, there is no obvious instrument to trade based on this publication. There is no financial stability equivalent of interest rate futures. This is an early attempt to examine the effect of central bank financial stability communication.

The aim of Financial Stability Reports is not to affect market prices but to inform the public about potential stability risks and update the public with recent developments, including regulatory ones. Nonetheless, it could have an impact on market (and especially equity) prices, if it reveals hitherto private information about the health of the banking system and the stance and policy intentions of the regulator. On the other hand, if policies are predictable then there should be no impact on market prices. The evidence from the limited number of studies that have examined stress tests does not lead to a clear, unambiguous conclusion.

Rather than trying to measure the impact of the Financial Stability Reports on financial stability itself – which is not directly measurable, at least not in the short-term, we examine whether it provides new information to market participants. The idea underpinning our research is that if an FSR contains useful, new information or policy actions, market participants will respond to this by adjusting their portfolios accordingly. If financial markets are efficient, this adjustment will happen immediately following the publication of the FSR.

We test for the information content of FSRs by using a standard event study analysis applied to UK financial firms after each publication of the Bank of England's Financial Stability Report from 2010. We use the Bank of England's FSR as it also contains details of regulatory developments. We find that the FSR does not significantly move financial markets, even when it includes the announcement of policy changes, and we explore a number of potential hypotheses as to why this might be the case. In particular, we explore the extent to which the content and policies are predictable. We also explore the idea that, although the content is predictable and known to some market participants, the FSR levels the informational playing field by releasing information to everyone. In this sense we build on the literature on FSR readability and content (Čihák, 2006) and sentiment (Correa et al., 2017).

The outline of the remainder of the paper is as follows. In the following section, we review the existing literature on Financial Stability reports and stress tests. In Section 3 we outline the institutional background to the UK's Financial Stability Report and its Financial Policy Committee. We outline our hypotheses and discuss the event study methodology and the data used in the empirical analysis in Sections 4, 5 and 6. Section 7 presents the results of the analysis and attempts to unpick the reasons for our results. Section 8 provides a summary of our findings, some concluding remarks and suggestions for further work.

2. Related literature

The literature on the effects of central bank communications on financial stability is small and examines stress tests, FSRs and also regulatory announcements. Owing to the fact that the Bank of England's FSR contains regulatory announcements and stress test results, our investigation is related to all three. The literature on stress testing consists largely of event studies examining the impact of US and EU stress tests, and presents mixed evidence both in terms of equity price movements and also information provision. Morgan et al. (2014) find that although the market largely anticipated which banks would have capital shortfalls before the stress test results are announced, the market was surprised by the size of the shortfall. Neretina et al. (2015) find no evidence that US stress tests over the 2009-15 period impact banks' equity returns; however, they find there is some impact on banks' equity betas and CDS spreads. Similarly, Chavaz et al. (2016) find that the market reacts to the publication of the BoE's stress-test scenarios but not to the publication of the results and that the change in the market perception of individual banks' systematic risk is also stronger after the publication of the scenario.

The literature seems to suggest that the information provided in stress tests is an important driver of the market reaction. Petrella and Resti (2013) show that the EBA stress test has only a marginal impact on equity returns but the disclosure of information about sovereign exposures provides useful information to the market. Ellahie (2013) examines the impact of EU stress tests and finds that following the disclosure of the 2011 stress test results, information asymmetry declines gradually but information uncertainty increases, which he interprets as markets being able to differentiate weak and strong banks but they remain uncertain due to a lack of credibility of the tests and uncertainty about banks' capital plans. Fernandes et al. (2017) find that banks that pass (fail) stress tests tend to experience large,

positive (negative) returns; they also find that US stress test disclosures contain important new information by examining measures of information asymmetry, especially in times of financial instability. Flannery et al. (2017) find that stress test disclosures in the US are associated with significantly higher absolute abnormal returns and trading volumes, which is consistent with stress tests conveying new information.

The literature on FSRs is considerably smaller, despite the fact that almost all major central banks publish such reports regularly. Some studies have examined the longer-term effects of FSRs. Oosterloo et al. (2007) show that causation can be reversed: having a banking crisis makes a country's central bank more likely to publish a financial stability report, but there is no relationship between the publication of a financial stability report and Moody's bank financial strength ratings (BFSR). Čihák et al. (2012) find higher quality FSRs are associated with greater financial stability, as measured by the probability of a banking crisis and changes in Moody's BFSRs which suggests that there may be a link, albeit a weak one, between the quality of the analysis in the reports and some dimensions of financial stability. Although Čihák et al. (2012) suggest that many FSRs are not forward-looking, Correa et al. (2017) use textual analysis to show that the sentiment of FSRs tends to become more pessimistic just prior to banking crises. In an analysis that looks at the near-term effects of FSR publication, Born et al. (2014) examine 1000 reports from 37 central banks over the period 1996-2009. They find some evidence that optimistic FSRs lead to significant positive abnormal stock market returns and lower volatility over a period of one month. In contrast to the stress test studies which examine the immediate impact and information content of a stress test, all of these studies of FSRs do not examine the immediate market impact or information contents of the financial stability report.

3. Institutional background to the Bank of England's FSR

In our study we examine the information content of the Bank of England's financial stability report. The BoE initiated a financial stability review document in 1996. In 2006 the document changed considerably from a 'review' to a 'report'. Its stated aim was "to identify the major downside risks to the UK financial system and, thereby, help financial firms, authorities overseas, and the wider public in managing and preparing for these risks."

After the formal creation of the Financial Policy Committee in 2013, the report acquired an additional role, namely to announce, explain, evaluate, and justify the BoE's policy actions. The FPC is required by law to produce a Financial Stability report twice each year and it is an important accountability tool: after the publication of each Financial Stability Report the Chancellor and the Governor of the Bank of England are required to meet to discuss the report and other matters related to financial stability.

The FSR specifically states that it "*…sets out the FPC's view of the outlook for UK financial stability, including its assessment of the resilience of the UK financial system and the current main risks to financial stability, and the action it is taking to remove or reduce those risks."* Thus, the publication of the FSR is most likely to impact traded instruments that are related to the expected profitability of banks, insurers and asset managers, or to their risk of default. In this paper, we focus our attention on the equity prices, equity volumes and equity bid-ask spreads of the largest LSE-listed banks, insurers and asset managers. We also examine the CDS spreads of the seven largest UK banks, which are designated as systemically important and for which data on the CDS are available. We find that financial firms' equity returns and banks' CDS spreads respond negatively to the publication of the average FSR. But FSR are in general not significant. Moreover, these results do not hold for volumes and bid-ask spreads, which are proxies for asset liquidity.

4. Hypothesis Development

Our study focuses on the 16 FSRs published in the period 2010-18. Each FSR can influence financial markets in the short-term either through the FPC's new risk-assessment or through its policy announcements. The FSR contains high quality analyses often conducted with firm-specific data to which only the BoE has access. Thus, the FSR may contain information about risks not accurately priced by the market. We develop hypotheses about the information content of the FSR and its implications for asset pricing.

We conjecture that the risk assessment contained within an FSR will result in abnormal returns in the days following publication, with the sign of the abnormal return following a particular FSR depending on whether the surprise is 'good' or 'bad'.

H1: The publication of the FSR contains `good' or `bad' surprises in relation to the profitability or risk of banks. This will lead to abnormal equity or CDS returns.

The FPC's policy announcements should have a material effect on banks, mainly owing to the need to raise capital. If these are unexpected then this will represent a further surprise, in addition to the information content in the FSR, giving rise to H2 and H3.

H2: The three winter FSRs between 2014 and 2016, published along the stress test results, have a larger market impact than the other FSRs in our sample.

H3: The publication of FSRs in which the FPC announced policy changes (2014H1, 2017H1 and 2017H2) have a larger market impact than other FSRs.

Publication of the risk assessment has the effect of levelling the informational playing field for market participants. That is, market participants gain access to the risk assessment contained in the FSR but also know that everyone else has access to the same information.

This might have the effect of reducing information asymmetry giving rise to H4 which we test using the asymmetric information component of the bid-ask spread.

H4: The FSR releases information that some market participants already have but others do not, thereby reducing information asymmetry in the market. Thus, the FSR release should lower the information asymmetry component of the bid-ask spread.

5. Construction of the sample of events and sample of financial institutions

5.1. Event dates

We examine the 16 financial stability reports published by the Bank of England during the period from January 2010 to January 2018. We exclude older FSRs from the main sample owing to the change in the format of the FSR from a review to a report. Additionally, the many events during the financial crisis, including equity injections into UK banks, make inference difficult. We do use the six FSRs in the period 2006-2009 as robustness checks.

5.2. Financial firms

To construct the sample of financial firms, we start with the 153 LSE-listed, UK-domiciled deposit-takers, insurers and asset managers for which daily equity price data are available from Bloomberg. Of these, we exclude the 68 firms that were not publicly traded prior to January 2010 to ensure a consistent sample for each of the 16 events we examine. Finally, we exclude the 12 firms which form part of the FTSE 250 index.[1] This is to avoid endogeneity issues as the FTSE 250 is an explanatory variable in our models. This yields a sample of 73 firms.

[1] The FTSE 250 Index is a capitalisation-weighted index consisting of the 101st to the 350th largest companies listed on the London Stock Exchange

For a subset of 62 firms, where data are available, we also collect daily equity volumes (i.e. number of traded shares), turnover, market capitalisation, the number of free floating shares, and the bid-ask spread. For the seven firms for which liquid credit default swap (CDS) contracts are available, we also collect daily 5-year senior CDS spreads.

There are two main reasons why we focus on daily data. First, higher frequency data exhibit effects related to market microstructure as trading patterns vary throughout the day (see Andersen and Bollerslev,(1998)). At very short intervals, trading activity is likely to be dominated by inventory needs. Using daily data averages this out and allows the impact of exogenous news to emerge. Second, daily data is available for less liquid securities and some of the financial firms in our sample are infrequently traded.

6. Methodology

We follow a standard event study methodology to examine the effect that FSR publications have on each of the four variables of interest: equity returns, equity volumes, equity bid-ask spreads and CDS spreads, and compare each of these variables of interest in the 'event window' vs 'normal times' In each case, we designate the day of the FSR publication as $t = 0$. The estimation window covers the period from 91 days before publication to 11 days before publication. The event window covers the day of publication and two days immediately after publication (see Figure 1).

The FSR publications are separated by between 100 and 150 trading days. The estimation window is chosen to be as long as possible given that it must be separated by at least 10 trading days from any given event window. The 'no overlap' rule ensures that it is very unlikely for a given estimation window to contain any new information revealed by the previous FSR. The event window is chosen to be short enough to exclude any non-FSR related news, and long enough to allow for the FSR publication to be assimilated by markets.

To estimate the impact of the FSR publication, we follow a similar methodology for each variable of interest. We use the estimation window to estimate the expected value of the variable conditional on the value of the market index. The difference between the actual values observed in the event window and the expected values gives a measure of the impact of each FSR on each variable of interest and for each institution. Below, we discuss in detail each of the four variables of interest.

6.1. Equity Returns

From index return prices $P_{i,t}$, we calculate returns, $R_{i,t}$, for each day *t* and each institution i:

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

We then regress each institution's returns on the FTSE 250 index returns, $R_{m,t}$, using the market model:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad (1)$$

McKinlay (1997) notes that the simple market model often has similar predictive power to more sophisticated models. Furthermore, simple models guard against over-fitting. We then calculate the daily abnormal return (AR) and cumulative abnormal return (CAR) over the three-day event window:

$$AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t} \qquad (2)$$

$$CAR_{i,t} = AR_{i,t} + AR_{i,t+1} + AR_{i,t+2} \qquad (3)$$

where $\hat{\alpha}$ and $\hat{\beta}$ are obtained from equation (1).

For a given event, we average CAR in (3) over firms to obtain average cumulative abnormal returns (CAAR):

$$CAAR_t = \frac{1}{n} * (\sum_{i=1}^{n} CAR_{i,t}) \qquad (4)$$

where $n = 73$ is the number of firms in our sample. While Bruno et al. et al. (2018) analyse positive and negative liquidity regulation events together and find an average absolute CAAR across events, we are unable to do this because ex-ante, it is not obvious which FSR events would be positive or negative.

We check the robustness of our simple market model specification by comparing it to two alternative models. The first is a naïve model in which beta is assumed to be equal to unity for all firms (i.e. $AR_{i,t} = R_{i,t} - R_{m,t}$). The second is the Fama-French (1993) three-factor model:

$$R_{i,t} = R_{f,t} + \beta_i\left(R_{m,t} - R_{f,t}\right) + s_i SMB_t + h_i HML_t + \varepsilon_{i,t} \qquad (5)$$

where $R_{f,t}$ is the risk-free rate of return and *SMB* and *HML* are, respectively, the size and value factors formed from six portfolios and calculated by Gregory et al. (2013) for the UK.[2]

To formally test whether FSR publications impact equity returns, we use a bootstrap procedure adapted from Bruno et al. (2017). We start with equity returns data from all trading days in the period January 2010 to December 2017. We remove the dates of each FSR publication, as well as the five trading days immediately before and after the publication date. We do the same for 24th June 2016, the day the results of the UK referendum on the future membership of the European Union (Brexit) were published as a sense check on our model. Thus, only non-event days, as far as FSR publications are concerned, remain in our data

[2] The Fama-French factors calculated for the UK by Gregory et al. (2013) are available at http://business-school.exeter.ac.uk/research/centres/xfi/famafrench/files/

sample. We choose 1000 of these days at random (with replacement) and calculate the $CAAR_t$ statistic for each one. This allows us to generate a simulated distribution for the returns on UK financial equities under the null hypothesis. We then use this simulated distribution to test the statistical significance of the calculated $CAAR_t$ values.

6.2. Equity volumes

We adapt our abnormal returns market model to measure abnormal volumes (AV) in the following way:

$$AV_{i,t} = Volume_{i,t} - \overline{Volume}_{i,t} \qquad (6)$$

where $Volume_{i,t}$ is the number of shares of firm i traded on day t divided by the number of outstanding free-floating shares and $\overline{Volume}_{i,t}$ is the average value of $Volume$ for firm i over the estimation period (-91, -11) associated with a given event. We normalise traded volume by outstanding free-floating shares in order to be able to compare across firms that have differing frequency of trading. We restrict our initial set of 73 firms to the 62 firms for which data on volumes and outstanding free floating shares are available on Bloomberg. We calculate cumulative average abnormal volumes, $CAAV_t$, for each event (modifying equations 3 and 4) and test their significance via the bootstrap procedure described above.

6.3. CDS spreads

As financial firms are often highly leveraged, some of the main stakeholders are actually the debt holders. To investigate whether FSR publications impact debt holders' behaviour, we examine the 5-year senior CDS spreads of the seven systemically important UK banks (Barclays, HSBC, Lloyds Banking Group, Nationwide Building Society, Royal Bank of Scotland, Santander UK, Standard Chartered Bank). Since CDS spreads rise with the probability of a bank defaulting on its debt, CDS spreads measure the riskiness of bank debt.

Hence, if FSR announcements matter, we are likely to see FSR publications associated with changing CDS spreads. We restrict our attention to the seven large banks, as only these institutions have sufficiently liquid CDS contracts associated with their debt.

We follow Flannery et al. (2016) and build a simple CDS market model where abnormal changes in CDS spreads are represented by the residuals from the following regression:

$$\left(\frac{CDS_{i,t}}{CDS_{i,t-1}} - 1\right) = \alpha_i + \beta_i \left(\frac{CDX_{i,t}}{CDX_{i,t-1}} - 1\right) + \varepsilon_{i,t} \qquad (7)$$

where $CDS_{i,t}$ is the CDS spread for firm i on day t and CDX_t is spread for the ITRAXX Europe investment grade index. Since the ITRAXX Index only goes back to the end of 2011, we omit the four FSR events that occur in 2010 and 2011. We follow the same methodology outlined above to calculate abnormal spreads and test their statistical significance.

7. Results

Panel A of Table 1 shows the cumulative average abnormal values for the four variables of interest for each of the FSR publications in our sample. As a cross-check on the model, we also include the abnormal values associated with the three-day period immediately after the results of the UK referendum on the EU. Values marked with an asterisk are significant at the 10% level (two-sided test).

These results are also illustrated in Figure 2 which plots the distribution of the bootstrapped abnormal returns for the market model. FSR publications are marked with black dots (and those that include policy intervention are indicated with labels). The pink bars represent the top 10% of abnormal returns. It is clear that none of the FSRs produce significant abnormal returns not even at the relatively lenient 10% significance level.

For completeness, we include the results of two additional equity return models which we use to check the robustness of our main market model specification. On the whole, the Fama-French model gives very similar predictions to the market model. The naïve model is generally correlated with the market model, but with some notable outliers. These outliers are unsurprising given the strong assumption in the naïve model that beta equals one for all firms. The high overall correlation between the findings of the three models suggests that our market model specification is robust.

The table shows that, on the whole, FSR publications are not associated with a significant impact on equity returns, equity volumes, equity bid-ask spreads or CDS spreads. No FSR publication results in significant abnormal returns of either sign, suggesting that the FSR either do not provide significant new information to markets or that the FPC's actions contained within the FSR do not have a significant impact on bank profitability. Another alternative is that the market does not consider the FPC's actions as binding.

The last column shows the effect on CDS spreads. This is a much smaller sample and includes only the seven major UK banks as these are the only ones with CDS contracts written on them throughout the sample period. There are two significant events: the June 2014 FSR and the July 2016 FSR. Both of these contained FPC actions. In particular, the June 2014 FSR contained the FPC's action to limit the volume of mortgages that can be extended at a loan-to-income ratio of above 4.5 to 15%. Given that the narrative in the FSR was that the risk from household debt was to households and not banks and that the FPC's actions should make the financial system safer or, at least, no riskier, it is somewhat puzzling that bank CDS spreads increased, especially as the financial stability report was otherwise quite positive, noting as it did that "*According to the Bank's latest Systemic Risk Survey, the perceived probability of a high-impact event in the UK financial system has fallen to its lowest level since the crisis*". One potential interpretation is that the FSR outlined a way that

household debt could ultimately still affect banks even if mortgage default rates remained as low as in the past, although this is unlikely to be the whole story.

We also obtain a significant result for the July 2016 FSR as abnormal CDS spreads increase by 8.24%. However, caution needs to be exercised when making inferences about the July 2016 FSR. The result of the Brexit referendum affected banks disproportionately relative to the rest of the economy, as illustrated by the large increase in CDS spreads on that day. Therefore, the news changed the relationship between banks and the rest of the market, potentially invalidating the model estimated in the estimation window. The short period of time – 12 days – between the results of the referendum and the FSR being released means that it is not possible to re-estimate the relationship.

On the whole, these results suggest that the release of the Financial Stability Report has no measurable impact on market prices. In the next section we investigate potential explanations for this.

7.1 What explains the lack of impact?

The results of the section above determined that FSRs do not significantly move markets; our hypotheses that there would be a larger reaction for the stress tests and FSRs where policies were announced was also incorrect. One potential explanation for the lack of a significant effect when FSRs are announced is that the essence of the content is signalled well in advance. This is a difficult exercise. Unlike in the case of monetary policy, there is no specific 'financial stability instrument' which is traded, far less any survey of expectations about expected financial stability policy. Even for the countercyclical capital buffer (CCyB) rate there is no survey in place, despite the fact 70 countries have a framework in place and it is set quarterly in most.

We therefore undertake a few exercises: we examine the extent to which the sentiment in the FSR is predictable and we extract the major policy changes by the bank of England's Financial Policy Committee and examine the extent to which these have been signalled in advance in previous communication. Further, we also examine the extent to which the FSR levels the informational playing field, in other words whether it reduces information asymmetry by revealing information that some – but not all – market participants may already have.

7.1.1. Is the sentiment in the FSR predictable?

Our first exercise is to examine the sentiment in the FSR and to the extent to which it is predictable. Correa et al. (2017) find that the sentiment in the FSR is a good indicator of the health of the financial system. In particular they find that an increase in the SRISK-to-GDP ratio[3], bank CDS spreads, credit-to-GDP gap and debt service ratio for private non-financial corporations is accompanied by a deterioration in sentiment with respect to the banking sector. Correa et al (2017) propose a financial stability text analysis dictionary and then use this to capture a financial stability sentiment index. We use data from Correa et al. (2017)[4] on the Bank of England's Financial Stability Sentiment index to examine the extent to which the overall sentiment in the FSR is predictable, based on changes in equity returns and average bank CDS spreads. We have used these variables as they are timely and public, meaning that they should capture recent, and obvious, developments in the financial system. The main reason for this approach is the small number of FSRs which means that we need to be parsimonious with our use of explanatory variables.

Our main specification is:

[3] SRISK is defined as the capital shortfall of the banking system conditional on a severe market decline as in Brownlees and Engle (2016).

[4] We would like to thank Ricardo Correa and his team at the Fed's Board of Governors for kindly providing us with the data for the analysis in this section.

$$sentiment_t = \alpha + \beta sentiment_{t-1} + \gamma \Delta equity_t + \epsilon_t \quad (8)$$

We find that the coefficient β, on the sentiment in the previous period, is 0.77 and is significant at the 1% level, suggesting that FSR sentiment is highly persistent. The change in the FTSE is not significant but the R-squared coefficient for the overall regression is reasonably high at around 50%.

It is difficult to interpret this: the remainder could be interpreted as surprise or alternatively, the result of measurement issues, a small number of data points and a parsimonious model. One other variable of concern is with our dependent variable: the FSR sentiment score of the executive summary seems to have a correlation of about 0.6 with the sentiment score of the text as a whole. This suggests that it is difficult to capture the true sentiment of the FSR as it depends on whether market participants read the text in its entirety or merely the executive summary (see Loughran and McDonald, 2011 for an illustration of the limitations of textual analysis). These measurement issues of the FSR sentiment, together with the small number of FSRs limit further inference.

7.1.2. Are policy messages predictable?

A second hypothesis that could explain the lack of market reactions, and in particular the failure of our hypothesis that FSRs with policy releases would have a bigger reaction, is that there are no surprises in the policy content of the FSR. It is difficult to formally test the predictability of FPC announcements. There is no consensus expectation survey as to the actions the Financial Policy Committee might take. Nor is there an obvious financial instrument from which we can extract a 'shocks' or 'surprises series in the manner of monetary policy (see for example Kuttner (2001), Gertler and Karadi (2015)). Instead we explore to what extent the FPC actions are predictable by taking each announcement and

examining the extent to which it had already been flagged, for example by providing forward guidance in previous FPC communications as detailed in Annex A.

It is clear that FPC actions on the Countercyclical Capital Buffer (CCyB) are signalled well in advance by the committee in their communication. Following the Brexit referendum, the FPC cut the CCyB and stated that "*Absent any material change in the outlook and given the need to give banks the clarity necessary to facilitate their capital planning, the FPC expects to maintain a 0% UK countercyclical capital buffer rate until at least June 2017*."[5] When the FPC increased the CCyB to 0.5% in June 2017, they also included a clear signal of an increase to 1% at the November 2017 meeting. This suggests that for the large part, FPC actions should be anticipated by the market as the policy is signalled in advance.

For the loan-to-income (LTI) limit, which constrained banks to lend no more than 15% of their lending at above a 4.5 level the picture is less clear. While there are certainly clear signals that the FPC was considering taking some kind of action and the possible tools it could use it did not signal *which* tool it would use.

7.2. Does the FSR reduce information asymmetry regarding financial stability risks in the market?

While Financial Stability Reports may not provide 'news' or surprise financial markets there may be an alternative effect in the sense that they level the informational playing field. A fundamental feature of banks (and some other financial firms) is that they are opaque and therefore costly to monitor (Freixas and Rochet (1997), Morgan (2001), Flannery et al (2004)). Therefore only some agents in the market will incur the cost of monitoring financial firms and the financial system. One potential effect the FSR may have is that it may level the informational playing field, meaning that all agents now have access to the same information.

[5] July 2016 FSR Executive Summary.

We therefore examine the effect of the release of the FSR on information asymmetry Motivated by Kyle (1985)'s model of information, we decompose the bid-ask spread into a number of components. The essential idea is that if a dealer/inventory holder thinks that agents in the market have insider information then the dealer will demand a wider bid-ask spread in order to protect himself against losses if trading with someone with superior information. Once we control for everything else that explains why a dealer would choose a bid-ask spread, such as inventory concerns, the error component is considered to be the asymmetric information component. We use Ellahie's (2013) measure of asymmetric information to test whether information asymmetry decreases during event periods. We estimate the adverse selection component of the bid-ask spread as the residual from the following regression:

$$y_{i,t} = \beta_1 Size_{i,t} + \beta_2 Volume_{i,t} + \beta_3 Turnover_{i,t} + \beta_4 Volatity_{i,t} + \mu_i + \varepsilon_{i,t} \qquad (9)$$

where $y_{i,t}$ is the log of the equity bid-ask spread for firm i on day t, $Size_{i,t}$ is the log of the daily market capitalisation, $Volume_{i,t}$ is the number of shares traded as a proportion of free-floating shares, $Turnover_{i,t}$ is the natural logarithm of the GBP value of shares traded, $Volatity_{i,t}$ is the rolling standard deviation of stock returns for the previous twelve months, and μ_i is a parameter representing the fixed effect associated with firm i. We calculate the cumulative average abnormal residuals associated with each event and then measure their statistical significance using the simulated distribution.

The results are reported in Table 2. No FSR shows a significant decrease or increase in the asymmetric information component of the bid-ask spread, suggesting that the FSR does not level the information playing field. This may be because although the information is released to financial markets, it is not in a format that allows all participants to process it quickly and so the level of information asymmetry may not decrease in the time frame we examine.

[Table 2]

8. Conclusion and discussion

While monetary policy communication has been well-studied, how central banks communicate on financial stability policy has received considerably less attention. Unlike with monetary policy there is no obvious financial instrument to examine, nor are there systematic surveys of expectations. We examine the impact that publication of the Bank of England's FSR has on the equity returns, credit default swap (CDS) spreads and trading volumes of UK financial institutions. We do not find evidence that FSRs have a significant effect on any of these.

We hypothesize – and find some evidence – that this is because the content of the FSR is largely predictable and therefore anticipated by the market. In particular, the Financial Policy Committee signals any actions to be taken – which would be the largest potential source of news – well in advance.

One problem with looking at the impact of the FSR is that it contains a lot of information that can impact different banks differently. One way to overcome this problem is to classify different FSRs based on their main messages and whether they contain positive or negative news, for example for domestically-focused versus internationally-focused banks. Unfortunately, this method is infeasible given the small sample size available. Future research could potentially include more financial institutions, especially as FSRs increasingly focus non-bank financial institutions and classify FSRs based on public interest and main messages. Media-coverage analysis of each FSR might help answer whether and how the media presents the main FSR findings and whether this affects what market participants take away from the different FSRs.

Furthermore, our paper highlights how limited the literature on measuring the effectiveness of FSRs is, notwithstanding the fact that an increasing number of central banks publish FSRs regularly. The amount of resources invested in the publication of Financial Stability Reports, our inconclusive evidence as to what the effects are in both the short and long term and the paucity of academic literature, all suggest that more research is needed in this area.

While we find some evidence that the information in the FSR does not change the level of information asymmetry a few recent initiatives mean that that this may not be the case going forward. Recently some central banks and other regulatory agencies have revamped their financial stability reports or made other innovations in the communication of financial stability issues. As noted above, the Bank of England has recently started to complement its FSR with visual summaries to make it more digestible and reach a wider audience. The European Central Bank has also done the same but also included a video explanation. The International Monetary Fund also publishes videos with the main messages from their FSR. In the USA the Office for Financial Research produces a Financial Systems Vulnerabilities Monitor which updates quarterly and provides a "heatmap" of the financial system. The Reserve Bank of New Zealand has produced a Financial Strength Dashboard which offers a graphical overview of bank resilience, their dashboard receives 11,000 visits a quarter compared with 500 for its predecessor.

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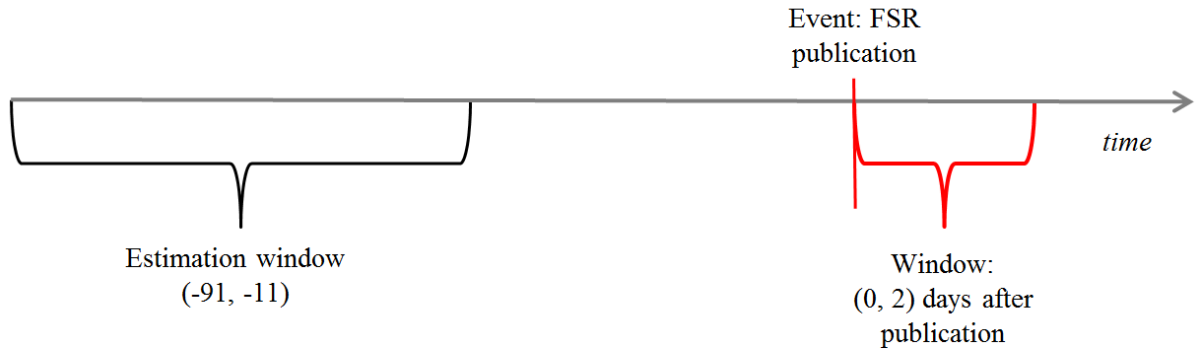
Figure 1: Event study time-line



Notes: the figure presents the event study time-line. The day of the FSR publication is $t = 0$. The estimation window covers the period from 91 days before publication to 11 days before publication. The event window covers the day of publication and two days immediately after publication.

Table 1: Cumulative average abnormal values and their critical values

Panel A: Cumulative average abnormal values for the different FSRs

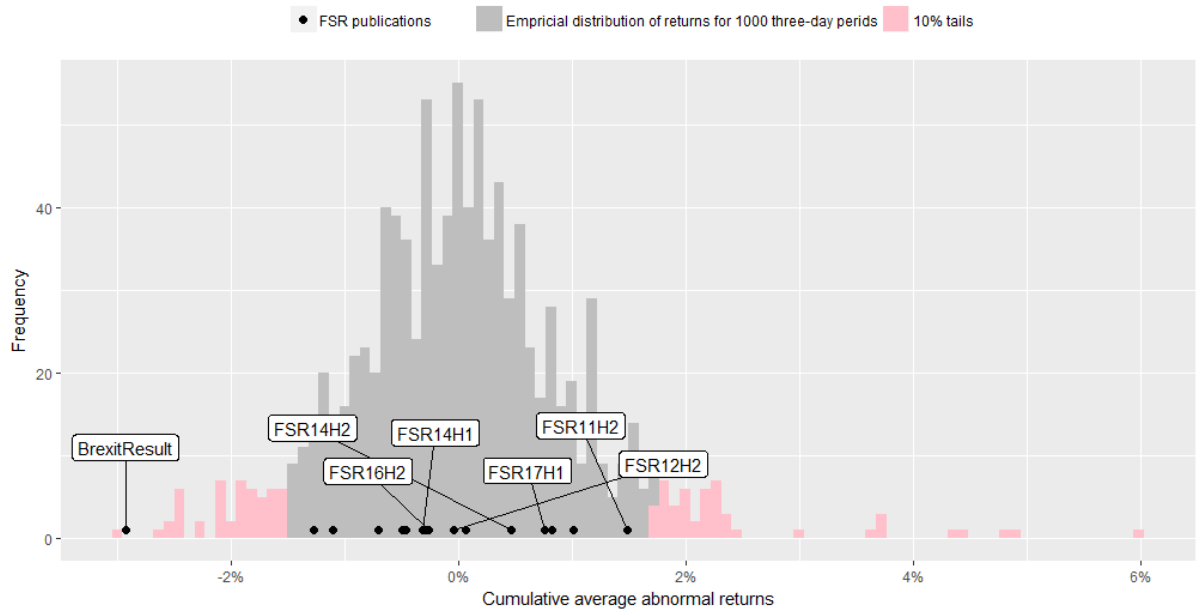
Events	Equity Returns			Equity volumes (%)	CDS spreads (%)
	Market model (%)	Naïve model (%)	Fama-French model (%)		
FSR10H1	-0.495	1.528	-0.466	-0.149	
FSR10H2	-1.100	-1.948	-0.924	-0.368	
FSR11H1	-0.036	-0.916	0.196	-0.306	
FSR11H2	1.489	0.809	1.214	0.260	
FSR12H1	-0.456	-3.314 *	-0.384	-0.493	-2.342
FSR12H2	-0.037	-0.541	-0.009	0.497	-2.626
FSR13H1	-0.707	-2.510 *	-0.532	-0.479	-1.082
FSR13H2	0.820	1.613	1.015	0.064	-0.707
FSR14H1	-0.311	-1.180	-0.103	0.166	8.662 *
FSR14H2	0.470	-1.324	0.282	-0.268	2.208
FSR15H1	0.069	-0.039		-0.240	4.598
FSR15H2	-0.280	-0.250	-0.109	-0.434	-3.852
Brexit	-2.927 *	4.124 *	-2.525 *	0.650	13.649 *
FSR16H1	-1.271	-0.521		-0.229	8.243 *
FSR16H2	-0.257	0.751		-0.505	0.367
FSR17H1	0.760	1.597		-0.293	0.028
FSR17H2	1.019	0.842		0.786	2.584

Panel B: 5th and 95th quantile critical values

Quantiles (%)	Equity Returns			Equity volumes (%)	CDS spreads (%)
	Market model (%)	Naïve model (%)	Fama-French model (%)		
5	-1.438	-1.999	-1.564	-0.643	-4.587
95	1.804	2.161	1.506	1.155	5.311

Notes: This table presents the cumulative average abnormal values for the four variables of interest for each of the FSR publications. We also include the abnormal values associated with the three-day period immediately after the results of the UK referendum on continued membership of the EU. Values marked with an asterisk (*) are significant at the 10% level (two-sided test).

Figure 2: Market impact of the FSRs



Notes: the figure shows the impact on CAAR of the different FSRs released over the period January 2010 to January 2018 for 73 financial firms. The empirical distribution is obtained with the bootstrap procedure adapted from Bruno et al. (2017). We remove the dates of each FSR publication as well as the five trading days before and after the publication date. We do the same for 24th June 2016 that relates to the outcome to the UK referendum on the future membership of the European Union (Brexit). We choose 1000 of these days at random with replacement and calculate the $CAAR_t$ statistic for each one which provides the simulated distribution for the returns on UK financial equities under the null hypothesis.

Table 2: Estimates of asymmetric information

Panel A: Asymmetric information measure for the different FSRs

Events	Asymmetric information measure (%)
FSR10H1	-20.519
FSR10H2	-6.735
FSR11H1	5.246
FSR11H2	-1.734
FSR12H1	0.256
FSR12H2	12.496
FSR13H1	4.133
FSR13H2	13.688
FSR14H1	-11.782
FSR14H2	-5.350
FSR15H1	9.626
FSR15H2	8.927
Brexit	7.191
FSR16H1	0.786
FSR16H2	-14.987
FSR17H1	-2.559
FSR17H2	17.404

Panel B: 5^{th} and 95^{th} quantile critical values

Quantiles (%)	Asymmetric information measure (%)
5	-90.848
95	91.087

Notes: the table presents the measure of asymmetric information to test whether information asymmetry decreases during event periods. The adverse selection component of the bid-ask spread is estimated as the residual from equation (9). We calculate the cumulative average abnormal residuals associated with each event and then measure their statistical significance using the simulated distribution.

Annex A: Statements by the FPC and others before policy actions.

Housing LTI limit

Event	What it was
July 2013 record	Nothing on housing
October 2013 record	In view of that assessment, the Committee agreed that it would need to be vigilant to potential emerging vulnerabilities in the financial system. That meant, first, close monitoring of developments in the housing market and banks' underwriting standards. Second, it was important that the Committee should develop a deep analysis of the ways in which housing developments might affect financial stability. There were a number of potential feedback loops between economic developments, housing and financial stability – and Committee members noted the important role that housing had played in several past UK credit cycles. But not all movements in house prices necessarily had financial stability implications – for example if transactions were largely cash-financed, or if lenders had substantial capital to absorb any losses on mortgages. And, third, the Committee should review the range of tools that could be used to mitigate risks to financial stability, should that become necessary.
November FSR	Standards are materially higher than before the crisis. There is little evidence of an immediate threat to stability. But risks may grow if stronger activity is accompanied by further substantial and rapid increases in house prices and a further build-up in household indebtedness, which is already elevated for some households. These risks would be accentuated if underwriting standards on mortgage lending were to weaken as has been the case in previous house price cycles. In a box the FPC also outlined the actions it had taken; additional steps and potential future tools were discussed.
March 2014 record	In the November 2013 Financial Stability Report, the FPC had announced initiatives to reduce stimulus, reaffirmed measures already in train and outlined further instruments it had available to mitigate potential risks from the housing market. Given the increasing momentum, the FPC agreed that it will remain vigilant to emerging vulnerabilities, will continue to monitor conditions closely and will take further proportionate and graduated action if warranted. As set out in November, measures to help maintain stronger mortgage underwriting standards were being put in place by the FCA with effect from April as part of the implementation of the Mortgage Market Review (MMR). In November the FPC had recommended that the FCA require mortgage lenders to have regard to any future FPC recommendation on appropriate interest rate stress tests to use in assessments of affordability required as part of the MMR [Recommendation

	13/Q4/1].
12 June 2014 Mansion house speech	The Chancellor of the Exchequer (the British version of the finance minister) gave the FPC tools to act in the housing market.

CCYB timeline

Date and action	Statements on impact	Forward guidance
December 2015 FSR & capital framework supplement		The FPC intends to set the countercyclical capital buffer above zero before the level of risk becomes elevated. The Committee expects to set a countercyclical capital buffer in the region of 1% of risk-weighted assets when risks are judged to be neither subdued nor elevated.
March 2016 Increase of CCyB	Following its review, the PRA Board has concluded that existing Pillar 2 supervisory capital buffers should be reduced, where possible, by the full 0.5% UK countercyclical capital buffer…..The removal of any overlap means that banks accounting for around three quarters of the outstanding stock of UK lending will not see their overall regulatory capital buffers increase as a result of the UK countercyclical capital buffer rate being increased to 0.5%.	In December, the Committee signalled its intention to set the UK countercyclical capital buffer rate in the region of 1% in a standard risk environment. Consistent with the Committee's assessment of the current risk environment, and its intention to move gradually, the Committee has decided to increase the UK countercyclical capital buffer rate from 0% to 0.5% of risk-weighted assets.
July 2016 release of the CCyB	It will reduce regulatory capital buffers by £5.7 billion, raising banks' capacity for lending to UK households and businesses by up to £150 billion.	The FPC reduced the UK countercyclical capital buffer rate from 0.5% to 0% of banks' UK exposures with immediate effect (see Box 1). Absent any material change in the outlook, and given the need to give banks the clarity necessary to facilitate their capital planning, the FPC expects to maintain a 0% UK countercyclical capital buffer rate until at least June 2017. This action reinforces the FPC's expectation that all elements of the substantial capital and liquidity buffers that have been built up by banks are able to

		be drawn on, as necessary.
June 2017 increase of the CCYB		Absent a material change in the outlook, and consistent with its stated policy for a standard risk environment and of moving gradually, the FPC expects to increase the rate to 1% at its November meeting.
November 2017 increase to 1%		The FPC will reconsider the adequacy of a 1% UK countercyclical capital buffer rate during the first half of 2018, in light of the evolution of the overall risk environment.