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REGULATOR COMMUNICATION AND MARKET CONFIDENCE IN DIFFICULT TIMES: LESSONS FROM THE GREAT FINANCIAL CRISIS

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Abstract

Communication with financial markets is an important task carried out by financial market supervisory bodies. In times of crisis, this can contribute to spreading confidence and calming markets. In light of the 10th anniversary of the last financial crisis, we examine the effect the UK Financial Services Authority (FSA), as the financial market regulator during that period, had on market confidence. Our aim is to derive lessons to aid the current supervisor in potential future crises. Analyzing the period 2006-2009, we find that both more positivity and uncertainty in tone in communications could either reduce or increase stock market volatility, depending on the type of communication and communicator. Further analysis also shows distinct impacts on short-term and long-term market volatility. The findings highlight the importance of considering source and type of communication when decisions on who communicates with the market are made. These results can be of use for any regulatory authority that communicates with financial markets to increase effectiveness of their messages.

Keywords: Market Communication, Market Confidence, Volatility, Financial Market Regulator, Text Analysis

JEL Classifications: C88, G01, G10, G14, G18

1. Introduction

Financial markets are based on trust and confidence in the solvency and liquidity of market participants, and the ability for continuous exchange. The last financial crisis in 2007-2009 led to an unprecedented loss of confidence and increased uncertainty. It demonstrated that the sudden disappearance of these systemic pillars leads to failures in the system and a possible

breakdown of financial markets. The credit and liquidity crunch of 2008 showed that a loss of confidence among market participants can lead to a drying up of liquidity and freezing up of credit markets, which then severely disrupts and threatens the overall financial system (Brunnermeier, 2009). Instability in the financial sector, in turn, can have devastating consequences for the overall economy (Levine, 2005; Reinhart and Rogoff, 2009; Knütter *et al.* 2011).

In light of the 10th anniversary of the financial crisis, and increasing concerns that the underlying issues have not been fully resolved¹ and the next financial crisis might just be around the corner (Lipton, 2018), this study examines a key safeguard against mayhem in the financial system: Supervision and monitoring of the financial system and markets. More specifically, we revisit supervisory actions during 2007-2009 to derive lessons that can be applied by the current supervisor to improve actions during a potential next crisis.

To prevent adverse financial and economic scenarios such as those described above, national oversight bodies are charged with monitoring stability in the financial system and financial markets. Oversight can be split into two main areas: On a predominantly macro level, central banks assume the role of monitoring stability of the overall financial system (Oosterloo and de Haan, 2004; Knütter *et al.* 2011).² On a more micro-level, when it comes to monitoring financial markets and the financial sector, the supervisor's function is to oversee capital markets and take corrective action where needed to maintain or restore healthy functioning markets. The last 20 years have seen continuous global changes in the set-up of micro-level oversight (Cecchetti, 2008; Masciandaro and Quintyn, 2009; Cukierman, 2011; Masciandaro and Romelli, 2018): A first wave of restructuring from the 1990s on removed financial market supervision from central banks and gave it to newly created separate and independent supervisory bodies. Following the apparent failure of this two-tier approach during the last financial crisis, a second wave of restructuring returned a large part of the supervision function to the central banks to create a more unified oversight structure.

During the period of the last financial crisis, the responsibility for overseeing financial markets in the United Kingdom (UK) lay with the Financial Services Authority (FSA). It had been created in 1997 as the official regulatory body for the financial services industry until its disbandment in 2013³. The FSA's mandated objectives were generally similar to those of other countries' financial regulators, but there was one specific task that set the FSA apart: Its mandated objective to maintain confidence in the UK financial system (Financial Services Authority, 2013)⁴. While the Bank of England's (BOE) remit was the stability of the overall financial system, the FSA's mandate was focused on monitoring financial markets, including its special objective of maintaining confidence. In this study, we focus on this unique task and examine whether the tone of FSA communication with the market during the depths of the recent financial crisis from 2007 to 2009 had a discernible impact on market confidence. As such, our investigation is akin to a case study of the FSA before the regulatory restructuring. By focusing on its effectiveness in an extraordinary crisis situation, our intention is to derive recommendations for future crisis communication by its successor body.

¹ See recent press coverage, e.g. Kumar and Waite (2017); The Economist (2018).

² Some central banks (e.g. UK, Sweden) publish regular Financial Stability Reports "which review the condition of the financial system, identify and assess risks to the system, and suggest market or policy changes to address significant risk concerns" (Wilkinson *et al.* 2010, p. 41). For that purpose, they analyze financial market-based indicators such as Credit Default Swaps (CDS), stock prices, volatility, and credit spreads.

³ Following a restructuring of the UK's regulatory environment in 2012, the FSA was dissolved and its responsibilities taken over by its successor, the Financial Conduct Authority (FCA). The supervisory function is now assumed by the Bank of England, located within the newly created Prudential Regulatory Authority (PRA).

⁴ The FSA's three other explicit objectives were (1) Public awareness: promoting public understanding of the financial system; (2) Consumer protection: securing the appropriate degree of protection for consumers; (3) The reduction of financial crime: reducing the extent to which it is possible for a business to be used for a purpose connected with financial crime.

While the FSA has been replaced by new arrangements⁵, the focus of our study is on an enduring aspect that is crucial for any attempt at successful supervision, irrespective of the specific oversight architecture in place: Communication by the supervisory body with the market. We ask the question what we can learn from the way the FSA communicated with the market during the financial crisis and its effects on market confidence, that may help the current supervisor to better communicate should the next crisis strike. The challenge of communicating with the market during times of crisis still remains, so we aim to understand previous attempts and its effects on confidence, to provide guidance for future crisis communication.

The FSA used various channels to communicate with the market. These included interviews and speeches, parliamentary hearings, and the formal and annual Financial Risk Outlook (FRO). While maintaining market confidence is fundamental for the functioning of the financial system during normal times, it becomes crucial during a crisis or market turmoil when confidence in the market is shaken or has disappeared. During such times, supervisory bodies such as the FSA, with deeper insight into the overall situation in the financial system, can provide reassurance to market participants. This can spread confidence and reduce uncertainty, and help ensure continuous trading and liquid markets. For instance, the market impact of Federal Reserve communication in the US was stronger during the financial crisis than in non-crisis periods (Hayo *et al.* 2015).

The tone of the communication is thereby of critical importance. Markets will interpret whether the supervisor is overall more optimistic or pessimistic about the condition of the markets, their stability, and their prospects. More positive tone is more likely to increase market confidence and lead to continued or resumed normal business, whereas more pessimistic tone makes market participants more cautious in their behavior and potentially scale back activities. If FSA communication is successful, it will reduce uncertainty and risk aversion, and be visible via lower volatility and better liquidity in financial markets. Hence, the tone of how the FSA delivers the message of their assessment of the markets and its prospects are key to maintaining or restoring market confidence. In light of the turmoil in the markets during the financial crisis, investigating the effectiveness of FSA communication during that period is therefore an important issue to consider. Our paper addresses this issue and examines if, and to what extent, the FSA managed to influence market confidence during the recent financial crisis.

Prior research in this area on the effect of communication with the market has focused on central bank communication. For instance, studies have shown that central bank communication affects economics variables such as interest rate expectations (Musard-Gies, 2006) or exchange rate volatility (Jansen and De Haan, 2005), but also financial markets' indicators such as stock returns and volatility (Hayo *et al.* 2015; Gertler and Horvath, 2018; Neugebauer, 2019; Schmeling and Wagner, 2019). Closer to our investigation, Born *et al.* (2012, 2014) have focused on central banks' communication regarding financial stability and the effects on financial markets. They show that the tone of Financial Stability Reports (FSRs), speeches, and interviews during the financial crisis had a significant and potentially long-lasting effect on stock market returns, and also tended to reduce market volatility (Born *et al.* 2014). Born *et al.* (2012) provide evidence that the release of FSRs reduces volatility in returns on both financial sector stocks and the overall market. They also find that returns increase after optimistic FSRs and decrease after pessimistic FSRs.

Our study contributes by examining a unique regulatory setup to understand and derive lessons from the effect of supervisory communication on financial market confidence. While there is evidence that Central Bank communication can exert a calming influence on markets and reduce uncertainty, not much is known about whether communication by the FSA, the only financial market supervisor with a unique and explicit objective of maintaining market confidence, managed to affect confidence. Our study addresses this gap and analyzes whether the tone of FSA communication during the period 2006 to 2009 had a discernible impact on market confidence.

⁵ Shortcomings of the then supervisory architecture leading to its abandonment have been well documented (Goodhart, 2008; Buiters, 2008; Turner, 2009; Masciandaro *et al.* 2013).

We provide specific evidence on the effectiveness of UK regulatory communication during the most testing of times, when the FSA's successfully achieving its objective of maintaining market confidence not only is most challenging, but also needed the most. Our results are highly relevant for current supervisory bodies to help improve effectiveness in communication and achieve intended results.

We conduct content analysis of a sample of FSA communication drawn from various channels (Annual Financial Risk Outlook, speeches, interviews and parliamentary hearings), and measure the strength of positivity and negativity in tone for the period from 2006 to 2009. Measuring the effect on market confidence with the same indicator the FSA itself used, market volatility, and an Exponential GARCH (EGARCH) model, we provide evidence that FSA communication events had a significant impact on market volatility. The impact, however, was not unidirectional: Depending on type of communication and who communicated, more positive tone could either reduce or increase market volatility. Similarly, uncertainty in tone can have opposing effects on returns and volatility. We also find a negative impact on stock returns, especially when emanating from the FSA Chief Executive. These findings highlight important nuances in the effects of communication on confidence, and even the possibility of increased market uncertainty post communication. Further analysis on the impact on short-term and long-term market volatility separately shows that Chief Executive communication had the most distinct market impact on this measure: Communication events had the longest lasting impact on the long-term component of volatility, but the shortest impact on the short-term volatility component.

Our findings have important implications for regulatory authorities that go beyond the UK context studied here and are universally significant. First, they provide timeless and universally applicable evidence on the effectiveness of supervisory communication with the market in times of a severe crisis. This is especially valuable for the current supervisor body to better understand the effect communication has on market confidence, with a view to preparing for a potential next crisis. It allows them to potentially make adjustments and fine-tune their approach in advance, taking into account the lessons from our analysis. It can therefore also be of use to non-UK regulators and supervisors to help increase effectiveness of their crisis communication.

Second, our results show the crucial importance of considering source and type of communication when decisions on who communicates with the market are made, as this can affect market reaction. Supervisory bodies and other agencies communicating with financial markets take great care to make sure their messages are not misunderstood and cause negative effects. Given the variety of communication channels and communicators used, those authorities should take note of our results and consider the importance of those factors.

The rest of the paper is organized as follows. The next section reviews the existing literature. Section 3 presents the methodology, and Section 4 presents the analysis and discusses the results. Section 5 concludes the paper.

2. Prior research

A review of the literature highlights that existing research in this area has focused on the effect of central bank communication tone on financial markets, while neglecting analysis of the effects of communication by separate supervisory and regulatory bodies. Furthermore, taking an economics perspective, those studies predominantly examined the impact of monetary policy communication on economic indicators, primarily interest rates and exchange rates. Hence, far less attention has been paid to the impact on more financial markets based indicators, such as stock prices and volatility, especially of communication related to financial stability and confidence. Overall, the existing evidence from a central bank perspective demonstrates that the tone of communication affects markets.

Studies have examined the tone of statements and the respective strength of the market impact in a variety of countries. For instance, Rozkrut *et al.* (2007) analyze a sample of central bank communication from the Czech Republic, Hungary, and Poland, for the period 2001-2004, and show that statements implying monetary tightening have a positive impact on

interest rates, mostly on short and medium term maturities. Communication was also found to increase interest rate volatility. Hayo *et al.* (2015) examine Federal Reserve communication during 1998-2009 and show that markets move according to the tone of the statement: A negative economic outlook leads to lower stock returns, and more hawkish (dovish) communications are linked to higher (lower) bond yields. Moreover, there were stronger market reactions during the financial crisis period. Hansen and McMahon (2016) report similar results for Federal Reserve communication between 1998-2014.

Huning (2017) finds that pessimism in Swiss National Bank press releases affects exchange rates, and documents a negative relationship between pessimism and medium- and long-term government bond yields. Gertler *et al.* (2019) study four Eurozone countries and show that, when there are extreme financial market events, unscheduled communication of members of the ECB's Governing Council classed as hawkish or dovish may increase comovements in stocks and bonds, with the effect varying across countries. Ehrmann and Talmi (2019) demonstrate that, when controlling for content, consecutive Bank of Canada press releases on monetary policy for 2001 to 2015 that are less similar lead to higher volatility in bond yields. This effect is amplified if the content of statements is very different from a series of previous similar ones. Further, analyzing the period 1998-2019, Neugebauer (2019) finds that ECB announcements increase stock market volatility, especially after the financial crisis beginning in 2007.

In terms of changes in tone, Musard-Gies (2006) analyze 66 press conferences held after the ECB monetary policy council interest rate decisions between 1999 and 2004. They show that the market reacted to the change in tone in the statements between meetings, rather than the absolute tone, and that the effect is mostly apparent at the short end of the yield curve. Hawkish (dovish) statements tend to raise (decrease) short-and long-term interest rates, with the strongest effect on the short end of the yield curve. Moreover, Schmeling and Wagner (2019) explore the effect of changes in the tone of the ECB president during press conferences on asset prices for the period 1999-2014. They find that when tone becomes more positive (negative) from the previous event, stock prices increase (decrease), with the effect becoming stronger the more time passes after the conference. Tone was also found to affect asset prices via affecting risk perception and aversion: More positive tone is associated with decreasing corporate credit spreads and decrease in the VSTOXX implied risk aversion. Similar results were found for the US and Fed communication.

Studies have also shown that the market reacts differently to communication by committees or by individual members. Market reaction to speeches and statements is significantly stronger when given by the Chairman rather than other board members (Andersson *et al.* 2006; Ehrmann and Fratzscher, 2007; Hayo *et al.* 2015). Evidence on the market effect of parliamentary hearings is mixed. While Kohn and Sack (2003) find that congressional testimonies by the US FOMC Chairman had a significant effect on interest rates during 1989-2003, and Connolly and Kohler (2004) show that parliamentary hearings have a significant effect on interest futures in New Zealand, Australia and the UK and US during 1997-2004, Reeves and Sawicki (2007) did not find evidence that speeches by UK MPC members and testimonies to a parliamentary committee affect market expectations of interest rates during the period 1997-2004. More generally, Gertler and Horvath (2018) examine verbal ad-hoc communication by ECB Governing Council members between meetings for the period 2008-2013. They find a negative association between communication of easing policies or negative economic outlook and subsequent decreases in both the stock market and interest rates.

Our study is the most closely related to Born *et al.* (2012) and Born *et al.* (2014), who study the effect of central bank communication regarding financial stability on financial market variables. Born *et al.* (2012) examine a sample of 87 Financial Stability Reports (FSR) and 89 speeches and interviews by central banks from emerging economies for the period 2001-2009. They find that the views in the FSR regarding financial stability affect the financial market as expected: Optimistic (pessimistic) FSRs are followed by an increase (decrease) in overall indices stock returns, with an even stronger effect on specific financial sector stock indices. Positive FSR tones also reduce stock market volatility. Speeches and interviews had no effect on stock market returns, but were linked to an increase in volatility of interest rates and

exchange rates. Similar results were obtained when focusing on the financial crisis period from 2007 on.

Born *et al.* (2014) analyze the effects of central bank communication regarding financial stability on the financial market using a sample of more than 1000 Financial Stability Reports (FSR), speeches and interviews by 37 central banks for the period 1996-2009. The findings show that FSRs had a significant and potentially long-lasting effect on stock market returns, with markets moving in the direction of the content (pessimistic/optimistic). A positive FSR tone also tended to reduce market volatility, especially if the FSR was optimistic about the risks to financial stability. Speeches and interviews, by contrast, had little effect on market returns and did not generate a volatility reduction. Moreover, FSRs had no systematic impact on financial markets during the 2007-10 financial crisis, while speeches and interviews by governors had a significant effect. Those findings suggest that during a crisis situation, speeches and interviews are much more influential.

Taken together, the review shows that prior research has extensively examined central bank communication tone, including Financial Stability related communication, and provided evidence for an effect on financial markets. However, it also highlights that the effect of communication tone by a distinct supervisory body has not yet been examined. Hence if, and to what extent, the FSA managed to maintain market confidence during the recent financial crisis is not known. As a corollary, it is unclear which lessons we can learn that can inform the current supervisor's crisis communication plans. The next section lays out our approach to addressing this question.

3. Methodology

3.1. Data and sample

The sample consists of all available FSA communication during the period 2006 to 2009, which covers the run-up to the financial crisis, the depth of the crisis, and the immediate aftermath with decreasing intensity. This allows us to follow the changes in FSA communication over time with the unfolding of the crisis, and how the FSA has attempted to respond to the outbreak of the crisis and to maintain market confidence. In particular, we are interested in potential tone changes and their effect. The data examined are the annual Financial Risk Outlook (FRO), speeches and interviews given by top FSA officials, and parliamentary hearings. A research assistant collected all FSA communications during the sample period. FROs are available from the FSA website's archive. Speeches and interviews given by top FSA officials, in which market confidence was either the focus of the communication or was touched upon, were identified via the FSA website archive and Press cutting services. Transcripts of parliamentary hearings involving either the head of the FSA or another top official that had a connection with market confidence were obtained from the Parliamentary Select Committee website. During collection, we recorded (1) the communication channel (Financial Risk Outlook, speech, interview, or parliamentary hearing) and (2) for all non-printed communication, i.e. verbal public appearances by FSA officials, we record the speaker. We recorded the exact date of each communication event, which is crucial for an analysis of the effect of FSA communication on the market. Following Born *et al.* (2010), we allocate communication events during weekends to the following Monday and communications made in the evening to the next trading day, thus analyze the effect of events occurring out of trading hours as the effect on the next trading day. In total, our sample is composed of a total of 77 communication events: Four Financial Risk Outlooks, 55 speeches, 7 interviews by FSA officials, and 11 parliamentary hearings (details are provided in the descriptive analysis in Section 4.1).

3.2. Measuring FSA communication content

We follow previous research in the area (Bligh and Hess, 2007; Armesto *et al.* 2009; Born *et al.* 2012; Born *et al.* 2014) and use the text-analysis software DICTION (version 7.1.3) to analyze the content of FSA communications and to capture positive and negative tone of the communication. As DICTION's in-built dictionary is a general English language dictionary, it is

not necessarily focused on financial information (Kearney and Liu, 2014). Studies testing the dictionary in a financial context (Henry and Leone, 2009; Li, 2010; Loughran and McDonald, 2011) highlight that certain words may have a different use and meaning in financial communication which lead to misclassification of certain words in a financial context.

For that reason, our study uses the dictionary by Loughran and McDonald (2011) (LM) who have developed a comprehensive dictionary specifically for the use with financial documents to address this limitation. It is based on the word lists of the General Inquirer (GI) software⁶, and LM have adapted it to the finance area. It has become the dictionary of choice in the recent finance literature analyzing companies' communication with the financial market (Doran *et al.* 2012; Garcia, 2013; Jegadeesh and Wu, 2013; Chen *et al.* 2011; Liu and McConnell, 2013; Loughran and McDonald, 2013; Huang *et al.* 2014; Ferguson *et al.* 2015). Schmeling and Wagner (2019). Recently, it has also been applied it to analyzing central bank statements (e.g., Hansen and McMahon, 2016; Huning, 2017; Schmeling and Wagner, 2019).⁷ As the FSA material we analyze targets the financial market, thus employing a more finance-related language, we consider the LM dictionary as more appropriate for our purposes. The LM list contains 2,355 words in the 'negative' category, 354 words in the 'positive' category, and 297 words denoting 'uncertainty'.⁸

To measure FSA communication, we follow previous studies (e.g. Armesto *et al.* 2009; Born *et al.* 2012; Born *et al.* 2014) and classify the content of each individual communication event (FRO, speech, interview, or parliamentary hearing) into either more positive or negative tone by subtracting the standardized negativity scores from the standardized positivity scores as generated by DICTION using the LM dictionary for positive, negative, and uncertainty words. We also capture the level of uncertainty in the texts to provide information about the level of uncertainty expressed by the FSA and the subsequent effect on market confidence. Uncertainty is also measured using the standardized uncertainty scores for each communication.⁹

3.3. Empirical models

To determine the effect of FSA communication on market confidence, we examine the effect on UK equity market volatility, one of the key metrics used by the FSA to measure its success against its market confidence objective (see Financial Services Authority, 2013). Equity market volatility is often used to measure uncertainty and risk aversion (Bekaert *et al.* 2013; Schmeling and Wagner, 2019), and Crockett (1997) highlights that asset price volatility and confidence are linked. In this context, Ehrmann and Fratzscher (2007) stress that influencing volatility and uncertainty is one of the main aims of central bank and regulator communication with the financial market. To measure its success in maintaining market confidence, the FSA explicitly looks at market volatility. If FSA communications achieve their goal, we will find reduced post-event volatility. This view is supported by Schmeling and Wagner (2019) who suggest, and find, that more positive tone by ECB President statements lowers risk aversion in the market and therefore lowers implied equity volatility. Our approach is consistent with previous studies that also measured the impact of communication on the volatility of financial market variables (Blinder *et al.* 2008; Knutner *et al.* 2011; Schmeling and Wagner, 2019).

⁶ The General Inquirer (GI) software is another widely used content analysis software in research in the social sciences as well as finance (Tetlock, 2007; Feldman *et al.* 2010; Tetlock *et al.* 2008; Loughran and McDonald, 2011; Engelberg *et al.* 2012; Ferris *et al.* 2013). Like DICTION, however, it is a general English language dictionary, thus shares the same limitations and disadvantages as DICTION when applied in a finance context, so its use for our study is not recommendable (Henry and Leone, 2009; Li, 2010; Loughran and McDonald, 2011).

⁷ See Loughran and McDonald (2016) for a recent survey of text analysis studies in accounting and finance.

⁸ Loughran and McDonald (2018)

⁹ We also measure our three tone measures by taking the percentage of the number of positive (negative, uncertainty) words to the total number of words in the text (see e.g. Kothari *et al.* 2009; Frankel *et al.* 2010; Loughran and McDonald, 2011; Huang *et al.* 2014). Our results remain qualitatively unchanged.

To measure the effect on volatility, we follow previous studies (Ehrmann and Fratzscher, 2007; Ehrmann and Fratzscher, 2009; Born *et al.* 2012) and specify an exponential GARCH (EGARCH) model as suggested by Nelson (1991), which explicitly accommodates the effects on asymmetric volatility. We examine the effect on the conditional mean and conditional volatility of the daily returns of the FTSE 100 stock index, the same measure the FSA itself uses. Stock returns should be positively affected by market confidence. In addition, we follow Born *et al.* (2014) and analyze the effect on stocks from the financial sector. These include FTSE 100 banks, insurance companies, and general financial services. Born *et al.* (2014) suggest that focusing on the financial sector should be the best way to analyze effects of communication regarding financial stability. The equation for the mean is as follows:

$$r_t = \alpha + \beta COM_t + \gamma r_{t-1} + \delta z_t + \varepsilon_t \quad (1)$$

where r_t is the daily returns on the FTSE 100 Index, COM_t is our measure for FSA communication on event days (Positivity Score or Uncertainty Score) that also indicates the type of communication event that has taken place on that day: Financial Risk Outlook (COM_t^{FRO}), Speech (COM_t^S), Interview (COM_t^I), or Parliamentary hearing (COM_t^{PH}); r_{t-1} is past returns, and z_t is a vector of dummies that control for the day of the week effect.¹⁰ The dummies take on the value of 1 if the day of the week is either Monday, Tuesday, Wednesday, or Thursday, and 0 otherwise.¹¹ $\varepsilon_t \sim (0, h_t)$ is assumed to follow a conditional normal distribution with a zero mean and a conditional variance h_t . The conditional variance h_t can be expressed as

$$\log(h_t) = \tau + \omega \left(\left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| - \sqrt{2/\pi} \right) + \phi \log(h_{t-1}) + \kappa \left(\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right) + \lambda COM_t + \xi z_t \quad (2)$$

where h_t is the conditional variance of r_t , h_{t-1} the past variance, ε_{t-1} past innovations, COM_t the communication measure, and z_t the vector of the day of the week controls. Model estimation is done by Maximum Likelihood. Stock prices were obtained from Datastream.

We expect positive (negative) communications to have a positive (negative) effect on returns and volatility. We analyze the effect of each type and source (i.e. which FSA official) separately since there is evidence that those communication channels have a different effect (Knutter *et al.* 2011; Born *et al.* 2012).

4. Results

4.1. Descriptive analysis

Table 1 contains a summary of the data by year, type, and source. Panel A presents the communication by type. First, as a general observation, we see that there was not much communication by the FSA with the market during 2006 and 2007. While the number of communication events doubled from 2006 to 2007, from the pre-crisis period to the early stages of the financial crisis, it was still at a low intensity. This changes when the financial crisis strikes with full force in 2008. The number of communication events increases threefold in 2008, thus the FSA significantly steps up its communication with the financial market. This includes all types of events, but mostly speeches (Table 1). Analysis of the dates of the communication events (not reported) also shows that the majority of communication events took place before

¹⁰ It is a widely evidenced phenomenon in the literature that stock return volatility differs with the day of the week (Berument and Kiyamaz, 2001; Kiyamaz and Berument, 2003; Charles, 2010). A variety of possible explanations has been put forward (Charles, 2010). It is a standard control variable in literature on the effect of central bank communication on market volatility (e.g. Jansen and De Haan, 2005; Ehrmann and Fratzscher, 2007; Ehrmann and Fratzscher, 2009; Born *et al.* 2011; Born *et al.* 2012), so we follow this approach.

¹¹ Friday is excluded to avoid the 'dummy trap' (Kiyamaz and Berument, 2003; Charles, 2010). All analysis is therefore in relation to Friday as the baseline (Charles, 2010).

the collapse of Lehman Brothers on 15th September 2008. Thus, even before this decisive event, the FSA significantly increased their efforts at communicating with the market. This increase in communication is sustained throughout 2009, the depths of the financial crisis, when the highest number of communication (32) with the market takes place. Taken together, this suggests that the FSA, along with the increase in the severity of the crisis, increased the frequency of their communication correspondingly.

Table 1. Summary Statistics for FSA communication types

Year	2006	2007	2008	2009	Total
Panel A					
<i>FRO</i>	1	1	1	1	4
<i>Interview</i>			4	3	7
<i>Speech</i>	4	8	18	25	55
<i>Hearing</i>		1	7	3	11
Total	5	10	30	32	77
Panel B					
<i>FRO</i>	1	1	1	1	4
<i>Chairman</i>	2	4	11	21	38
<i>Chief Executive</i>		5	14	6	25
<i>Other</i>	2		4	4	10
Total	4	9	29	31	77

Note: This table reports the summary statistics for FSA communication in the sample by year. Panel A reports the statistics broken down by the different types of communication examined. These are Financial Risk Outlooks (*FRO*), Interviews by FSA top officials (*Interview*), Speeches by FSA top officials (*Speech*), and Parliamentary hearings and other oral evidence given by FSA top officials before lawmakers (*Hearing*). Panel B reports the statistics broken down by the different sources of communication examined. These are communication by the Chairman of the FSA (*Chairman*), Chief Executive of the FSA (*Chief Executive*), and other top FSA officials (*Other*).

Panel B presents the statistics by year and sources of communication to understand the composition of communication each year and its evolution over time. We can see that the vast majority of communication came from the Chairman of the FSA who delivered 49% of FSA communication on market confidence during that period, followed by the Chief Executive with 32%. Other top officials only made up about 8%. This underscores the dominant role of the FSA Chairman in communicating with the market on this topic, who was involved in 53% more communication events than the Chief Executive. Moreover, Table 1 shows that the increase in communication with the market after 2007 came predominantly from a substantial increase in Chairman communication. While Chief Executive communication also rises strongly from 2007 to 2008, the frequency then drops back to 2007 levels once the most acute crisis had passed in 2009. By contrast, Chairman communication approximately doubled again from 2008 to 2009. This is not surprising as the Chairman's role as a senior figure encompasses being the public face of the FSA, and therefore will be the first port of call for questions about the crisis and its effects and lessons learned, and the future role of the FSA and market oversight.

Table 2. Average tone characteristics of FSA communication

Year	Average tone in FSA communication in percentages		
	Positivity	Negativity	Uncertainty
2006	0.23%	0.23%	0.24%
2007	0.26%	0.34%	0.24%
2008	0.19%	0.29%	0.17%
2009	0.14%	0.26%	0.13%

Note: This table reports the average positivity, negativity, and uncertainty of each communication event by sample year. It is measured as the average number of positive, negative, or uncertainty words in each communication as percentage of overall words in each communication.

Table 2 presents the results of the descriptive analysis of the positivity, negativity, and uncertainty measures. The results show a clear change in the positivity, negativity, and uncertainty in communication over the crisis period. While the FSA's communications showed a neutral tone with balanced negativity and positivity in 2006, this changed drastically in 2007 with the onset and first effects of the financial crisis. Communications became significantly more negative, with an increase of 48% in overall negativity of communication, clearly highlighting the FSA's increasing concern with the ongoing events. Despite that, communication became also slightly more positive, potentially reflecting a more positive outlook for a future resolution of the crisis since the crisis had not yet reached its climax. The uncertainty level remained unchanged from the prior year. From 2007 to 2008, with the slowly unfolding crisis, the FSA's tone became less negative, but also significantly less positive. Positivity declined by 27%, which may reflect increasing concerns about the situation. Negativity reduced by a lesser 15%. In light of the majority of 2008 communication occurring before the Lehman Brothers event in September 2008, it may be that the expected negative effects from the unfolding financial crisis were still at a low level at that stage, so the FSA may have shown reduced negativity, which is reflected in the data. The FSA's tone also became significantly less uncertain. This 29% reduction in uncertainty may also stem from the initial effects of the crisis being less severe and visible prior to Lehman, thus suggesting a resolution of uncertainty, if only partly and temporarily.

In 2009, after Lehman, and when the most severe effects had started to unfold (i.e. the credit crunch), all measures of the FSA's communication tone dropped further from 2008. The FSA became less positive, showing that the FSA had become more concerned about the markets and market confidence. Positivity had dropped 40% from 2006 levels prior to the crisis, thus reflecting the FSA's much reduced positivity regarding the financial system. Despite slightly dropping from 2008, the fact that, in 2009, negativity level was nearly double the level of positivity after being evenly balanced in 2006, suggests that the FSA had increasingly focused on highlighting the negative aspects more than the positive aspects, in an attempt to point to possible issues and to caution the market. Uncertainty in 2009 had nearly halved from 2006 levels, which may reflect that the FSA, in 2006, might have been aware of built-in imbalances and rising risk in the system, but concerned and uncertain how those issues would be resolved in the future. In 2009, there was much more clarity and the effects from the financial crisis and credit crunch that had fully unfolded, thus less uncertainty.

4.2. Empirical results

4.2.1. Effect of type of FSA communication on financial markets

The results of the first empirical analysis of the effect of different types of FSA communication on indicators of market confidence are presented in Table 3.

Starting with the annual Financial Risk Outlook (FRO) in Panel A, we can see that the publication of FROs does not affect the mean returns (column 2) of the FTSE 100 or the FTSE 100 Financial Sector returns. While the negative (positive) association suggests the publication of FROs is linked to lower (higher) returns of the FTSE 100 (Financial Sector), the effect is not significant. By contrast, we find a significant positive association with volatility (column 3) of both FTSE 100 and Financial Sector returns. This suggests that the release of more positive FROs leads to increased volatility, thus FSA communication may have had the opposite of the intended effect. Instead of bolstering market confidence, it results in higher volatility. Potentially the FRO release initially increases uncertainty as the market tries to make sense of the information and come to a consensus about its interpretation and implications, hence we observe higher volatility at its release. This is consistent with Dewachter *et al.* (2014) who point out that volatility following announcements and events may increase as market participants interpret information and its likely impact differently, leading to different reactions. This finding also suggests that the FRO, while prescheduled and therefore expected, still has information content that is new to the market, and affects its volatility.

Table 3. Effect of type of FSA communication on financial markets

	Mean	Volatility
Panel A		
<i>FRO</i>		
FTSE 100	-0.02887 (0.05187)	0.17573** (0.074)
FTSE 100 Financial Sector	0.00242 (0.00208)	0.27736** (0.14021)
Panel B		
<i>Speech</i>		
FTSE 100	-0.05522 (0.10306)	0.10538 (0.06422)
FTSE 100 Financial Sector	-0.00282 (0.00183)	0.01379 (0.54430)
Panel C		
<i>Interview</i>		
FTSE 100	0.03732 (0.26924)	-0.26013** (0.12932)
FTSE 100 Financial Sector	0.01017* (0.00556)	-0.11185 (0.26277)
Panel D		
<i>Hearing</i>		
FTSE 100	-1.00728*** (0.15342)	-0.22012 (0.43259)
FTSE 100 Financial Sector	-0.00767*** (0.00018)	-0.39987 (0.60308)

Note: This table reports the results for EGARCH models examining the effect of Positivity expressed in different types of FSA communication (*FRO* (Financial Risk Outlook), *Speech* (Speeches by FSA top officials), *Interview* (Interviews with FSA top officials), *Hearing* (Parliamentary hearings)) on market returns and volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Next, the results in Panel B show that speeches by FSA officials seem to have no effect on average returns and volatility. While the coefficients for the mean (volatility) effect of tone are negative (positive), they are insignificant across all four aspects. Speeches are usually given in the evenings when UK financial markets are closed and at closed-door events only for a select audience (e.g. academic and professional conferences, practitioner seminars in the City of London). The timing and the select audience may be the reason that news and content of the speech (1) do not leak into the market until a while after, thus have become partly 'stale' information once it reaches a broader audience, or (2) never become broadly disseminated knowledge to all market participants due to their specific focus, even if market stability and confidence were touched upon. As with returns, volatility of both FTSE 100 and Financial Sector specific returns are unaffected by Speeches. This provides further evidence that the tone in Speeches does not constitute market-moving information.

The results for interviews by FSA officials (Panel C) provide a mixed picture in terms of market impact and strength. Interviews with a more positive tone lead to significantly higher Financial Sector returns (at 10% level), while FTSE 100 returns remain unaffected. Thus, there is a marginal positive effect on Financial Sector returns, which suggests some success in providing confidence to that sector of the market, whereas overall market returns are unaffected. In terms of volatility, we find the opposite effect. Interviews with a more positive tone significantly reduce volatility for FTSE 100 returns, while having no significant effect on Financial Sector returns. Again, it is possible that more positive tone in interviews may be perceived as positive for the overall market and economy. This, in turn, reduces uncertainty

held by market participants and creates confidence in the market, and therefore lower volatility. The insignificance for Financial Sector returns may stem from interviews having a broader objective of fostering confidence in the overall market, not necessarily targeting the Financial Sector specifically. The Financial Sector may still be affected by more positive communication and increased confidence in the overall market (as reflected in the negative coefficient), and as part of the overall market, but not explicitly show any effects.

Lastly, the results for Parliamentary hearings in Panel D show a very different picture to the other types of communication. As can be seen from column 2, hearings have a significant negative effect (at 1% level) on both FTSE 100 average returns and Financial Sector returns, the strongest effect among all communication types. These findings are consistent with other studies showing that parliamentary appearances by central bank members affect markets (Kohn and Sack, 2003; Connolly and Kohler, 2004). This result is not surprising since Parliamentary hearings are related to issues in the financial markets and the financial system, especially during the depth of the financial crisis. The matters discussed and their tone is of direct relevance to the overall market, and especially the Financial Sector. More specifically, while a more positive tone in the FSA officials' communication during hearings may indicate confidence regarding the stability and working of financial markets, the nature of these hearings means that failings in the financial sector may have been discussed, along with possible measures such as increased regulation and restriction of activities (already implemented or planned) that may negatively impact market participants and the financial sector. Hence, a strongly negative reaction arises from such hearings. Generally, in those hearings, members of the Treasury Select Committee probe the FSA representatives and seek on-the-record explanations and answers. A large part of such hearings consists of FSA representatives having to respond on the spot, spontaneously, to follow-up questions and requests for clarification of issues they may not have been prepared for. These situations may lead to the revelation of measures to be taken or issues to be addressed by the FSA that are potentially negative for financial market participants, such as more regulations and stricter rules, although the tone is positive from a financial stability perspective (e.g. addressing weaknesses in the system). As these hearings tend to be broadcast live on television and therefore can be traded upon instantly, a negative market reaction follows.

Since we find no effect of hearings on volatility, and the market reaction to hearings is clearly strongly negative (in terms of returns), it seems that the interpretation of the communication is clear-cut. There does not seem to be much uncertainty arising from hearings, therefore volatility is not affected.

4.2.2. Effect of source of FSA communication on financial markets

Table 4 presents the results of our analysis of the effect of FSA communication on financial markets by source of communication. As with the analysis of effect by type of communication, we examined the effect on financial markets separately for who made the communication that is which type of FSA official: The Chairman, the Chief Executive, or other top ranking officials.

As can be seen from Panel A in Table 4, more positive communication by the FSA Chairman has no effect on FTSE 100 returns nor on Financial Sector returns. Likewise, there is no association with volatility in both cases. Taken together, positive communication by the Chairman, the most senior and authoritative figure in the FSA, does not seem to affect the markets. The results for communication by the FSA Chief Executive (Panel B) are quite the opposite. Positive Chief Executive communication is associated with a significant reduction in returns, both for the overall FTSE 100 and the Financial Sector. The Chief Executive of the FSA can be considered as the key person responsible for market oversight, driving and implementing initiatives, and ensuring market confidence. It is, therefore, not surprising that those communications will be closely followed and have a significant impact on the market. The negative market reaction suggests that issues that are positive from the FSA's point of view (e.g. new regulations to make markets safer and more stable) will mean more restrictions and less business for market participants regardless of the sector of the stock market; hence the negative reaction. Panel C presents the effect of other FSA top officials' communication on the

markets. Similar to the results for the Chairman, more positive tone in communications by FSA officials other than the Chairman or Chief Executive have no effect on the market. Neither returns nor volatility move significantly in reaction to such communication. This further shows that the market seems to consider communication by the Chief Executive to be most important, whereas any other officials' communication does not seem to convey value relevant or confidence relevant information. That is, spreading and fostering market confidence seems to be the Chief Executive's task. Our findings are similar to studies focusing on central banks, which show that the market reacts significantly stronger to speeches and statements by the Chairman rather than other board members (Andersson *et al.* 2006; Ehrmann and Fratzscher, 2007; Hayo *et al.* 2015). Overall, this result may be important to consider for regulators in deciding who should convey crucial messages to the market, and the government when contemplating further changes to the regulatory structure.

Table 4. Effect of source of FSA communication on financial markets

	Mean	Volatility
Panel A		
<i>Chairman</i>		
FTSE 100	0.10723 (0.14669)	0.03834 (0.09544)
FTSE 100 Financial Sector	-0.00308 (0.00491)	-0.10917 (0.27997)
Panel B		
<i>Chief executive</i>		
FTSE 100	-0.45704** (0.22002)	0.10989 (0.029)
FTSE 100 Financial Sector	-0.00502*** (0.00064)	0.01532 (0.18125)
Panel C		
<i>Other</i>		
FTSE 100	0.08042 (0.278)	-0.01670 (0.12674)
FTSE 100 Financial Sector	-0.00146 (0.01350)	0.03641 (0.38676)

Note: This table reports the results for EGARCH models examining the effect of Positivity expressed in different sources of FSA communication (by *Chairman* (FSA Chairman), *Chief Executive* (FSA Chief Executive), *Other* (Other FSA top officials)) on market returns and volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

4.2.3. Effect of uncertainty in FSA tone on financial markets – by communication type

We also examine whether uncertainty in the tone of FSA communication affects the markets. The measure of uncertainty is defined in the methodology section. First, we report the results according to type of communication in Table 5.

The results show that FROs (*FRO*) and especially parliamentary hearings (*Hearing*) have a significant influence on both returns and volatility. Higher uncertainty in FROs (Panel A) is linked to lower stock returns in the Financial Sector (at 1% level) but not overall market returns. This suggests that the market perceives the uncertainty expressed in FROs to have more negative effects for the Financial Sector rather than the overall market. In terms of volatility, we find the opposite effect. Higher uncertainty leads to higher volatility in the overall market returns (at 5% level), while Financial Sector volatility remains unaffected. It is possible that the uncertainty expressed leads to a general increase in market uncertainty (i.e. volatility), while the consequences for the Financial Sector are rather clear-cut and negative (leading to lower returns) but the interpretation of the effect is straightforward negative, so there is no effect on volatility. Uncertainty in speeches (*Speech*) (Panel B) does not seem to influence returns or

volatility, which is consistent with the insignificant results for Positivity reported earlier. Taken together, that suggests that speeches by FSA top officials (the tone) did not influence market confidence. Similarly, Panel C shows that uncertainty in interviews (*Interview*) has no effect on either returns or volatility. By contrast, the results in Panel D highlight that uncertainty in the tone of Parliamentary hearings (*Hearing*) has a significant effect on returns (at 1% level) as well as FTSE 100 volatility (at 5% level). Interestingly, higher uncertainty is associated with higher returns in both the overall market and the Financial Sector. It may be that, as Parliamentary hearings usually have an element of politicians asking for what measures are planned to prevent a repetition of an issue in the future, the uncertainty in tone may be perceived as positive by the market. Measures taken by the regulator intending to reduce crisis potential and risk tend to involve more regulation and restrictions for market participants, which will restrict their behavior and reduce potential profit opportunities. The positive effect of higher uncertainty on returns and volatility may indicate that the FSA (1) had not yet decided on specific measures (i.e. so far no additional restrictions) or (2) their proposed measures were less negative for market participants than they had expected.

Table 5. Effect of uncertainty in FSA tone in communication on financial markets

	Mean	Volatility
Panel A		
<i>FRO</i>		
FTSE 100	-0.07605 (0.09546)	0.17573** (0.07397)
FTSE 100 Financial Sector	-0.00413*** (0.00108)	-0.18339 (0.21682)
Panel B		
<i>Speech</i>		
FTSE 100	0.06963 (0.10006)	-0.05145 (0.08710)
FTSE 100 Financial Sector	-0.00270 (0.00192)	-0.06607 (0.16261)
Panel C		
<i>Interview</i>		
FTSE 100	-0.33090 (0.62250)	-0.21284 (0.15469)
FTSE 100 Financial Sector	0.00385 (0.00533)	-0.35061 (0.30721)
Panel D		
<i>Hearing</i>		
FTSE 100	0.54251*** (0.13068)	-0.45060** (0.18470)
FTSE 100 Financial Sector	0.00381*** (0.00066)	-0.52686 (0.32773)

Note: This table reports the results for EGARCH models examining the effect of Uncertainty expressed in different types of FSA communication (*FRO* (Financial Risk Outlook), *Speech* (Speeches by FSA top officials), *Interview* (Interviews with FSA top officials), *Hearing* (Parliamentary hearings)) on market returns and volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Comparing these results to other studies is complicated by the fact that previous research investigating uncertainty uses aggregate central bank announcements and press releases instead of the separate types as in our study. Nevertheless, our results are in line with previous studies which show that less uncertainty in Federal Reserve statements is linked to higher stock prices (Hansen and McMahon, 2016), and that ECB and Bank of Canada communication can lead to increased market volatility and bond yield volatility, respectively (Neugebauer, 2019; Ehrmann and Talmi, 2019).

4.2.4. Effect of uncertainty in FSA tone on financial markets – by communication source

Table 6 shows the results for the effect of higher uncertainty by source (*Chairman, Chief Executive, Other*).

Table 6. Effect of (uncertainty in) source of FSA communication on financial markets

	Mean	Volatility
Panel A		
<i>Chairman</i>		
FTSE 100	-0.01517 (0.11653)	-0.06897 (0.07674)
FTSE 100 Financial Sector	-0.00376*** (0.00145)	-0.05453 (0.12832)
Panel B		
<i>Chief executive</i>		
FTSE 100	0.43440** (0.19746)	-0.36950** (0.18804)
FTSE 100 Financial Sector	0.00386*** (0.00112)	-0.30142 (0.19458)
Panel C		
<i>Other</i>		
FTSE 100	0.47096*** (0.17100)	0.38372** (0.15676)
FTSE 100 Financial Sector	-0.01109** (0.00473)	-0.13632 (1.60591)

Note: This table reports the results for EGARCH models examining the effect of Positivity expressed in different sources of FSA communication (by *Chairman* (FSA Chairman), *Chief Executive* (FSA Chief Executive), *Other* (Other FSA top officials)) on market returns and volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

We can see from Panel A that higher uncertainty in the tone of FSA Chairman communication (*Chairman*) only affects Financial Sector returns, but that is a highly significant negative impact (at 1% level). Overall stock market returns are unaffected, as is volatility. Thus, higher uncertainty seems to be perceived as negative for the Financial Sector. By contrast, Panel B shows that higher uncertainty in the Chief Executive's tone (*Chief Executive*) has a much wider and stronger effect on the markets. Higher uncertainty is linked to significantly higher returns in the overall market (at 5% level) and the Financial Sector in particular (at 1% level), and lower volatility in the overall market. This suggests that higher uncertainty in the Chief Executive's tone would lead to more confidence in the market. This at first glance counterintuitive result may come from the communication expressing more uncertainty regarding the design or absence of timeframe for potential implementation of new regulations which quite likely would restrict market participants' behavior. As the Chief Executive is the person responsible for driving through any new measures, uncertainty in this area expressed by the Chief Executive may be seen as positive by the market. The results in Panel C for *Other* sources of communication are slightly more complex. Higher uncertainty in communication by FSA top officials other than Chairman and Chief Executive has opposite effects on stock returns, with higher (lower) returns in the overall market (Financial Sector). Other FSA officials occupy leading positions of specialized FSA departments. Especially important is the Director of the Banking Sector Division who handles the relevant communication on market confidence and therefore constitutes the 'other' directors' communication in our sample. The speeches given are on supervision and banking regulation, including banks' business models and activities, thus have more direct significance for the Financial Sector than the overall market. Hence, it is possible that uncertainty in their communication negatively affect the Financial Sector (e.g.

potential future limitations on banks' business activities), while being perceived as positive for the overall market.

In terms of volatility, only the overall market shows higher volatility (5% level), whereas the Financial Sector remains unaffected. Here as well, it is possible that uncertainty in tone may mean different things for the overall market than for the Financial Sector.

Overall, our results are consistent with previous studies that also found that market reaction differs depending on the source of communication, such as Chairman, CEO, or other (e.g., Andersson et al. 2006; Ehrmann and Fratzscher, 2007; Hayo et al. 2015).

4.3. Additional analysis

To provide a more in-depth analysis of the effect of communication events on volatility, we specify Engle and Lee's (1999) asymmetric Component GARCH (CGARCH) model to break down the market impact of communication into a short-term and long-term component. This model separates the effect into a slowly mean reverting long-run component of conditional variance, and a more volatile short-run component. This allows us to examine persistence in market effect that is how long it takes for the variance to revert toward its long-run average in each case. High (low) persistence means variance slowly (quickly) reverts (decays) to its average (Chen and Shen, 2004; Kang et al. 2009). Based on our previous results, we focus on those communication types and sources that have significant market effects.

Table 7 presents the results for the positivity measures. Panel A (Types of communication) shows there is significant permanent-transitory component volatility decomposition for all three communication types (*Hearing*, *FRO*, *Interview*) for the overall market (FTSE 100) but not for the Financial Sector. Specifically, we find that the parameters of persistence of shocks to the permanent component (ρ) and both transitory parameters (α & β) are significant. The persistence of shocks to the permanent component are high with 0.9959, 0.9959, and 0.9961 for *Hearing*, *FRO*, and *Interview*, respectively. The half-lives of those components are 169 days (*FRO*, *Interview*) and 177 days (*Hearing*), which means that the effect of a shock to the conditional volatility tends to take months to fade and volatility to revert to its mean. The values for shocks to the transitory component of the three measures are 0.939, 0.937, and 0.936, respectively. The corresponding half-lives of those components are approximately 10-11 days for each type of communication, which means that the effect of a shock to the transitory component fades much quicker.

Panel B presents the results for communication by the Chief Executive. Here as well, we find a significant effect for overall returns but not for the Financial Sector. The persistence of shocks to the permanent component is also high with 0.9962, comparable to the different types of communication as before. The half-life of shocks to the permanent component is 182 days, a few days longer than we find for communication events in general. This suggests that if communication comes from the FSA Chief Executive, it amplifies the market impact and lengthens the period for the shock to volatility to decay. The value for shocks to the transitory component is 0.939 with a half-life of just under 10 days, indicating that the shock to the transitory component fades slightly quicker when coming from the Chief Executive.

Table 7. Decomposition of effect of Positivity in FSA communication on permanent and transitory components of volatility

Panel A: Communication type					
	ω	ρ	φ	α	β
<i>FRO</i>					
FTSE 100	0.0046** (0.0018)	0.9959*** (0.0000)	0.0345*** (0.011)	0.0856*** (0.0209)	0.8502*** (0.0390)
FTSE 100 Financial Sector	0.0000 (0.0000)	0.9999*** (0.1534)	0.1166** (0.0562)	0.0252 (0.0156)	0.7915*** (0.1689)
<i>Interview</i>					
FTSE 100	0.00462*** (0.0017)	0.9959*** (0.0000)	0.0343*** (0.01394)	0.0855*** (0.0153)	0.8512*** (0.0294)
FTSE 100 Financial Sector	0.0000 (0.0000)	0.9998*** (0.1996)	0.1136 (0.2095)	0.0251 (0.2389)	0.7867*** (0.1531)
<i>Hearing</i>					
FTSE 100	0.0044** (0.0018)	0.9961*** (0.0000)	0.0346*** (0.0131)	0.0859*** (0.0214)	0.8499*** (0.0386)
FTSE 100 Financial Sector	0.0000 (0.0000)	0.9981*** (0.0115)	0.1189*** (0.0052)	0.0110 (0.0079)	0.8071*** (0.0197)
Panel B: Communication source					
<i>Chief executive</i>					
FTSE 100	0.0042** (0.0021)	0.9962*** (0.0000)	0.0350* (0.0201)	0.0889*** (0.0255)	0.8436*** (0.0409)
FTSE 100 Financial Sector	0.0000 (0.0000)	0.9934*** (0.0033)	0.1185*** (0.0025)	0.0103 (0.0026)	0.80984*** (0.00324)

Note: This table reports the results for Component GARCH models examining the effect of Positivity expressed in different types of FSA communication (*FRO* (Financial Risk Outlook), *Interview* (Interviews with FSA top officials), *Hearing* (Parliamentary hearings)) and sources of FSA communication (by the *Chief Executive* (FSA Chief Executive)) on permanent and transitory components of volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8 shows the results for decomposing the effect of uncertainty in FSA communication on permanent and transitory volatility. First, for type of communication (Panel A), we find evidence for a significant decomposition effect for overall returns (FTSE 100) for both communication types (*FRO*, *Hearing*) as well as for the Financial Sector for *FRO* only. Both parameters of persistence of shocks to the permanent (ρ) and transitory component (α & β) are significant. The persistence of shocks to the permanent component are high with 0.9959, 0.9931 (*FRO*), and 0.9962 (*Hearing*). The half-lives of those components for the overall FTSE 100 are 169 days (*FRO*) and 182 days (*Hearing*), which are in line with our previous findings. That hearings have the longest impact is not surprising since the issues discussed may have more profound future long-term indications for the market, such as new regulations. The half-life for the effect on Financial Sector returns is decidedly shorter with 100 days, possibly because a higher frequency of information relevant to the sector leads to a shorter lifespan of information events. The values for shocks to the transitory component for the overall FTSE 100 returns are 0.937 and 0.935, respectively, with corresponding half-lives of approximately 10-11 days (*FRO*) and 10 days for Hearings (*Hearing*). The effect of the shock on the Financial Sector is comparatively rather short, with a value of 0.8242 corresponding to a half-life of 3.5 days. This again suggests that shocks to volatility in the Financial Sector decay a lot faster.

Table 8. Decomposition of effect of Uncertainty in FSA communication on permanent and transitory components of volatility

Panel A: Communication type					
	ω	ρ	φ	α	β
<i>FRO</i>					
FTSE 100	0.0046*	0.9959***	0.0344**	0.0850***	0.8519***
	(0.0025)	(0.0000)	(0.0140)	(0.0223)	(0.0396)
FTSE 100 Financial Sector	0.0000	0.9931***	0.1200***	0.0131***	0.8111***
	(0.0000)	(0.0005)	(0.0019)	(0.0020)	(0.0009)
<i>Hearing</i>					
FTSE 100	0.0043**	0.9962***	0.0349**	0.0873***	0.8477***
	(0.0020)	(0.0000)	(0.0139)	(0.022)	(0.0392)
FTSE 100 Financial Sector	0.0000	0.9962***	0.1122***	0.0145	0.7975***
	(0.0000)	(0.0055)	(0.0099)	(0.0174)	(0.0068)
Panel B: Communication source					
<i>Chairman</i>					
FTSE 100	0.0046	0.9959***	0.0344*	0.0850***	0.8515***
	(0.0028)	(0.0000)	(0.0181)	(0.0241)	(0.0387)
FTSE 100 Financial Sector	0.0000	0.9984***	0.1158***	0.0162	0.7975***
	(0.0000)	(0.0069)	(0.0018)	(0.0204)	(0.0018)
<i>Chief executive</i>					
FTSE 100	0.00428***	0.9962***	0.0352**	0.0875***	0.8460***
	(0.0009)	(0.0000)	(0.0137)	(0.0193)	(0.0292)
FTSE 100 Financial Sector	0.0000	0.9934***	0.1179***	0.0115***	0.8087***
	(0.0000)	(0.0005)	(0.0013)	(0.0008)	(0.0017)
<i>Other</i>					
FTSE 100	0.0046**	0.9959***	0.0345**	0.0847***	0.8518***
	(0.0019)	(0.0000)	(0.0158)	(0.0234)	(0.0382)
FTSE 100 Financial Sector	0.0000	0.9972***	0.1131***	0.0205	0.7928***
	(0.0000)	(0.1391)	(0.0094)	(0.0340)	(0.0696)

Note: This table reports the results for Component GARCH models examining the effect of Positivity expressed in different types of FSA communication (*FRO* (Financial Risk Outlook) and *Hearing* (Parliamentary hearings)) and sources of FSA communication (by *Chairman* (FSA Chairman), *Chief Executive* (FSA Chief Executive), *Other* (Other FSA top officials)) on permanent and transitory components of volatility. Numbers in brackets denote standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel B shows the results for communication sources. We find significant effects for all three sources for FTSE returns, while Chief Executive communication also impacts on the Financial Sector. The persistence of shocks to the permanent component for the overall market (FTSE 100) are high with 0.9959, 0.9962, and 0.9959 for *Chairman*, *Chief Executive*, and *Other*, respectively. The half-lives of those components are 169 days (*Chairman*, *Other*) and 182 days for the Chief Executive, again highlighting the stronger impact of Chief Executive communication compared to other types and sources. In terms of the shock to the transitory

components, the values of 0.9365, 0.9335, and 0.9365 correspond to half-lives of 10.5 days (*Chairman, Other*) and 10 days (*Chief Executive*), hence all three sources have a comparable impact on the transitory volatility component.

To sum up our tests of decomposing shocks to volatility into short-term and long-term components, we find that communication events affect both components of volatility. Further, while positivity and uncertainty have a similar impact on the long and long-term volatilities, we observe that communication by the FSA's Chief Executive has a special impact.

5. Conclusion

This study examines how successful the Financial Services Authority (FSA), the UK financial markets regulator between 1997 and 2013, was in achieving its stated objective of maintaining confidence in the financial markets. We focus on the recent financial crisis and the period 2006 (the run-up to the crisis) to 2009 (the year after the Lehman Brothers collapse) during which bolstering market confidence was critical, and analyze whether the tone in FSA communication had a discernible impact on market confidence during this time of severe crisis. Our explicit aim is to derive lessons that can help the current supervisor body to improve their communication, especially with a view to future crises.

We find evidence that FSA communication with the markets was only partly successful in spreading and fostering confidence. While we find that communication had a significant impact on market volatility, the impact was not unidirectional: Depending on type of communication and who communicated, more positive tone could either reduce or increase market volatility. Similarly, uncertainty in tone can have opposing effects on returns and volatility. We also find a negative impact on stock returns, especially when emanating from the FSA Chief Executive. These findings do not fully support the idea that FSA communication strengthened market confidence, visible via lower volatility.

Further analysis on the impact on short-term and long-term market volatility shows that Chief Executive communication had the most distinct market impact on this measure: Communication events had the longest lasting impact on the long-term component of volatility, but the shortest impact on the short-term volatility component. Our evidence is consistent with previous research (Ehrmann and Fratzscher, 2009; Born et al. 2012; Born et al. 2014) showing that Central Bank communication influences financial markets.

Our findings have important implications for regulatory authorities that go beyond the immediate UK context. First, we provide timeless evidence on the effectiveness of supervisory communication with the market in times of a severe crisis. This is especially valuable for current supervisory bodies, who can heed the lessons to better understand the effect of communication on market confidence, in order to improve their own future crisis communication to help achieve a desired effect. Second, our results show the crucial importance of considering source and type of communication when decisions on who communicates with the market are made, as this can affect market reaction. Supervisory bodies and other agencies communicating with financial markets try to meticulously ensure that their communicating with financial markets do not cause negative effects or unintended consequences. Given the variety of possible communication channels and communicators used, they should take note of our results.

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