An investigation into how the quantitative easing programme, Vickers' ring-fencing regulation and the 'Brexit' announcement impacted the UK banking sector.

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ABSTRACT

In this paper, 'Events study analysis' is used to analyse the impact of Vickers' ring-fencing regulation, quantitative easing programme and the United Kingdom's vote to leave the European Union ('Brexit') on the UK banking system. Ten banks have been included in the study and the stock price data for each of them was collected from the 14th January 2011 to the 30th of July 2016. We find that banks affected by Vickers' regulation did have negative abnormal returns as the policy progressed, indicating that the policy may not be the best way to limit risk in banks. The results also show that Quantitative Easing does affect the banks' abnormal returns positively and that 'bigger' banks benefit more from its implementation. Finally, we discover that the 'Brexit' vote did cause negative abnormal returns across all banks, however, it was the smaller 'unaffected' banks which suffered the most.

Keywords: ring-fencing; brexit; quantitative easing; events study analysis; UK banking regulations

1 Introduction

The financial crisis of 2007 had the greatest impact on the world's economy since the great depression of the 1930s. Its impact on the global economic system was so immense that governments around the world began to work on regulations to prevent an event like it from reoccurring. Two of the most notable regulations were the 'Volcker rule' implemented in the USA and Vickers' 'ring-fencing' regulation implemented in the UK. Since the crisis there have also been other events within the United Kingdom which have had a substantial effect on the financial landscape of the country. One of these is the initiation of quantitative easing (QE) by the Bank of England which was also implemented in response to the crisis of 2007, and another is the vote by the population of the UK to leave the European Union in 2016 – better known as 'Brexit'.

In terms of the regulations implemented in response to the crisis, the United Kingdom accepted the proposal put forward by Sir John Vickers: he first proposed his ring-fencing policy in 2011 where he suggested that changes should be made to the structure of banks within the UK. His main goal was essentially to separate retail banks from their investment banking counterparts in order to reduce the risk of a financial collapse occurring, which would affect both the banks and their customers (i.e. people who hold accounts/deposits in the bank). By doing this, should a crisis occur, the Bank of England would be more able to help a retail bank survive whilst potentially allowing its investment arm to fail, meaning the wider economy will be safer from unforeseen financial complications. Since 2011 Vickers' proposal was turned into regulation and the banks have had to submit their plans to comply with the new requirements. These changes need to be implemented prior to the official commencement date of this regulation which is on the 1st January 2019.

After the financial crisis of 2007 the UK also commenced a programme of quantitative easing which was carried out in an attempt to stimulate the economy. It largely took place from 2009 to 2012 and over £350 billion was injected into the economy. This was done as a direct result of the repercussions of the crisis, in the hope of creating greater financial stability across the country. In addition, in August 2016 further quantitative easing was also announced by the Bank of England, but instead of being attributed to the financial crisis it was probably prompted by the result of the UK's 'Brexit' vote which occurred a few months before.

'Brexit' or the vote to leave the European Union by the United Kingdom, was also a significant landmark in the United Kingdom's economic landscape. The result of the vote was announced on the 24th of June 2016 and it spurred great changes in both the financial landscape and the country as a whole. UK indices and bank equity values rapidly declined over the course of the result announcements and some have yet to return to their initial pre-announcement values. The vote also led to the resignation of Prime Minister David Cameron who stepped down as he felt he wasn't the right person to lead the United Kingdom through the impending 'Brexit' changes. However, since then the relevant financial markets have picked up and the new Prime Minister Theresa May has commenced the process of negotiating the 'Brexit' changes. At present the success of the outcome is still unknown and many questions have still been left unanswered in regards to how the UK will go about leaving the European Union.

The banking sector within the United Kingdom is key to the country's economy and as a direct consequence of the changes mentioned above banks within the United Kingdom underwent significant changes. Vickers' ring-fencing policy arguably should have had the most influence on these banks as it is a regulation which is directly related to them. Given how the new regulation will both restrict the banks' ability to generate cash flows through risky activities and force them to increase the amounts of buffer capital held, one would expect the banks to react negatively to developments in Vickers' regulation. This research will aim to ascertain whether the banks did indeed react positively or negatively to developments in the policy, from the initial proposal in 2011 to the present date. By doing this we will establish whether this regulation was a good move for the banking sector or not.

Quantitative easing is regarded as being a positive stimulant for banks and therefore its implementation should have a positive effect on them. This is especially true when we take into account the largest banks within the United Kingdom, as it is usually the largest 'players' in the market which benefit the most from QE. This research will help the readers gain a clearer picture of how the banks actually responded to the implementation of QE within the country as well as looking at how different types of banks responded to it.

Finally, in terms of the 'Brexit' decision, we'd expect to see banks across the country reacting very negatively to the news of vote. This is due to the current and future implications of actually leaving

the European Union, which will have an enormous effect on the banking system and the rest of the country as a whole. At present it is hard to say whether the vote was ultimately successful or not for the banks, however given the initial reaction and the unpredictability of the outcome, the current outlook is negative.

There are six main hypotheses in this paper to assess the research questions.

H_1: As Vickers' regulation gains momentum the 'affected' banks will respond negatively.

H_2: 'Affected' banks will have more negative abnormal returns than the 'unaffected' banks as Vickers' regulation progresses.

In terms of this regulation we'd expect the affected banks to have negative abnormal returns as the regulation progresses positively. On the other hand, were there to be any setbacks to the regulation or possibly even its cancellation we'd expect the banks to respond positively. Therefore there should essentially be an inverse relationship between the banks' equity values and Vickers' regulation. We'd also expect banks/banking institutions within the United Kingdom which don't fall within the criteria for the Ring-fencing requirements (i.e. 'unaffected' banks) to be largely unaffected by any progression in the regulation (good or bad). They may even react in the opposite direction to the affected banks as they won't be impacted from any changes brought in.

H_4: All banks/banking institutions in the study react positively to the announcement of QE.

H_5: Banks in the 'affected' group have higher abnormal returns than those in the 'unaffected' group.

With QE we'd expect all the banks within the country to react positively to its implementation as they are very likely to directly or indirectly receive benefits from it. The largest banks within the country (which are also the ones which will be affected by Vickers' regulation) are also likely to have

higher returns than the smaller 'unaffected' banks/banking institutions as the institutions with larger stakes in the economy will benefit more from the initiation of QE.

H$_5$: All banks/banking institutions in the study will react negatively to the 'Brexit' result.

H$_6$: Smaller banks (those in the 'unaffected' group) will have larger abnormal losses.

We'd expect the 'Brexit' results to be negative across all banks within the research regardless of size. This is mainly because of the unpredictability attached to the outcome, so it will be hard for the financial markets to be optimistic about the result and its impact on banks. However, given the size (financially) and wider multi-national presence of the largest banks within the United Kingdom (incidentally also the ones affected by Vickers' ring-fencing policy), we'd expect the bigger banks not to respond as badly to the outcome as the smaller banks/banking institutions.

The rest of the paper includes a literature review, the methodology of the research, the results of the research, the conclusion of the paper and finally appendices and references.

2 Literature Review

This section will discuss the literature review undertaken before commencing the data analysis. The literature review is split into five parts in which the first three parts contain literature based on the different events contained within the research, the fourth is based on the literature of how to carry out the project and the fifth is based on another measure that we wanted to include in the paper.

2.1 Vickers' ring-fencing policy

This part of the literature review is associated with Hypotheses 1 and 2.

In the world of academia, the examination of the impact of regulations on a financial system is a popular topic and this is especially so when we look at the studies of the major policies enacted in the United States of America (such as the Volcker rule which was enacted after the financial crisis of 2007). One example of this is a paper that looks at how the Volcker rule impacted bank valuations and risk in

the USA using time series analysis to assess the response of banks (Madura and Premti, 2014). This sparked an interest in using econometric analysis to see how regulations impact banks, which led to the initiation of this research. However, despite the Volcker rule being an interesting regulation to study, there has already been an array of academic literature devoted to it.

In the United Kingdom a similar regulation was also enacted after the financial crisis known as Vickers' ring-fencing regulation and in common with the Volcker rule also has the end goal of decreasing the risk of banks in the country. However, unlike the Volcker rule, Vickers' regulation has received far less attention in the academic community, especially when looking at how its implementation affects banks within the United Kingdom. Therefore, the focus of this research will be on this regulation and the UK's banking sector.

One paper, which has covered both these regulations – by Schafer et al. (2016) – analyses some of the main banks in each country and calculates their abnormal returns in response to changes in the regulation. This paper provided a strong basis to follow in our paper as it did analyse Vickers' regulation, but only dates up to Vickers' initial proposal therefore we have the possibility of examining new developments in the regulation since its proposal in 2011.

It is also important to gain a greater understanding of Vickers' regulation and the background of ring-fencing. One study poses a generic definition of ring-fencing and also comments on the issues with implementing such a regulation into the economy (Binder, 2015). The study comments on how ring-fencing regulations present 'significant costs' to the markets as well as having implications on their 'long-term profitability' too. This initially appears peculiar as the aim of Vickers' regulation is to decrease the risk levels present in the most important banking institutions in the country. However, as further research is carried out into the actual requirements of the regulation (Prudential Regulation Authority, 2014) and how the American banks responded to the Volcker rule, the conclusion of the paper certainly makes a lot more sense and it helps to form the hypotheses for this paper.

2.2 Quantitative Easing

This part of the literature review is associated with hypotheses 3 and 4. When analysing regulatory reform on banks it is also useful to take into account government intervention in the markets. In this

paper we will look at government intervention in the way of quantitative easing by the Bank of England and how it affects the banks involved in the research. In our research a similar approach is taken to that in Kobayashi et al.'s (2006) paper which uses events study analysis to see how Japanese bank equity values were impacted by quantitative easing from the bank of Japan.

In terms of quantitative easing in the United Kingdom, an early study (*Will quantitative easing pull the UK out of recession?*, 2009) set out the mechanics and early progress of QE and discussed how the policy was viewed as a last resort for the UK. It did argue that QE could be successful in controlling interest rates, however it remained sceptical on its impact in the real economy. More recent research on quantitative easing in the UK has been carried out by Breedon et al. (2012), it reinforced the fact that QE is effective in influencing longer-term bonds, however, they also conclude that the wider impact of QE remains controversial and will probably remain unresolved in the near future. Based on the previous research it seems as though it will be hard to estimate the QE's impact on the whole economy, therefore this paper will focus solely on the impact on the banking sector.

2.3 'Brexit'

This part of the literature review is based upon hypotheses 5 and 6.

Given the timing of this project, we believe it is also important to include the impact of the United Kingdom's vote to leave the European Union (aka 'Brexit') in the research. Unfortunately, based on how recent the 'Brexit' vote was there is very little in the way of academic research which focuses on its impacts, especially when examining the stock market or its influence on the banking landscape. However, prior to the event a lot of authors discussed the potential repercussions of the vote. Many authors take a sceptical view of the possibility of leaving the EU including one author (Mugarura, 2016) who discusses the potential negative effects on banks, both 'direct' such as the loss of EU banking licenses and indirect through the changes to their borrowers from which dealings occur.

2.4 Events Study Analysis

This part of the literature review is based upon the methods used to carry out the research.

Having selected the events to be examined, it is now important to focus on what type of data should be used to quantify the impact on the UK banking system. One research which looks at how regulatory reform impacted banks in Indonesia focuses on measuring bank efficiency using data from the annual financial statements to assess the impact of the regulatory reform (Defung, et al., 2016). Whilst this is a very valid way of assessing the impact, the time period used in this study is far longer than the one available in our study, meaning that it would be hard to use annual data as there are only five years to assess. Furthermore, our study aims to look at how intermediary events throughout the year impact the banks too as opposed to just viewing the before and after effects – once again signifying we need more regular data than merely annual.

It therefore appears more feasible to use daily data as it can be used to capture the immediate effects of any announcement or implementation. Fortunately, one of the biggest indicators of how a company is performing is its stock price on the markets. Given the continuous nature of the stock markets, it is possible to obtain daily data for banks within the United Kingdom and therefore it seems more appropriate to use this as a measure of response to Vickers' regulation. This approach was utilised by Kristjanpoller and Concha (2016) in their research which focused on the impact in airline stock returns from changes in fuel prices. Despite the fact this isn't explicitly linked to regulations, the methodology is still applicable as it is a strong example of how the impact of specific events can be measured by utilising the daily returns of stocks. The closest paper utilising events study analysis in relation to the banking sector is Schafer et al.'s (2016) paper, as mentioned above. This paper uses an estimation procedure to look at the abnormal returns of banks at key event dates. This method was also utilised by Maitra and Dey (2012) in their study on dividend announcements and the market response in the Indian stock market. After studying these it appears as though this is a successful way to conduct the research and therefore we shall base our study on these.

In terms of actually carrying out events study analysis to generate abnormal returns we also consult Mackinlay's (1997) paper which discusses the different models available and we have chosen to use the market model as it allows for the use of a relevant index.

2.5 Default Probability

Aside from the literature discussed above, there has been an attempt to try to assess the impact of the events on the bank default probability. However, the main problem here is how to assess the default probabilities on a continuous basis.

It is commonly known that the main way to judge the default probability of a bank/institution is to look at the credit rating issued to it by one of the main credit rating agencies. However, given the virtually static nature of credit ratings (they change after very long intervals), it will be impossible to include these in our events study analyses as they will barely change across our sample and therefore will not help to quantify the change in credit rating.

As a result of this, an alternative needs to be found which both quantifies the default rating and is continuous. Research into the topic uncovers a popular indicator known as the Z-Score which was originally created by Edward I. Altman (Altman, 1968). The Z-score quantifies the risk of bankruptcy and it has been perfected and expanded since its creation. In order to assess whether this will be suitable for our paper more research is carried out into its validity. One paper by Salimi (2015) does examine the validity of the Z-score and whilst it does argue it well, we find out that the Z-score is also not continuous and instead uses yearly figures. For this reason, we can't use this predictor as we need to be able to visualise the daily changes.

We carry out further research to try and find a continuous statistic however unfortunately we cannot find one. It may be possible to construct one but, this would take away a lot of time and attention from the actual goal of assessing how the events affected bank stock prices. Furthermore, were we to estimate one ourselves it may be inaccurate and this could significantly affect the abnormal returns of the banks in the research, therefore we choose not to involve the default probability into our research.

3 Methodology

3.1 Identification of Dates

The key data needed before any testing can be carried out are the dates to be examined. In order to ascertain which dates were relevant to the policy an extensive literature review was undertaken to ascertain which events were the most significant. The dates range from the initial policy recommendation in September 2011 to the present date.

Past research carried out by Schafer et al. (2016) analysed the effects of the regulation up to the implementation of the policy and therefore this was chosen as the starting point for this research. The main events that formed part of Vickers' regulation were: the initial proposal (11th September 2011), the date at which four consultation papers were released by the Prudential Regulation Authority making it policy (6th October 2014) and the submission date for the affected banks' plans to comply with the regulation (6th January 2015). These dates were key to the implementation of the policy so it was important for them to be included in the research.

Further reading and research was undertaken to see whether there were any other significant dates which could be included. This was carried out by reviewing archives of Financial Times newspapers which corresponded to relevant news items, and after some potential dates to be included were found Thomson Reuters was used to see if there were any interesting patterns in the stock prices of banks. After all of this only one more date was included into the research as it was the only one which presented interesting stock patterns amongst the affected banks and had a prominent article in the Financial Times newspaper (Jenkins, 2012)

After the research on Vickers' policy had been carried out, the dates of other important events in the wider banking environment were included. This process took a lot less time as the outcome of 'Brexit' was well documented so the date was not hard to find. This event was included as the repercussions of the outcome had (and will continue to have) an enormous impact on both the continuing operations of the banks included in the research as well as potential changes in Vickers' policy which is set to come into force in 2019. In addition, the dates of Quantitative Easing from the Bank of England were also included as 'QE' also has a substantial impact on the banking sector (i.e. through the whole process of purchasing financial assets to create more money for the retail banks

which are key in this study) and so it is important to see how it affected the different banks involved. The QE which took place during this time period was also well documented so it was easy to include them in the research. Figure 1 displays all of the dates included in the study.

3.2 Selection of Banks

A total of ten banks will be analysed in this research and they will be placed into one of two groups. The rationale behind this was to divide them into groups based upon whether they would supposedly be affected by Vickers' Ring-fencing regulation or not. The first group is made up of four banks which satisfy the criteria to be ring-fenced under the new regulations (this is determined by multiple factors such as deposits held) and thus are more likely to be affected by any events involving the policy. There are actually six banks operating within the United Kingdom that fall within the criteria for ring-fencing: Barclays, Royal Bank of Scotland, Lloyd's Banking Group, Santander, the Cooperative Bank and HSBC. However, one of these – Santander – is headquartered outside of the UK and therefore will be far less susceptible to any changes in UK regulations/events, therefore the inclusion of this bank would likely distort the results. The other – the Cooperative Bank – is headquartered within the United Kingdom but isn't listed on any stock exchange meaning that it does not have a continuous stock price to carry out events study analysis on.

The second group will be made up of banks/banking firms all operating within the United Kingdom and are listed on a stock exchange, however they fall below the minimum requirements to be ring-fenced under the new regulation. Given the tight criteria to be part of this research, very few banks were available to choose from. Therefore all the ones listed on an exchange (with stock prices that date back far enough to be included in the events study analysis), are headquartered within the United Kingdom (for the same reason as the ring-fenced banks) and aren't supposedly affected by the new regulations have been included – of which there are six: Close Brothers Group, Standard Chartered, Schroders plc, Investec plc, ICAP plc and 3i Group (a full list of the banks giving more details can be seen in Appendix A).

3.3 Data

In this research we use stock data taken from the ten different banks mentioned above within the period 14th January 2011 to the 29th of July 2016. The core data analysed was the daily closing prices of the stocks within the time period. These were used in conjunction with the daily market capitalisation for each of the banks listed above as well as the daily closing prices of the FTSE 100 index (one of the most appropriate indexes given how the study is focused on the United Kingdom).

The data needed for the research was taken from two different sources, and the first source used was 'Bankscope'. This program allowed us to set specific criteria from which we could narrow down a list of banks to be included in the sample. Although the research only includes ten banks/banking firms, a great deal of selection and modification of parameters was made possible by 'Bankscope' which greatly sped up the process of selecting the banks to be included in the research. The actual data itself was taken from Thomson Reuters which gave us the daily data for all ten banks and the index, which were vital for the events study analysis to be carried out.

3.4 Estimation Procedure

The goal of this research is to see how the banks responded to the different events mentioned above. One way to estimate this is to carry out events study analysis to calculate the abnormal returns of the stocks on the specific event dates. 'Events study analysis' is a type of empirical analysis that allows researchers to analyse the change in something (in this case a stock price) in relation to a particular event. This is particularly helpful to this research as we are trying to capture the immediate effects of the events on the banks. The events study analysis was carried out with the help of 'Princeton University Library' (2008) which was used as a guide throughout analysis stages. We also consulted Mackinlay's (1997) paper to decide which type of events study analysis to carry out and we chose the 'market model' as it includes the use of a broad index.

The first thing to do when carrying out the events study analysis was to estimate the normal performance of the stocks. This was carried out by performing a separate regression for every bank using the data within the estimation windows and salving the alphas and the betas (Princeton University

Library, 2008). After this, the abnormal returns were obtained by simply subtracting the predicted normal return from the actual return for each day in the event window.

Although this seems a fairly simplistic process, there was a large amount of data preparation which was undertaken prior to generating the returns. Firstly, it was important to ensure that the data was in the right format to be used in the analysis. A few test runs were carried out with the data in different formats until the correct formatting was found. It was also important to create a 'counter' which specified how many trading days away from the event we were. This was created so that estimation windows could be used to generate multiple abnormal returns.

The estimation windows used in the regressions were initially based on Schafer et al.'s (2016) paper which used an 80-day window, however, 40-day, 30-day and 20-day windows were also used as shorter estimation windows seemed more appropriate for these events. After the separate regressions were carried out, the three new estimation windows (20, 30 and 40-day) appeared to show consistent results whereas the 80-day window appeared to show far different and incoherent results. For this reason further analysis was only carried out on those three estimation windows.

Finally we tested the significance of the results (which is presented below) and the final abnormal returns were separated by date and by sub-group (i.e. the 'supposedly affected' and the 'supposedly unaffected'), and averaged out to see the difference in effect on the two groups. These are presented in the results section of the paper.

3.5 Testing

After the abnormal results had been generated, a test was carried out to check whether the average abnormal returns for each stock were statistically different from zero. The test used was:

$$Test = (\frac{\Sigma AR}{N})/(\frac{AR_{SD}}{sqrt(N)}) \tag{1}$$

Where: AR = Abnormal return

   AR_{SD} = Abnormal return standard deviation

   N = Number of days in the event window

The absolute value of the test should be greater/smaller than +/- 1.96 indicating that the abnormal return of that stock is statistically different from zero at the 5% level (Princeton University Library, 2008). The actual testing of the figures showed that the majority of the abnormal returns were statistically significant and there were only a few figures throughout the different regressions of varying event windows that weren't statistically significant.

4 Results

This section presents the results of the research separated out by event date.

There is strong evidence from the results supporting the hypotheses set out at the beginning. Firstly, the results show that as Vickers' policy progressed and gained momentum, the banks in the 'affected' group reacted negatively, so the main conclusion to take away from this is that the new regulation has been portrayed as being negative for the banks falling within the criteria. This might appear strange given that the regulation is aimed at reducing the risk of banks, however, if we take into account the knock-on effects that the regulation is likely to have on profitability, control and freedom to operate then we can see why the banks performed poorly in response to the regulation.

This research also looked at the impact on the banks as a result of the United Kingdom leaving the European Union ('Brexit'). As most people predicted they reacted negatively. The forecast of the 'affected' group being less susceptible also shows in some of the results, but not all.

Finally, this paper also looked at the effects of quantitative easing in the UK and the results were largely as expected. Given the nature of quantitative easing, which favours the larger banks with a higher stake in the economy (incidentally the ones in the 'affected' group), we'd expect to see the 'affected' group of banks performing better and this was in fact mostly the case.

4.1 Proposal of the ring-fencing rules put forward by Vickers – 11th September 2011

This date was the first date to be examined using events study analysis. It was the date at which Vickers released his ring-fencing proposal so one would assume that this event would mean larger negative abnormal returns for the 'affected' banks as opposed to the 'unaffected' ones. It must be noted

that of all the dates examined, this date was the only one that didn't fall on a trading day, therefore the following day (12th September 2011) was used instead.

From the results presented in 'Figure 2' the 20 and 30-day estimation windows seem to be consistent with the hypothesis that the affected banks would suffer more on event dates in which Vickers' policy progressed. The results show that the average abnormal returns of the 'affected' banks are far lower than those of the 'unaffected' banks, meaning that the stock prices seemed to drop a lot farther than expected due to Vickers' initial proposal of the regulation.

However, from the 40-day results there appears to be an error in that the results aren't consistent with the other two estimation windows. The most probable reason for this (as mentioned above) is that the actual event date couldn't be studied due to it not falling on a trading day, so in fact what we are seeing here is more of a 'day after' knock-on effect from Vickers' policy turning into regulation. Notwithstanding this issue, we can still see from the 20 and 30-day estimation windows that this knock-on effect is still strong the day after the initial announcement, and for this reason it appears as though the 'affected' banks do suffer more whenever an event specific to Vickers' regulations occurs.

Figure 3 shows how Lloyds, RBS and Barclays' stock prices reacted the day after the initial proposal. The graph shows the price at the closing date and in all three cases there was a drop from the previous closing date indicating that the news was taken badly by the financial markets. It must be remembered however that in this case it is harder to visualise the significance of the changes as this date was the day after the event occurred.

4.2 Three instances of the BofE's Quantitative Easing Programme – 5th October 2011, 9th February 2012 and 5th July 2012

This section of the results examines all the results from quantitative easing in conjunction. The reasoning behind this is that it is hard to come to a conclusion looking at the results individually, however when we group the three sets of results together there is a pattern between the bigger 'affected' banks as opposed to the smaller 'unaffected' banks.

The first date (5th October), was the date at which the Bank of England first announced that quantitative easing would be injected into the economy and the sum announced was £75 billion. The

logical assumption from this is that the banks would respond well, however there are other considerations to take into account. The second date (9th February) brought about the announcement of sanctions of £50 billion in gilts along with holding interest rates in the UK. Finally, the last date (5th July) saw the announcement of a further £50 billion injection into the UK economy.

By looking at all the results together, a clear pattern appears to emerge amongst the two groups. In all cases, barring the 40-day estimations in Figure 2, it appears as though the group of 'affected' banks did appear to respond better to the announcements in quantitative easing as the abnormal returns are both higher than that of the other group and they remain positive. On the contrary (again barring the 40-day estimations in Figure 2), the group of 'unaffected' banks appears to respond worse to the quantitative easing announcements and in some cases the abnormal returns are even negative. The likely reason behind this is that the way in which quantitative easing is implemented favours the banks/institutions with a larger role to play in the economy as they will receive a larger share of the benefits. Therefore the banks in the 'affected' group which have significantly more financial backing and a larger stake in the economy are more likely to respond better to announcements of quantitative easing as they are more likely to benefit from it than the smaller institutions in the 'unaffected' group.

4.3 Large setbacks to the proposals which affected progress – 23rd October 2012

As described in the methodology, this date is the only one which doesn't coincide with an actual documented event. At this date an article was released in the Financial Times commenting on how Vickers' policy was facing heavy setbacks and possible amendments. Given how the 'affected' banks react negatively to positive progression in Vickers' proposal, one would expect the banks to react well to the news that the proposal was facing both setbacks and possible amendments.

The results appear to be fairly well aligned with the hypothesis as the 'affected' banks performed better in all three estimation windows. Furthermore the 20 and 40-day estimation windows showed a figure hovering around zero whereas the 30-day window showed a large positive abnormal return. Given that this event wasn't a landmark in the process of Vickers' proposal and was instead included due to a newspaper article, these results do need to be viewed with some scepticism. However,

they do help to further reinforce the inverse relationship between the 'affected' banks and positive progression of Vickers' regulation as set out in the hypothesis.

4.4 Proposal turned into regulation for banks through four consultation papers – 6th October 2014

The examination of this date is crucial to this research as it is the date on which the policy was finally turned into regulation through four consultation papers released by the Prudential Regulation Authority. Due to this we would expect to see negative abnormal returns across all the estimation windows in the 'affected' group as well as abnormal returns which are far lower than that those in the 'unaffected' group.

These results are all consistent with the hypotheses. The 'unaffected' banks perform better across all estimation windows (ranging from hovering around zero to positive returns) whereas the 'affected' banks perform worse and are all negative. The average abnormal returns across all the estimation windows showed that the banks suffered on the financial markets when the policy was finally turned into regulation, indicating the general consensus of the wider financial landscape on these regulations. This consistency is strong evidence to make the case that as Vickers' regulation made strong progress, the 'affected' banks suffered and performed inversely.

Figure 4 shows the reaction of Lloyds and HSBC on the day that the four consultation papers were released. Both Lloyds and HSBC's closing price decreased indicating that they reacted negatively to the news that the policy was turned into regulation. Barclays and RBS both had a slightly positive closing price on the day, however, the overall abnormal returns were negative showing that the event was negative for the 'affected' group as opposed to the 'unaffected' group which was barely affected.

4.5 Submission date of the plans for banks to comply with the regulation– 6th January 2015

The examination of this date is also crucial to this research as it is the date on which the banks had to submit their plans to comply with the ring-fencing regulations in the future before its official start date (1st January 2019). As with the previous set of results we'd again expect to see negative abnormal returns for the 'affected' banks due to the implications of submitting these important documents. We'd also expect to see the 'unaffected' banks perform much better than the other group

and possibly even have positive abnormal returns as they have no need to submit any plans whilst the main banks do.

As with the previous results, these results also strongly reinforce the hypothesis of the relationship between Vickers' regulation and the 'affected' banks. The 'affected' banks have very strong negative abnormal returns which go as high as -8.452 (see Figure 2). This is a good indication of how the banks may perform whenever they have to adhere to the changes brought in by Vickers' policy. To further highlight the impact the regulation had on these specific banks, if we look at the results of the 'unaffected' banks we see zero-to-positive returns indicating that they were in no way affected by the day's events. This further proves that it is only a select few banks that will suffer from the new regulations and this is of particular importance as they are the most well established banks in the United Kingdom which hold the most customer deposits.

Figure 5 shows the clearest graphical representation of how bank stock prices reacted to this event. Barclays, RBS and Lloyds show a negative response to the deadline for submitting the plans. Given that this is the first time the banks have had to adhere to Vickers' regulation since it officially became a 'regulation', these results are a good indication of how the banks may respond to future rules imposed by the regulation.

4.6 Britain leaves the European Union 'Brexit' – 23rd June 2016

This event date plays a very significant role in the development and progression of the banking industry within the United Kingdom and for this reason it was crucial to have it in the study. Given the nature of 'Brexit' we'd expect to see all banks within the United Kingdom suffer and in the context of this research we'd expect to see consistent negative abnormal returns across both groups and across all the estimation windows. However, given the much larger scale and wider international presence of the banks within the 'affected' group, we'd expect to see lower abnormal returns when compared with the 'unaffected' group which included smaller banks/banking firms of which some had a small international presence.

The results appear to be linked with the initial hypothesis. By this we mean that all the abnormal returns were in fact negative, and despite the fact this was a fairly obvious assumption, it does help to

add validity to the other results. Most people would agree that 'Brexit' had a negative impact on banks within the United Kingdom, so if these results proved to be correct, there is an added level of assurance for the readers that the previous sets of results should've been correct too. Both the 20-day and 30-day results also provided some validity to the hypothesis that the banks in the 'affected' group would react slightly better (or in this case not as badly) than the banks in the 'unaffected' group. However, the 40-day results seem to show the abnormal returns as being roughly equal so further investigation would be required to prove which banks were more affected.

Figures 6 and 7 show the movement of stock prices of all four banks in the affected group at the 'Brexit' vote. Of the four banks only HSBC has reached and surpassed the pre 'Brexit' price (at 29th July 2016), whereas the other three were still suffering from the initial shock. This graphical representation allows readers to visualise how the banks actually responded to the vote (alongside the abnormal returns displayed above), and gain a greater insight into how 'Brexit' affected these banks.

5 Conclusion

In this paper we assessed how Vickers' ring-fencing regulation, the Bank of England's quantitative easing programme and the UK's 'Brexit' vote impacted the UK banking system. This was carried out by utilising 'events study analysis' to generate the abnormal returns of banks at several different event dates.

When looking at how Vickers' regulation affected the banks we hypothesised that the regulation would have a negative effect on the banks' equity prices and that there was an inverse relationship between the regulation progressing and the equity value of the 'affected' banks. We also believed that the larger 'affected' institutions would have far more negative abnormal returns than the smaller 'unaffected' banks. Our results were consistent with this as it was found that whenever the regulation appeared to make positive progress, the 'affected' banks had negative abnormal returns which were lower than the banks in the 'unaffected' group. This was probably to do with the implications of the regulation on the 'affected' banks which would put a limit on the banks' freedom to operate and take part in high-risk/high reward activity.

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In terms of quantitative easing we hypothesised that all the banks would respond positively to its implementation. It was also believed that the larger 'affected' institutions would have higher abnormal returns given that they were likely to receive a larger share of the benefits brought about by the QE. Our results once again appeared to be consistent with the hypotheses as a large amount of the abnormal returns were positive. Furthermore, across most of the results it was also possible to see that the larger 'affected' banks did have higher abnormal returns signifying that they may have benefitted more from the introduction of the QE. This is most likely the case as the larger 'affected' banks will probably receive a larger share of the benefits brought in by the Quantitative Easing.

Finally we looked at the result of the UK population's decision to leave the European Union – 'Brexit'. The hypotheses were that the results of the vote would lead to negative abnormal returns across all the banks as well as the larger 'affected' banks having slightly more positive abnormal returns (i.e. they weren't as badly affected). The results demonstrated that all the banks did in fact respond negatively to the announcement of the 'Brexit' vote indicating that the result was viewed as being bad for the UK banking system. Most of the results also agreed with the fact that the larger 'affected' banks would have less negative abnormal returns as they have a larger financial backing and a wider global presence (which allows them to indirectly escape the repercussions of the 'Brexit' vote).

Appendix A

Table 1: Bank sample

Bank	Headquarters	Share Symbol	Supposedly Affected
Barclays	London, England	BARC.L	Yes
HSBC	London, England	HSBA.L	Yes
Lloyds Bank	London, England	LLOY.L	Yes
Royal Bank of Scotland	Edinburgh, Scotland	RBS.L	Yes
Standard Chartered	London, England	STAN.L	No
Close Brothers Group	London, England	CBG.L	No
Investec	London, England	INVP.L	No
Schroders	London, England	SDR.L	No
3i Group	London, England	III.L	No
ICAP	London, England	IAP.L	No

Source: Bankscope

Figure 1: Dates analysed in the study

This table displays all of the dates which will be studied in the events study analysis and the event that they are linked to (events followed by an asterisk (*) are specific to Vickers' regulation).

Date	Event
11/09/2011	Proposal of the ring-fencing rules put forward by Vickers*
05/10/2011	Bank of England announces quantitative easing of £75bn
09/02/2012	Bank of England holds interest rates and sanctions £50bn in gilts
05/07/2012	Bank of England announces more quantitative easing of £50bn
23/10/2012	Large setbacks to the proposals which affected progress*
06/10/2014	Proposal turned into regulation for banks through four consultation papers*
06/01/2015	Submission date of the plans from the banks to comply with the policy*
23/06/2016	'Brexit' - UK leaves the EU

**Figure 2: Average abnormal returns of 'affected' and 'unaffected' banks in the research**
This table shows the results of our events study analysis. The figures are the abnormal returns at each event date and they are separated out by the type of bank (*i.e.* 'affected' or 'unaffected') and by the estimation window (20, 30 or 40 days).

Date	Event	AAR (20-Day) 'Affected'	AAR (20-Day) 'Unaffected'	AAR (30-Day) 'Affected'	AAR (30-Day) 'Unaffected'	AAR (40-Day) 'Affected'	AAR (40-Day) 'Unaffected'
11th September 2011	Proposal of the Ring-fencing rules put forward by Vickers	-12.212	3.153	-3.582	3.512	2.621	2.440
5th October 2011	Bank of England announces QE of £75bn	2.551	-1.512	1.704	1.288	-4.865	1.726
9th February 2012	Bank of England holds interest rates and sanctions £50bn in gilts	20.056	8.597	0.194	-0.562	-1.295	2.168
5th July 2012	Bank of England announces more QE of £50bn	1.160	-2.158	0.286	-2.747	1.960	-2.862
23rd October 2012	Large setbacks to the proposals which affected progress	-0.161	-2.119	2.472	-1.697	-0.969	-1.932
6th October 2014	Proposal turned into regulation for banks through four consultation papers	-1.663	1.602	-1.808	-0.080	-1.436	-0.396
6th January 2015	Submission date of the plans for banks to comply	-8.452	-0.061	-6.338	1.657	-1.053	1.926
23rd June 2016	Britain leaves the European Union 'Brexit'	-1.571	-2.707	-1.776	-2.923	-2.807	-2.603

Source: Our results based upon the data from Thomson Reuters

Figure 3: The closing stock prices of three of the banks in the 'affected' group from the 5th August 2011 to the 17th October 2011
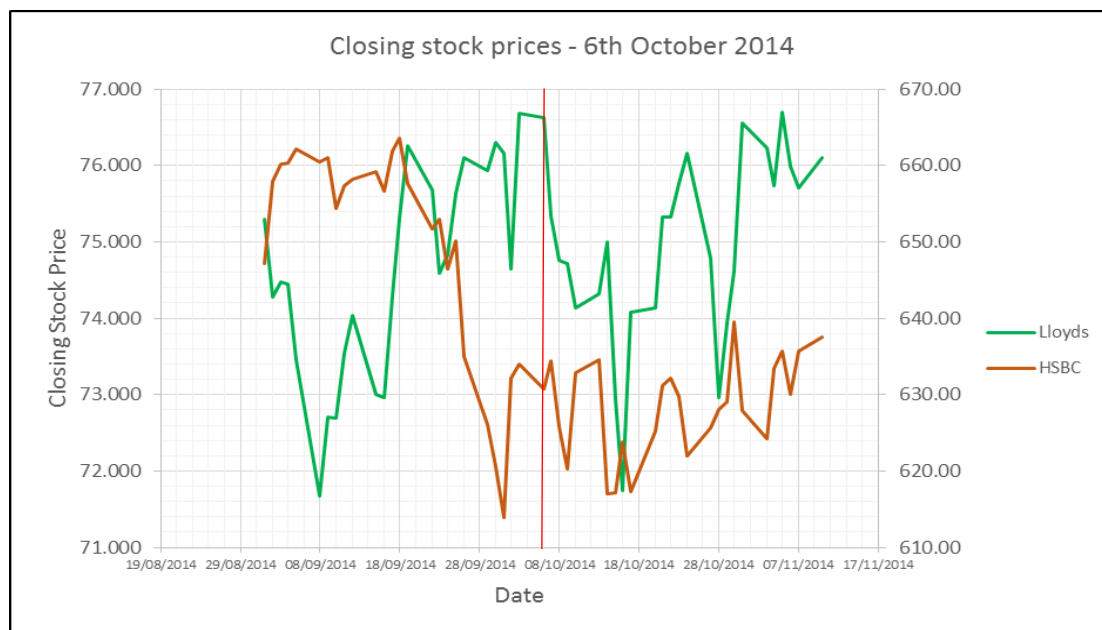
This graph shows the daily closing stock prices of three of the banks in the affected group – Barclays, RBS and Lloyds. Lloyds' results are shown on the secondary axis (to the right) to allow for ease of comparison.
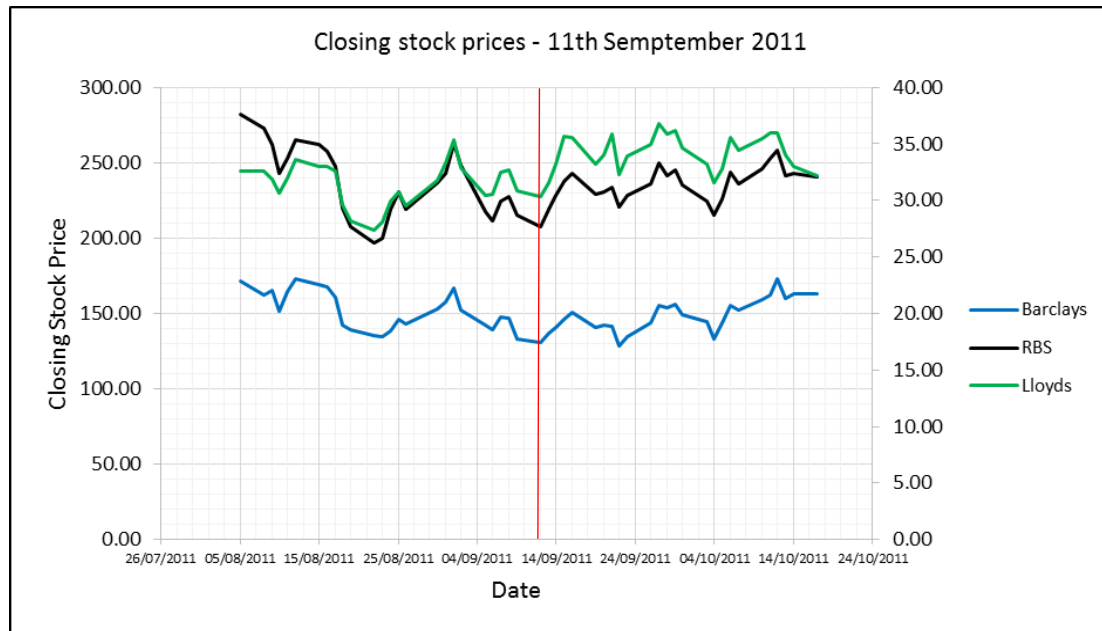
Source: Thomson Reuters

Figure 4: The closing stock prices of two of the banks in the 'affected' group from the 1st September 2014 to the 10th October 2014.
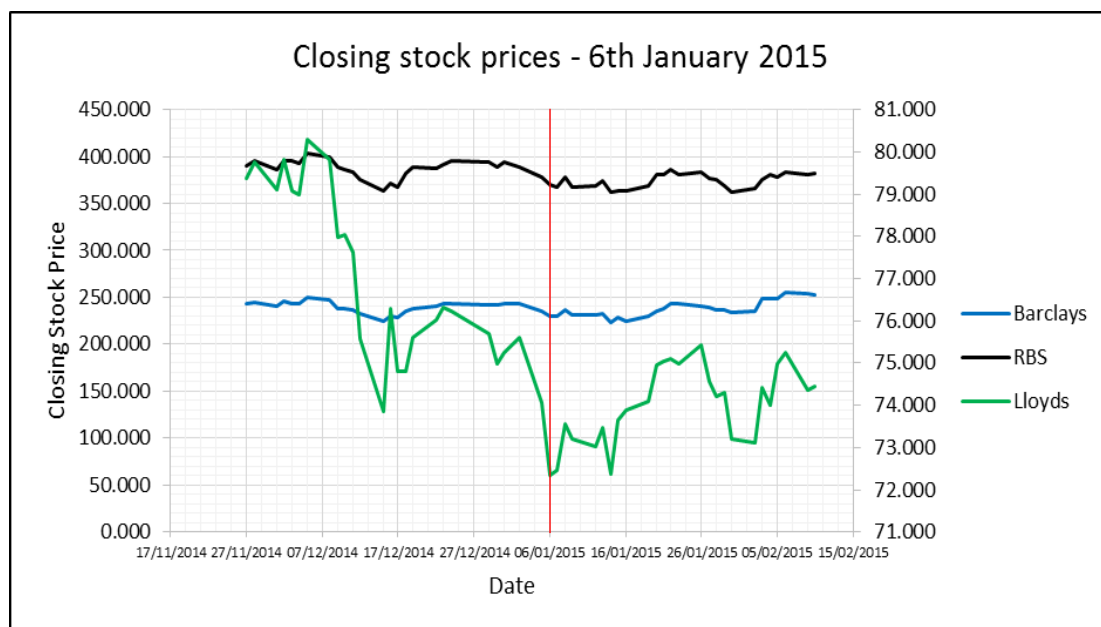
This graph shows the daily closing stock prices of two of the banks in the affected group – HSBC and Lloyds. HSBC's results are shown on the secondary axis (to the right) to allow for ease of comparison.

Source: Thomson Reuters

Figure 5: The closing stock prices of three of the banks in the 'affected' group from the 27th November 2014 to the 10th February 2015.
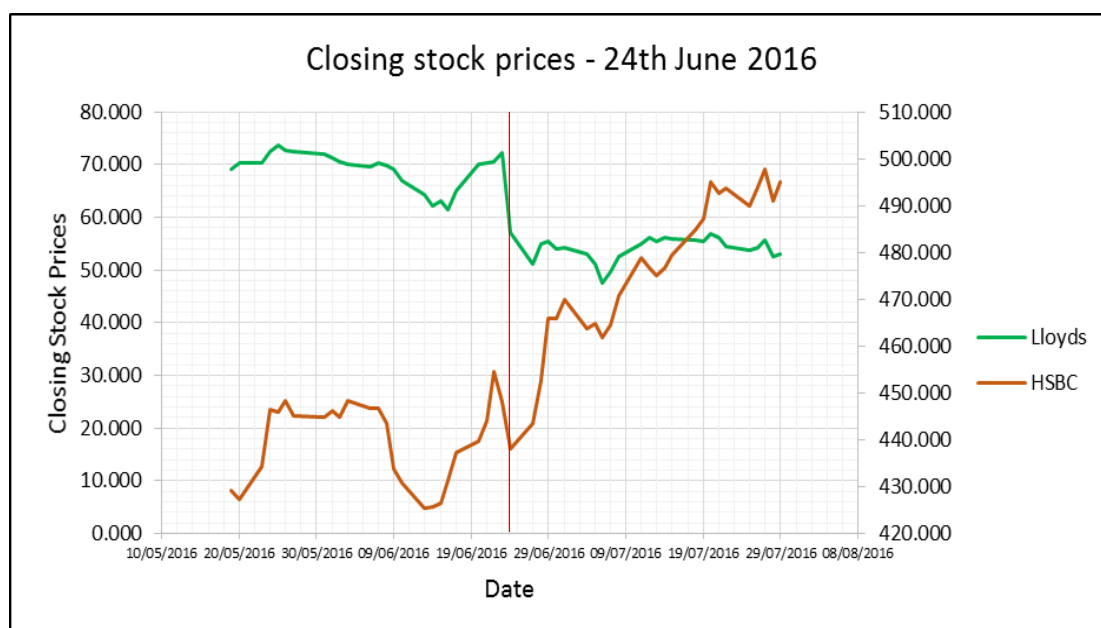
This graph shows the daily closing stock prices of three of the banks in the affected group – Barclays, RBS and Lloyds. Lloyds's results are shown on the secondary axis (to the right) to allow for ease of comparison.

Source: Thomson Reuters

Figure 6: The closing stock price movements of two of the banks in the 'affected' group from the 19th May 2016 to the 29th July 2016.

This graph shows the daily closing stock prices of two of the banks in the affected group – HSBC and Lloyds. HSBC's results are shown on the secondary axis (to the right) to allow for ease of comparison.

Source: Thomson Reuters

Figure 7: The closing stock price movements of two of the banks in the 'affected' group from the 19th May 2016 to the 29th July 2016.

This graph shows the daily closing stock prices of two of the banks in the affected group – RBS and Barclays.
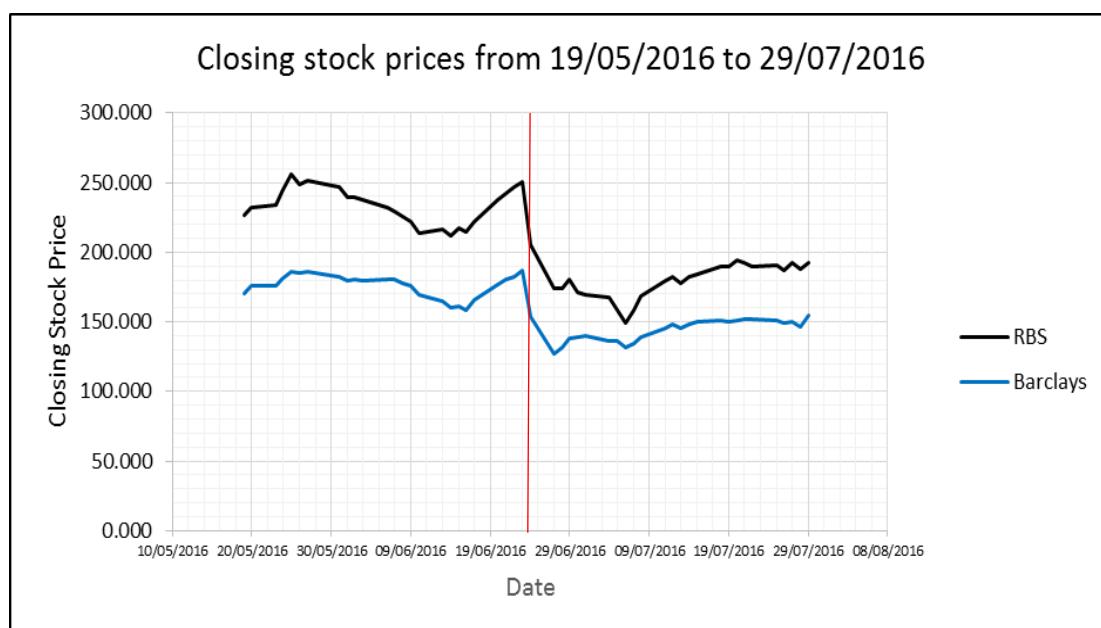
Source: Thomson Reuters

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