The Effects of Unconventional Monetary Policies on Bank Soundness

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Abstract

Unconventional monetary policy is often assumed to benefit banks. However, we find little supporting evidence. Rather, we find some evidence for heightened medium-term risks. In an event study using a novel instrument for monetary policy surprises, we do not detect clear effects of monetary easing on bank stock valuation but find a deterioration of medium-term bank credit risk in the United States, the euro area, and the United Kingdom. However, these risks are essentially the same as conventional monetary easing in pre-crisis years.

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[1] Corresponding author. The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy. We would like to thank Jiaqian Chen, Gaston Gelos, Laura Kodres, Andrew Levin, Tommaso Mancini-Griffoli, and S. Erik Oppers for helpful comments and suggestions. Tomas Mondino provided excellent research assistance. We are grateful for comments by seminar participants at the IMF.

I. INTRODUCTION

To combat the financial turmoil and subsequent "Great Recession", major advanced countries have adopted unconventional monetary policies: keeping the policy rate near zero, attempting to manage expectations actively (forward guidance), expanding central banks' balance sheets by purchasing long-term government bonds and risky assets, and introducing schemes to facilitate bank lending.[2] In particular, when the financial market faced acute dysfunction, central banks' actions prevented banks, and the economy at large, from falling into a "bad" equilibrium or debt-deflation spiral (for a review, see for example, IMF, 2013a).

In theory, even after the acute phase of the crisis ended, unconventional monetary policies may benefit banks. In the short run, banks engaging in maturity transformation should gain from low short-term rates as long as the long-term rates remain relatively stable. Similarly, banks can gain from borrowing at low cost and investing in assets delivering higher returns provided that policies do not depress the returns on those assets as well. Moreover, banks may take advantage of any reduction in term premia to replace short-term debt with long-term debt and reduce the risk of maturity mismatches in their balance sheets (Stein, 2012).

However, in the medium term, too easy monetary policies may hurt banks. The boost in spread income wanes as unconventional policies flatten the yield curve and reduce the risk premia. Consequently, banks may rationally take extra leverage and risk (Borio and Zhu, 2008). This negative relationship between short-term interest rates and risk-taking is strengthened in a model of financial intermediation where banks, operating under limited liability and asymmetric information, can engage in costly monitoring to reduce the credit risk in their loan portfolios, and endogenously modify their capital structure in response to a monetary policy change (Allen and Gale, 2004, and Dell'Ariccia, Laeven and Marquez,

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[2] In this paper, we refer to the policies aimed at keeping the short-term interest rate near zero as unconventional monetary policies, although a policy rate cut is by itself a conventional policy tool.

2010). Under limited liability, a policy change that decreases banks' profits, as unconventional monetary policies do to a limited extent, reduces the franchise value of banks and hence the incentive for monitoring the borrowers and investing prudently. A policy rate cut also reduces the incentive for banks to finance themselves with equity as a commitment device to prevent excessive risk-taking and decreases the cost of debt and deposits, so that leverage increases. Also, with low interest rates, banks may prefer to roll over loans to non-viable firms rather than declaring them non-performing and registering a loss in their income statement. Previous studies have found evidence of such "evergreening" policies in Japan in the 1990s and 2000s (Peek and Rosengren, 2003; Caballero, Hoshi and Kashyap, 2008).

The overall effect of unconventional monetary policies on banks' profitability and risk is thus theoretically unclear. Both the benefits and costs, however, should be reflected in the changes in banks' stock prices and their bond risk premia at the time of announcement of new monetary policy measures. We analyze the sign and magnitude of such changes by regressing daily changes in bank asset prices on the surprise changes in monetary policy on all Federal Open Market Committee's announcement days from January 2000 until October 2012.

We find that bank credit risk increases with monetary easing over the medium term without clear effects on bank stock valuation. However, these risks are essentially the same as those of conventional monetary easing episodes in the pre-crisis period. To accurately gauge the effects, we use the surprise component of policy announcements. This is because the expected element should not affect market prices at the time of announcement as it should be already priced in. In particular, in the benchmark regressions, we use the change in the one-year-ahead three-month futures rates as the surprise measure, so as to capture both the contemporaneous part of a monetary policy announcement (reflected in the target policy rate change) and any expected developments for near-term future rates (focus of the forward guidance and quantitative easing).

However, this standard measure of monetary policy surprise may also reflect the expected effect on one-year-ahead rates of today's policy. Besides, downward changes are potentially limited once the policy rate hits the zero lower bound. As an alternative, we thus construct a

novel instrument for the surprise based on the number of news articles before and after each policy announcement. This measure is not constrained by the zero lower bound. The instrumental variable estimates confirm the negative effect of monetary easing on bank credit risk.

To the best of our knowledge, our paper is the first to provide a comprehensive assessment of the effects of unconventional monetary policies on the soundness of the banking sector. While the empirical literature on unconventional monetary policy has been growing, most studies focus either on the transmission question, i.e., the effects of unconventional policies on long-term government bond yields and risky asset prices, or on the macroeconomic question, i.e., the effects on inflation and GDP growth rate (see review papers, for example, Woodford, 2012, and IMF, 2013b).

A few papers have examined the relationship between monetary policy and bank risk-taking but primarily over the pre-crisis period. Altunbas, Gambacorta, and Marqués-Ibáñez (2010) found evidence that low interest rates over an extended period of time contributed to an increase in banks' risk, measured by their expected default frequency, over the pre-crisis period 1999–2008. Using data on U.S. banks' corporate loan ratings over a longer period that includes the first years of the crisis (1997–2011), Dell'Ariccia, Laeven, and Suarez (2013) also found a negative relationship between risk-taking by banks and increases in real policy rates. The strength of that relationship depends on banks' capitalization and the effect of interest rates on risk-taking is smaller for poorly capitalized banks. Similar results were obtained by Jiménez, Ongena, Peydrò and Saurina (2009) with data on loans granted by Spanish banks over the period 1984–2006 and by Ioannidou, Ongena and Peydrò (2009) with Bolivian data.

A recent paper by English, Van den Heuvel, and Zakrajšek (2012) is most similar to our study. Using pre-crisis period data, they study the effects of changes in the level of policy rates and the slope of the yield curve on bank stock valuations and profitability. They show a drop in bank stock prices following an unexpected increase in the level of policy rates and a steepening of the yield curve. Although higher short-term rates and a steeper yield curve

increase banks' return on assets, the positive effect on near-term profitability is offset by a slowdown in asset growth and an outflow of core deposits, which represent an inexpensive source of funding compared to market alternatives. Yet a policy rate cut is typically associated with a steepening of the yield curve. This is consistent with the assumption that monetary easing is effective at boosting economic activity, which should increase inflation and growth expectations.

The rest of the paper is organized as follows. Section II discusses and defines measures of monetary policy surprises. Section III reports the regression results using the U.S. market index data. Section IV presents the results of the robustness analysis, including the results for the euro area and the United Kingdom based on the market index, and for the United States based on bank-level data. Section V concludes.

II. Surprise Component of Monetary Policy Announcements

We compare the average effects on banks of unconventional monetary policies with those of conventional monetary policies. We do so by regressing daily bank stock returns and daily changes in credit risks on monetary policy surprises on (almost) all FOMC announcement days since 2000. We define the conventional monetary policy period as the period before August 2007 while the so-called unconventional policy period starts after the collapse of Lehman Brothers on September 16, 2008 (see more detailed discussion below). The effects of unconventional policies could differ from those of conventional policies both quantitatively and qualitatively.

A difficulty in conducting an event study on monetary policy is that the expected actions are already priced into asset prices at the time of the policy announcement. In other words, only the surprise component of an announcement can affect asset prices. Yet, in the conventional policy period, when the interest rate is the only policy tool, once the impact of one unit (e.g., one basis point) of surprise is estimated, the overall impact of the total policy rate change (e.g., 25 basis point cut) can be calculated simply by multiplying the coefficient by the total policy rate change (e.g., 25 times the estimated coefficient). Unfortunately, a similar estimate for the overall effect by an unconventional policy is difficult to obtain, as unconventional

policy measures do not take the form of a change in the policy rate. Instead, we investigate whether the effects of unconventional policies differ in terms of signs and magnitude for one unit of surprise from those of conventional policies.

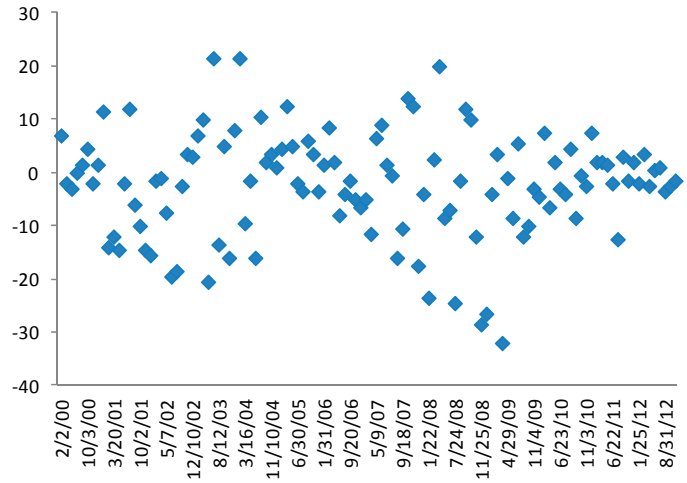
To compare the results, it is essential to gauge the surprise component for both conventional and unconventional monetary policy actions in a similar way. For conventional policies, Bernanke and Kuttner (2005) and Kuttner (2001) used daily changes in the 30-day federal funds futures contract rate as a measure of the surprise element of a monetary policy action for the United States. However, mirroring the behavior of the federal funds rate, the federal funds futures rate has been near zero and moving very little since late-2009. Moreover, the zero lower bound on short-term interest rates has caused central banks to target interest rates on longer-term securities as well as riskier assets.

As our benchmark surprise measure we use one-year-ahead futures of the three-month Eurodollar rate. This is because the one-year-ahead futures rate is less affected by the zero lower bound than the current-month futures contract rate and also because it relates more to the unconventional monetary policy's intention to influence longer-term interest rates. Moreover, even in conventional times, changes in the one-year-ahead futures contract rate reflect not only the target policy rate changes but also implicit forward guidance on future economic conditions and future policy rates implied by the FOMC statements, which is an important part of monetary policy (Gürkanyak, Sack, and Swanson, 2005, and Campbell, Evans, Fisher and Justiniano, 2012).

We acknowledge that the change in the one-year-ahead three-month Eurodollar futures rate is not a perfect measure of monetary policy surprises. First, rate changes are also constrained by the zero lower bound in later years, even though unconventional policy measures such as quantitative easing may not be constrained. In this case, the measured surprise can be smaller than the true surprise, and this would create an upward bias in the estimated magnitude of the effects of surprise. Figure 1 appears to show a reduction in the variance of the changes in the one-year-ahead futures rate in the unconventional policy period. Yet, changes are larger than

those in the current-month federal funds futures rates, which stay at essentially zero after late-2009.

Figure 1. Surprise-Change in One-Year Ahead Three-Month Eurodollar Futures



Sources: Bloomberg L.P. and authors' calculations.

Second, a bold monetary easing action by the Fed, especially in the acute crisis phase, may be also seen as signaling a pessimistic view about the economy, and the market may accordingly revise its own assessment of economic growth downward. In this case, the one-year-ahead futures rate would decline more than in the absence of such unintentional signals.[3] However, the direction of the overall bias is unclear because the opposite case is also possible (i.e., a less-than-expected action may signal that the Fed holds an optimistic view).

In addition to the measurement issues, endogeneity problems may also arise in the regression when using the one-year-ahead futures rate. The one-year-ahead futures rate reflects expectations of economic conditions a year later, which are influenced by current monetary

[3] Such unintentional signals would also affect other asset prices.

policy. Put differently, changes in the one-year-ahead futures rate may capture not only the monetary surprise itself but also the expected outcome one year from now of the announced monetary actions. If, for example, today's policy rate cut is effective at increasing growth and inflation a year later, changes in the one-year-ahead futures rate may be reduced or even reversed. Moreover, the underlying interest rate of the Eurodollar futures contract is the London interbank rate (LIBOR), which picks up the credit risk of banks in addition to the policy rate.[4] Thus, any change in the expectations of future credit risks due to current monetary policy is also reflected in the change in the one-year-ahead Eurodollar futures rate. In this case, if the current policy rate cut is effective at lowering credit risks, the movements in the one-year-ahead futures rate may be even larger.

So far researchers have not come up with a clean surprise measure of unconventional monetary policy. Only a few attempts have been made: Rosa (2012) provides a measure of the unanticipated component of asset purchases programs by the Fed based on the Financial Times' coverage, and Joyce, Lasaosa, Stevens and Tong (2011) relies on market participants' expectations of asset purchases by the Bank of England. However, Rosa's measure can only take three values (-1, 0, and 1) depending on whether the announcement is deemed more restrictive, similar, or more expansionary than expected and his classification relies on a single news source. The data used by Joyce et al. are unfortunately unavailable for the United States. In any case, asset purchases are only one type of unconventional monetary policy measure.

We expanded Rosa's approach and counted the number of news articles on monetary policy three days before and after each policy announcement (total news coverage) using *Factiva*, which is a news-article search service provided by the Dow Jones company. We also

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[4] The Eurodollar futures contract itself does not imply any counterparty risk as the standardized contract is centrally traded at the Chicago Mercantile Exchange. However, the underlying rate, the Eurodollar LIBOR, may still include a counterparty credit risk premium.

collected the numbers of "positive" and "negative" news references in terms of monetary easing.[5] These three variables, specifically, the before-after changes in total, positive, and negative news coverage, are used as instruments to avoid the endogeneity issues discussed above. Unlike Rosa's measure, our surprise measure does not involve a judgment call by the researcher.

Figure 2 shows the plot of the fitted surprise measure constructed from the first stage regression of a two stage least squares estimation.[6] Note that the movements of the fitted surprise are no longer constrained by the zero-lower bound in the later period unlike the changes in the one-year-ahead three-month Eurodollar futures rates (shown in Figure 1). In this sense, our two stage least squares strategy addresses not only the endogeneity problem but also corrects a possible bias due to the zero lower bound.

There is still a caveat. The number of news articles used as an instrument for the monetary policy surprise may increase just because unconventional monetary policy is newsworthy and not because of a surprise related to monetary policy easing or tightening. However, because many unconventional policies were already discussed and announced (for example, in speeches) before actual FOMC meetings and we only use FOMC episodes (with just two exceptions), the potential bias stemming from the novelty of the policy tools should be small.

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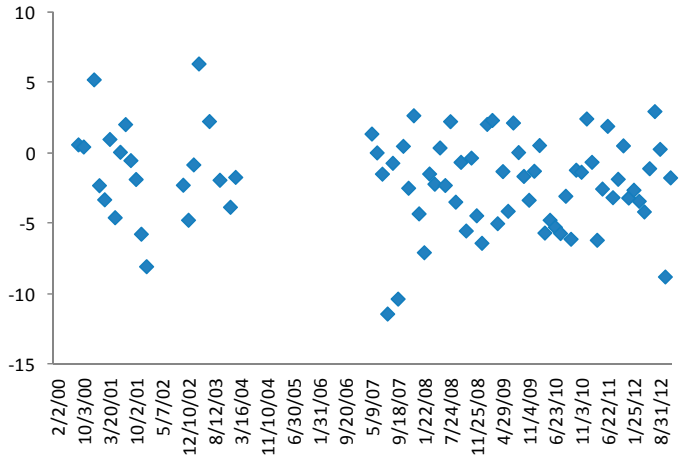
[5] For the United States, search query terms for *total surprise* in *Factiva* are: ("FOMC" or "Federal Reserve") and ("interest rates" or QE or "quantitative easing"). For a *positive surprise*, they are: ("FOMC" or "Federal Reserve") and ("interest rates" or QE or "quantitative easing") and ("aggressive" or "aggressively" or "exceeded expectations" or "beyond expectations" or "positive surprise"). For a *negative surprise*, they are: ("FOMC" or "Federal reserve") and ("interest rates" or QE or "quantitative easing") and ("disappointed" or "disappoint" or "below expectations"). In the place of ("FOMC" or "Federal Reserve"), we used ("ECB" or "European Central Bank") for the euro area and ("BOE" or "Bank of England") for the United Kingdom. We collected data from January 2000 to October 2012 and adjusted for duplicated articles after March 2008 when *Factiva* started to report duplicates. Note that *Factiva* is continuously expanding its coverage over global and web contents. We only searched for English-language news sources.

[6] See below for a detailed explanation of the two stage least square estimation strategy. Note that the plot is created only for monetary easing episodes because positive and negative news variables are well-defined only in these cases.

Indeed, the mean and the variance of our fitted surprise measure in Figure 2 are more or less the same during the conventional policy period and the unconventional policy period.

Figure 2. Surprise-Fitted Values in the First State of TSLS By News Based Instruments



Sources: Bloomberg L.P. and authors' calculations.

III. BENCHMARK REGRESSIONS

We run simple regressions for key bank-related asset prices based on our sample of monetary policy decision dates in the spirit of Bernanke and Kuttner (2005). Specifically, we regress daily bank stock returns and daily changes in spreads between bank corporate bond yields and the Treasury bond yields on the surprise component of the monetary policy

announcements.[7] By including a dummy variable for unconventional policy announcements, we allow for possible differences in the level effect (that is, the constant term) and the marginal effect (that is, the coefficient on surprise) between conventional and unconventional monetary policy announcements:

$$y_z = \beta_0 + \beta_1 UMPdummy_z + \beta_2 Surprise_z + \beta_3 \left(Surprise_z * UMPdummy_z \right) + \varepsilon_z, \quad (1)$$

where the subscript *z* corresponds to each FOMC announcement and *UMPdummy* takes value one for announcements during the unconventional policy period and zero otherwise. Unscheduled meetings are included in our sample of events but speeches (outside FOMC meetings) are in general excluded to ensure consistency as well as to contain any biases that might arise from pooling different types of events.

We are interested in the overall average effects of monetary policy announcements and thus use as many policy announcement events as possible. This is in contrast to most previous studies on unconventional monetary policy which focus only on a few events and look at asset prices movements for each event separately. In particular, we include FOMC days in which there was no policy change. This is because the surprise component can be negative or positive depending on market expectations before the FOMC meeting, even if no change in monetary policy was announced. Note that in these events without any policy changes, the expectations for the use of some specific policy tool (like asset purchases or forward

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[7] For the United States and the euro area, bank stock returns are calculated based on the *MSCI Bank Stock Index*. For the United Kingdom, returns are based on the *FTSE All Share (Bank) Index*. All indices are provided commercially by Bloomberg. The bank bond yield spreads from government bond yields are *Financial Sector Bond Option Adjusted Spreads* (that is, for early retirement option) for the same maturity government bond yields, provided commercially by Bank of America Merrill Lynch via Bloomberg. The financial sector covers more institutions than just the deposit-taking banking sector. Note that, for the euro area, government bond yields are defined as the average of German and French government bond yields. Summary statistics of the variables are provided in Table 1a.

guidance) cannot be identified but the size of the expectations for monetary easing can still be gauged by our measure of surprise.

We define the conventional policy period as the period up to July 31, 2007, because the FOMC held its first ad hoc meeting (conference call) on August 10, 2007, in response to the beginning of the financial turmoil.[8] Thus, in the regression, the conventional policy period (i.e., *UMPdummy = 0*) covers the period from January 1, 2000, to July 31, 2007. The unconventional policy period (i.e., *UMPdummy = 1*) covers the period following the collapse of Lehman Brothers, that is, September 16, 2008 to October 31, 2012. Essentially all FOMC meeting dates are included except for September 12, 2001, corresponding to the FOMC meeting held one day after the September 11 attack on New York and Washington, D.C.[9]

The first column of Table 2 shows the effect of conventional monetary policy surprises on bank stock daily returns. It is insignificant. Similarly, the simple average effect of monetary policy surprises in both conventional and unconventional policy periods (second column) is not significant. The third column shows the results for the full specification, allowing different constant terms and coefficients for both the conventional and unconventional monetary policy periods. Again, no significant result arises. This finding is consistent with previous studies. Bernanke and Kuttner (2005) reports positive effects of surprise policy rate cuts on the market-wide stock index. However, as already discussed, a policy rate cut typically steepens the yield curve. Considering the positive effect of the policy rate cut and

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[8] The ad hoc FOMC meeting was held to address the market turmoil after Bear Stearns liquidated two hedge funds on July 31, 2007, and after BNP Paribas halted redemption of three investment funds on August 9, 2007.

[9] Two Jackson Hole speech days are included (in 2010 and 2012) as Chairman Bernanke first announced QE1 and QE2 respectively in those two speeches. However, excluding them barely affects the regression results. Also, note that we exclude any event which happened on weekends and Mondays, so that we can compute consistent daily changes in asset prices. This would have excluded some important speech days, in case we had wanted to include them. FOMC meetings are rarely held on Mondays so that we lose few observations.

the negative effect from a steepened yield curve found in English, et al. (2012), the overall effect is ambiguous and we interpret our results in this light.

However, we found negative, significant effects of monetary easing on bank credit risk measured by the daily changes in the spread between the bank corporate bond yields and the Treasury bond yields for the similar maturities (Table 2, columns 4 to 12). For all maturities, an increase of about 0.08 basis point (bp) in spreads is observed for any unit of monetary easing surprise.[10] Roughly speaking, 1 bp of monetary easing increases the credit spread by about 0.1 bp. Over the three years since the beginning of the easing cycle after the onset of the financial crisis, the policy rate came down from about 5 percent. Assuming that the cumulative easing from interest cuts, QE, and forward guidance is "equivalent" to 6 percent in interest rate terms, the impact on the credit spread would correspond to a 50 to 60 bp increase, which is substantial. From a study on bank funding cost and credit ratings (Ueda and Weder di Mauro, 2013), we know that a 60 bp funding cost increase is equivalent to a downgrade of almost 3 notches in the credit rating scale used by most credit rating agencies.

Since unconventional monetary policies aim at easing monetary conditions, they may be better compared only to monetary easing episodes in the conventional monetary policy period. Bernanke and Kuttner (2005) indeed find slightly different coefficient estimates in regressions using all monetary policy events and in those using only tightening episodes. This is consistent with anecdotal evidence that monetary tightening is often gradual, while easing is often executed more rapidly. Also, even if tightening and easing proceed at the same pace, their impact might be asymmetric.

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[10] Columns 4, 7, and 10 show a significant effect of monetary policy surprises during the conventional policy period. This effect is not significant over the whole sample period, which includes both conventional and unconventional policy periods (columns 5, 8, and 10). Formally, we can test whether the effects of monetary policy surprises differ between the two periods by including an indicator variable for the unconventional policy period and interaction terms. The results, shown in columns 6, 9, and 12 do not support the hypothesis of different effects.

On the basis of the monetary easing events only, the effect of monetary surprises is found to be slightly lower than the one found in the benchmark regression (results omitted). Note that all episodes in the unconventional policy period are defined as monetary easing episodes. As for the conventional policy period, an FOMC announcement is classified as an easing episode if the expected change in the one-year-ahead futures rate is negative. The expected change is defined as the actual change in policy rates minus the surprise change.

Table 3 shows the results using our news-based surprise measures as instruments in two stage least squares (TSLS) regressions. Specifically, in the first stage, logarithms of the before-after ratios of the number of total news, positive news, and negative news references are used as three regressors, substituting for the one-year-ahead three-month Eurodollar futures rate.[11] Then, the fitted value is used as our *Surprise* variable in the key regression (1). The reported standard errors account for the two stage least squares estimation. To avoid any bias which may stem from the ambiguity in the search terms used to identify "positive" or "negative" surprises, we only consider monetary easing episodes in the conventional policy period and the whole sample of events in the unconventional period.

The results are broadly consistent with those of the benchmark regressions. Monetary policy easing surprises are associated with a deterioration of bank credit risk at the 1–3 year and 3–5 year maturities, but statistical significance is lost for the longer, 5–7 year, maturity. Again, we do not find any significant effect on bank stock returns.

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[11] For the weak identification test, we look at the Kleinbergen-Paap rk Wald statistic. It is equal to 1.9, suggesting that the instruments are weak. However, there is a reason for this. Changes in the original variable, the one-year-ahead three-month Eurodollar futures rate, are likely to be constrained by the zero lower bound in later years as already discussed. Therefore, our instruments, which are not affected by this constraint, can appear "weak" since they can reflect true policy changes more freely. Indeed, in the year-by-year regressions (see the next subsection), the Kleinbergen-Paark Wald statistic tends to decline in the regressions for the later years.

IV. ROBUSTNESS CHECKS

A. Sample Selection and Effects over Time

The results are robust to changes in the sample of events (taking out observations when the surprise measure exceeds its sample mean by more than two-standard deviations) and to alternative definitions of the conventional and unconventional monetary policy periods (results omitted).[12]

As an additional robustness check, it is, however interesting to investigate whether the effects of unconventional policies have changed over time after the collapse of Lehman Brothers. Unconventional policies were explicitly or implicitly employed to calm down the acute financial turmoil, especially in 2009 and 2010, but the stress subsided as time went by. Again, rather than describing what happened in each event, we use regression analysis but compare each year after 2008 to the conventional policy period as previously defined (January 2000, to July 2007). The periods we consider are (i) September 16, 2008 to September 30, 2009; (ii) October 1, 2009 to September 30, 2010; (iii) October 1, 2010 to September 31, 2011; and (iv) October 1, 2011 to October 31, 2012.[13]

Table 4 shows the year-by-year regression results. During the first year after the Lehman collapse, the effects of monetary policy announcements are the same as in the benchmark regression. In other words, unconventional policies do not seem to have qualitatively different effects compared to conventional policies. Perhaps the crisis was so acute that the

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[12] Specifically, we considered two alternative dates for the start of the unconventional policy period: August 17, 2007, when the FOMC launched the first emergency measures following an unscheduled meeting, and January 30, 2008, when FOMC lowered the policy rate to 3 percent. The conventional policy period can be also extended until the end of 2007. As for the start date of the conventional policy period, we considered March 2001 (that is, the beginning of the previous easing cycle) as an alternative to January, 2000.

[13] The regression results for the first year after the Lehman collapse do not change much if we exclude the FOMC meeting held on September 16, 2008 (results omitted).

unconventional policies did not have much effect. Or, on the contrary, if non-linear dynamics are at play, unconventional policies may have prevented the economy from falling into a "bad equilibrium" that cannot be observed. In this case, the hypothesis of zero effect of unconventional monetary policy as a counterfactual is not correct. The linear effect that is not significantly different from zero may in fact conceal a larger impact. However, a formal technique to study such non-linear counterfactuals has not yet been developed.

Unconventional policies had qualitatively different effects in the second year after the Lehman collapse (October 2009 to September 2010). They had a significant negative effect on stock returns but improved medium-term (3–5 years) credit risk significantly. This suggests that bold policies may have lowered the default probability of banks but also involved weaker expectations for profitability, and is consistent with the view that some monetary policy measures worked as merely a life support system for distressed banks at that time. In the third year after the Lehman collapse, unconventional monetary policy, though it became less active, appears to increase both bank stock prices and credit risk. Lastly, in the fourth year, unconventional monetary policies seem to have lost any distinct effect on banks' profitability and soundness and the results are similar to those of the benchmark regressions.

In summary, unconventional policies do not have robust specific effects, as those effects differ depending on the year (and surely depending on each event). However, the common effects of both conventional and unconventional monetary policies on bank credit risk remain significant over all sample years.

B. Euro Area and the United Kingdom

A natural question is whether the effects of monetary policy are different in other countries. To answer this question, we estimated similar regressions for the euro area (Table 5a) and the United Kingdom (Table 5b). As regards bank credit risk, the regression results show similar results to the ones obtained for the United States in that monetary easing surprises appear to cause a deterioration of bank credit risk. The magnitude of the effect for the United Kingdom is similar to that for the United States, while the magnitude for the euro area is about twice as large. In addition, for the euro area and the United Kingdom, bank stock prices fall with

monetary easing, an effect not observed in the United States. Again, most of these effects are common to both conventional and unconventional policies.

The results from the two stage least squares estimation are a bit weaker. Like in the United States, we do not find a significant effect of monetary policy on bank stock returns. Credit risk in the euro area still deteriorates, while the effect is not significant anymore in the United Kingdom (results omitted).

C. U.S. Bank-level Regressions

This section examines whether the effects of monetary policy on bank stock returns and credit risk vary with individual bank characteristics such as asset size and capitalization. We use quarterly balance sheet data (i.e., total assets and the equity/assets ratio) for a balanced sample of 88 U.S. banks from the SNL Financial database.[14] Total assets are divided by GDP to ensure stationarity. The variables are lagged by one quarter and then used as the additional controls in the regression. We also include interaction terms with the surprise measure and the unconventional monetary policy dummy. Note that bank balance sheet data are quarterly while monetary policy announcements typically occur once a month. To control for differences in the information content of balance sheet variables in different months within a quarter, we include a dummy variable for the first month of each quarter (*Mon1 dummy*) and another dummy variable for the second month of each quarter (*Mon2 dummy*).[15] The following equation is estimated with bank fixed effects.

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[14] The database is provided commercially by SNL Financial. Data availability issues prevent us from conducting the same analysis for the euro area and the United Kingdom.

[15] *Mon1 dummy* takes the value one if the month of a monetary policy announcement is January, April, July, or October, and zero otherwise. *Mon2 dummy* takes the value one if the month of a monetary policy announcement is February, May, August, or November, and zero otherwise. These dummies are usually significant in the regressions.

$$
\begin{aligned}
y_{iz} = {} & \gamma_{0i} + \gamma_1 Mon1dummy + \gamma_2 Mon2dummy \\
& + \gamma_3 UMPdummy_z + \gamma_4 Surprise_z + \gamma_5 \left(Surprise_z * UMPdummy_z \right) \\
& + \gamma_6 Lag\left(Asset / GDP \right)_{iz} + \gamma_7 Lag\left(Equity / Asset \right)_{iz} \\
& + \gamma_8 \left(Lag\left(Asset / GDP \right)_{iz} * UMPdummy_z \right) + \gamma_9 \left(Lag\left(Equity / Asset \right)_{iz} * UMPdummy_z \right) \\
& + \gamma_{10} \left(Surprise_z * Lag\left(Asset / GDP \right)_{iz} \right) + \gamma_{11} \left(Surprise_z * Lag\left(Equity / Asset \right)_{iz} \right) \\
& + \gamma_{12} \left(Surprise_z * Lag\left(Asset / GDP \right)_{iz} * UMPdummy_z \right) \\
& + \gamma_{13} \left(Surprise_z * Lag\left(Equity / Asset \right)_{iz} * UMPdummy_z \right) + \nu_{iz}, \qquad (2)
\end{aligned}
$$

where subscript *z* denotes a FOMC announcement and *i* refers to a bank.

Table 6 shows the results.[16] We are in particular interested in the coefficients on the *Surprise* measure and its interactions. Results from the fixed effect estimation are shown in columns 1 to 5 and those from two-stage-least-squares estimation where we use our news variable are shown in columns 6 to 10.

The results generally support the benchmark regression results—little effect of monetary easing on bank stocks. Conventional monetary policy surprises have no effect on bank stock returns (column 1) though unconventional monetary easing has a positive effect (γ_5, around 0.08). Moreover, this effect is larger for larger banks ($\gamma_{12,}$ around 0.001). These effects come out strongly only in the third year after the collapse of Lehman Brothers (column 4). However, TSLS regressions indicate that these effects disappear once the endogeneity problems and the measurement problems introduced by the zero-lower-bound are accounted for by use of the news-based surprise variable.

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[16] The coefficient estimates for the bank fixed effects, *Mon1* and *Mon2* dummies, and the constant term are not reported. The use of a balanced panel potentially introduces a survivorship bias and may lead to underestimating the coefficients as banks which exited the sample following a bankruptcy, a merger or a takeover may have experienced larger movements in their stock prices. Standard errors are corrected for clustering at bank level.

Similar regressions are run on bank credit default swap (CDS) spreads. Bank CDS spreads are in principle a better measure of bank credit risk compared to bank corporate bond spreads from Treasury bond yields. This is because monetary easing may primarily alter Treasury bond yields without affecting bank bond yields. In the presence of market frictions that prevent arbitrage between the two markets, the observed increase in spreads may not reflect an increase in the bank risk premium. Such arbitrage failures may have happened in the few months immediately following the collapse of Lehman Brothers.

The CDS market for U.S. banks is relatively new (the earliest available data are from 2005) and notoriously thin in earlier years. We therefore focus on the period after the collapse of Lehman Brothers and on four banks only: Bank of America, JP Morgan, U.S. Bancorp, and Wells Fargo. The regressions are run separately for each bank using simple OLS.

Tables 7a (OLS estimation) and 7b (TSLS estimation) show robust evidence of a negative effect of monetary policy surprises only for U.S. Bankcorp. This does not disprove the results of the benchmark regressions. The sampled four banks are quite large compared to the average bank whose bond is included in the index of bank corporate bond spreads provided by Bank of America Merrill Lynch. In particular, perhaps with the exception of U.S. Bancorp, these banks are most likely protected by "too-big-to-fail" considerations. This would limit the downward movements of CDS spreads for these banks. In our view, finding a consistent and significant result for at least one of the largest banks corroborates the benchmark results for the average bank.

V. CONCLUSION

We examined the effects of unconventional monetary policy on banking sector soundness. We could not find clear supporting evidence for the common conception that unconventional monetary policy helped banks. Rather, we find some evidence for heightened medium-term risks. Specifically, using a novel instrument for monetary policy surprise, we find robust evidence that unexpected monetary policy easing tends to increase bank medium-term credit risk in the United States, the euro area, and the United Kingdom. However, such financial

stability risks by unconventional policies appear essentially the same as the risks stemming from conventional monetary easing.

A caveat is that the crisis-period data may require analysis based on non-linear counterfactuals. We implicitly examine whether the effects are different from zero, but the potential negative paths that the economy may take could be much larger without the support of the unconventional monetary policy. Further technical developments are warranted to address this issue when analyzing crisis-period data.

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Table 1a. Summary Statistics for the Variables Used in the Event Study

Surprise is the daily change in one-year ahead three-month futures rates: Eurodollar futures for the United States, Euribor futures for the euro area, and Sterling futures for the United Kingdom. *UMP dummy* takes the value one for the unconventional monetary policy period, which is defined as after August 1, 2007. *Total news ratio* is the ratio of the number of English-language news articles reported in Factiva in three days after the monetary policy announcement to the number of news articles in three days before the announcement. *Positive news ratio* is calculated in the same way as the *Total news ratio* but contains only expressions indicating positive surprise for monetary easing. *Negative news ratio* is calculated in the same way as the *Total news ratio* with negative expressions only. Due to the smaller coverage of English language news for the ECB, in *Positive* and *Negative news ratios*, several outliers are observed and winsorized at 3 for the euro area.

United States

	Sample size	Mean	Std. Dev.	Min	Max
Surprise	123	-2.772	10.620	-48.0	21.5
Ump dummy	123	0.496	0.502	0	1
Total news ratio	123	2.063	1.508	0.282	14.594
Positive news ratio	123	2.226	1.792	0.208	15.833
Negative news ratio	122	2.749	2.327	0.030	12.000
Daily return of bank stock index (%)	118	0.738	3.370	-7.246	19.283
Daily change in bank-government bond yield spread (1-3 year maturity, bp)	120	1.575	9.969	-19	95
Daily change in bank-government bond yield spread (3-5 year maturity, bp)	120	0.867	7.309	-13	69
Daily change in bank-government bond yield spread (5-7 year maturity, bp)	120	0.825	7.166	-18	59

Euro area

	Sample size	Mean	Std. Dev.	Min	Max
Surprise	172	-0.029	7.986	-21.5	30.0
Ump dummy	172	0.372	0.485	0	1
Total news ratio	172	0.776	0.296	0.349	2.194
Positive news ratio	172	0.824	0.620	0.000	3.000
Negative news ratio	172	1.159	0.884	0.000	3.000
Daily return of bank stock index (%)	171	-0.143	2.222	-7.271	8.245
Daily change in bank-government bond yield spread (1-3 year maturity, bp)	171	0.281	3.518	-12	21
Daily change in bank-government bond yield spread (3-5 year maturity, bp)	171	0.216	2.739	-10	14
Daily change in bank-government bond yield spread (5-7 year maturity, bp)	171	0.123	2.911	-19	12

United Kingdom

	Sample size	Mean	Std. Dev.	Min	Max
Surprise	152	-1.092	7.165	-25.0	27.0
Ump dummy	152	0.408	0.493	0	1
Total news ratio	152	0.806	0.390	0.327	2.684
Positive news ratio	150	0.963	0.843	0.000	5.000
Negative news ratio	148	1.375	1.385	0.000	8.500
Daily return of bank stock index (%)	152	-0.059	1.954	-7.422	8.972
Daily change in bank-government bond yield spread (all maturity, bp)	152	0.132	3.036	-7.000	29.000

Table 1b. Correlation Matrix for the Variables Used in the Event Study

United States

correlations	Surprise	Ump dummy	Total news ratio	Positive news ratio	Negative news ratio	Stock return	Bond spread (1-3 yr)	Bond spread (3-5 yr)	Bond spread (5-7 yr)
Surprise (bp)	1.000								
Ump dummy	-0.106	1.000							
Total news ratio	-0.144	0.051	1.000						
Positive news ratio	-0.238	0.035	0.646	1.000					
Negative news ratio	0.157	-0.116	0.238	0.215	1.000				
Daily return of bank stock index (%)	-0.060	0.185	0.249	0.213	-0.019	1			
Daily change in bank-government bond yield spread (1-3 year maturity, bp)	0.041	0.127	0.145	0.016	0.005	0.157	1.000		
Daily change in bank-government bond yield spread (3-5 year maturity, bp)	0.055	0.080	0.179	0.029	0.004	0.169	0.922	1.000	
Daily change in bank-government bond yield spread (5-7 year maturity, bp)	0.022	0.066	0.242	0.054	0.017	0.087	0.863	0.935	1.000

Euro area

correlations	Surprise	Ump dummy	Total news ratio	Positive news ratio	Negative news ratio	Stock return	Bond spread (1-3 yr)	Bond spread (3-5 yr)	Bond spread (5-7 yr)
Surprise (bp)	1.000								
Ump dummy	-0.108	1.000							
Total news ratio	-0.061	0.256	1.000						
Positive news ratio	0.007	0.030	0.526	1.000					
Negative news ratio	-0.045	0.091	0.324	0.209	1.000				
Daily return of bank stock index (%)	0.322	-0.109	-0.160	-0.044	-0.069	1.000			
Daily change in bank-government bond yield spread (1-3 year maturity, bp)	-0.460	0.153	0.213	-0.094	0.055	-0.302	1.000		
Daily change in bank-government bond yield spread (3-5 year maturity, bp)	-0.454	0.184	0.196	-0.049	0.069	-0.316	0.887	1.000	
Daily change in bank-government bond yield spread (5-7 year maturity, bp)	-0.358	0.143	0.036	-0.133	0.007	-0.235	0.773	0.871	1.000

United Kingdom

correlations	Surprise	Ump dummy	Total news ratio	Positive news ratio	Negative news ratio	Stock return	Bond spread (all yr)
Surprise (bp)	1.000						
Ump dummy	-0.004	1.000					
Total news ratio	-0.064	0.005	1.000				
Positive news ratio	-0.013	-0.069	0.527	1.000			
Negative news ratio	0.115	0.064	0.208	0.125	1.000		
Daily return of bank stock index (%)	0.302	-0.021	-0.054	0.041	-0.081	1.000	
Daily change in bank-government bond yield spread (all maturity, bp)	-0.179	0.099	0.046	-0.081	0.068	-0.459	1.000

Table 1c. Summary Statistics and Correlation Matrix for the Variables Used in the U.S. Bank-Level Event Study

	Sample size	Mean	Std. Dev.	Min	Max
Asset/GDP ratio (lagged, %/10)	10032	6.265	21.892	0.039	166.932
Equity/Asset ratio (lagged, %)	10032	9.511	2.106	0.484	20.463
Daily stock return (%)	10032	0.683	3.383	-22.330	36.398
Daily change in CDS spread (5 year maturity, bp)	272	-0.449	11.327	-41.0	68.2
Daily change in CDS spread (1 year maturity, bp)	351	-1.207	8.999	-49.2	47.5

	Surprise	Ump dummy	Total news ratio	Positive news ratio	Negative news ratio	Asset / GDP ratio	Equity / Asset ratio	Stock return	1yr CDS change	5yr CDS change
Surprise (bp)	1.000									
Ump dummy	-0.083	1.000								
Total news ratio	-0.073	0.014	1.000							
Positive news ratio	-0.193	0.018	0.613	1.000						
Negative news ratio	0.169	-0.111	0.249	0.202	1.000					
Asset/GDP ratio (lagged, %)	-0.003	0.062	-0.001	0.002	-0.008	1.000				
Equity/Asset ratio (lagged, %)	-0.001	0.342	0.003	0.004	-0.053	-0.100	1.000			
Daily stock return (%)	-0.053	0.130	0.116	0.072	-0.083	0.018	0.028	1.000		
Daily change in CDS spread (5 year maturity, bp)	-0.140	-0.009	0.103	0.109	0.085	0.053	-0.121	-0.003	1.000	
Daily change in CDS spread (1 year maturity, bp)	-0.190	-0.043	-0.044	0.014	0.033	-0.010	-0.022	-0.312	0.670	1.000

Table 2. Benchmark Regression Using Surprise Measure Computed from Changes in 1-year Ahead 3-month Futures Rates

The dependent variable is either the daily bank stock return (%) or the daily change in yield spread (bp) between bank corporate bonds and Treasury bonds with the similar maturity. The events are FOMC announcements between January 2000 and October 2012, except for September 12, 2001. Also, two Jackson Hole speech dates are added for 2010 and 2012. The regressors are: *Surprise,* which denotes for the daily change in one-year ahead three-month Eurodollar futures rate; *UMP dummy*, which takes the value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Bank Stock, Daily Return (%)			Bank Bond - Treasury Bond Spread, Daily Change (bp)								
				1 - 3 year maturity			3 - 5 year maturity			5 - 7 year maturity		
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Surprise	-0.018	-0.063	-0.018	-0.078	0.101	-0.078	-0.087	0.081	-0.087	-0.075	0.042	-0.075
	[-0.873]	[-1.246]	[-0.870]	[-2.806]***	[0.667]	[-2.797]***	[-3.081]***	[0.726]	[-3.071]***	[-2.084]**	[0.378]	[-2.077]**
Ump dummy			0.966			3.349			2.369			1.872
			[1.179]			[0.942]			[0.919]			[0.751]
Surprise * Ump dummy			-0.099			0.494			0.453			0.316
			[-0.917]			[1.202]			[1.495]			[1.063]
Constant	0.125	0.543	0.125	0.205	1.291	0.205	0.178	0.901	0.178	0.242	0.832	0.242
	[0.650]	[1.740]*	[0.648]	[0.401]	[0.995]	[0.399]	[0.556]	[0.948]	[0.554]	[0.758]	[0.911]	[0.756]
Obs. Number	62	103	103	62	103	103	62	103	103	62	103	103
F-stat	0.761	1.552	1.712	7.876	0.444	2.950	9.495	0.527	3.672	4.343	0.143	1.672
F p-value	0.386	0.216	0.169	0.007	0.507	0.036	0.003	0.469	0.015	0.041	0.706	0.178
R^squared	0.013	0.033	0.085	0.034	0.008	0.066	0.095	0.010	0.090	0.072	0.003	0.044

Table 3. Two Stage Least Square Using News-based Instruments, Easing Episodes Only

The dependent variable is either the daily bank stock return (%) or the daily change in yield spread (bp) between bank corporate bonds and Treasury bonds with the similar maturity. The events are FOMC announcements between January 2000 and October 2012, except for September 12, 2001. Also, two Jackson Hole speech dates are added for 2010 and 2012. In the conventional period, only monetary easing episodes are used. The regressors are: *Surprise,* which is fitted value based on the first-stage regression of the daily change in one-year ahead three-month Eurodollar futures rate on the logarithms of after-before ratio of number of total news, positive news, and negative news (see text); *UMP dummy*, which takes the value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Bank Stock, Daily Return (%)			Bank Bond - Treasury Bond Spread, Daily Change (bp)								
				1 - 3 year maturity			3 - 5 year maturity			5 - 7 year maturity		
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Surprise	-0.074	-0.041	-0.070	-0.111	-0.050	-0.182	-0.097	-0.086	-0.126	-0.057	-0.254	-0.107
	[-1.348]	[-0.353]	[-1.309]	[-2.222]**	[-0.206]	[-2.201]**	[-2.062]**	[-0.446]	[-1.943]*	[-1.113]	[-1.122]	[-1.496]
Ump dummy			0.939			3.546			1.831			0.209
			[0.676]			[0.889]			[0.620]			[0.070]
Surprise * Ump dummy			0.078			0.269			0.074			-0.337
			[0.264]			[0.460]			[0.161]			[-0.623]
Constant	0.548	1.028	0.54	-1.123	-1.222	-1.007	-0.624	-0.642	-0.577	-0.298	0.024	-0.218
	[1.479]	[1.863]*	[1.459]	[-2.265]**	[-2.006]**	[-1.623]	[-1.296]	[-1.113]	[-1.096]	[-0.485]	[0.029]	[-0.339]
Obs. Number	23	64	64	23	64	64	23	64	64	23	64	64
F-stat	1.660	0.121	1.347	4.507	4.659	4.262	3.881	2.005	2.070	1.131	1.437	1.455
F p-value	0.212	0.729	0.268	0.046	0.013	0.009	0.062	0.143	0.114	0.300	0.246	0.236
R^squared	-0.122	0.034	0.004	-0.055	0.004	0.036	0.040	-0.029	-0.013	0.072	-0.119	-0.239

Table 4. Benchmark Regression, Year by Year

The dependent variable is either the daily bank stock return (%) or the daily change in yield spread (bp) between bank corporate bonds and Treasury bonds with the similar maturity. The events are FOMC announcements between January 2000 and October 2012, except for September 12, 2001. Also, two Jackson Hole speech dates are added for 2010 and 2012. The unconventional policy period is divided into four subperiods: the first year after the collapse of Lehman Brothers (columns 1, 5, 9, 13); the second year (columns 2, 6, 10, 14); the third year (columns 3, 7, 11, and 15); and the fourth year (columns 4, 8, 12, and 16). The regressors are: *Surprise,* which denotes for the daily change in one-year ahead three-month Eurodollar futures rate; *UMP dummy*, which takes the value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Bank Stock, Daily Return (%)				Bank Bond - Treasury Bond Spread, Daily Change (bp)											
					1 - 3 year maturity				3 - 5 year maturity				5 - 7 year maturity			
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2008	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2008	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2008	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	Sep 16 2008 - Sep 2009	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012	Sep 16 2008 - Sep 2009	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012	Sep 16 2008 - Sep 2009	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012	Sep 16 2008 - Sep 2009	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Surprise	-0.018	-0.018	-0.018	-0.018	-0.078	-0.078	-0.078	-0.078	-0.087	-0.087	-0.087	-0.087	-0.075	-0.075	-0.075	-0.075
	[-0.863]	[-0.862]	[-0.861]	[-0.862]	[-2.776]***	[-2.771]***	[-2.770]***	[-2.772]***	[-3.048]***	[-3.043]***	[-3.041]***	[-3.044]***	[-2.061]**	[-2.058]**	[-2.057]**	[-2.059]**
Ump dummy	2.908	0.797	-0.262	0.877	11.043	-0.065	2.722	-0.693	9.064	-0.116	2.741	-2.237	7.720	-0.698	3.859	-2.660
	[1.172]	[1.833]*	[-0.339]	[1.123]	[0.923]	[-0.098]	[2.372]**	[-0.914]	[1.083]	[-0.311]	[2.592]**	[-4.858]***	[0.959]	[-1.285]	[2.401]**	[-3.981]***
Surprise * Ump dummy	-0.048	0.297	-0.445	0.149	0.815	0.031	-0.336	-0.211	0.726	0.123	-0.267	-0.157	0.572	0.133	-0.733	-0.107
	[-0.341]	[4.314]***	[-3.462]***	[0.406]	[1.228]	[0.369]	[-2.831]***	[-0.761]	[1.545]	[2.662]***	[-2.139]**	[-0.873]	[1.284]	[1.362]	[-3.629]***	[-0.383]
Constant	0.125	0.125	0.125	0.125	0.205	0.205	0.205	0.205	0.178	0.178	0.178	0.178	0.242	0.242	0.242	0.242
	[0.643]	[0.642]	[0.641]	[0.642]	[0.396]	[0.396]	[0.396]	[0.396]	[0.550]	[0.549]	[0.549]	[0.549]	[0.750]	[0.749]	[0.749]	[0.749]
Obs. Number	75	71	70	72	75	71	70	72	75	71	70	72	75	71	70	72
F-stat	1.453	10.636	4.794	0.841	3.036	2.680	14.908	3.383	3.801	3.417	9.172	11.529	1.837	2.189	9.744	7.701
F p-value	0.235	0.000	0.004	0.476	0.035	0.054	0.000	0.023	0.014	0.022	0.000	0.000	0.148	0.097	0.000	0.000
R^squared	0.149	0.112	0.234	0.042	0.153	0.034	0.104	0.039	0.214	0.097	0.207	0.174	0.147	0.084	0.339	0.181

Table 5a. Events Study Results—Euro Area

The dependent variable is either the daily bank stock return (%) or the daily change in yield spread (bp) between bank corporate bonds and Treasury bonds with the similar maturity. The events are monetary policy official announcements between January 2000 and October 2012. The regressors are: *Surprise,* which denotes for the daily change in one-year ahead three-month Euribor futures rate; *UMP dummy*, which takes value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Bank Stock, Daily Return (%)			Bank Bond - Treasury Bond Spread, Daily Change (bp)								
				1 - 3 year maturity			3 - 5 year maturity			5 - 7 year maturity		
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Surprise	0.056	0.112	0.056	-0.126	-0.195	-0.126	-0.154	-0.163	-0.154	-0.130	-0.130	-0.130
	[2.283]**	[4.078]***	[2.275]**	[-5.331]***	[-5.015]***	[-5.312]***	[-6.065]***	[-5.534]***	[-6.043]***	[-5.631]***	[-4.663]***	[-5.611]***
Ump dummy			-0.305			0.702			0.785			0.604
			[-0.668]			[0.917]			[1.319]			[0.888]
Surprise * Ump dummy			0.129			-0.156			-0.013			0.008
			[2.190]**			[-1.829]*			[-0.213]			[0.139]
Constant	0.005	-0.126	0.005	-0.048	0.214	-0.048	-0.067	0.18	-0.067	-0.11	0.074	-0.11
	[0.034]	[-0.742]	[0.034]	[-0.449]	[0.815]	[-0.448]	[-0.614]	[0.887]	[-0.612]	[-0.964]	[0.333]	[-0.960]
Obs. Number	108	156	156	108	156	156	108	156	156	108	156	156
F-stat	5.213	16.628	6.717	28.423	25.147	13.757	36.782	30.624	14.991	31.710	21.742	12.327
F p-value	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R^squared	0.060	0.138	0.187	0.367	0.176	0.212	0.447	0.198	0.215	0.357	0.112	0.121

Table 5b. Events Study Results—United Kingdom

The dependent variable is either the daily bank stock return (%) or the daily change in yield spread (bp) between bank corporate bonds and Treasury bonds with the similar maturity. The events are monetary policy official announcements between January 2000 and October 2012. The regressors are: *Surprise,* which denotes for the daily change in one-year ahead three-month Sterling futures rate; *UMP dummy*, which takes value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Bank Stock, Daily Return (%)			Bank Bond - Treasury Bond Spread, Daily Change (bp)		
				All maturity		
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	n.a.	After Sep 16 2008	After Sep 16 2008	n.a.	After Sep 16 2008	After Sep 16 2008
	(1)	(2)	(3)	(4)	(5)	(6)
Surprise	0.066	0.079	0.066	-0.071	-0.075	-0.071
	[2.656]***	[3.218]***	[2.647]***	[-6.331]***	[-3.205]***	[-6.309]***
Ump dummy			0.222			0.390
			[0.559]			[0.510]
Surprise * Ump dummy			0.035			-0.009
			[0.623]			[-0.156]
Constant	0.043	0.122	0.043	-0.182	-0.047	-0.182
	[0.321]	[0.779]	[0.320]	[-1.493]	[-0.171]	[-1.487]
Obs. Number	90	138	138	90	138	138
F-stat	7.057	10.358	3.971	40.087	10.269	14.193
F p-value	0.009	0.002	0.010	0.000	0.002	0.000
R^squared	0.114	0.084	0.089	0.162	0.029	0.033

Table 6. The U.S. Bank-Level Panel Regressions of Stock Returns

The dependent variable is the daily bank stock return (%). Events are FOMC announcements between January 2000 and October 2012, except for September 12, 2001. Also, two Jackson Hole speech dates are added for 2010 and 2012. The aggregate-level regressors are: *Surprise,* which denotes for the daily change in one-year ahead three-month Eurodollar futures rate in fixed effect estimation (columns 1-5); or, for the two stage least square specifications (columns 6-10), *Surprise* is the fitted value based on the first-stage regression of the daily change in one-year ahead three-month Eurodollar futures rate on the logarithms of after-before ratio of number of total news, positive news, and negative news (see text); *UMP dummy*, which takes the value one for the unconventional policy period (defined in the row just above the column numbers); and the interaction term, *Surprise * UMP dummy*. Coefficients for the level controls are not reported: bank fixed effects, constant, dummy for the first month in each quarter, and the dummy for the second month in each quarter. The bank-level regressors are*: Lagged Asset/GDP ratio*, *Lagged Equity/Asset Ratio*, and interaction terms between these bank-level variables and *Surprise* as well as *UMP dummy*. Triple interaction terms are also included. T-statistics are presented in parenthesis based on robust standard errors clustered at bank level: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	Fixed Effect Estimation Bank Stock Daily Return (%)					TSLS Estimation Bank Stock Daily Return (%)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample period for conventional policy (UMP dummy = 0)	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007	Pre-Aug 2007
Sample period for unconventional policy (UMP dummy = 1)	Sep 16 2008 - Oct 2012	Sep 16 2008 - Oct 2012	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012	Sep 16 2008 - Oct 2012	Sep 16 2008 - Oct 2012	Oct 2009 - Sep 2010	Oct 2010 - Sep 2011	Oct 2011 - Oct 2012
Surprise	0.018	0.015	0.017	0.019	0.018	-0.071	-0.106	-0.106	-0.060	-0.104
	[0.933]	[0.783]	[0.876]	[0.978]	[0.929]	[-1.334]	[-1.887]*	[-1.927]*	[-1.136]	[-1.880]*
UMP dummy	0.637	1.707	-1.789	-0.672	0.545	1.680	2.625	-1.684	-0.790	-0.003
	[1.387]	[2.157]**	[-2.065]**	[-1.019]	[1.410]	[2.091]**	[1.726]*	[-1.966]**	[-0.935]	[-0.002]
Surprise * UMP dummy	-0.078	-0.048	-0.172	-0.282	0.144	0.172	0.188	0.042	-0.342	-0.259
	[-2.424]**	[-1.107]	[-1.163]	[-2.032]**	[0.945]	[1.185]	[1.266]	[0.195]	[-0.789]	[-0.136]
Lagged Asset/GDP	-0.006	-0.005	0.002	0.004	0.001	-0.012	-0.013	0.006	0.007	0.005
	[-1.265]	[-0.775]	[1.198]	[1.278]	[0.545]	[-0.565]	[-0.347]	[0.438]	[0.516]	[0.236]
Lagged Equity Ratio	-0.031	-0.018	-0.034	-0.047	-0.042	-0.068	-0.050	-0.026	-0.072	-0.04
	[-1.424]	[-0.628]	[-1.469]	[-2.157]**	[-1.777]*	[-1.403]	[-0.676]	[-0.517]	[-1.370]	[-0.770]
(Lagged Asset/GDP) * UMP dummy	0.004	0.004	0.005	-0.002	0.006	-0.001	0.000	-0.003	-0.008	-0.008
	[1.724]*	[1.226]	[2.345]**	[-0.847]	[5.725]***	[-0.069]	[0.010]	[-0.406]	[-1.090]	[-0.585]
Lagged Equity Ratio * UMP dummy	-0.017	0.007	0.191	0.036	0.007	-0.075	0.016	0.186	0.049	0.035
	[-0.404]	[0.092]	[2.447]**	[0.640]	[0.199]	[-0.979]	[0.107]	[2.313]**	[0.602]	[0.278]
Surprise * (Lagged Asset/GDP)	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.001
	[0.964]	[0.944]	[0.696]	[0.567]	[0.708]	[-1.246]	[-0.950]	[-1.168]	[-1.388]	[-1.233]
Surprise * Lagged Equity Ratio	-0.003	-0.003	-0.003	-0.003	-0.004	0.002	0.006	0.005	0.003	0.004
	[-1.580]	[-1.525]	[-1.577]	[-1.577]	[-1.574]	[0.425]	[0.927]	[0.851]	[0.503]	[0.701]
Surprise * (Lagged Asset/GDP) * UMP dummy	-0.001	-0.001	0.000	-0.003	0.001	-0.001	-0.001	0.000	-0.002	-0.011
	[-3.979]***	[-3.397]***	[0.752]	[-3.315]***	[1.875]*	[-0.584]	[-0.371]	[0.328]	[-0.539]	[-0.898]
Surprise * Lagged Equity Ratio * UMP dummy	0.000	0.000	0.040	-0.008	-0.012	-0.011	-0.008	0.028	-0.019	0.002
	[-0.145]	[0.112]	[3.005]***	[-0.657]	[-0.933]	[-0.770]	[-0.537]	[1.447]	[-0.491]	[0.009]
Obs. Number	8800	6424	6072	6072	6072	5544	3168	2816	2816	2816
Number of Banks	88	88	88	88	88	88	88	88	88	88
F-stat	49.446	71.268	27.551	128.592	96.028	11.725	19.201	15.475	27.458	10.626
F p=value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R^squared	0.058	0.102	0.062	0.132	0.022	0.001	0.032	0.028	0.139	-0.139

Table 7a. The U.S. Bank-level Regressions of Credit Default Swap Spreads for Major Banks (Fixed Effect)

The dependent variable is the daily change in CDS spread (bp) for each bank. Events are FOMC announcements after September 16, 2008, until October 2012. Two Jackson Hole speech dates are added for 2010 and 2012. The aggregate regressor is *Surprise,* which denotes for the daily change in one-year ahead three-month Eurodollar futures rate. The coefficients for the level controls are not reported: constant, dummy for the first month in each quarter, and the dummy for the second month in each quarter. The bank-level regressors are: *Lagged Asset/GDP ratio*, *Lagged Equity/Asset Ratio*, and interaction terms between these bank-level variables and *Surprise*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	1-year CDS Spread Daily Change (bp)				5-year CDS Spread Daily Change (bp)			
Bank	Bank of America	JP Morgan	US Bancorp	Wells Fargo	Bank of America	JP Morgan	US Bancorp	Wells Fargo
	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Surprise	3.739	8.543	-3.325	-0.188	4.611	1.254	-3.152	-1.674
	[0.952]	[1.415]	[-2.596]**	[-0.116]	[1.918]*	[0.268]	[-1.896]*	[-1.348]
Lagged Asset/GDP	0.017	-0.002	0.832	-0.398	0.149	-0.371	1.155	-0.080
	[0.061]	[-0.007]	[1.696]	[-1.338]	[1.038]	[-1.289]	[1.873]*	[-0.853]
Lagged Equity Ratio	-9.357	0.001	-2.467	-2.628	-7.539	-1.679	-3.641	0.693
	[-2.094]**	[0.001]	[-2.372]**	[-1.827]*	[-2.540]**	[-0.727]	[-2.843]**	[0.461]
Surprise * (Lagged Asset/GDP)	-16.863	-0.036	-0.300	-0.027	-10.664	-0.005	-0.351	-0.014
	[-2.280]**	[-1.427]	[-2.782]**	[-2.162]**	[-1.971]*	[-0.229]	[-2.669]**	[-2.257]**
Surprise * Lagged Equity Ratio	-11.985	-0.443	0.927	0.295	-5.310	-0.068	1.014	0.316
	[-2.540]**	[-1.306]	[2.757]**	[2.744]***	[-1.243]	[-0.310]	[2.421]**	[1.736]*
Obs. Number	40	40	23	40	40	40	24	40
F-stat	3.067	2.496	6.133	6.959	1.486	4.224	2.985	3.634
F p-value	0.014	0.036	0.002	0.000	0.207	0.002	0.033	0.005
R^squared	0.312	0.181	0.572	0.511	0.228	0.260	0.523	0.319

Table 7b: The U.S. Bank-Level Regressions of Credit Default Swap Spreads for Major Banks (TSLS)

The dependent variable is the daily change in CDS spread (bp) for each bank. Events are FOMC announcements after September 16, 2008, until October 2012. Two Jackson Hole speech dates are added for 2010 and 2012. The aggregate regressor is *Surprise,* which is the fitted value based on the first-stage regression of the daily change in one-year ahead three-month Eurodollar futures rate on the logarithms of after-before ratio of number of total news, positive news, and negative news (see text). The coefficients for the level controls are not reported: constant, dummy for the first month in each quarter, and the dummy for the second month in each quarter. The bank-level regressors are: *Lagged Asset/GDP ratio*, *Lagged Equity/Asset Ratio*, and interaction terms between these bank-level variables and *Surprise*. T-statistics are presented in parenthesis based on robust standard errors: * denotes significance at the 10 percent threshold, ** at 5 percent, and *** at 1 percent.

	1-year CDS Spread Daily Change (bp)				5-year CDS Spread Daily Change (bp)			
Bank	Bank of America	JP Morgan	US Bancorp	Wells Fargo	Bank of America	JP Morgan	US Bancorp	Wells Fargo
	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Surprise	-42.390	33.057	-2.597	5.125	-0.160	6.130	-3.388	-3.849
	[-1.124]	[0.645]	[-1.825]*	[0.739]	[-0.006]	[0.231]	[-1.729]*	[-1.638]
Lagged Asset/GDP	0.363	0.86	0.702	-0.553	0.164	-0.235	1.283	-0.088
	[0.693]	[0.487]	[1.652]*	[-3.301]***	[0.615]	[-0.245]	[2.089]**	[-1.047]
Lagged Equity Ratio	23.13	-19.033	-2.614	-5.217	-4.930	10.550	-2.862	1.490
	[1.005]	[-0.540]	[-2.631]***	[-1.964]**	[-0.272]	[0.566]	[-1.385]	[1.120]
Surprise * (Lagged Asset/GDP)	-0.062	-0.071	-0.189	-0.041	0.002	-0.069	-0.067	-0.020
	[-0.837]	[-0.748]	[-1.072]	[-1.023]	[0.025]	[-1.249]	[-0.184]	[-1.634]
Surprise * Lagged Equity Ratio	5.241	-2.916	0.644	-0.153	0.008	0.509	0.497	0.622
	[1.174]	[-0.559]	[1.494]	[-0.303]	[0.002]	[0.192]	[0.615]	[1.880]*
Obs. Number	40	40	23	40	40	40	24	40
F-stat	1.142	0.209	2.017	10.933	1.275	1.240	2.191	1.264
F p-value	0.362	0.981	0.120	0.000	0.294	0.311	0.092	0.299
R^squared	-2.615	-4.033	0.409	0.051	0.157	-0.882	-0.014	0.214