What is the effect of the US unconventional monetary policy on banking?

Emmanuel Mamatzakis[1] and Theodora Bermpei[2]

May 2016

Abstract

This paper examines the impact of unconventional monetary policy on the US banking performance. Unconventional monetary policy is captured through the central bank's assets and excess reserves. Results show that there is a negative relationship between unconventional monetary policy and bank performance. Dynamic threshold analysis identifies shifts in regimes of the unconventional monetary policy over time, and in particular in the aftermath of the financial credit crunch late in the last decade. This analysis reveals that the negative relationship between unconventional monetary policy and bank performance is particularly pronounced above the reported threshold value that identifies the two regimes. We employ also deposit insurance coverage in association with unconventional monetary policy and find that it has a significant negative effect on bank performance for deposit uninsured banks. Finally, we observe that the negative impact of unconventional monetary policy on performance is mitigated for banks with high asset diversification and low deposit funding.

Keywords: Unconventional Monetary policy, Bank Performance, Deposit insurance coverage, Dynamic Threshold Analysis.

JEL classification: G21; G01; E43; E52

[1] School of Business, Management and Economics, University of Sussex, Jubilee Building, Brighton, BN1 9SL, United Kingdom. [2]School of Business, Nottingham Trent University, Newton Building, Nottingham, NG1 4BU, United Kingdom.
Corresponding author: Theodora Bermpei, t.bermpei@sussex.ac.uk.

1. Introduction

Responding to the financial meltdown in 2008, the Federal Reserve (Fed) in the US has been actively engaged in monetary expansion of immense proportions. Only as part of the Fed's large-asset purchase programmes trillions of the US long-term Treasury bonds and mortgage-backed securities over the 2008-2013 period were purchased. It does not come as a surprise, therefore, that a lot of emphasis has been put in place by academics and policy makers alike on understanding the impact of unconventional monetary policy (Joyce et al., 2012; Miles, 2014; Svensson, 2014). Along these lines, there has been a growing literature that examines the effect of interest rates on the risk-taking of banks (Ioannidou et al., 2015; Delis et al., 2011; Altunbas et al., 2012; Fungacova et al., 2014; Buch et al., 2014).

However, to date, there is rather limited evidence on the impact of unconventional monetary policy (UMP) on the performance of banks (Montecino and Epstein, 2014; Lambert and Ueda, 2014). This paper tries to bridge a gap in the existing literature by examining the underlying relationship between the unconventional monetary policies, as measured by central bank's assets and excess reserves, on the US bank performance by taking into account the impact of bank-specific and country-level control variables.

Although, there is a large volume of empirical literature regarding the broader economic impact of UMPs, there is rather limited evidence on the effect of UMPs on bank performance (Montecino and Epstein, 2014; Lambert and Ueda, 2014). Mostly, since the first round of the Fed's assets purchases in 2008, numerous studies offer explanations on the effectiveness of UMPs on asset prices, interest rates and a number of other macroeconomic variables (Krishnamurthy and Jorgensen, 2011; D'Amico et al., 2012; Wright et al., 2012; Kapetanios et al., 2012; Chen et al., 2012; Swanson et al., 2014; Bowman et al., 2015; Rogers et al., 2014). Some studies employ high frequency data and look at the impact of Fed policy announcements on long term interest rates (Krishnamurthy and Jorgensen, 2011; Swanson et al., 2014; D'Amico et al., 2012; Wright et al., 2012) sovereign yields, stock prices and foreign exchange rates (Bowman et al., 2015; Rogers et al., 2014). Other studies look at the impact of UMPs on output and inflation (Kapetanios et al., 2012; Chen et al., 2012). Some studies also investigate the association between UMP and financial stability (Gilchrist and Zakrajsek, 2013; Chodorow-reich, 2014). Gilchrist and Zakrajsek (2013) examine the effect of UMPs on corporate risk for commercial and investment banks over the 2008-2011 period. They conclude that UMP increases corporate risk for the period under study. Similarly, Chodorow-reich (2014) examines the effect of UMPs on risk-taking for a sample of insurers, and mutual funds between 2008 and 2013. The author finds some evidence of positive association between UMP and risk for the 2010-2013 period. The reported positive impact of UMP on bank risk-taking confirms the 'portfolio balance' channel that is introduced by Tobin (1963, 1969).[2]

Turning now to the impact of UMP on bank performance this could be explained through its effect on bank interest margins which is an important source of bank profitability. Bank's interest margin reflects the net interest income that arises from the difference between the short term (deposit) rate and long term (lending) rate (Delis and Kouretas, 2011). When the Fed has initiated UMPs, the short term interest rate has already reached the zero lower bounds. Furthermore, expansionary monetary policies are found to decrease long term interest rates (Krishnamurthy and Jorgensen, 2011; Swanson et al., 2014; D'Amico et al., 2012; Wright et al., 2012). Therefore, a reduction in the long term interest rates due to UMPs would decrease the difference between these long term interest rates and the short term interest rates that would consequently supress the interest margins. Literature has pointed two channels for the UMPs, particularly LSAPs, to reduce long term interest rates. One is the 'portfolio balance' based on which Fed's LSAPs could affect the long term interest rates through the reduction of the amount of long-term assets that the private sector holds (Joyce et al., 2012; Gagnon et al., 2011). The other is the 'signalling' channel through which LSAP might signal to market observes that the Fed has changed its views on policy preferences. This in turn might change bond investors' expectations of the future short term interest rate resulting in lengthening period of the near-zero federal fund rate. This signalling channel would decrease long term bond yields by reducing the average expected short-rate which is component of the long term rates (Bauer and Rudebusch, 2013).

However, the empirical evidence on the effect of UMP on bank profitability is rather scarce. In particular, we know of only two studies that focus on the underlying relationship between

[2] This theoretical framework, is particularly relevant in the case of LSAPs, in which financial institutions are engaged and thus 'portfolio balance' theory is a core mechanism that could explain the impact of UMP on bank risk (Steeley, 2015). Tobin (1963, 1969) suggests that central banks could decrease the relative returns of financial institutions by shifting supplies of assets with different maturities and liquidity due to imperfect substitutability. In particular, when a central bank buys assets from banks, the amount of cash that financial institutions hold increases. Since cash is not a perfect substitute for assets, banks would put emphasis in rebalancing their portfolios by purchasing assets that are better substitutes and offer higher yield (Joyce et al., 2012; Kapetanios et al., 2012). These assets would comprise riskier assets than cash, such as stocks and bonds that in turn would increase the undertaken risk of banks (Fisher, 2010; Fratzscher et al., 2014).

UMPs and bank profits (Montecino and Epstein, 2014; Lambert and Ueda, 2014). Montecino and Epstein (2014) find that LSAPs, as proxied by a 'counterparty treatment variable', increase bank profitability but this effect is robust only for the large US banks. Furthermore, Lambert and Ueda (2014) investigate the impact of UMPs, as captured by the central bank's assets over gross domestic product (GDP) ratio, on bank profits for a sample of the US commercial banks over the 2007Q3-2012Q3 period. They find that UMPs exerts a negative effect on bank profits and thus they raise questions concerning the effectiveness of expansionary policies on the performance of financial institutions.

Both these two studies (Montecino and Epstein, 2014; Lambert and Ueda, 2014) do not find a strong positive association between UMPs and bank performance. Unconventional monetary policies took place in the US after the burst of the financial crisis aiming to boost the wider economy, thus when one examines the impact of these policies on bank performance should take into account also the regulation framework that is particularly associated with the deposit runs of banks. In detail, as a response to the financial crisis, numerous countries increased significantly the coverage of their financial safety nets aiming to prevent potential contagion defaults on the banking sector. In particular, a recent study by Anginer et al. (2013) shows that during good times the deposit insurance has a negative impact on bank stability due to the increase of the moral hazard, while over periods of economic crisis the impact of deposit insurance coverage on bank stability is positive because of the *'stabilization effect'*. Therefore, when we examine the impact of the unconventional monetary policy on bank performance and we should include also the effect of the deposit insurance coverage particularly during economic downturns when contagious bank defaults are more likely to take place.

The paper contributes in the existing literature through various ways. Firstly, we shed new light on the underlying relationship between the unconventional monetary policy and bank performance as estimated by a number of accounting ratios for a sample of US banks over the 2007Q2-2013Q2 period. Secondly, we test how deposit insurance coverage affects the performance of banks over this period, while we also examine whether the impact of UMP on bank performance changes for Federal Deposit Insurance Coverage (FDIC)-insured institutions. Thirdly, we also use a dynamic threshold methodology to identify possible threshold-effects of UMPs with respect to bank performance over a period of significant structural changes for the banking institutions as well as for the entire economy. Fourthly, we test whether the effect of

UMPs on bank performance varies based on different levels of bank asset diversification and deposit funding.

Our findings suggest a strong negative relationship between UMPs, as proxied by central bank's asset and excess reserves, and the US bank performance over the 2007Q2- 2013Q2. Moreover, we find that the impact of deposit insurance coverage on performance is negative across the majority of our specifications, suggesting the presence of the moral hazard effect. In addition, we find that the negative effect of UMP on bank performance is moderated for the FDIC-insured institutions over turbulent periods. In crisis times, when UMP is used, depositors of FDIC-uninsured institutions would demand higher deposit interest rates compared to depositors of FDIC-insured banks. Therefore, higher deposit interest rates reduces further interest margins and bank profitability for FDIC-uninsured banks, while this effect is less pronounced for deposit insured institutions. Dynamic threshold analysis demonstrates that the negative effect of UMP on bank performance is particularly enhanced above the identified threshold value of UMP that classifies two regimes. Finally, we find that the negative effect of UMP on performance is less pronounced for banks of high asset diversification and low deposit funding.

The rest of the paper is structured as follows. Section 2 presents the hypotheses to be tested. Section 3 introduces the data, while section 4 discusses the methodology and the results. Section 5 concludes.

2. Hypotheses to be tested.

In this section we develop the three main hypotheses of our study; i) the first tests the impact of the unconventional monetary policy on bank performance ii) the second examines the effect of deposit coverage insurance on the performance iii) while the third looks at the impact of UMP on bank performance for deposit insured banks. We test these propositions for a sample of US commercial and saving banks over the crisis period (2007Q2-2013Q2).

2.1.Unconventional Monetary Policy and Bank Performance

The existing literature on the effects of UMPs on bank performance is rather limited, while there is a large discussion on the impact of monetary policy via interest rates on net interest margins on banking institutions. Following the hypothesis advanced by Samuelson (1945), known as the 'Samuelson effect', changes in interest rates affects bank performance, and more specifically profitability, via their effect on bank interest margins. In other words, when interest rates are very low banks' revenues from loans are reduced, while the bank's interest expenses from saving deposits are not decreased to the same extent, because banks' portfolio consist primarily of demand and transaction deposits. In similar vein, Hancock (1985) shows that an increase in interest rates result in an increase of bank profitability, as lending rate elasticity is larger than the deposit rate elasticity. Trying to bridge a link between UMPs and interest margins is imperative to understand the effect of the non-standard monetary policies on the long term interest rates on which banks lend money to borrowers. It is established in the literature that UMPs, particularly via LSAPs, decrease long term interest rates and thus decrease the difference between the federal fund rate (short term interest rate) and long term interest rates (Gagnon, et al., 2013; Swanson, 2011; Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Therefore, due to the documented larger elasticity of the lending rate compared to the deposit rate (Hancock, 1985), the reduction of long term interest rates could consequently lead to a faster decrease of revenues than interest expenses arising from deposits.

Furthermore, one of the leading theoretical models for the determination of interest margins is the bank dealership model as developed by Ho and Saunders (1981).[3] According to this model, banks are risk-averse financial intermediaries that face an inventory risk which arises from the mismatch between liabilities and assets. This risk has to be compensated via the pure interest spread, the difference between loan and deposit rates. Ho and Saunders (1981) suggest that the interest margin is dependent, among others, on the volatility of interest rates signifying that increases of interest rate volatility rise interest margins. A subsequent study by McShane and Sharpe (1984) finds that the bank interest margin is positively related to interest rate volatility. In support of the above argument, Maudos and Guevara (2006) empirically confirm a significant relationship between interest rate volatility and interest margins. Following previous findings (Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013), UMPs particularly via LSAPs, decrease long term interest rates. This in turn suggests that the difference between long and short term interest rates reduces. As a result,

[3] This model is based on the grounds of the hedging hypothesis that banks seek to match the maturities of liabilities (deposits) and assets (loans) aiming to avoid the reinvestment or refinancing costs that increase when assets are either too long or too short.

when interest rates decrease they tend to converge to zero-low bounds and consequently interest rate volatility reduces. Indeed, Krisnamurthy and Jorgensen (2011) find that UMP decreases interest rate volatility as estimated by the implied volatility on swaptions. Therefore, low interest rate volatility over expansionary monetary periods might be negatively associated with interest margins and bank profits as in Maudos's and Guevara (2006) study. Furthermore, the reduced volatility tend to motivate banks to undertake riskier positions that could result in lower bank performance (Borio and Zhu, 2012).

Another mechanism through which UMPs could affect the performance of banking institutions is through the reduction of the maturity mismatching risk. When UMP is employed banks could benefit from the lower term premium and issue long-term debt to substitute short term debt, thus prolonging the maturity of their liabilities and decreasing the risk of maturity mismatches (Stein, 2012). In support of this argument, Lambert and Ueda (2014) find that UMPs, via central bank's assets, lower the short-term debt ratio of the US depository institutions. Thus, reduction in the maturity mismatch risk would reduce resources and costs that banks devote in associated monitoring operations. These resources would then be diverted into operations that could further improve bank performance (Berger and DeYoung, 1997).[4] This issuance of long term debt could also occur at lower funding cost as LSAP found to reduce bank bond yields (Gagnon et al., 2013; Gilchrist and Zakrajsek , 2013). In support of this argument, Santos (2014) finds that the UMPs reduces the funding cost of large banks that trade bonds. Moreover, the Fed's purchases of Mortgage Backed Securities (MBS) from depository institutions, suggests that the central bank might have subsided banks' funding cost to fund these mortgages (Kandrac and Schlusche, 2015).

In addition, since the Fed's LSAPs has increased banks' cash holdings, market participants might consider this injection of liquidity to depository institutions as an implicit guarantee for the well-functioning of the banking industry and might decrease bank's cost of funding (Montecino and Epstein, 2014). However, depository institutions that have been engaged in LSAP, might regard cash provided by the Fed as a safety net (Hancock and Passmore, 2014) which might give an increase in moral hazard (Calomiris and Kane, 1996). Under the 'moral hazard' hypothesis managers undertake excessive risk and demonstrate inadequate asset

[4]According to Berger and DeYoung (1997) an increase of risk could lead to a decrease of bank performance. The reason is that bank managers divert resources from day to day operations in screening and monitoring activities that would consequently increase the associated costs.

screening that in turn might result in higher level of non-performing loans (Berger and DeYoung, 1997; Williams, 2004). This rise in the number of nonperforming loans could lead to an increase of unpaid loans, suggesting that these assets have offered low profits to financial institutions (Miller and Noulas, 1997).

Unconventional monetary policy, could also affect bank's cost of capital (Chang and Song, 2014). In some detail, LSAPs might have rebuilt market confidence and decrease investor's risk aversion (Bekaert et al., 2013; Roache and Rousset, 2013). Thus, if investors are characterized by lower levels of risk-aversion are thus willing to undertake increased risk for a lower required return on stocks. This reduction in the cost of capital (required return) would lead to an increase in future cash flows and stock prices of banks (Chang and Song, 2014). Also, the decrease of market uncertainty would boost asset prices (Gambacorta et al., 2014). Thus, this growth in asset prices might have a positive effect on the income that stems from bank's trading operations. However, as bank managers tend to be less risk-averse over expansionary monetary periods (Bekaert et al., 2013) this might reduce risk-monitoring of trading operations and prompt them to undertake less beneficial positions for the performance of the bank.

Based on the above discussion there is no clear indication on the effect of UMP on bank performance, thus the hypothesis H1.A and the competing hypothesis H1.B are formed as follows:

H1A (H1.B): The impact of unconventional monetary policy on bank performance could be negative (positive).

2.2 Deposit Coverage Insurance, UMP and Bank Performance

In response to the financial crisis, a number of countries have considerably raised the coverage of their financial safety nets aiming to reinstate the market confidence and to avoid contagion effects on the banking industry (Anginer et al., 2013). Deposit insurance coverage is a regulatory measure that could prove to be considerably effective during financial crises (Diamond and Dybvig, 1983). The reason being that deposit insurance reduces the risk of depositor runs (Matutes and Vives, 1996). In support of this view, Gropp and Vesala (2004) find that the increase of deposit insurance coverage decreases bank risk in European Union. Also, there is empirical evidence to suggest that deposit insurance coverage is associated with enhanced financial intermediation, as estimated by the level of deposits (Chernykh and Cole, 2011). In similar vein, Anginer et al. (2013) find that the deposit insurance coverage offers important stabilization effects over the period of the crisis (2007-2009) for a sample of 4109 banks in 96 countries. However, there are counterarguments of the negative impact of deposit insurance on bank stability and performance. Specifically, too generous or unsuitably priced deposit insurance schemes might increase moral hazard by incentivizing banks to undertake disproportionate risk (Demirguc-Kunt and Kane, 2002; Beck et al., 2013; Fu et al., 2014). Anginer et al. (2013) demonstrate that the deposit insurance coverage is negatively related with the bank stability during tranquil periods (2004-2007). Moreover, Barth et al. (2013) find that deposit insurance coverage is negatively associated with the performance, as estimated by efficiency, for a sample of 4050 banks over the 1999-2007 period. Thus, a generous deposit insurance scheme would deteriorate banks' stability and performance.

Based on the above discussion there is no clear indication on the effect of deposit insurance on bank performance, thus the hypothesis H2.A and the competing hypothesis H2.B are formed as follows:

H2.A (H2.B): The impact of deposit insurance coverage on bank performance is negative (positive)

Based on the above discussion that deposit insurance could have a stabilizing or a negative effect on performance, it would be interesting to explore the impact of the interaction of deposit insurance with UMP on bank performance. Drawing from the arguments in the previous section (2.1), one major channel through which expansionary monetary policy could affect bank performance is by the reduction in the interest margins that arises from the decrease in long term interest rate when the short term rate (fed fund rate) is close to the zero lower bound (Fawley and Neely, 2013; Bauer and Rudebusch, 2013).

The bank interest margins could further decrease in the absence of deposit insurance. This is because banks of not insured depositors tend to charge higher interest rates aiming to reduce bank risk resulting in the decrease of bank's interest margin (Anginer et al., 2013). On the contrary, if deposits are insured, depositors lack incentives to monitor and consequently charge lower interest rates (Demirguc-Kunt and Huizinga, 2004). Thus a further decrease in the interest margins of banks because of the monitoring of depositors could occur for non-deposit insured banks. In this case, the negative (positive) effect of UMP on bank performance would be moderated (strengthened) for deposit insured banks. However, the “moral hazard” effect of deposit insurance could dominate in the interaction of deposit insurance with UMP. At the presence of lower margins due to unconventional monetary policy, insured banks might search for higher returns by lending credit to customers of low creditworthiness that could charge higher lending interest rates (Ioannidou and Penas, 2010). Although, these loans carry higher interest rates they could lead to a higher default rate and thus lower bank performance (Ioannidou and Penas, 2010). In this case the negative (positive) effect of UMP on performance would be strengthened (moderated) for banks with deposit insurance.

Based on the above discussion hypothesis H3.A and the competing hypothesis H3.B would be formulated as follows:

H3.A The positive (negative) impact of unconventional monetary policy on bank performance is strengthened (moderated) for deposit insured institutions

And

H3.B: The positive (negative) impact of unconventional monetary policy on bank performance is moderated (strengthened) for deposit insured institutions

3. Data and Variables

We use quarterly financial data from the Fitch IBCA's Bankscope database for a period that covers the financial crisis 2007Q2-2013Q2. Our final sample includes 6771 US commercial and saving banks and a total 88,888 observations, after removing errors and inconsistencies. Table 1 describes all dependent and explanatory variables employed in the empirical analysis.

[INSERT TABLE 1 ABOUT HERE]

3.1. Unconventional monetary policy and deposit insurance coverage variables

Since 2009, the Fed has conducted a number of LSAPs rounds that includes primarily Treasury securities and mortgage-backed securities (MBS). In 2014, the Fed purchased almost $2.5 and

$1.7 trillion of Treasury securities and MBS respectively. This had as a result the expansion of the Fed's balance sheet by almost five times compared with the size of it before the crisis. Consequently, UMPs through LSAPs have increased substantially both the asset and liability side of the Fed’s balance sheet. A number of previous studies highlight that the size of central bank’s assets is an appropriate measure of UMPs and indeed is found to influence the prices of specific assets (Gagnon et al., 2011; Greenwood and Vayanos, 2010; Hamilton and Wu, 2012; D’Amico and King, 2013; Gambacorta et al., 2014), while Lambert and Ueda (2014) demonstrate its significant effect on the profitability of the US banks. Similarly, we use the natural logarithm of central bank’s assets (CBA) to capture the expansion of the Fed’s balance sheet from the asset side.

Moreover, the expansion of the liability side of the Fed’s balance sheet due to the initiation of the LSAPs has led to a significant increase of excess reserves hold by banks (Todd, 2013). Excess reserves stand for the extra amount of reserves against deposits and other liabilities that banks hold above the required reserves that the federal law suggests. In particular, excess reserves increased sharply since the late 2008 in the US. In 2007, excess reserves averaged $1.9 billion, while by April 2014 reached around $1.863 trillion, of which only around $115 billion are required reserves. This large increase of excess reserves is reflected by its high standard deviation (1.04) over the period under study 2007Q2-2013Q2 (see Table 2). Moreover, this substantial growth in excess reserves has also been driven by an important policy change; since 2008 the Fed has started to pay interest on reserves. This in turn has encouraged banks to maintain large amount of excess reserves. In addition, paying interest on reserves allows the central bank to put a floor on the federal funds rate, as banks will not want to lend out their reserves at rates lower than those that they can earn from the Fed (Kozicki et al., 2011). This in turn offers the ability to the Open Market Trading Desk (Desk) at the Fed to maintain the federal fund rate very close to the Federal Open Market Committee’s (FOMC’s) target rate (Federal Reserve Bank of New York, 2013). Therefore, we also use as a second proxy of UMP, the natural logarithm of excess reserves (EXC_RES) consistent with Bech and Monnet (2013).

[INSERT TABLE 2 ABOUT HERE]

In addition, in order to account for the effect of the deposit insurance coverage we employ a comprehensive dataset that provides bank-specific information on all the FDIC-insured institutions. Also, it offers valuable evidence on the particular date that a bank has gained access into the FDIC that in turn captures time heterogeneity.[5] Thus, we include a dummy that takes the value of 1 for those banks (and years) that deposits are insured, while takes the value of 0 for these banks (and years) that do not have access to the FDIC. The increase of deposit insurance coverage is particularly evident the recent years is depicted by the mean value of the FDIC dummy variable that is equal to 0.65, thus more than the half of our sample includes FDIC-insured financial institutions (Table 2).

3.2. Control Variables

We employ a number of bank-specific and state-specific variables consistent with a number of previous empirical studies. We use the natural logarithm of total assets to proxy for the size of each bank (SIZE). The existing empirical evidence on the effect of the size on bank performance is mixed (Altunbas et al., 2001; DeGuevara and Maudos, 2007). On the one hand, bank size might have a positive effect on bank performance due to higher diversification (Mester, 1993). On the other hand, the impact of bank size on bank performance could be negative if economies of scope and scale are not realized. We also include the equity over total assets ratio as a proxy of capital (E/TA), as in previous studies (Athanasoglou et al., 2008; Lepetit et al., 2008). The impact of the equity over total assets ratio on bank performance could be positive, as more capital at risk prompts managers to undertake less risky positions that in turn would protect banks from increased losses (Gorton and Rosen, 1995; Athanasoglou et al., 2008; Lepetit et al., 2008). On the other hand, an increase of leverage, which implies a decrease of capital, might have a positive impact on bank performance under the *'agency cost'* hypothesis introduced by Jensen and Meckling (1976). This is because increases of leverage (decreases of capital) could moderate the conflicts that shareholders and managers have with regards to the risk of an investment choice (Myers, 1977). When leverage increases the priority of managers is to secure funding to pay the debt rather to undertake extremely risky projects (Myers, 1977). Hence, high leverage (low capital) could have a positive impact on bank performance, consistent with Berger and Bonaccorsi di Patti (2006). We also account for the impact of liquidity on bank performance estimated by the ratio of liquid assets over total assets (LIQ/TA). Previous empirical studies show that the impact of liquidity on performance could

[5] We would like to thank an anonymous Reviewer for pointing out the necessity to use an informative measure of FDIC that would enable us to capture bank and time heterogeneity. Data for all the FDIC-insured institutions are available here: https://www5.fdic.gov/idasp/warp_download_all.asp.

be positive due to the lower liquidity risk (Demirguc-Kunt and Huizinga, 1999; Athanasoglou et al., 2008). However, there is evidence to suggest that the effect could be negative since high liquidity is associated with low returns (Pasiouras and Kosmidou, 2007) and high storage expenses (Kwan, 2003). Furthermore, we opt for the ratio of loans to assets (LA/TA) which is a proxy for well-functioning intermediation by the bank and is extensively used by previous studies (Pasiouras, 2008; Lin and Zhang, 2009; Garcia-Herrero et al., 2009; Bertay et al., 2013). Lastly, we also account for the insolvency risk as estimated by the Z-Score= $(1+ ROE)/\sigma_{ROE}$, where ROE is the return on equity and σ_{ROE} is the estimate of standard deviation of ROE (Boyd and Graham, 1986). Higher values of Z-Score for a bank indicates higher distance from default and therefore we expect that increases of Z-Score would have a positive impact on bank performance consistent with numerous previous studies (Lepetit et al., 2008; Delis and Staikouras, 2011). Lastly, we also include the ratio of non- performing loans over total loans at the US state level (NPLs), in order to capture the state-specific credit risk.[6]

Turning now to the rest of the control variables, we opt for a number of macroeconomic variables to capture the general economic conditions.[7] Thus, as proxies of macroeconomic stability we include in our regressions gross domestic product growth (GDP gr) and inflation (INFL) consistent with previous studies (Lozano-Vivas and Pasiouras, 2010; Chortareas et al., 2011; Mamatzakis and Kalyvas, 2013). On the one hand, there is empirical evidence to support that favorable economic conditions, i.e. high GDP growth, can increase banking expenses owing to higher operating costs to offer a particular level of services (Dietsch and Lozano-Vivas, 2000). Also, banks tend to increase their lending through shifting to riskier assets aiming to rise their returns. This in turn might dampen bank performance in the long run (Delis and Kouretas, 2010). On the other hand, an increase of GDP growth could reduce banking costs and thus increase profitability due to the easy access that banks in prosperous countries have to new technologies (Lensink et al., 2008).

Regarding the effect of inflation on bank performance, Revell (1979) claims that it depends on whether bank's salaries and other operating expenses could increase at a faster (lower) degree than the inflation rate. Thus, if a bank's management could predict the inflation rate, a bank could adapt interest rates in order to increase revenues faster than costs and hence improve

[6]For the state-level non-performing loans ratio we obtained the data from the Federal Reserve Bank of St. Louis.
[7]We would like to thank an anonymous Reviewer who proposed to introduce variables such as GDP growth, inflation and unemployment rate, aiming to capture the effect of general economic conditions on bank performance.

bank performance. In contrast, if bank managers could not accurately predict the inflation rate that would not result in appropriate adjustment of interest rates. In that case, bank costs would increase at a higher level than earnings resulting in the reduction of bank performance. Moreover, we include as another measure of economic conditions the unemployment rate (UNEMP). The impact of UNEMP on bank performance is expected to be negative consistent with Abreu and Mendes (2002). We also control for the effect of monetary policy, including the federal fund rate (Fed rate). The impact of Fed rate on bank performance is expected to be positive. In particular, lower interest rates tend to increase risk-taking (Ioannidou et al., 2009; Brissimis and Delis, 2009; Jimenez et al., 2013) that in turn might dampen bank performance.

4. Methodology and Results

4.1.1 Fixed effect estimator

As a first step of the empirical analysis we run the following general model with the fixed effect estimator:

$$(Perform)_{i,t} = \left[c + a_1(UMP)_t + a_2(DIC)_{i,t} + \beta_j \sum_{j=1}^{n}(Control)_{i,t} + v_i + u_{i,t}\right] \quad (1)$$

where $(Perform)_{i,t}$ is the vector of bank-specific measure of the US bank performance estimated by four different proxies; 1) return on assets (ROA), 2) return on equity (ROE), 3) pre-tax operating income as a percentage of the average total assets (POI), 4) and net interest margin (NIM). c is the constant term , $(UMP)_t$ stands for the unconventional monetary policy independent variable. $(DIC)_{i,t}$ is a dummy variable that captures the deposit protection and takes the value of 1 for the FDIC-insured banks, otherwise it takes the value of 0. $(Control)_{i,t}$ comprises a number of bank-specific, state-level and country-level control variables, v_i is the unobserved bank specific effect, while $u_{i,t}$ denotes the idiosyncratic error term.

Fixed effect estimator is an appropriate method in the context of our study as we use a panel dataset.[8] In particular, with fixed effect estimation we take into account heterogeneity across banks as it allows unobserved bank specific characteristics, v_i, to be arbitrarily correlated with the observed explanatory variables (Baltagi, 2008). Therefore, bank fixed effects, v_i, capture heterogeneity across banks as bank-individual characteristics are not constrained and could

[8] We use the Hausman (Hausman, 1978) test that rejects the null hypothesis, suggesting that the fixed effect estimator (and not random effect) is the preferred estimation method.

impact upon the predictor variables Fixed effect wipes out the impact of time-invariant characteristics and hence we could examine the net effect of UMPs and the rest of our explanatory variables on bank performance.[9]

4.1.2 Fixed effect panel results

The fixed effect estimations reveal that the unconventional monetary policy, as estimated by two different proxies, exerts a significant and negative impact on bank performance in support of our H1.A hypothesis. In particular, unconventional monetary policy, as measured by central bank's assets (CBA), has a significant negative impact on bank performance across all different specifications (ROE, ROA, NIM, POI). Similar results we observe when we use excess reserves (EXC_RES) as an alternative measure of UMP. Also, the EXC_RES exerts a negative effect on bank performance at the 1% level across all our regression models (Table 3). Mostly, we observe that CBA exerts a larger in magnitude impact on bank performance compared to that of EXC_RES. Overall, these findings reveal that there is a strong negative association between UMP and bank performance. This result is supported by the effect that UMP could have on net interest margins of banking institutions. In particular, over the monetary expansionary periods, the deposit rates (federal fund rate) has been kept at zero lower bounds. Also, LSAPs are found to reduce the lending rates (Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Thus, UMP has prone to the depression of net interest margins. Thus, one mechanism though which UMP affects negatively bank performance is through its impact on net interest margins. Another channel through which UMP impacts bank performance is through its impact on asset prices. In some detail, the Fed's purchases is regarded by market participants as a signal of the deterioration of financial prospects which effects adversely the value of trading assets and portfolio gains (Christensen and Rudebusch, 2013).

[INSERT TABLE 3 ABOUT HERE]

[9] Heterogeneity over time is captured using time dummies.

Turning to the other variable of our main interest, we observe that federal deposit insurance coverage (FDIC) is negatively associated with bank performance as estimated by different accounting-based indicators across all our specifications. In some detail, the effect of deposit insurance coverage is negative and significant at the 1% level across the majority of our regression models (see Table 3) confirming in that way our H2.A. Notably, we observe that the FDIC exerts an economically important effect on bank performance as the estimated coefficients for the regressions of ROA, NIM and POI are large in magnitude. These findings suggest that deposit insured institutions grant credit regardless the costs arising from relaxed standards and monitoring. As such, banks increase the level of defaulted loans, thereby increasing costs and depressing interest margins (Abreu and Mendes, 2001).

In addition, we go a step further and investigate what is the impact of the interaction of UMP with deposit insurance coverage on bank performance. Our results show that the negative impact of unconventional monetary policy on bank performance, as discussed above, is less pronounced for FDIC-insured financial institutions. In some detail, the interaction of the deposit insurance coverage with the two alternative measures of UMP, CBA*FDIC and EXC_RES*FDIC, enters the regressions positive and significant (Table 3), suggesting that negative effects of UMP on bank performance is moderated for FDIC-insured banks confirming our H3.A hypothesis. In some detail, this impact is more robust for those specifications where we employ EXC_RES as a measure of UMP. As we discussed earlier, one of the major channels through which UMP could affect bank performance is through its impact on interest margins. Our results show that bank depositors of FDIC-insured banks lack incentives to monitor and thus they charge lower deposit rates compared to that of non-insured depositors (Demirguc-Kunt and Huizinga, 2004). This suggests that a further reduction of interest margins due to UMP is moderated by the presence of deposit insurance.

Turning to the impact of the rest of the bank-specific control variables, we find that the bank SIZE increases bank performance as estimated by the ROA, ROE, NIM and POI ratios. In some detail, the SIZE is positively associated with bank performance (see Table 3). These results show that increases in the bank size offer diversification benefits to banks through economies of scale and scope (Mester, 1993). In addition, we find that LA/TA increases bank performance. In particular, we find that LA/TA has a positive and significant impact on bank performance at the 1% significance level (see Table 3). Our results indicate that increases of the ratio of loans stands for the well-functioning intermediation of banks. Our findings are also consistent with these of previous empirical studies (Isik and Hassan, 2003; Casu and Girardone, 2004; Lensink et al., 2008).

With regards to the impact of capital, E/TA, on bank performance we observe that increases of capital improves bank profitability across all the specifications (see Table 3). In particular, we find that E/TA exerts a positive and significant effect at the 1% level on ROE and ROA (see Table 3). These findings suggest that increased capital prompts managers to take less risky positions that consequently protect banks from high losses (Gorton and Rosen, 1995). Our finding is similar to that of Athanasoglou et al. (2008) and Lepetit et al. (2008). We also find that the impact of LIQ/TA is negative on bank profitability, suggesting that banks which hold high liquid assets are related with low returns (Pasiouras and Kosmidou, 2007) and high storage expenses (Kwan, 2003).

In addition, we examine the impact of the insolvency risk, as estimated by the Z-Score, on bank performance. Our findings demonstrate, that an increase of the Z-Score (decrease of risk to default) improves bank profitability as proxied by the two alternative measures of UMP. In particular, we observe that there is a strong positive relationship between the Z-Score and bank performance at the 1% significance level (see Table 3). Our empirical results are in line with a number of previous studies (Lepetit et al., 2008; Barry et al., 2011; Delis and Staikouras, 2011) and suggests that banks with high default risk (lower Z-Score) divert resources from day-to-day to monitoring operations that in turn can increase bank expenses and thus reduce banks profitability consistent with the *'bad luck'* hypothesis advanced by Berger and DeYoung (1997). Lastly, regarding the impact of the state-level ratio of non-performing loans to total loans on bank performance we observe, as it is expected, a negative sign and significant at the 1% across the majority of the specifications (see Table 3).

Regarding the impact of country-level control variables, we find that GDP gr exerts a negative effect on bank performance consistent with previous studies (Yildirim and Philipatos, 2007; Delis and Kouretas, 2010). This in turn suggests that in prosperous economic conditions banking costs increase due to higher operating expenses to supply a given level of services (Dietsch and Lozano-Vivas, 2000). Moreover, we find that INFL exerts a negative and significant effect on bank performance in line with previous empirical evidence (Wallich, 1977; Petersen, 1986; Lozano-Vivas and Pasiouras, 2010). The reason being that bank's management cannot accurately predict inflation rate and consequently cannot adjust interest rates equivalently. Thus, bank expenses increase at a faster pace than revenues suggesting the decrease of bank profits (Revell, 1979). Moreover, we observe a negative association between UEMP and bank performance as in Abreu and Mendes (2002). Finally, we find a positive and significant relationship between Fed rate and performance confirming the increase of risk taking that arise from low interest rates (Ioannidou et al., 2009; Brissimis and Delis, 2009; Jimenez et al., 2013).

4.2.1 Dynamic estimations

In order to test our main hypotheses (H1, H2 & H3), we opt for the two-step 'system' GMM estimator (Arrelano and Bover, 1995; Blundell and Bond, 1998) as in Lambert and Ueda (2014) that examines the impact of unconventional monetary policy on bank performance. The usage of this estimator is appropriate in the context of this study as it accounts for endogeneity issues. [10] Moreover, the well-documented persistence in bank profits (Goddard et al., 2004) is controlled by the inclusion of the performance-lagged dependent variable amongst the rest of the determinants (Athanasoglou et al., 2008). We also follow the finite sample correction introduced by Windmeijer (2005) as the two-step estimates of standards errors tend to be downward biased (Blundell and Bond, 1998).

The dynamic panel model that we use takes the following form:

$$(Perform)_{i,t} = \left[c + \varphi(Perform)_{i,t-1} + a_1(UMP)_t + a_2(DIC)_{i,t} + \beta_j \sum_{j=1}^{n}(Control)_{i,t} + v_i + u_{i,t}\right] \quad (2),$$

where $(Perform)_{i,t}$ is the vector of bank-specific measure of the US bank performance as estimated by ROA, ROE, POI and NIM, while $(Perform)_{i,t-1}$ stands for the lagged performance independent variable. $(UMP)_t$ is the variable that captures the unconventional monetary policy. $(DIC)_{i,t}$ is a bank specific dummy variable that accounts for the deposit protection and takes the value of 1, while takes the value of 0 for non FDIC-insured institutions. $(Control)_{i,t}$ includes bank-specific, state-level and country-level control variables, v_i is the unobserved bank specific effect ,while $u_{i,t}$ denotes the idiosyncratic error term.

[10]For the 'system' GMM estimation we use Roodman (2006) "xtabond 2" specification in Stata.

4.2.2 Dynamic panel results

Table 4 shows the regression results of the dynamic panel analysis with the central bank's assets and excess reserves, as unconventional monetary policy variables. The suitability of the usage of the two-step 'system' GMM estimator is justified by the significant lagged dependent performance variables in all the corresponding models (see Table 4). In addition, with respect to statistical diagnostics we observe that the second-order autocorrelation in second differences and the Hansen test are insignificant (see Table 4).

[INSERT TABLE 4 ABOUT HERE]

With regards to the impact of the UMP, as estimated by CBA and EXC_RES, on bank performance we observe that it remains negative and significant. In particular, we find that the CBA and EXC_RES exerts a negative and significant impact on bank performance at the (see Table 4). Largely, we find that the effect of CBA on performance is larger in magnitude compared to that of EXC_RES. These findings lend further support to the results of the fixed effects specifications, suggesting that UMPs dampen bank performance. These results also provide evidence of the negative effect of UMP on bank performance through its effect on interest margins. Briefly, it is documented that LSAPs decrease the lending rates (Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Thus, this reduction of lending rates affect negatively net interest margins and bank performance. The negative effect of UMP on bank performance through its impact on asset prices. Announcements of LSAPs signal downturn of future economic conditions which is considered negative information by investors which affect adversely asset prices (Christensen and Rudebusch, 2013).

Turning now to the impact of deposit insurance coverage on bank performance, we find a negative result, which is consistent with the fixed effect specifications and further confirms the negative effect of deposit insurance coverage on bank performance. Banks of insured depositors tend to relax credit standards and decrease monitoring that in turn give a rise in the level of nonperforming loans. This increase of problem loans suggest rise of costs and thus deterioration of bank performance (Abreu and Mendes, 2001). With regards to the impact of interaction of the deposit insurance coverage with UMP, as estimated by CBA*FDIC and EXC_RES*FDIC, on performance we find supportive evidence of the fixed effect results, showing that the negative impact of the UMP on bank performance is less pronounced for

FDIC-insured institutions (see Table 4). Overall, we find that the CBA*FDIC exerts larger in magnitude effect on bank performance compared to that of EXC_RES*FDIC. UMP decreases bank performance through the reduction in interest margins. The further reduction of interest margins is moderated when bank depositors are insured as they charge lower interest rates compared to that of uninsured depositors (Demirguc-Kunt and Huizinga, 2004).

Regarding the impact of the rest of the control bank-specific variables, we observe that the results are consistent with the fixed effect specifications. In some detail, we observe a positive relationship between the SIZE of the bank and performance (see Table 4) and consistent with Mester (1993). Furthermore, we find that the LA/TA ratio is positively associated with bank performance (see Table 4), consistent with the fixed effect specifications and previous empirical evidence (Isik and Hassan, 2003; Casu and Girardone, 2004; Lensink et al., 2008). In addition, as in the fixed effect estimator, we find that the Z-Score exerts a positive impact on bank performance across all our models (see Table 4), consistent with previous empirical evidence (Lepetit et al., 2008; Barry et al., 2011; Radic et al., 2012). Finally, we also observe a strong negative association between NPLs and bank performance (see Table 4). Moreover, we find that GDP gr, INFL and UEMP exerts a negative effect on bank performance in line with fixed effect specifications and previous empirical evidence. Finally, the Fed rate enters the regression positive and significant confirming our previous findings (4.1.2).

4.3.1 Dynamic Panel Threshold Model

As a further step, we opt for a dynamic panel threshold model that enables us to identify any regime shifts due to UMP. In some detail, we build on the dynamic panel threshold model of Kremer et al. (2013) based on the cross-sectional balanced panel threshold methodology introduced by Hansen (1999). This model identifies changes in coefficients of the main regressors of our interest, whilst it detects thresholds and thereby different regimes endogenously without ex ante imposing structural breaks. A major criticism in the literature (Jimenez et al., 2008; Maddaloni and Peydro, 2011; Ioannidou et al., 2015) refers to endogeneity of monetary policy measures on bank performance. Our model deals with this issue as the estimation method is GMM based on instrumental variables. In addition, the data information set would reveal if and when there is a break in the data generating process, rather than imposing arbitrarily a structural break in the data as in Klapper and Love (2011) and Anginer et al. (2014). This is of importance as during the period f our sample, there is major financial crisis, but to this date it is not clear when commercial banks were affected by the crisis. Our model identifies thresholds for central bank's assets and excess reserves and their impact on bank performance over the period of our study (2007Q2-2013Q2). Based on the estimation of threshold we would be able to identify the exact date of the structural break, and detect possible shifts (see Hansen 1999; Kremer et al. 2013).

The threshold model takes the following form[11]:

$$\mathrm{perform}_{i,t} = \mu_i + \lambda_1 m_{i,t}\, I(q_{i,t} \le \gamma) + \delta_1 I(q_{i,t} \le \gamma) + \lambda_2 m_{i,t}\, I(q_{i,t} > \gamma) + \varepsilon_{i,t} \quad , (3)$$

where $\mathrm{perform}_{i,t}$ is the dependent variable and stands for the ROA, ROE, POI and NIM. μ_i is the bank-specific fixed effect, while λ_1 and λ_2 stand for the two reverse regression slopes based on the assumption that there exist two regimes, ε_{it} is the random error. m_{it} is a vector of explanatory variables that include both bank-specific, state-level and country-level control variables. δ_1 is the regime dependent intercept and as in Bick (2007) its inclusion is essential for estimating both the threshold value and the coefficient magnitudes of the two regimes. I is the indicator function suggesting the regime specified by the threshold variable q_{it} and the threshold value γ.

The $\varepsilon^*_{i,t}$ takes the following transformation:

$$\varepsilon^*_{i,t} = \sqrt{\frac{T-t}{T-t+1}}\left[\varepsilon_{i,t} - \frac{1}{T-t}\left(\varepsilon_{i(t+1)} + \cdots + \varepsilon_{i,T}\right)\right] \qquad (4)$$

In the equation (3) the threshold variable is q_{it}, and herein refers to two measures of unconventional monetary policy; i) central bank's assets ii) excess reserves. γ is the threshold value which would indicate those observations above (high regime) and below the threshold value (low regime).The above dynamic panel threshold model employs a GMM estimation method (see Arellano and Bover, 1995; Caner and Hansen, 2004) so as to address issues related to endogeneity and avoid the serial correlation in the transformed errors.

The estimation of the threshold variable follows a two-step procedure; in the first step the estimation of a reduced type regression for the endogenous variable as a function of instruments takes place. The predicted values are then used to replace the endogenous variable in the

[11]For simplicity we outline the threshold model based on two identified regimes and one threshold. Without loss of generality, this model could expand to more thresholds and thereby more regimes.

equation (3). Next we estimate equation (3) for a fixed threshold value where the threshold variable is replaced by its predicted values obtained in the first step. Threshold values are specified by the minimization of the concentrated sum of squared errors as $\gamma_i^* = \text{argmin}_\gamma S_{i(\gamma)}$ (Chan, 1993; Hansen, 1997). Lastly, slope coefficients λ_1 and λ_2 could be estimated with the use of the GMM estimator (Caner and Hansen, 2004).

4.3.2 Dynamic threshold results

If a central bank intends to initiate higher levels of UMPs, through more large scale asset purchases, bank investors are then more easily persuaded about the future policies of the central bank and thus their beliefs that interest rates would remain low for a long period become stronger (Bernanke et al., 2004). Eggertson and Woodford (2003) suggest that UMPs could prove to be beneficial in decreasing bond yields only if these policies function as a credible commitment by the central bank to retain interest rates low. Clouse et al. (2003) suggests that this commitment becomes more credible if central bank purchases large volumes of MBS and Treasury bills. In particular, Bauer and Rudebusch (2013) finds that a LSAP announcement result in the lengthening of the expected period of near-zero policy rates. The reason is that if a central bank decides to increases interest rates then it would have a loss on these assets (Krishnamurth and Vissing-Jorgensen, 2011).

Therefore, if a central bank purchases large quantities of long term assets this signals a credible commitment that interest rates would be low for a rather longer period of time. This however, could induce bank managers to decrease their lending standards and the risk monitoring of their operations. It is evident in the existing literature that low interest rates for a prolonged time soften lending standards (Adrian and Shin, 2010; Maddaloni and Peydro, 2011). Banks tend to entail more risk-taking as low interest rates make riskless assets less attractive and thus financial institutions swift to riskier assets (Rajan, 2005). Low interest rates soften lending standards and decrease screening by banks (Dell'Ariccia and Marquez, 2006) and this in turn might prone financial institutions to less beneficial positions in terms of risk-return due to the increase of non-performing loans.

Thus, the negative effect of UMP on bank performance would be even more pronounced under higher levels of UMPs. In addition, lower interest rates as discussed in the hypothesis section, decreases the difference between the long and short term interest rates, i.e., interest margins

(Gagnon, et al., 2013; Swanson, 2011; Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Therefore, since larger volumes of LSAPs signals longer duration of near-zero interest rates the negative impact on banks' interest margins would be more robust than that of lower level of UMPs in quantitative terms.

Our results in the fixed effect and dynamic panel regressions indicate the presence of negative effect of UMP on bank performance. Based on these first results and the discussion above, we believe that the negative effect of UMPs on bank performance would be more pronounced for larger volumes of UMPs compared to that of lower quantities of UMPs. Thus, we implement the dynamic panel threshold model introduced by Kremer et al. (2013) which allow us to identify the presence of potential threshold-effects of the unconventional monetary policy with respect to the US bank performance. The potential presence of threshold-effects would enable us to research in depth a period of significant structural changes for the banking institutions as well as for the entire economy. We employ this econometric method setting as threshold variable two alternative UMPs measures, CBA and EXC_RES.

4.3.3 Threshold variable Central bank assets

Our dynamic threshold analysis reveals a threshold value of the CBA to be 5.560105 (see Table 5). This value splits the sample of 82,117 observations into two regimes. The high regime includes all the observations whereby the level of the CBA, is above the 5.560105. By contrast, in the low regime belong all these observations for which the value of CBA is below 5.560105. Our findings suggest that the CBA exerts a strong negative impact on bank performance for both regimes. In particular, coefficient estimates with regards to the effect of central bank's assets on bank performance are $\lambda 2= -4.075$ for the high regime and $\lambda 1= -2.548$ for the low regime (see Table 5). In some detail, we observe that CBA has a larger in magnitude impact on bank performance for banks that belong to the high regime compared to those that belong to the low regime. Thus, our findings confirm our expectations that the negative effect of UMP on bank performance would be more pronounced for banks under higher levels of the Fed's asset purchases.

[INSERT TABLE 5 ABOUT HERE]

Likewise, we also observe a negative association between LIQ/TA and NPLs and bank performance. In addition, as in the previous findings, we also find a negative effect of FDIC and a positive impact of the CBA*FDIC on performance. In addition, FDIC is found to have a particularly significant economic effect on bank performance (coef. -1.812). Similarly with our preceding results, CBA*FDIC exerts a positive and significant impact on bank performance. We also find that Z-Score and E/TA ratio exerts a positive impact on bank performance. Moreover, consistent with our previous findings we observe GDP gr, INFL and UNEMP exerts a negative effect on performance. Finally, we find that the Fed rate exerts a significant and positive impact on bank performance.

Moreover, Figure 1 illustrates that the initiation of unconventional expansionary policies is evident particularly in the third quarter of 2008, whereby the level of CBA was increased considerably compared to the previous period (2007Q2-2008Q2). In addition, we observe that the magnitude of the negative effect in the high regime refers to the 2011Q1-2013Q2 period, suggesting that the destabilizing impact of UMP on bank performance is more pronounced in this period.

[INSERT FIGURE 1 ABOUT HERE]

4.3.4 Threshold variable Excess Reserves

Our dynamic threshold analysis reveals a threshold value of the EXC_RES to be 13.9947 (see Table 6). This value splits the sample of 82,117 observations into two regimes. The high regime comprises all these observations where the EXC_RES is above the 13.9947. On the contrary, the low regime includes the rest observations for which the EXC_RES takes values below the threshold value, i.e., 13.9947. Our results show that the EXC_RES has a negative impact on bank performance for both regimes consistent with the previous section (4.3.3). In particular, we observe that in the high regime EXC_RES exerts a negative impact on bank performance, as λ2= -3.368, at the 1% significance level (see Table 6). Similarly, our findings show that in the low regime EXC_RES has a negative impact on bank performance, as λ1= -0.428, at the 1% level of significance. Moreover, we observe that the impact of EXC_RES is larger in magnitude impact for the higher regime (λ2= -3.368) compared to that of the lower (λ1= -0.428), confirming our previous findings (4.2.2).

[INSERT TABLE 6 ABOUT HERE]

Moreover, regarding the rest of the variables results are similar to the fixed effect and dynamic panel specifications. We find E/TA, SIZE, LA/TA and Z-Score exert a positive impact on bank performance. In contrast, LIQ/TA, FDIC, NPLs, GDP gr, INFL and UEMP have a negative effect on bank performance. Finally, we observe that Fed rate and EXC_RES*FDIC enter the regression significant and positive.

Turning now to Figure 2, we observe a huge growth of the level of excess reserves during the period under study. Notably, the level of excess reserves in 2007Q2 is almost half of it in 2008Q3, indicating that the UMP has led to a significant increase of the EXC_RES. Likewise, we observe that the change in the magnitude of the negative effect of the UMP on bank performance occurs around the 2010Q4. This illustrates that the negative impact of UMP on performance is particularly evident between 2011Q1 and 2013Q2 when excess reserves are considerably high.

[INSERT FIGURE 2 ABOUT HERE]

4.4 The impact of UMPs on bank performance for banks of different asset and funding structure

In this part, we report findings regarding the impact of UMP on bank performance, whilst taking into account two main US bank-specific characteristics: i) the asset diversification and ii) the total deposit funding.[12] We split the sample accordingly: banks below 25th, between 25th and 75th percentile and banks above 75th percentile. So, we employ three models based on these three sub-samples of banks of low, medium and high level of asset diversification and deposit funding.[13]

Our main motivation for this analysis arises from the fact that the US banking institutions are well-diversified institutions in both funding and asset structure terms. Previous empirical evidence suggests that interest based income that stems from loans is less volatile compared to the income that stems from non-interest bearing assets, such as derivatives and securities (see

[12]We would like to thank an anonymous Reviewer for highlighting the importance of asset and funding structure for the US bank performance. We measure asset diversification by using the following formula: asset diversification= $1 - \left|\frac{(Net\ loans - Other\ earning\ assets)}{Total\ earning\ assets}\right|$, consistent with Laeven and Levine (2007). For the level of deposit funding we use the ratio of total deposits over total assets as in Beltratti and Stulz (2012).

[13]Note that we sort the data of asset diversification and deposit to asset ratio with respect to the first year. In that way, we avoid any endogeneity issue arising from bank's management decisions driven by the macroeconomic conditions including non-conventional monetary policies.

DeYoung and Roland, 2001; Lepetit et al., 2008). Similarly, banks that rely on trading activities experience higher losses compared to financial institutions that focus on traditional banking operations (Brunnermeier et al., 2012). Also, DeJonghe (2010) demonstrates that banks that engage particularly in non-interest based operations are vulnerable to changes in macroeconomic conditions. These findings illustrate that banks of various levels of asset diversification might react differently to changes in macroeconomic environment, including unconventional monetary policies.[14] It is, therefore, of interest to investigate whether cross-sectional variation in the asset diversification and the total deposit funding would alter the impact of UMP on bank performance.

We employ dynamic panel analysis to exploit the cross-sectional variation of our data. As in the previous section, we use two-step system GMM estimation following Arellano and Bover (1995) and Blundell and Bond (1998) aiming to account for both endogeneity issues and the documented persistence of bank profits (Berger et al., 2000; Goddart et al., 2004; Athanasoglou et al., 2008). We also use a finite sample correction as developed by Widmeijer (2005) as two-step estimates are likely to be downward biased (Blundell and Bond, 1998). Additionally, we use Hansen diagnostic test of overidentifying restrictions and the second order autocorrelation test of residuals introduced by Arellano and Bover (1991).[15] This strategy is similar to that of other previous empirical studies that take into account the importance of cross-sectional variation in identifying differences in the effect of UMPs on institutions (Becker and Ivashina, 2014; Chodorow-Reich, 2014; Foley-Fisher et al., 2014; Bowman et al., 2015).

Table 7 reports that UMP exerts a negative impact on bank performance across all three different sub-samples; banks of low, medium and high level of asset diversification. Thus, across all sub-samples we reveal that UMP would reduce bank performance, with the economic significance of this effect being similar across banks. Note that there is some variation on the

[14]Moreover, banks that rely more on non-deposit funding than deposits could face higher funding costs as wholesale funders could impose enhanced monitoring and could withdraw their financing faster than depositors (Demirguc-Kunt and Huizinga, 2010). Some studies argue that market funding would negatively affect the stability of financial institutions in the event of liquidity shocks (Adrian and Shin, 2008; Brunnermeier, 2008; Diamond and Rajan, 2009). The is so as banks that rely particularly on deposits are exposed to lower risk of drying-up in liquidity due to explicit (deposit insurance coverage) and implicit government guarantees (Demirguc-Kunt and Huizinga, 2010; Demirguc-Kunt and Huizinga, 2013). Given that previous findings suggest that differences in funding structure matter, it is warranted to examine whether there is variability on the impact of UMP on banks of different funding structure.

[15]We include time effects in our models implying that we investigate cross-sectional differences of the impact of UMPs on bank profitability eliminating time variations. We also run the regression including the bank specific and macroeconomic variables (excluding time dummies). These results are available upon request.

significance level of such effects. In some detail, the interaction of central bank assets and asset diversification (CBA*ASSETDIV) exerts a negative and significant at 5% level in the medium and low level of asset diversification banks, and at 10% in the high level of asset diversification. A similar picture arises from the regression results where we employ as an alternative measure of UMPs the interaction of excess reserves with asset diversification (EXC_RES*ASSETDIV). The impact of UMP remains negative across all banks, but it is significant at 1% and 5% for banks that fall within the case of low and medium level of asset diversification respectively. As a consequence, from a statistical point of view, the negative effect of UMP on bank performance is somewhat less pronounced for banks of high level of asset diversification.

It is well documented that UMPs would lead to lower lending rates and thereby to lower difference between lending and the deposit rates (Gagnon, et al., 2013; Swanson, 2011; Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). This movement in lending rates would depress interest margin. Given that banks' of low and medium asset diversification rely heavily on interest margins for their profitability, a reduction of interest margins would negatively affect their performance as a whole. Although, this result remains plausible for banks of high level asset diversification, and therefore of banks with a high share of non-interest based activities, it is less pronounced from a statistical point of view. Thus, banks of high level asset diversification would not be statistically affected by UMP as other banks that rely on interest margins.[16]

[INSERT TABLE 7 ABOUT HERE]

Turning now to Table 8, we observe that the negative effect of the interaction of central bank assets with deposit to assets ratio (CBA*DEP/TA) has higher economic significance compared to results in Table 7 where asset diversification has been taken into account. This highlights previous findings where the importance of deposits, and in particular interest rate margin, for the transmission of monetary policy has been emphasised (Gagnon, et al., 2013; Swanson, 2011;

[16] As previously discussed in the hypothesis section, UMPs could restore market uncertainty (Bekaert et al., 2013; Roache and Rousset, 2013) and increase asset prices (Gambacorta et al., 2014). The positive impact of UMP on asset values can also be explained by the portfolio rebalancing theory (Tobin, 1958; Vayanos and Vila, 2009). Based on this theory, banks receive cash from the central bank and use these proceeds to buy trading assets such as securities. This in turn will give rise to the demand of these assets and increase their prices suggesting gains for banks of high level of asset diversification. Thus, those institutions that engage particularly in non-interest based assets are less adversely affected by UMP compared to banks of medium and low asset diversification.

Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Indeed, present findings demonstrate that the UMP transition mechanism is particularly effective through its interaction with deposits. Table 8 reveals that banks high level of deposit funding, that is banks in the sub-sample of high level of deposits to total assets, are subject more to the adverse impact of UMP, as measured by CBA*DEP/TA, both in terms of economic and statistical significance compared to banks of either low or medium deposits to total assets. In particular, CBA*DEP/TA exerts a negative impact on performance of banks in low deposit to total assets sub-sample, but this is significant at 10%. In similar vein, the effect of the interaction of excess reserves with the deposit to assets ratio (EXC_RES*DEP/TA) on bank performance is negative and significant at 1% only for banks in the sub-sample of high deposit to total assets, though its economic significance is lower than that of banks in medium deposit to total assets. In the sub-sample of low deposits to total assets, again, the negative impact of UMP is significant only at 10%. This result, once more, confirms the importance for the transition of UMP of the net interest margin in line with the literature (Gagnon et al., 2013; Swanson, 2011; Krishnamurthy and Jorgensen, 2011; Fawley and Neely, 2013; Bauer and Rudebusch, 2013). Moreover, reliance on wholesale funding might mitigate the impact of UMP on bank performance.[17]

[INSERT TABLE 8 ABOUT HERE]

[17] As we discussed in the hypothesis section (2.1 Section), wholesale financiers charge higher interest rates than retail depositors aiming to discipline banking institutions (Calomiris, 1999). UMPs could restore wholesale financiers' confidence, as injection of cash to depository institutions function as an implicit guarantee for the well-functioning of the banking industry (Montecino and Epstein, 2014). This in turn suggests that banks of higher level of wholesale funding than deposit funding benefit more from a reduction of funding cost over expansionary monetary periods.

5. Conclusion

Our results demonstrate that unconventional monetary policy reduces bank performance. The dynamic panel threshold analysis further reveals that this negative relationship is pronounced above a reported threshold value. Similarly, an increase of deposit insurance coverage has important destabilization effects as it increases moral hazard and in turn decreases bank performance. We also find that the negative impact of unconventional monetary policy on bank performance is further enhanced for deposit uninsured financial institutions. On the contrary, the negative effect of unconventional monetary policy on bank performance is less pronounced for banks of higher level of asset diversification and low deposit funding.

With regards to policy implications, our findings suggest that the Fed should enhance its attention on bank performance in an environment of very low interest rates, while bank managers and supervision should also take into account unconventional monetary policy consequences. Along these lines bank supervision should be reinforced so as to closely monitor bank performance's response to unconventional monetary policy and use this as feedback to FED's decision making.

References

Abreu, M., and V. Mendes. (2002). Commercial Bank Interest Margins and Profitability: Evidence from EU Countries. Porto Working Paper Series, CISEP, Portugal

Adrian, T., and Shin, H. (2008). Liquidity, monetary policy, and financial cycles. Current issues in economics and finance, 14, Federal Reserve Bank of New York.

Adrian, T., and Shin, H. (2010). Liquidity and leverage. Journal of Financial Intermediation, 19, pages 418-437.

Altunbas, Y., Gambacorta, L., and Marques-Ibanez, D. (2012). Do bank characteristics influence the effect of monetary policy on bank risk?. Economics Letters, 117, pages 220-222.

Altunbas, Y., Gardener, E., Molyneux, P., and Moore, B. (2001). Efficiency in European banking. European Economic Review, 45, pages 1931-1955.

Anginer, D., Demirguc-Kunt, A., and Zhu, M. (2014). How does deposit insurance affect bank risk? Evidence from the recent crisis. Journal of Banking and finance, 48, pages 312-321.

Arellano, M., and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. The Review of Economic Studies, 58, pages 277-297.

Arellano, M., and Bover, O. (1995). Another look at the instrumental-variable estimation of error components models. Journal of Econometrics, 68, pages 29-52.

Athanasoglou, P., Brissimis, S., and Delis, M. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. Journal of International financial Markets, Institutions and Money, 18, pages 121-136.

Baltagi, B. (2008). Econometric analysis of panel data (Vol. 1). John Wiley and Sons.

Barth, J., Lin, C., Ma, Y., Seade, J., and Song, F. (2013). Do bank regulation, supervision and monitoring enhance or impede bank efficiency? Journal of Banking and Finance, 37, pages 2879-2892.

Bauer, M., and Rudebusch, G. (2013). Monetary policy expectations at the zero lower bound. Federal Reserve Bank of San Francisco Working Paper, 18.

Beck, T., De Jonghe, O., and Schepens, G. (2013). Bank competition and stability: cross-country heterogeneity. Journal of Financial Intermediation, 22, pages 218-244.

Becker, B., and Ivashina, V. (2014). Reaching for yield in the bond market. The Journal of Finance.s Letters, 118, pages 135-138.

Bech, M., and Monnet, C. (2013). The Impact of unconventional monetary policy on the overnight interbank market. In Liquidity and Funding Markets, RBA Annual Conference Volume. Reserve Bank of Australia.

Bekaert, G., Hoerova, M., and Duca, M. (2013). Risk, uncertainty and monetary policy. Journal of Monetary Economics, 60, pages 771-788.

Beltratti, A., and Stulz, R. (2012). The credit crisis around the globe: Why did some banks perform better?. Journal of Financial Economics, 105, pages 1-17.

Berger, A., and Bonaccorsi di Patti, E. (2006). Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. Journal of Banking and Finance, 30, pages 1065-1102.

Berger, A., and DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. Journal of Banking and Finance, 21, pages 849-870.

Berger, A., and DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. Journal of Banking and Finance, 21, pages 849-870.

Bernanke, B., and Reinhart, V. (2004). Conducting monetary policy at very low short-term interest rates. American Economic Review, 94, pages 85-90.

Bertay, C., Demirguc-Kunt, A., and Huizinga, H. (2013). Do we need big banks? Evidence on performance, strategy and market discipline. Journal of Financial Intermediation, 22, pages 532-558.

Bick, A. (2007). Pitfalls in panel threshold models: The role of regime dependent intercepts. Working Paper, Goethe University.

Blundell, R., and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87, pages 115-143.

Borio, C., and Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?. Journal of Financial Stability, 8, pages 236-251.

Bowman, D., Londono, J., and Sapriza, H. (2015). US unconventional monetary policy and transmission to emerging market economies. Journal of International Money and Finance, 55, pages 27-59.

Boyd, J., and Graham, S. (1986). Risk, regulation, and bank holding company expansion into nonbanking. Quarterly Review, 4, pages 2-17.

Boyd, J., and Graham, S. (1986). Risk, regulation, and bank holding company expansion into nonbanking. Federal Reserve Bank of Minneapolis, Quarterly Review, 10, pages 2-17.

Brissimis, S., and Delis, M. (2009). Identification of a loan supply function: A cross-country test for the existence of a bank lending channel. Journal of International Financial Markets, Institutions and Money, 19, pages 321-335.

Brunnermeier, M. (2008). Deciphering the liquidity and credit crunch 2007-08 (No. w14612). National Bureau of Economic Research.

Brunnermeier, M., Dong, G., and Palia, D. (2012). Banks’ non-interest income and systemic risk. In AFA 2012 Chicago Meetings Paper.

Buch, C., Eickmeier, S., and Prieto, E. (2014). In search for yield? Survey-based evidence on bank risk taking. Journal of Economic Dynamics and Control, 43, pages 12-30.

Calomiris, C., and Kahn, C. (1996). The efficiency of self-regulated payments systems: Learning from the Suffolk System (No. w5442). National Bureau of Economic Research.

Caner, M., and Hansen, B. (2004). Instrumental variable estimation of a threshold model. Econometric Theory, 20, pages 813–843.

Casu, B., and Girardone, C. (2004). Financial conglomeration: efficiency, productivity and strategic drive. Applied Financial Economics, 14, pages 687-696.

Clark, T., Dick, A., Hirtle, B., Stiroh, K., Williams, R., 2007. The role of banking in the US banking industry: risk, return and industry structure. Economic Policy Review, Federal Reserve Bank New York 13, 39–56.

Clouse, J., Henderson, D., Orphanides, A., Small, D., and Tinsley, P. (2003). Monetary policy when the nominal short-term interest rate is zero. Topics in Macroeconomics, 3, pages

Chang, H., and Song, F. (2014). The Unconventional Effects of Large-scale Asset Purchases: A Firm-level Analysis. Working paper.

Chen, H., Curdia, V., and Ferrero, A. (2012). The Macroeconomic Effects of Large-scale Asset Purchase Programmes. The Economic Journal, 122, pages F289-F315.

Chernykh, L., and Cole, R. (2011). Does deposit insurance improve financial intermediation? Evidence from the Russian experiment. Journal of Banking and Finance, 35, pages 388-402.

Chodorow-Reich, G. (2014). Effects of unconventional monetary policy on financial institutions (No. w20230). National Bureau of Economic Research.

Chortareas, G., Garza-Garcia, J., and Girardone, C. (2011). Banking sector performance in Latin America: market power versus efficiency. Review of Development Economics, 15, pages 307-325.

D'Amico, S., and King, T. (2013). Flow and stock effects of large-scale treasury purchases: Evidence on the importance of local supply. Journal of Financial Economics, 108, pages 425-448.

D'Amico, S., English, W., López-Salido, D., and Nelson, E. (2012). The Federal Reserve's Large-scale Asset Purchase Programmes: Rationale and Effects. The Economic Journal, 122, pages 415-446.

De Guevara, J., and Maudos, J. (2007). Explanatory factors of market power in the banking system. The Manchester School, 75, pages 275-296.

De Jonghe, O. (2010). Back to the basics in banking? a micro-analysis of banking system stability. Journal of Financial Intermediation, 19, pages 387-417.

Delis, M., and Kouretas, G. (2011). Interest rates and bank risk-taking. Journal of Banking and Finance, 35, pages 840-855.

Delis, M., and Staikouras, P. (2011). Supervisory effectiveness and bank risk. Review of Finance, 15 , pages 511-543.

Delis, M., Hasan, I., and Mylonidis, N. (2011). The risk-taking channel of monetary policy in the USA: Evidence from micro-level data.(No. w34084). MPRA Paper.

Dell' Ariccia, G., and Marquez, R. (2006). Lending booms and lending standards. The Journal of Finance, 61, pages 2511-2546.

Demirguc-Kunt, A., and Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. The World Bank Economic Review, 13, pages 379-408.

Demirguc-Kunt, A., and Huizinga, H. (1999). Market discipline and financial safety net design. World Bank Policy Research Working Paper, (2183).

Demirguc-Kunt, A., and Huizinga, H. (2004). Market discipline and deposit insurance. Journal of Monetary Economics, 51, pages 375-399.

Demirguc-Kunt, A., and Huizinga, H. (2010). Bank activity and funding strategies: The impact on risk and returns. Journal of Financial Economics, 98, pages 626-650.

Demirguc-Kunt, A., and Huizinga, H. (2013). Are banks too big to fail or too big to save? International evidence from equity prices and CDS spreads. Journal of Banking and Finance, 37, pages 875-894.

Demirguc-Kunt, A., and Kane, E. (2002). Deposit insurance around the globe: Where does it work?. Journal of Economic Perspectives, 16, pages 175-195.
Demirguc-Kunt, A., and Huizinga, H. (2010). Bank activity and funding strategies: The impact on risk and returns. Journal of Financial Economics, 98, pages 626-650.
DeYoung, R., and Roland, K. (2001). Product mix and earnings volatility at commercial banks: Evidence from a degree of total leverage model. Journal of Financial Intermediation, 10, pages 54-84.

Diamond, D., and Rajan, R. (2009). The credit crisis: Conjectures about causes and remedies (No. w14739). National Bureau of Economic Research.

Diamond, D., and Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity. Journal of Political Economy, 91, pages 401–419.

Dietsch, M., and Lozano-Vivas, A. (2000). How the environment determines banking efficiency: A comparison between French and Spanish industries. Journal of Banking and Finance, 24, pages 985-1004.

Eggertsson, G., and Woodford, M. (2003). Optimal monetary policy in a liquidity trap (No. w9968). National Bureau of Economic Research.

Fawley, B., and Neely, C. (2013). Four stories of quantitative easing. Federal Reserve Bank of St. Louis Review, 95(January/February 2013).

Fisher, P. (2010). An unconventional journey: the Bank of England’s asset purchase programme. London: Bank of England). www. bankofengland. co. uk/publications/Documents/speeches/2010/speech453. pdf.

Flannery, M. (1981). Market interest rates and commercial bank profitability: An empirical investigation. The Journal of Finance, 36, pages 1085-1101.

Foley-Fisher, N., Ramcharan, R., and Yu, E. (2014). The Impact of Unconventional Monetary Policy on Firm Financing Constraints: Evidence from the Maturity Extension Program. Available at SSRN 2537958.

Fratzscher, M., Duca, M., and Straub, R. (2014). ECB Unconventional Monetary Policy Actions: Market Impact, International Spillovers and Transmission Channels. International Monetary Fund.

Fu, X., Lin, Y., and Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. Journal of Banking and Finance, 38, pages 64-77.

Fungacova, Z., Solanko, L., and Weill, L. (2014). Does competition influence the bank lending channel in the euro area? Journal of Banking and Finance, 49, pages 356-366.

Gagnon, J., Raskin, M., Remache, J., and Sack, B. (2011). The financial market effects of the Federal Reserve’s large-scale asset purchases. International Journal of Central Banking, 7, pages 3-43.

Gambacorta, L., Hofmann, B., and Peersman, G. (2014). The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis. Journal of Money, Credit and Banking, 46, pages 615-642.

Garcia-Herrero, A., Gavilá, S., and Santabárbara, D. (2009). What explains the low profitability of Chinese banks? Journal of Banking and Finance, 33, pages 2080-2092.

Gatev, E., and Strahan, P. (2006). Banks' advantage in hedging liquidity risk: Theory and evidence from the commercial paper market. The Journal of Finance, 61, pages 867-892.

Gilchrist, S., and Zakrajsek, E. (2013). The Impact of the Federal Reserve's Large-Scale Asset Purchase Programs on Corporate Credit Risk. Journal of Money, Credit and Banking, 45, pages 29-57.

Goddard, J., Molyneux, P., and Wilson, J. (2004). The profitability of european banks: a cross-sectional and dynamic panel analysis. The Manchester School, 72, pages 363-381.

Gorton, G., and Rosen, R. (1995). Corporate control, portfolio choice, and the decline of banking. The Journal of Finance, 50, pages 1377-1420.

Greenwood, R., and Vayanos, D. (2010). Price pressure in the government bond market. The American Economic Review, 100, pages 585-590.

Gropp, R., and Vesala, J. (2004). Deposit insurance, moral hazard and market monitoring. Review of Finance, 8, pages 571-602.

Hamilton, J., and Wu, J. (2012). The effectiveness of alternative monetary policy tools in a zero lower bound environment. Journal of Money, Credit and Banking, 44, pages 3-46.

Hancock, D. (1985). Bank profitability, interest rates, and monetary policy. Journal of Money, Credit and Banking, 17, pages 189-202.

Hancock, D., and Passmore, S. (2014). How the Federal Reserve's Large-Scale Asset Purchases (LSAPs) Influence Mortgage-Backed Securities (MBS) Yields and US Mortgage Rates.

Hansen, B. (1997). Inference in TAR models. Studies in Nonlinear Dynamics and Econometrics, 2, pages 1-14.

Hansen, B. (1999). Threshold effects in non-dynamic panels: estimation, testing and inference. Journal of Econometrics, 93, pages 345–368.

Hausman, J. A. (1978). Specification tests in econometrics. Econometrica, 46, pages 1251-1271.

Ho, T., and Saunders, A. (1981). The determinants of bank interest margins: theory and empirical evidence. Journal of Financial and Quantitative analysis,16, pages 581-600.

Ioannidou, V., and Penas, M. (2010). Deposit insurance and bank risk-taking: Evidence from internal loan ratings. Journal of Financial Intermediation, 19, pages 95-115.

Ioannidou, V., Ongena, S., and Peydro, J. (2015). Monetary policy, risk-taking, and pricing: Evidence from a quasi-natural experiment. Review of Finance, 19 , pages 95-144.

Isik, I., and Hassan, M. (2003). Financial deregulation and total factor productivity change: An empirical study of Turkish commercial banks. Journal of Banking and Finance, 27, pages 1455-1485.

Jensen, M., and Meckling, W. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3, pages 305-360.

Jiménez, G., Lopez, J., and Saurina, J. (2013). How does competition affect bank risk-taking?. Journal of Financial Stability, 9, pages 185-195.

Joyce, M., Miles, D., Scott, A., and Vayanos, D. (2012). Quantitative Easing and Unconventional Monetary Policy–an Introduction. The Economic Journal, 122, pages 271-288.

Kalyvas, A. N., and Mamatzakis, E. (2014). Does business regulation matter for banks in the European Union?. Journal of International Financial Markets, Institutions and Money, 32, pages 278-324.

Kandrac, J., and Schlusche, B. (2015). An agency problem in the MBS market and the solicited refinancing channel of large-scale asset purchases. Working paper.

Kapetanios, G., Mumtaz, H., Stevens, I., and Theodoridis, K. (2012). Assessing the Economy-wide Effects of Quantitative Easing. The Economic Journal, 122, pages 316-347.

Kozicki, S., Santor, E., and Suchanek, L. (2011). Central bank balance sheets and long-term forward rates. Interest Rates, Prices and Liquidity. Working paper, Bank of Canada.

Kremer, S., Bick, A., and Nautz, D. (2013). Inflation and growth: new evidence from a dynamic panel threshold analysis. Empirical Economics, 44, pages 861-878.

Krishnamurthy, A., and Vissing-Jorgensen, A. (2011). The effects of quantitative easing on interest rates: channels and implications for policy (No.17555). National Bureau of Economic Research.

Kwan, S. (2003). Operating performance of banks among Asian economies: An international and time series comparison. Journal of Banking and Finance, 27, pages 471-489.

Laeven, L., and Levine, R. (2007). Is there a diversification discount in financial conglomerates?. Journal of Financial Economics, 85, pages 331-367.

Lambert, F., and Ueda, K. (2014). The Effects of Unconventional Monetary Policies on Bank Soundness. International Monetary Fund. No. 14-152.

Lensink, R., Meesters, A., and Naaborg, I. (2008). Bank efficiency and foreign ownership: Do good institutions matter?. Journal of Banking and Finance, 32, pages 834-844.

Lepetit, L., Nys, E., Rous, P., and Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. Journal of Banking and Finance, 32, pages 1452-1467.

Lin, X., and Zhang, Y. (2009). Bank ownership reform and bank performance in China. Journal of Banking and Finance, 33, pages 20-29.

Lozano-Vivas, A., and Pasiouras, F. (2010). The impact of non-traditional activities on the estimation of bank efficiency: international evidence. Journal of Banking and Finance, 34, pages 1436-1449.

Maddaloni, A., and Peydro, J. L. (2011). Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the Euro-area and the US lending standards. Review of Financial Studies, 24, pages 2121-2165.

Matutes, C., and Vives, X. (2000). Imperfect competition, risk taking, and regulation in banking. European Economic Review, 44, pages 1-34.

Maudos, J., and Fernandez de Guevara, J. (2006). Banking competition, financial dependence and economic growth.

McShane, R. and Sharpe, I. (1985). A time Series/Cross Section Analysis of the Determinants of Australian Trading Bank Loan/Deposit Interest Margins. Journal of Banking and Finance, 9, pages 155-136.

Mester, L. (1993). Efficiency in the savings and loan industry. Journal of Banking and Finance, 17, pages 267-286.

Miles, D. (2014). Inflation, Employment, and Monetary Policy: Objectives and Outcomes in the UK and US Compared. Journal of Money, Credit and Banking, 46, pages 155-167.

Miller, S., and Noulas, A. (1997). Portfolio mix and large-bank profitability in the USA. Applied Economics, 29, pages 505-512.

Montecino, J., and Epstein, G. (2014). Have Large Scale Asset Purchases Increased Bank Profits?. Institute for New Economic Thinking. Working Paper Series.

Myers, S. (1977). Determinants of corporate borrowing. Journal of financial economics, 5, pages 147-175.

Pasiouras, F. (2008). International evidence on the impact of regulations and supervision on banks' technical efficiency: an application of two-stage data envelopment analysis. Review of Quantitative Finance and Accounting, 30, pages 187-223.

Pasiouras, F., and Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. Research in International Business and Finance, 21, pages 222-237.

Petersen, W. (1986). The effects of inflation on bank profitability. Recent Trends in Commercial Bank Profitability. Working paper.

Rajan, R. (2005). Has financial development made the world riskier? (No. w11728). National Bureau of economic Research.

Revell, J. (1979). Inflation and Financial Institutions. Financial Times Limited.

Roache, S. , and Rousset, M. (2013). Unconventional monetary policy and asset price risk. IMF working paper.

Rogers, J., Scotti, C., and Wright, J. (2014). Evaluating asset-market effects of unconventional monetary policy: a multi-country review. Economic Policy, 29, pages 749-799.

Samuelson, P. (1945). The effect of interest rate increases on the banking system. The American Economic Review, 35, pages 16-27.

Santos J. (2014). Evidence from the bond market on banks' too-big-to-fail subsidy. Economic Policy Review, 20, No.2.

Steeley, J., and Matyushkin, A. (2015). The effects of quantitative easing on the volatility of the gilt-edged market. International review of financial analysis, 37, pages 113-128.

Stein, Jeremy C., 2012, "Evaluating Large-Scale Asset Purchases," Speech delivered at the Brookings Institution, October 11.

Stiroh, K. (2004). Diversification in banking: Is noninterest income the answer?. Journal of Money, Credit and Banking, 36, pages 853-882.

Svensson, L. (2014). How to Weigh Unemployment Relative to Inflation in Monetary Policy? Journal of Money, Credit and Banking, 46, pages 183-188.

Swanson, E., and Williams, J. (2014). Measuring the effect of the zero lower bound on medium-and longer-term interest rates (No. w20486). National Bureau of Economic Research.

Tobin, J. (1963). An essay on the principles of debt management. Cowles Foundation for Research in Economics at Yale University.

Tobin, J. (1969). A general equilibrium approach to monetary theory. Journal of money, credit and banking, 1, pages 15-29.

Todd, W. (2013). The Problem of Excess Reserves, Then and Now. Levy Economics Institute of Bard College Working Paper.

Wallich, H. (1977). Inflation is destroying bank earnings and capital adequacy. Bankers Magazine, Autumn, pages 12-16.

Williams, M. (2004). Government Cash Management: Good and Bad Practice. World Bank Technical Note.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. Journal of Econometrics, 126, pages 25-51.

Wright, J. (2012). What does Monetary Policy do to Long-term Interest Rates at the Zero Lower Bound?. The Economic Journal, 122, pages 447-466.

Yildirim, H., and Philippatos, G. (2007). Efficiency of banks: Recent evidence from the transition economies of Europe, 1993–2000. The European Journal of Finance, 13, pages 123-143.

Table 1. Variables Definition and Sources

Notation	Measure	Data source
A. Dep. Variables		
Return on assets (ROA)	Total bank profits before tax/ total assets	Bankscope
Return on equity (ROE)	Return on equity/ total assets	Bankscope
Net interest margin (NIM)	Interest income minus interest expenses/interest earning assets	Bankscope
Pre-tax operating income (POI)	Pre-tax operating assets/total assets	Bankscope
B. Independent Variables of our main interest		
Central bank's assets (CBA)	Claims on domestic real nonfinancial sector by the Central Bank	International Financial Statistics (IFS), International Monetary Fund (IMF).
Excess reserves (EXC_RES)	The amount of money that a bank has on deposit with the Federal Reserve that is above what is required by the Federal Reserve.	Federal Reserve Bank of St. Louis
Federal Deposit insurance coverage (FDIC)	Bank specific dummy, that takes the value of 0 if banks' deposit are not insured by the Fed while 1 if banks' deposit are insured.	Federal Reserve Bank of St. Louis
C. Other bank-specific		
Size	Natural logarithm of real total assets	Bankscope
E/TA	Equity/total assets	Bankscope
LA/TA	Loans/total assets	Bankscope
LIQ/TA	Liquid assets/total assets	Bankscope
Z-Score	(1+ROE)/sdROE where ROE is the return on equity and sdROE is the standard deviation of return on equity (Boyd and Graham, 1986)	Authors' estimation
D. Country level and state-level explanatory variables		
GDP gr	Gross Domestic product (GDP) changes from one year to another	Federal Reserve Bank of St. Louis
INFL	Inflation	Federal Reserve Bank of St. Louis
UNEMPL	Unemployment	Federal Reserve Bank of St. Louis
NPLs	Non-performing loans (state level)/total loans	Federal Reserve Bank of St. Louis
Fed rate	Federal fund rate	Federal Reserve Bank of St. Louis

Table 2. Descriptive statistics of the variables used in the empirical analysis with respect to bank performance.

Variable	Mean	Std. dv.	Min.	Max.
A. Dependent Variables				
ROA	0.6	4.47	-72.49	35.51
ROE	0.03	0.34	-9.93	8.00
NIM	4.02	2.84	-427.00	406.15
POI	17.4	15.31	-25.49	194.55
B. Independent Variables of our main interest				
CBA	5.77	0.23	-5.62	4.6
EXC_RES	14.06	1.04	7.38	14.68
FDIC	0.67	0.47	0	1
C. Bank-specific control variables				
Size	12.18	1.34	4.67	21.11
E/TA	7.94	2.79	-11.75	12.99
LA/TA	71.80	9.26	50.03	97.14
LIQ/TA	72.56	13.64	51.68	99.54
Z-Score	-1.27	1.84	-7.94	4.49
D. Country level and state-level explanatory variables				
GDP gr	0.51	0.47	-2.11	1.12
INFL	1.75	0.45	0.73	2.50
UEMPL	8.34	0.89	4.50	9.50
NPLs	2.74	1.37	0.12	9.32
Fed rate	0.19	0.52	0.07	5.09

Notes: our final sample includes 88888 observations after removing all errors and inconsistencies. The Table shows the basic descriptive statistics (mean, std.dv., min., max.) of all our dependent and independent variables. Our dependent variables are: ROA; ROE; NIM; POI. Our independent variables of our main variables are: CBA; EXC_RES; FDIC. Other bank-specific independent control variables: Size; E/TA; LA/TA; LIQ/TA; Z-Score; Country level and state-level independent variables: NPLs, Fed rate, GDP gr, INFL, UNEMP.

Table 3. The impact of UMP on the US bank performance (fixed effect regressions).

Dependent Variables	ROE		ROA		NIM		POI	
CBA	-0.890***		-0.384***		-0.154**		-0.721**	
	(0.255)		(0.117)		(0.069)		(0.318)	
EXC_RES		-0.707***		-0.240***		-0.684***		-0.291***
		(0.046)		(0.030)		(0.211)		(0.052)
SIZE	0.982***	0.996***	0.559***	0.572***	0.163	0.150	0.195	0.137
	(0.301)	(0.301)	(0.170)	(0.169)	(0.133)	(0.160)	(0.553)	(0.554)
LA/TA	0.402***	0.394***	0.029***	0.027***	0.020***	0.015***	0.331***	0.313***
	(0.109)	(0.042)	(0.003)	(0.009)	(0.002)	(0.002)	(0.011)	(0.097)
E/TA	0.192***	0.193***	0.064***	0.062***	0.026**	0.041**	0.067	0.068
	(0.030)	(0.026)	(0.021)	(0.021)	(0.013)	(0.017)	(0.043)	(0.043)
LIQ/TA	-0.007	-0.007	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.005)	(0.005)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Z-SCORE	0.755***	0.760***	0.819***	0.820***	0.093***	0.111***	0.331***	0.329***
	(0.100)	(0.139)	(0.107)	(0.177)	(0.018)	(0.014)	(0.070)	(0.069)
FDIC	-0.308*	-0.441***	-0.372*	-0.281***	-0.109**	-0.149***	-0.952***	-0.313***
	(0.180)	(0.123)	(0.215)	(0.061)	(0.051)	(0.045)	(0.191)	(0.104)
CBA*FDIC	0.540*		0.770		0.185**		0.161***	
	(0.311)		(0.487)		(0.088)		(0.033)	
EXC_RES*FDIC		0.140**		0.685*		0.655**		0.853***
		(0.069)		(0.392)		(0.265)		(0.196)
Fed rate	0.368***	0.126***	0.356***	0.146***	0.184***	0.096***	0.791***	0.549***
	(0.100)	(0.032)	(0.038)	(0.025)	(0.020)	(0.014)	(0.059)	(0.052)
NPLs	-0.299***	-0.193***	-0.217***	-0.193***	-0.056***	-0.012	-0.009	-0.029
	(0.040)	(0.041)	(0.020)	(0.018)	(0.010)	(0.013)	(0.010)	(0.040)
GDP gr	-0.176***	-0.257***	-0.013	-0.018	-0.059***	0.025***	-0.297***	-0.349***
	(0.036)	(0.038)	(0.018)	(0.019)	(0.011)	(0.009)	(0.027)	(0.029)
INFL	-0.162***	-0.176***	-0.043**	-0.068***	-0.066***	-0.072***	-0.676***	-0.644***
	(0.030)	(0.029)	(0.017)	(0.018)	(0.010)	(0.012)	(0.042)	(0.143)
UEMP	-0.020	-0.092**	-0.055***	-0.082***	-0.086***	-0.095***	-0.065	-0.026
	(0.040)	(0.041)	(0.018)	(0.018)	(0.018)	(0.030)	(0.042)	(0.043)
Constant	1.345***	2.124***	-1.015***	7.832***	4.364***	2.814	4.389***	4.293***
	(0.358)	(0.376)	(0.235)	(2.362)	(1.706)	(1.946)	(0.637)	(0.663)
F-test	75.40***	76.89***	90.88***	94.07***	85.33***	63.49***	130.92***	134.37***
Observations	88888	88888	88888	88888	88888	88888	88888	88888
R-squared	0.140	0.1428	0.106	0.107	0.11	0.127	0.1684	0.169
Number of banks	6771	6771	6771	6771	6771	6771	6771	6771

Notes: the Table shows fixed effect regressions with ROA, ROE, NIM and POI as dependent variables. Our independent variables of our main interest: CBA; EXC_RES; FDIC, EXC_RES*FDIC (cross-term), CBA* FDIC (cross term). Other bank-specific independent control variables: Size; E/TA; LA/TA; LIQ/TA; Z-Score; Country level and state-level independent variables: NPLs, GDP gr, INFL, UNEMP, Fed rate. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors clustered by quarter are in parentheses.

Table 4. The impact of UMP on the US bank performance (dynamic panel regressions).

Dependent Variables	ROA		ROE		NIM		POI	
L.ROA	0.584***	0.572**	0.256***	0.244***	0.957***	0.970***	0.926***	0.941***
	(0.248)	(0.244)	(0.029)	(0.028)	(0.169)	(0.244)	(0.097)	(0.197)
CBA	-0.581*		-0.356***		-0.824*		-0.222**	
	(0.332)		(0.071)		(0.487)		(0.101)	
EXC_RES		-0.102*		-0.709***		-0.062***		-0.187*
		(0.052)		(0.118)		(0.004)		(0.097)
SIZE	0.173*	0.184*	0.204	0.192	0.083	0.123***	0.300	0.322
	(0.101)	(0.107)	(0.295)	(0.301)	(0.081)	(0.032)	(0.225)	(0.280)
LA/TA	0.107	0.110	0.412***	0.367***	0.008**	0.007*	0.302	0.274
	(0.081)	(0.088)	(0.108)	(0.110)	(0.003)	(0.005)	(0.454)	(0.255)
E/TA	0.496*	0.494*	0.186***	0.179***	0.012	0.012***	0.180	0.163
	(0.279)	(0.282)	(0.027)	(0.028)	(0.010)	(0.004)	(0.148)	(0.139)
LIQ/TA	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Z-SCORE	0.232	0.171	0.787***	0.765***	0.056*	0.049***	0.016	0.045**
	(0.215)	(0.136)	(0.071)	(0.074)	(0.028)	(0.010)	(0.015)	(0.016)
FDIC	-0.546*	-0.210*	-0.318***	-0.141***	-0.319	-0.212***	-0.221**	-0.179
	(0.328)	(0.121)	(0.063)	(0.036)	(0.484)	(0.035)	(0.110)	(0.164)
CBA*FDIC	0.124*		0.648***		0.606		0.482**	
	(0.072)		(0.122)		(0.709)		(0.239)	
EXC_RES*FDIC		0.263*		0.137***		0.047***		0.366
		(0.141)		(0.028)		(0.012)		(0.260)
Fed rate	0.536***	0.579***	0.347***	0.280***	0.121***	0.102***	0.125***	0.996***
	(0.091)	(0.094)	(0.071)	(0.066)	(0.035)	(0.011)	(0.033)	(0.314)
NPLs	-0.124*	-0.109*	-0.275***	-0.247***	-0.061	-0.056***	-0.621	-0.535
	(0.072)	(0.062)	(0.086)	(0.081)	(0.068)	(0.010)	(0.407)	(0.351)
GDP gr	-0.334	-0.013	-0.091***	-0.797***	-0.079***	-0.072**	-0.235	-0.039
	(0.040)	(0.034)	(0.025)	(0.245)	(0.011)	(0.034)	(0.212)	(0.029)
INFL	-0.106	0.011	-0.006	-0.262	-0.018*	-0.033*	0.586	-0.541***
	(0.095)	(0.068)	(0.005)	(0.233)	(0.010)	(0.017)	(0.395)	(0.125)
UEMP	-0.040	-0.055	-0.116	-0.205**	-0.008	-0.003*	-0.121	-0.133
	(0.054)	(0.062)	(0.139)	(0.390)	(0.023)	(0.002)	(0.113)	(0.123)
Constant	1.397***	3.333***	1.718***	2.341**	6.361***	3.249***	2.137***	3.403***
	(0.105)	(0.741)	(0.437)	(0.394)	(0.669)	(0.761)	(0.536)	(0.362)
Wald test	240.09***	296.52***	760.87***	734.46***	5892.85***	113.09***	493.64***	511.05***
Hansen(p-value)	0.377	0.179	0.522	0.183	0.179	0.146	0.526	0.273
AR(2)	0.114	0.218	0.316	0.465	0.612	0.327	0.197	0.184
Number of banks	6771	6771	6771	6771	6771	6771	6771	6771

Notes: the Table shows dynamic panel regressions with ROA, ROE, NIM and POI as dependent variables. Our independent variables of our main interest: CBA; EXC_RES; FDIC, EXC_RES*FDIC (cross-term), CBA* FDIC (cross term). Other bank-specific independent control variables: Size; E/TA; LA/TA; LIQ/TA; Z-SCORE; Country level and state-level independent variables: NPLs, GDP gr, INFL, UNEMP, Fed rate. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors are in parentheses.

Table 5.Results of dynamic panel threshold estimation with Central bank's assets as threshold variable.

Threshold estimate		
CBA		5.560105
95% confidence interval		(5.560105-5.560105)
Impact of CBA	S.E	
λ1	-2.548***	0.662
λ2	-4.075***	1.019
Impact of covariates		S.E
E/TA	0.400***	0.110
SIZE	0.286**	0.113
LIQ/TA	-0.001***	0.000
LA/TA	0.041***	0.010
Z-Score	0.051***	0.010
FDIC	-1.812**	0.864
CBA*FDIC	0.302**	0.148
Fed rate	0.144	0.103
NPLs	-0.138***	0.032
GDP gr	-0.072*	0.047
INFL	-0.010	0.048
UNEMP	-0.123**	0.055
δ	0.355**	0.181
Observations	82117	
Low regime	6384	
High regime	75733	

Notes: the Table reports the estimations for the dynamic panel threshold model. Each regime has at least 5% of the observations (Hansen, 1999). We denote as dependent variable banks' performance ($perform_{it}$), while as the threshold and the regime dependent variable we impose the Central bank's assets (CBA_{it}) which represents unconventional monetary easing. Following Bick (2007), the model accounts for regime dependent intercepts (δ). Our dependent variable is ROA. Our independent variables of our main interest: CBA; FDIC, CBA*FDIC (cross-term). Other bank-specific independent control variables: Size; E/TA; LA/TA; LIQ/TA; Z-Score; Country level and state-level independent variables: NPLs, GDP gr, INFL, UNEMP, Fed rate. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors are in parentheses.

Table 6.Results of dynamic panel threshold estimation with Excess Reserves as threshold variable.

Threshold estimate		
EXC_RES		13.9947
95% confidence interval		(13.9947-14.2927)
Impact of EXC_RES		
λ1	-0.428***	0.112
λ2	-3.368***	0.872
Impact of covariates		S.E
E/TA	0.400***	0.100
SIZE	0.303**	0.116
LIQ/TA	-0.001***	0.000
LA/TA	0.039***	0.010
Z-Score	0.051***	0.010
FDIC	-1.806**	0.620
EXC_RES*FDIC	0.123**	0.043
Fed rate	0.148	0.096
NPLs	-0.150***	0.030
GDP gr	-0.137**	0.047
INFL	-0.181**	0.075
UNEMP	-0.162**	0.059
δ	0.402**	0.181
Observations	82117	
Low regime	19426	
High regime	62691	

Notes: the Table reports the estimations for the dynamic panel threshold model. Each regime has at least 5% of the observations (Hansen, 1999). We denote as dependent variable banks' performance ($perform_{it}$), while as the threshold and the regime dependent variable we impose excess reserves (CBA_{it}) which represents unconventional monetary easing. Following Bick (2007), the model accounts for regime dependent intercepts (δ). Our dependent variable is ROA. Our independent variables of our main interest: EXC_RES; FDIC, EXC_RES*FDIC (cross-term). Other bank-specific independent control variables: Size; E/TA; LA/TA; LIQ/TA; Z-Score; Country level and state-level independent variables: NPLs, GDP gr, INFL, UNEMP, Fed rate. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors are in parentheses.

Table 7. Dynamic panel results of CBA and EXC_RES on bank performance based on asset diversification classification.

Dependent Var. ROA	Low level of asset diversification		Medium level of asset diversification		High level of asset diversification	
L.ROA	0.428***	0.365**	0.069**	0.094*	0.179***	0.196***
	(0.143)	(0.164)	(0.021)	(0.051)	(0.049)	(0.043)
CBA*ASSETDIV	-0.316**		-0.301**		-0.289*	
	(0.141)		(0.135)		(0.159)	
EXC_RES*ASSETDIV		-0.429***		-0.665**		-0.171
		(0.155)		(0.276)		(0.136)
SIZE	0.189	0.163**	0.028	0.252	0.069	0.374*
	(0.172)	(0.071)	(0.019)	(0.232)	(0.045)	(0.220)
LA/TA	0.844	0.367	0.035	0.028	0.136***	0.019
	(0.751)	(0.225)	(0.047)	(0.025)	(0.035)	(0.024)
E/TA	0.284**	0.224***	0.139	0.137	0.184***	0.163***
	(0.137)	(0.071)	(0.091)	(0.088)	(0.045)	(0.062)
LIQ/TA	-0.004**	-0.001	-0.014**	-0.010	-0.001	-0.001
	(0.002)	(0.000)	(0.006)	(0.006)	(0.000)	(0.001)
Z-SCORE	0.284**	0.141***	0.387***	0.493***	0.300**	0.615***
	(0.134)	(0.049)	(0.108)	(0.074)	(0.139)	(0.114)
ASSETDIV	0.257**	0.975***	0.114**	0.876**	0.101*	0.304*
	(0.126)	(0.356)	(0.044)	(0.389)	(0.057)	(0.182)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.363*	2.834***	3.544***	5.444***	2.993***	3.139***
	(0.176)	(0.103)	(2.974)	(2.118)	(0.256)	(0.511)
Wald chi2	176.37***	111.02***	154.13***	1349.46***	806.59***	760.11***
Observations	22448	22448	36660	36660	29780	29780
Hansen(p-value)	0.515	0.132	0.185	0.125	0.212	0.462
AR(2)	0.697	0.180	0.595	0.904	0.381	0.328
Number of banks	2194	2194	3558	3558	1019	1019

Notes: the Table shows dynamic panel regressions with ROA as dependent variable across three different level of bank asset diversification (low, medium and high percentile (>25%, 25%< >75%, 75%<)). Our independent variables of our main interest: CBA*ASSETDIV and EXC_RES*ASSETDIVE (interaction terms). Other bank-specific independent control variables: Size; E/TA; SIZE; LA/TA; LIQ/TA; Z-SCORE; ASSETDIV. Hansen test is the p-value of the J-statistic for over-identifying restrictions. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors are in parentheses.

Table 8. Dynamic panel results of CBA and EXC_RES on bank performance based on deposits over total assets ratio classification.

Dependent Var. ROA	Low level of deposits/total assets		Medium level of deposits/total assets		High level of deposits/total assets	
L.ROA	0.493**	0.509**	0.101***	0.065*	0.068***	0.046**
	(0.227)	(0.219)	(0.016)	(0.033)	(0.018)	(0.019)
CBA*DEP/TA	-0.836*		-0.673**		-0.920***	
	(0.503)		(0.301)		(0.159)	
EXC_RES*DEP/TA		-0.210*		-0.325**		-0.137***
		(0.116)		(0.071)		(0.031)
SIZE	0.131	0.107	0.187**	0.013	0.049	0.081
	(0.106)	(0.106)	(0.077)	(0.085)	(0.099)	(0.109)
LA/TA	0.224*	0.231*	0.022***	0.001	0.003	0.002
	(0.123)	(0.125)	(0.004)	(0.000)	(0.006)	(0.006)
E/TA	0.153	0.130	0.293***	0.159***	0.158***	0.134***
	(0.098)	(0.098)	(0.093)	(0.050)	(0.548)	(0.032)
LIQ/TA	-0.002	-0.002	-0.001***	-0.000***	-0.004***	-0.004***
	(0.002)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)
Z-SCORE	0.188***	0.199***	0.289***	0.464***	0.548***	0.576***
	(0.053)	(0.056)	(0.023)	(0.027)	(0.044)	(0.041)
DEP/TA	0.402**	0.288*	0.358**	0.181**	0.387***	0.839*
	(0.192)	(0.153)	(0.175)	(0.100)	(0.094)	(0.477)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.243***	2.598***	2.645***	6.001***	2.390***	3.412***
	(0.176)	(0.243)	(0.826)	(1.718)	(0.146)	(0.511)
Wald chi2	115.29***	124.85***	114.56***	331.94***	1709.26***	1699.11***
Observations	22963	22963	46465	46465	19421	19421
Hansen(p-value)	0.141	0.256	0.472	0.530	0.467	0.608
AR(2)	0.118	0.116	0.219	0.174	0.137	0.231
Number of banks	1586	1586	3398	3398	1787	1787

Notes: the Table shows dynamic panel regressions with ROA as dependent variable across three different level of bank deposits over total assets ratio (low, medium and high percentile (>25%, 25%< >75%, 75%<)). Our independent variables of our main interest: CBA*ASSETDIV and EXC_RES* DEP/TA (interaction terms). Other bank-specific independent control variables: Size; E/TA; SIZE; LA/TA; LIQ/TA; Z-SCORE; DEP/TA. Hansen test is the p-value of the J-statistic for over-identifying restrictions. We check that there is not a high level of correlation between the variables used in the models. ***, ** and * indicate 1%, 5% and 10% significance levels respectively. Robust standard errors are in parentheses.