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The determinants of bank risks: Evidence from the recent financial crisis

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ABSTRACT

We investigate whether US bank holding company fundamental characteristics are related to bank risk over a period that covers the recent 2007–09 financial crisis. We extend prior studies to consider bank equity risk exposure to market-wide default risk, the structured finance market, and the asset-backed money market in a variance decomposition. Four important results emerge: (1) the risk in bank opaque assets is not accurately priced; (2) banks with lower earnings have higher risk; (3) a positive relationship between non-performing loans and bank risk increased threefold during the crisis and (4) banks with a larger buffer of Tier 1 capital have lower risk and lower exposure to shocks in market-wide default risk and the structured finance market in particular. These results highlight the importance to investors of studying fundamentals, while from a bank regulatory perspective, effective management of regulatory capital may manage risks arising from contagion stemming from structured finance markets and funding illiquidity.

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1. Introduction

While there is ample evidence that bank equity risk is associated with managerial shareholdings (Demsetz et al., 1997; Anderson and Fraser, 2000), the presence of capital adequacy requirements (Konishi and Yasuda, 2004), board structure and CEO power (Pathan, 2009), and franchise value (Keeley, 1990; Demsetz et al., 1997; Anderson and Fraser, 2000), less is known about the role of more fundamental variables in explaining bank risk, particularly during periods of financial crisis.¹ We address this by conducting a comprehensive examination of how fundamental characteristics relate to bank risk before, during and after the 2007–09 financial crisis. Specifically, the objectives of this paper are to study the within-bank relationships between fundamental characteristics and decomposed equity risk, and to investigate the changes in these relationships during the recent crisis. The results have important implications for shareholders and bondholders in the context of investment and risk management and for bank regulators for ensuring the safety of banks and the banking system.

Following prior literature, this paper utilises market-based equity risk as a proxy for bank risk and evaluates the association between fundamental variables, including asset composition and opacity, profitability, credit risk control and funding

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¹ A noticeable exception is Stiroh (2006b) who finds evidence that the operating choice and non-interest generating activities of US banks affected their equity risk over the 1997–2004 period.

liquidity, and bank risk during non-crisis and crisis periods.² An innovative feature of this study is that we decompose total equity risk into six components: market, interest rate, market-wide default, asset-backed structured finance, short-term funding illiquidity, and residual risks. Each component is specific to individual banks according to their correlation with the factors, while the time variation is driven by the broader market. The components are designed to reflect bank exposure to the market risk factor and shocks to interest rate risk, market-wide default risk, the structured finance market and asset-backed money markets, which are interesting and important in the context of the recent crisis.

This first contribution of this paper is to facilitate an improved understanding of the fundamental determinants of bank risk, and we provide a number of useful implications to a range of market participants. We follow Jones et al. (2013) and study whether opaque assets are accurately priced and are perceived to be more risky relative to transparent assets, which may provide important implications for policymakers in limiting systemic risk. Second, we evaluate the relationship between loan portfolio credit quality and risk both before and during the crisis, thus highlighting the importance of effective and timely internal risk and credit control, which may be relevant to both investors and regulators. Third, our investigation provides evidence that some fundamentals are important for explaining bank equity risk and that the relationships became stronger in some cases during the recent crisis, which included a possible ‘flight-to-quality’ phenomenon. Finally, we extend the literature to identify the fundamental characteristics that are related to bank exposure to decomposed risks. Beyond conventional bank risk factors driven by the market and interest rates, we also capture shocks related to a market-wide default risk, structured finance securities and funding illiquidity, which are particularly interesting and topical given the events of the recent crisis. Our sample includes an interesting period characterised by contagion, funding illiquidity and macroeconomic uncertainty when these three additional risk factors were most prevalent, allowing our results to contribute to debates surrounding regulation, financial stability and prevention of systemic bank failures.

One major feature of the US banking sector that contributed to the recent crisis is the ‘shadow’ banking system in which there is a maturity mismatch between a bank’s issuance of short-term money market instruments (e.g., asset-backed commercial papers (ABCP)) and financing of longer-term structured finance securities via off-balance sheet conduits.³ During the recent crisis, banks were obligated to fund these conduits via credit line facilities and were thus susceptible to substantial funding illiquidity risk. This motivates us to measure bank exposure to widening ABCP yield spreads to determine whether it is an important constituent of bank risk. In parallel, other studies have shown that securitised and structured finance products, such as Collateralised Debt Obligations (CDOs) and subprime Residential Mortgage Backed Securities (RMBS), were responsible for the intensification and severity of the recent crisis.⁴ As downgrades of these structured securities spiked in 2007 their prices plunged, while the buy side almost disappeared (for losses on RMBS, see, Merrill et al., 2012). The RMBS market has been shown to be the origin of contagion during the crisis and so represented a source of considerable risk for banks relating to increasing risk aversion and market illiquidity (Fender and Scheicher, 2009; Longstaff, 2010). Given the topical nature and importance of these innovative products and markets, we extend prior literature by isolating the risk exposure of banks to shocks from the structured finance market and asset-backed money markets. We achieve this by implementing a variance decomposition procedure to capture individual bank sensitivity to shocks from the structured finance market index as measured by the ABX AAA index and from funding illiquidity measured by the ABCP market.⁵ Our findings show that stronger bank fundamentals protected against both conventional systematic risks and these more recent crisis related shocks.

Using a panel of 227 Bank Holding Companies (BHCs) over the period 2006–11, we estimate a pooled weighted least squares (WLS) regression with two-way fixed effects and two-way clustered robust standard errors to control for unobserved heterogeneity across banks and quarters. We consider a number of bank fundamental variables that includes various types of loan assets, earnings, non-interest income, non-performing loans, loan-to-deposit ratios, Tier 1 capital and other control variables. Our goal is to investigate the potential relationships between these fundamentals and various components of bank risk and also to evaluate changes in these relationships during the recent crisis using interaction effects.

Following Jones et al. (2013) closely, we separate total bank loan assets into trading, commercial real estate, residential real estate, other loans, other opaque assets and transparent assets to investigate how these asset types affect equity risk and whether asset opacity is important. Our evidence shows that banks with more trading and loan assets have significantly higher total and residual risks in the non-crisis subsample, a finding that supplements Fahlenbrach et al. (2012) and Acharya et al. (2013) who find that banks with higher exposure to illiquid assets have lower stock returns. We use *F*-tests of coefficient equality to evaluate whether the impact of opaque and transparent assets on bank risk differs and find little evidence of any significant differences. This suggests that asset opacity is not often priced in bank equity risk, consistent with the conclusion of Jones et al. (2013) that the risk in opaque assets is not sufficiently discounted. Another interesting finding is that the equity risk relating to the asset types become smaller during the crisis, indicating a possible change in the market perception of the risk of bank lending activities at a time of extreme short-term funding constraint.

We also evaluate whether bank fundamental characteristics are related to the various decomposed equity risk and identify any changes in their impacts during the crisis. We find strong evidence that earnings are significantly and negatively related

² See Anderson and Fraser (2000), Stiroh (2006b), Haq and Heaney (2012) and Ellul and Yerramilli (2013) as examples of studies using equity risk.

³ See for example Eichengreen (2008), Frank et al. (2008), Brunnermeier (2009) and Acharya et al. (2013).

⁴ See in particular Benmelech and Dlugosz (2009), Brunnermeier (2009), Gorton (2009) and Mühlmann (2013).

⁵ The ABX AAA index is a benchmark index that tracks the performance of a static portfolio of RMBS.

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