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Size, leverage, and risk-taking of financial institutions

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ABSTRACT

We investigate the link between firm size and risk-taking among financial institutions during the period of 2002 to 2012 and find size is positively correlated with risk-taking measures. Second, a decomposition of the primary risk measure, the Z-score, reveals that financial firms engage in excessive risk-taking mainly through increased leverage. Third, banks that enjoy better corporate governance engage in less risk-taking. Fourth, investment banks engage in more risk-taking compared to commercial banks. Finally, the positive relation between bank size and risk is present in the pre-crisis period (2002–2006) and the crisis period (2007–2009), but not in the post-crisis period (2010–2012).

"Too-big-to-fail policies offer systemically important firms the explicit or implicit promise of a bailout when things go wrong. These policies are destructive, for several reasons. First, because the possibility of a bailout means a firm's stakeholders claim all the profits but only some of the losses, financial firms that might receive government support have an incentive to take extra risk. The firm's shareholders, creditors, employees, and management all share the temptation. The result is an increase in the risks borne by society as a whole." – French et al. (2010), The Squam Lake Report.

"But giant banks, operating on the belief that they are backed by government, turn these otherwise manageable episodes into catastrophes. Is there a better alternative? Yes, reducing the size and complexity of the largest banks." – Richard Fisher, President and CEO of the Federal Reserve Bank of Dallas.

1. Introduction

Are large banks riskier? Some argue that governments have to bail out a large failing financial institution because its failure may present a threat to the proper functioning of the financial intermediation process and cause severe disruption to the economy.[1] When firms are perceived to be too big to fail (TBTF), they have a propensity to assume excessive risks to profit in the short term. Indeed, TBTF policy has been blamed by many as one of the main factors causing distortion in financial firms' risk-taking incentives; for example, see Boyd et al. (2009).

In turn, researchers and policymakers have proposed an array of regulations. Limiting the size of financial institutions is a frequent suggestion.[2] On the other hand, many concerns are associated with this proposed reform to limit bank size. First, it is difficult to determine the correct size threshold. Second, this simple size metric will miss many small firms that perform critical payment processing and pose significant systemic risk, even if the first issue can be solved (see, Stern and Feldman (2009)). In addition, opponents of such a proposal often cite the literature on scale economies; they are concerned such

[1] For example, see the recent book by former Treasury Secretary, Timothy Geithner (2014).

[2] For example, the SAFE Banking Act of 2012 was introduced in the U.S. Senate on May 9, 2012. Among other restrictions, it proposes a strict 10% cap on any bank's share of the total amount of deposits of all insured banks in the U.S., and a limit of 2% of the U.S. GDP of the non-deposit liabilities of a bank holding company. The SAFE Banking Act was not enacted, however.

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restraint could weaken the global competitiveness of the U.S. financial firms and cause loss of market share. Further, Dermine and Schoenmaker (2010) argue that capping the size is not the best tool, based on the finding that countries with relatively small banks faced large bailout costs; in addition, they caution that capping the size can have unintended effects, such as lack of credit risk diversification.

Is size the problem? This paper sheds light on the issue by studying the size effect on the risk-taking of U.S.-based financial institutions, including commercial banks, investment banks and life insurance companies. Using data on the size and risk-taking of financial institutions from 2002 to 2012, we investigate whether cross-sectional variation in the size of firms is related to risk-taking. Our measures of risk-taking are comprehensive. They include two model-based measures (namely, the *Z-score*, and Merton's Distance to Default (Merton DD)), a market-based measure (volatility of stock returns), and an accounting-based measure (write-downs). We focus primarily on *Z-score* and Merton DD; the other risk measures serve as robustness checks.

If size does affect risk-taking as measured by *Z-score*, then an interesting question is how does size affect the components of *Z-score*? Focusing on the components of *Z-score* – namely, leverage, return on assets, and volatility of earnings – allows policymakers to target the risk-taking problem of financial institutions more directly.

We establish the following findings. First, firm size is positively correlated with risk-taking, even when controlling for observable firm characteristics such as market-to-book ratio and corporate governance structure. The relationship between bank size and risk is plagued by endogeneity concerns. Banks are more likely to pursue riskier activities (even if they are negative net present value) as they get bigger because of TBTF regulatory bias and the increasing likelihood of a government bailout if things go bad; however, it is also possible that risky banks strive to grow in size to obtain TBTF status; for example, see Brewer III and Jagtiani (2009), and Molyneux et al. (2010). It is unclear whether large banks undertake riskier activities, or whether an omitted variable impacts both risk and size. To account for this, we adopt an instrumental variables approach. We consider three instruments for bank size: the bank's number of employees, the bank's net plant, property and equipment (PP&E), and an indicator variable for whether a firm is incorporated in Delaware. We utilize a battery of robustness tests to verify the validity and strength of our instruments.

Our second finding: the decomposition of *Z-score* reveals that firm size has a consistent and significant negative impact on the capital asset ratio; we do not find a consistent relation between firm size and return on assets or earnings volatility. These findings suggest that financial firms engage in excessive risk-taking mainly through increased leverage. On the other hand, they also suggest that economies of scale do not exist for banks. Regressions with volatility of stock return as the dependent variable indicate that size-related diversification may not exist in the financial sector since size is positively associated with return volatility.

Third, we find that Bhagat and Bolton's (2008) newly developed corporate governance measure, calculated as median director dollar stockholding, is negatively associated with risk-taking. This has important policy implications, to wit, policy-makers interested in discouraging banks from engaging in excessive risk should focus on bank director compensation and stock ownership.

Fourth, we find that investment banks, but not insurance companies, engage in more risk-taking compared to commercial banks. Finally, we document that the positive relation between bank size and risk is present in the pre-crisis period (2002–2006) and the crisis period (2007–2009), but not in the post-crisis period (2010–2012). Perhaps the intense scrutiny put on bank risk-taking by the bank regulators, senior policy-makers, and the media in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments.

Our analysis is critical from a public policy perspective because the risk-taking behavior of financial institutions affects financial and economic fragility, as well as economic growth – see Bernanke (1983), Calomiris and Mason (1997, 2003a, 2003b), and Keely (1990). Our findings have important policy implications that are particularly relevant today, as the calls for tougher restrictions and reinforcement of corporate governance on the financial sector accelerate. First, they suggest that instead of just limiting firm size, it may be more effective for regulators to strengthen and enhance regulations on equity capital requirements for all financial institutions. This suggestion regarding increased bank equity capital requirements is consistent with the recent recommendations of Admati and Hellwig (2013), Bhagat and Bolton (2014), and Fama (2010). Also, in recent op-eds, the *Wall Street Journal* has recommended significantly higher equity capital requirements for banks. Second, our finding on corporate governance indicates that median director dollar stockholding can be used as an effective internal corporate risk control mechanism.

The paper is organized as follows. In the next section we briefly review the extant literature. Section 3 describes the data. Section 4 presents core results. The final section concludes with policy implications.

2. Literature review

While there is a substantial literature that examines the risk-taking behavior of financial institutions (see Saunders et al., 1990; Demsetz and Strahan, 1997; Stiroh, 2006; Laeven and Levine, 2009; Houston et al., 2010; Demirguc-Kunt and Huizinga, 2011)), to our knowledge, we are the first to focus exclusively on the relation between size and risk-taking of financial institutions (see Table 1 for a summary of other studies). While Boyd and Runkle (1993) is the closest to this study, there are significant differences. First, the scope of their study is limited by focusing on only large bank holding companies (BHCs), while our sample includes commercial banks, investment banks and insurance companies which have a larger variation in size. We argue that, since the recent financial crisis was not caused by BHCs alone, excluding non-BHCs will not provide a complete picture about risk-taking in the financial industry. Second, Boyd and Runkle (1993) is a univariate analysis between size and risk. We consider covariates which, in theory, might affect bank risk-taking. Another paper which is close to ours is Demsetz and Strahan (1997) who focus on BHC diversification and size. They conclude that BHC size-related diversification does not translate into reductions in risk since size is uncorrelated or positively correlated with stock return variance in many years of their sample period. In their regression analysis, however, they find that firm size has a significant effect in reducing firm-specific risk for their sample period (1980–1993).

The recent financial crisis has generated tremendous interest in the study of risk-taking of financial institutions. Laeven and Levine (2009) consider a sample of the largest 270 banks in 48 countries. They find a significant positive relation between the cash flow rights of the largest shareholder of the bank and bank risk measured as *Z-score*. They also document a positive relation between bank size and bank risk. Beltratti and Stulz (2012) exploit variation in the cross-section of performance of 164 large banks (defined as banks with total assets greater than $50 billion) across the world during the period of the financial turmoil (2007–2008). They document that smaller banks with concentrated ownership and more non-interest income are associated with higher idiosyncratic risk. Consistent with our results, they document a negative relation between bank size and *Z-score*. However, their relation is statistically not significant – possibly due to the limited cross-sectional variation in their bank size measure since they only consider banks