Dual Holding and Bank Risk *

Stefano Bonini†
Ali Taatian‡

Saturday 15th January, 2022

*We thank the 'Hanlon Financial Systems Center', Stevens Institute of Technology for providing financial support to obtain the required data. We are grateful to conference participants at the 2020 IRMC Conference, 2021 FMA European conference, seminar participants at OneToWorld symposium, and faculty seminar participants at Stevens Institute of Technology School of Business and Venice University for their valuable comments. We also thank Suman Banerjee, Anand Goel for helpful suggestions. The ideas expressed in this paper are those of the authors and do not necessarily reflect the position of the authors' respective institutions. Any errors are our responsibility. Declarations of interest: none.

†School of Business, Stevens Institute of Technology, Hoboken, NJ 07030. Tel: 201 216 3528. Email: sbonini@stevens.edu

‡School of Business, Stevens Institute of Technology, Hoboken, NJ 07030. Tel: 201 216 5000. Email: ataatian@stevens.edu

Dual Holding and Bank Risk

Abstract

Using the 2007-9 financial crisis as a quasi-natural experiment, we show that banks with investors holding simultaneously both equity and bonds (dual-holders) exhibit lower risk and superior performance. Dual-holders' influence is higher in more opaque banks, indicating that the mechanism of transmission is through a decrease in information asymmetry and a reduction in debtholder-shareholder conflict. This effect translates into higher unconditional and risk-adjusted stock returns. These economically large results show that a market mechanism implemented by outside investors is strongly effective in mitigating excessive risk taking by banks thus providing important normative implications for the stability of financial systems.

JEL classification: G21, G28, G01

Keywords: bank risk, dual holdings, financial stability

1. Introduction

The recent financial crisis has highlighted how the vulnerability of the banking sector was partially caused by a build-up of excessive risk (Brunnermeier (2009); DeYoung, Peng, and Yan (2013)). In response to the systemic effects that undermined the stability of financial systems, both regulators and market participants have explored how different mechanisms can mitigate excessive risk taking in banks. However, bank managers have substantial discretion in choices, such as business portfolio composition, investments, and capital structure that can expose banks to excessive risk. This heterogeneity in the sources of risk makes the identification of optimal contracts or governance solutions complicated. For example, compensation packages that align managers incentives to those of shareholders may lead managers to excessively increase volatility. Similarly, shareholders-oriented governance may encourage shifting risks to debtholders (Jensen and Meckling (1976)). In this paper we show that the presence of dual holders, i.e. investors that simultaneously hold shares and bonds of the same bank, significantly affects financial policies and risk taking behavior. Banks with dual holders are more resilient to shocks and exhibit superior stock performance. A crucial feature of dual ownership as a mechanism to reduce risk taking, is its pure market-based nature that doesn't require the intervention and enforcement of regulators or tortuous changes in the bank's governance structures. In fact dual holders are at once outside debt holders, who discourage taking too much risk, and equity holders, who have the right to monitor and intervene in the bank. As such, dual holders are inherently equipped to prevent managerial investment inefficiencies and risk shifting by shareholders because they have both control power on the equity side, and superior information and informal control rights (e.g. covenant renegotiation) on the debt side (e.g. Anton and Lin (2020)). Consistent with this view we find that several risk measures in banks decrease in the presence of dual holders. We attribute this risk reduction to the selection of more conservative financial policies more aligned with dualholders preferences.

Dual ownership has been relatively understudied in the literature but is surprisingly

widespread. Anton and Lin (2020) document that more than 30% of all US-listed firms on NYSE, AMEX, and NASDAQ have at least one dual holder. While measures of dual ownership vary, Jiang, Li, and Shao (2010) define as dual holders those investors holding long-term debt (bonds and loans) and an equity stake in excess of 1% of the outstanding equity or with a value above 2 million U.S. dollars. Manconi and Massa (2009) show that there is an increasing trend for large investors to hold substantial equity and debt positions in the same company. Besides different idiosyncratic reasons for the emergence of dual holdings, such as merger and acquisitions among financial institutions or the random selection of bond and equity by different fund managers within the same fund family, the literature has advanced two main theories to explain why large investors seem to compromise the diversity of their portfolio by the deliberate investment in two asset classes of the same company. First the information bridge theory states that when equity holders hold the debt of the company they establish a closer relationship that leads to (more) accurate information that they use to trade stocks (Ivashina and Sun (2011)). Second, the incentive alignment theory proposes that when dual holders debt to equity ratio is similar to that of the company, their preferences are for a maximization of the entire firm value, thereby limiting risk shifting and wealth transfer from debt holders to equity holders(Chu (2018)). Manconi and Massa (2009) empirically show that the incentive alignment theory better explains the existence of dual holders. Financial institutions are particularly prone to these types of managerial discretion and agency problems that dual ownership appears particularly effective in mitigating. Yet, no paper has addressed this issue that has potentially profound policy implications.

We try to fill this gap using the financial crisis of 2007-2009 as a natural experiment to investigate the moderating effects of dual ownership on banks values. This setting appears ideal as the financial crisis acted as an exogenous stress test that revealed ex-post the extent of risk taking prior to the crisis, thereby it allows to capture a causal link with limited endogeneity concerns. In particular, we argue that banks' true risk level was determined by ex-ante decisions that were, however, unobservable. The crisis shock revealed the extent of

risk taking through different effects on assets value. The ex-ante presence of dual holders moderated the extent of risk taking, in particular when the bank is less transparent and dual owners' holdings are high in financial debt. Using institutional holdings data from Thomson Reuters's eMAXX bond holding and 13F institutional equity holdings, we identify 64 banks that had significant dual holding in the last quarter of 2006, immediately before the crisis, and 145 banks with insignificant/zero dual holding. On this sample we run a series of cross-sectional tests, controlling for multiple relevant covariates. Our findings show that banks that had a significant presence of dual holders proved more resilient during the crisis period. The intensity of dual ownership has a significant moderating effect in the level of risk of investment and business decisions whose true value is observed during the years following the crisis. Testing alternative hypotheses, we show that this effect is determined by a decrease in the asymmetry of information between insiders (shareholders) and outsiders (bondholders), and the related reduction in agency costs. Differently we find weaker support to an alternative incentive alignment hypothesis that would attribute any effect to the mechanical alignment of dual holders incentives with a broader firm value maximization goal. Finally, to address any possible endogeneity issue regarding the selection bias, we develop a two-stage instrumental variable regression test. Following Jiang et al. (2010) we use the company's stock liquidity as an instrument for dualholding. After running the regressions with the instrument, the same effects still maintain.

Our study contributes to several research areas. First, while several papers (e.g. Bebchuk and Spamann (2009), Kashyap, Rajan, and Stein (2008), Kirkpatrick (2009)) propose different governance solutions, such as board structures, executive compensation, and risk management systems, to restrict bank risk taking, we show that a market mechanism implemented by outside investors is surprisingly effective in fostering financial stability. Second, we shed light on the previously unobserved effects of dual holders in financial institutions. Finally, we outline several novel policy implications. Dual holders acting as a market-based mechanism, rather than a regulatory or auditing procedure, can complement capital ade-

quacy requirements, thereby reducing the cost of capital, a mechanism similar to the effects of the design of bank's CEO compensation packages on FDIC-imposed insurance costs shown by John, Saunders, and Senbet (2000).

The paper proceeds as follows: Section 2 reviews the related literature on risk shifting in banks and dual holding. Section 3 proposes the research design and develops the hypotheses. Section 4 discusses the data and measures. Section 5 presents our analyses and results. Section 6 concludes.

2. Related Literature

2.1. Risk Taking and Risk Shifting in Banks

In their seminal work, Jensen and Meckling (1976) highlighted how managerial agency problems produce inefficiencies when CEOs act only in the interest of shareholders. Unmonitored managers may engage in excessive risk taking and extreme borrowing. These costly inefficiencies can be mitigated if managers do not exclusively pursue shareholders value maximisation. However, when contracts are incomplete, corporate governance alone fails to align debtholders and shareholders' interests.

These well known problems are inherently severe in financial institutions for several reasons. First, banks are complex and opaque, and as a result, creditors might not be able to obtain information to assess bank's riskiness accurately and monitor on-going bank activities. The opacity stems from assets' quality and true values not being readily observable and their true riskiness may not be revealed for potentially long periods. Relatedly, banks can alter the risk composition of their assets more quickly than most non-financial firms, and they can conceal the deterioration of certain investments by rolling over loans to poor quality clients, as shown by Bernanke (1989). This translates to greater banks' opacity and can make information asymmetries between management and other stakeholders arguably

more severe (e.g. Levine (2004)). Not surprisingly, Morgan (2002) finds that bond analysts disagree more over the bonds issued by banks than by non-financial firms. Second, several banking regulations and government policies provide bank creditors with explicit and implicit guarantees that protect them from losses in case of bank default, and consequently may reduce their incentives to monitor. In particular, the outright FDIC deposit insurance, the implicit government bail-out guarantee for too-big-to-fail (TBTF) financial institutions, or the market-wide intervention during the time banks face distress (e.g. Duchin and Sosyura (2012))) may induce bank managers to shift default risk to the deposit insurance funds and taxpayers. As Bolton, Mehran, and Shapiro (2015) show in their theoretical model, in the presence of implicit and explicit guarantees, shareholders lack appropriate incentives to control the managers' risk taking. In this respect, there is significant discussion over the extent to which governance failures have contributed to the risk exposures of banks. In particular, there are questions over whether bank boards were unable to effectively monitor and control risk, whether executive pay was excessively structured to promote risk taking, or whether banks' risk management systems were adequate (Bebchuk and Spamann (2009); Kashyap et al. (2008); Kirkpatrick (2009)). As an example, Stulz (2015) argues that governance plays an important role in helping banks pursue an 'optimal' level of risk that allows managers to maximize shareholders value while also taking into account the social costs of bank failures. To achieve this objective, an effective risk management framework is required to identify, measure, and control bank risk exposures timely and accurately.

Several mechanisms and policies have been proposed to reduce risk shifting friction. Kahn and Winton (2004) show that risk shifting could partially be alleviated by creating a structure with two subsidiaries, where one subsidiary is supposed to hold relatively safe loans, and the other is supposed to hold relatively risky loans. This structure makes asset substitution more costly for shareholders. Furfine (2001) shows that banks somewhat monitor themselves because riskier institutions are charged higher interest rates in the interbank borrowing market and the subordinated debt market; consequently, financial intermediaries should find

it costly to engage in excessive risk taking. In a similar spirit, Berger and Turk-Ariss (2015) and Martinez Peria and Schmukler (2001) argue that depositors can discipline risk taking by demanding higher interest rates. Van Bekkum (2016) proposes that an executive pay system that reflects creditor wealth helps aligning both managers' and creditors' interests. In particular they show that the level of inside debt, the debt portion of CEO compensation, affects bank risk and that banks with larger inside debt holdings have lower risk exposures. Yet bank risk taking appears not adequately controlled and there is consensus on the need for a bank governance that represents the interests of all shareholders, creditors, and taxpayers (Adams, Mehran, et al. (2003), Berger, Kick, and Schaeck (2014), Macey and O'hara (2003)).

2.2. Corporate Governance and Dual Holders

While dual holdings can be the random consequence of merger and acquisitions between financial institutions, the large number of banks exhibiting the presence of dual holders suggests that these are the result of deliberate investment strategies. However holding both debt and equity of the same issuer has a negative impact on portfolio diversification which raises the question of the rationale of these portfolio choices by investors. Several recent contributions argue that dual ownership reduces adverse selection. Bodnaruk and Rossi (2020) show that in bond Initial Public Offerings (IPOs) a disproportionately large percentage of issued bonds is acquired by equity investors that often hold equity in the same company and that the presence of such "habitual dual holders" determines both the willingness of company management to conduct a bond IPO and its pricing. Further, according to Ivashina and Sun (2011), equity holders might lend to a firm to acquire proprietary information and trade equity on that information. Examining stock trades of institutional investors whose portfolios also include debt obligations of the same company, they find support to their hypothesis. In another paper, Acharya and Johnson (2007) show that CDS spreads also contain nonpublic information that is impounded into prices by informed traders and include forward-looking information that is not yet reflected in the current accounting variables (such as the Altman

Z-score). Another possible driver leading to dual ownership is that it may induce firms to reduce excessive, value-destroying investment through the inherent smoothing of debt holders and equity holders conflict of interests. Chava, Wang, and Zou (2019) show how the simultaneous ownership of debt and equity claims affects loan contracting. They find that dual ownership ex ante significantly reduces the likelihood of a capital expenditure restriction covenant and ex post increases the likelihood of granting unconditional waivers in the instances of covenant violation.

Along with a growing trend of research on the cause of dual holding, multiple contributions discuss the corporate implications of dual holders. Galai and Masulis (1976) suggest that if all investors hold equal proportions of both the firm's debt and the firm's equity issues, wealth re-distributions among claim-holders leave all investors indifferent. Jiang et al. (2010) study how a firm's dual ownership affects its borrowing costs and find that syndicated loans with dual holder participation have lower loan yield spreads than those without dual holders. In addition, they also find that dual holders have longer investment horizon than non-dual holders and they improve borrowers' credit ratings. Chu (2018) shows that dual holders reduce dividend payout. Bodnaruk and Rossi (2016) show that target firms with larger equity ownership by dual holders experience lower equity premiums and larger abnormal bond returns in mergers and acquisitions (M&As), suggesting a coordination effect within dual holding institutions in M&As. All the extant contributions however have focused solely on industrial firms. Whether any of these mechanisms or different ones apply also to financial institutions is still unknown.

3. Hypotheses Development

Following the discussions in the previous sections, we propose four hypotheses. First, we argue that dual ownership leads to a decrease in bank risk.

Hypothesis 1) The presence of dual holders significantly decreases bank risk.

A reduction in risk may come from various sources. We conjecture that dual holders would support and promote more conservative policies that lead to an aggregate reduction in risk. This channel should be particularly effective with regards to investment and business portfolio selection that directly affect the value (or the loss) of the assets. We accordingly formulate the following:

Hypothesis 2) The presence of dual holders significantly increases conservative financial decisions in banks.

A natural question that arises is "what is the mechanism through which dual holders deploy their influence?" We examine two hypotheses: the incentive alignment hypothesis and the information bridge hypothesis. The first hypothesis proposes that if dual holders are sufficiently exposed to the debt of the bank, the loss they incur on their debt outweighs the gain they make on their equity when risk increases, therefore, unlike other equity holders they would not support risky policies but align their incentives to those of bondholders, avoiding the loss related to risk taking.

Hypothesis 3-1) The decrease in bank's risk due to dual holders is increasing in dual holders' exposure to the bank's debt.

However, dual holders play also a role as an "information bridge" between shareholders, as insiders, and debt holders, as outsiders, even if they are not highly exposed to the bank's debt. When a bank is opaque and the creditors can not clearly anticipate the behavior of the management and the level of their risk taking, they reduce the ex ante high risk taking by acquiring enough equity of the bank and find a voice in the management. Therefore, the ex post risk of the vague banks decreases due to the presence of dual holders among their

investors. In other words, when the information gap between the insiders and outsiders is large, the presence of an information bridge could give debt holders more information and monitoring opportunities, raising the ex ex post commitment of shareholders to not to take too much risk. We therefore propose a complementary hypothesis:

Hypothesis 3-2) The decrease in bank's risk due to dual holders is more significant in the presence of high information asymmetry between insiders and outsiders.

It is important to note that both effects can be present at the same time therefore the two hypotheses are not mutually exclusive; the dual holders gain control of the bank due to information asymmetry and difficulty in monitoring the bank to protect their debt, and consequently the level of their intervention in favor of debt depends on their wealth composition.

Finally, we posit that the risk mitigation effect brought by dual ownership reduces the debtholder-shareholder friction significantly thus improving the aggregate value of the financial institution. Investors recognize the value creation and incorporate it in the price thereby leading to higher stock returns. Accordingly, we hypothesize the following:

Hypothesis 4) The presence of dual holders significantly increases bank's stock performance.

4. Empirical design

4.1. Setting

We utilize the 2007 financial crisis as an exogenous shock to the financial system to identify the effect of dual holders on bank risk. The financial crisis began slowly in the first and second quarters of 2007 and continued to escalate through 2008. On February 8, 2007,

HSBC, the world's third largest bank at the time, significantly increased its provision for loan losses due to U.S. mortgage loan exposure. On April 2, 2007 the subprime lender New Century Financial Corporation declared bankruptcy. During the third quarter, two Bear Stearns hedge funds were liquidated. The pinnacle of the crisis occurred in September 2008 when Fannie Mae and Freddie Mac were taken into receivership, Lehman Brothers failed, and AIG was bailed out by the government. The sequence of collapses led to a spike in the cases of bank distress or outright default. The general consensus on this unprecedented downturn is that many risk-monitoring mechanisms and policies, either failed to function or were not strong enough to do the job. For instance, Kirkpatrick (2009) shows that weak governance of banks led to inadequate risk management, especially insufficient risk monitoring through the board, a factor that contributed significantly to the financial instability during the crisis. Also, the design of compensation packages aimed at aligning the interests between managers and shareholders resulted in banks taking risks that disproportionately benefited bank shareholders at the expense of creditors and taxpayers, a possibility theorized by John et al. (2000). Surprisingly, despite its massive ex-post scale, financial institutions did not anticipate the extent of the crisis. Fahlenbrach and Stulz (2011) finds in fact that bank CEOs did not reduce their stock holdings in the anticipation of the crisis, and subsequently suffered large wealth losses. Such a setting is particularly effective in capturing the risk mitigating effect of dual holders: the existence and extent of dual holdings could not be endogenously determined by the crisis which mitigates concerns about the causal nature of any effect we may find.

If dual ownership leads to an ex-ante reduction in risk taking, this should translate into an observable ex post superior outcome with regards to risk and stability. In figure 1 we summarize our empirical design and show the timeline of our analyses.

INSERT FIGURE 1 HERE

4.2. Dual Holding measures

Following Bodnaruk and Rossi (2016), we define dual holders as investors that own simultaneously both equity and debt of a bank. A caveat is whether debt should be computed as bonds, loans or both. Prior contributions looked at non-financial companies and focused on bonds (Manconi and Massa (2009), Bodnaruk and Rossi (2016), Chen, Zhang, and Zhu (2019), Keswani, Tran, and Volpin (2019), Chu, Diep-Nguyen, Wang, Wang, and Wang (2019)), loans ((Jiang et al. (2010), Anton and Lin (2020), Yang (2019), Liu (2019), Chava et al. (2019), Chu et al. (2019), Chu (2018))), or an aggregate measure of both (Hamilton, Irlbeck, and McKee (2019)). The capital structure of banks is however profoundly different. In deposit institutions in fact the majority of the non-deposit, long-term debt is in the form of bonds (Johnson (1998)). Accordingly, we focus on bond ownership and define dual holding DH as a dummy variable that takes the value of 1 if one or more of the firm's "significant" shareholders simultaneously own bonds. Since we measure dual holding by only the bond holdings and not including loans, and we do not include the holdings of the hedge funds due to data availability issues, our measure is a lower bound of the true frequency of dual ownership. Moreover, given that marginal dual ownership can be the effect of some random events such as investor or bank mergers, or changes in the investment focus or trading, in order to avoid incorrect or spurious classification of investors as dual holders, we classify as dual holders only "significant" investors, i.e. the debt holders who own more than 1% of the shares held by all institutional investors, or own over 2 million U.S. dollars of shares as in Jiang et al. (2010). We supplement this binary metric with a continuous measure given by the logarithm of the fraction of outstanding shares held by the firm's dual holders divided by the total institutional share ownership: $log(E^{DH}/E + 1)$. The E^{DH}/E metric captures dual holders' relative voting power (control rights), and ranges from zero (no control) to 1 (full control rights). We adopt a logarithmic transformation to allow fora wider variation in our regressors.

4.3. Bank Risk measures

The estimation of risk of default, for its straightforward consequences on deposits and lending, has received high attention with most of the emphasis on fundamental factor-driven discriminant score models (Houston, Lin, Lin, and Ma (2010), Laeven and Levine (2009)) and market-based metrics based on Merton's structural distance-to-default model (Gropp, Vesala, and Vulpes (2006); Hagendorff and Vallascas (2011)). However, stability concerns in response to the severity of the crisis in the financial intermediary sector shifted regulators' focus toward more granular measures of bank risk (Basel Committee on Banking Supervision, 2013) rather than composite measures. In particular, the existence of banks' thin capital expanded the measures of risk to leverage risk, defined as the risk due to holding low amounts of capital to support the operations (Flannery and Rangan (2008); Gropp and Heider (2010); Nier and Baumann (2006)) and portfolio risk, defined as the volatility of asset returns arising from a bank's investment activities (Flannery and Rangan (2008); Hagendorff, Keasey, and Vallascas (2017)). In the light of these results and the need for capturing risk from the perspectives of both shareholders and debt holders, we adopt two alternative measures for bank risk. The first measure accounts for shareholders risk and, following prior studies (Anderson and Fraser (2000); Chen, Steiner, and Whyte (2006)), we estimate it as the daily volatility of stock returns. This metric, however, fails to capture efficiently the risk borne by financial creditors. Because debt is a senior claim over equity and has a fixed amount, the value of debt falls only in response to sufficiently large swings of equity prices, reflecting the fact that in case of default, debt holders' loss is generally limited to a portion of their principal. Accordingly, risk measures need to overweight the left tail of the returns distribution, the so-called downside risk. A common measure of downside risk is Value-at-Risk (VaR). Its ability to capture market risk is supported by its adoption by U.S. and international banking authorities through the 1996 Market Risk Amendment to the Basel Accord, in determining capital requirements for large banks (Berkowitz and O'Brien (2002)). Therefore, in addition to stock volatility, we utilize VaR, conventionally calculated at the

5% threshold, as our second measure of risk.

To establish the channel of the effect of dual-holders, we parse the banks exposure in both their investments and their business portfolio choices. There is consensus that the 2007-8 financial crisis has been originated by excessive risk-taking in particular in real estate related investments, both prime and subprime. In the light of this and following Chesney, Stromberg, Wagner, and Wolff (2020), we use "non-performing real estate" as our main proxy for risky investments and supplement it with "asset write-downs" as a more comprehensive measure. We capture the riskiness of business portfolios through "the fraction of nontraditional banking activities", measured by non-interest income, as in Van Bekkum (2016).

5. Data Sources and Sample Selection

Different data sources are used to measure dual holding and bank risk in our study. We use Thomson Reuters' eMAXX data on bond ownership in mutual funds, pension funds, and insurance companies, and Thomson Reuters' 13F data on institutional investors' equity ownership. Firms' financial characteristics are obtained from COMPUSTAT, and stock market prices are retrieved from CRSP. We measure dual holding at the end of 2006, immediately before the crisis began, and measure risk metrics during the period of the crisis, 2007 through 2009, following the prior literature (e.g. Van Bekkum (2016)).

The sample of dual holders is collected out of all banks whose bonds and stocks are trading publicly in the US market at the end of 2006. Our sample includes banks and credit institutions with SIC codes between 6000 and 6199. Since we do not have the data for hedge funds' bond holdings, our estimates can be considered as a lower bound for the presence of dual holdings in the US banks. We find about 600 banks whose data was available on COMPUSTAT for the last quarter of 2006. Out of this group, we find 64 U.S. banks with significant dual holding in that quarter as the treatment group. We also randomly chose comparable 145 U.S. banks that had insignificant or zero dual holding, based the available

data, that we use as a control group. In the following section, we show that the characteristics of the control group are very similar to the treatment group, and that increases the validity of our diff-in-diff analysis.

5.1. Descriptive Statistics

Table (1) presents the summary statistics of our banks sample and their dual holdings at the end of 2006, i.e. prior to the crisis. We observe that, unconditionally, banks with significant dual holding have a higher level of opinion dispersion among analysts and have less concentrated institutional investors, which implies lower block holding. The average equity ratio of the dual holders in banks is 6%, which while being about half of the ratio found in non-financial corporations by Bodnaruk and Rossi (2016), is consistent with the structurally lower level of equity in financial firms. The dual holders' portfolio balance ($D^{DH}/(D^{DH} + E^{DH})$) is on average 7%. This ratio in corporations is much higher, about 35% to 40%, indicating that banks' dual holders are less exposed to debt claims, compared to dual holders in industrial companies (Bodnaruk and Rossi (2016)). We will address this difference again when we establish the mechanics of the effects of dual ownership on bank risk in the next sections.

Table (2) shows the summary statistics of risk-related dependent variables calculated during the period of 2007-2009, the period of the crisis. Some of the unconditional averages of risk measures or risky activities are smaller for banks with significant dual holdings, such as stock volatility, value at risk, and non-interest income. Moreover, the unconditional average of stock performance metrics, stock cumulative total return and stock cumulative abnormal return, are both higher in banks with significant dual holding. The average 1-day standard deviation of stock return is 6%, and the average value at risk at 5% level is -8%.

[Insert Table 1 here]

[Insert Table 2 here]

6. Empirical Analysis and Results

6.1. Methodology

As outlined in section 4.1, we assume that at the end of 2006, a crisis was still largely not anticipated, as shown by Fahlenbrach and Stulz (2011). Similar to (Van Bekkum (2016)), we design a set of cross-sectional tests aimed at examining whether the presence of dual owners - and their potential moderating effects - at the end of 2006 can explain some of the variation in the bank riskiness, measured over the crisis period of July 2007 to March 2009.

6.2. Effect of Dual Holding on Bank Risk

We begin by plotting in Figure 2 the univariate levels of risk measures over the entire period for banks with and without dual holders.

INSERT FIGURE 2 HERE

Panel A shows the time series of returns volatility as a proxy for risk for both groups of banks, while Panel B replaces volatility with VaR. Prior to the crisis, both groups of banks exhibited statistically non distinguishable levels of risk, irrespective of the metric adopted. Once the crisis unfolded all banks experienced a surge in risk. However, banks with dual owners experienced a substantially lower increase in risk and reverted much more quickly, reaching almost their pre-crisis levels by the beginning of 2010. This visual evidence provides a first convincing hint at the existence of a causal effect of the ownership structure on risk-taking. To formally test whether the existence and intensity of dual holding at the end of 2006 are associated with meaningful differences in the banks risk during the crisis, we estimate the following cross-sectional regression model (1):

$$Y_{i,MAR09} = \beta_0 + \beta_1 DH_{i,DEC06} + \beta_2 X_{i,DEC06} + \epsilon_{i,MAR09} \tag{1}$$

where $Y_{i,MAR09}$ is the bank i risk over the surge of the crisis (from July 2007 to March 2009),

estimated alternatively with stock market volatility and VaR. $X_{i,DEC06}$ is a collection of control variables measured at the end of 2006, and $\epsilon_{i,MAR09}$ is an error term that is adjusted for heteroskedasticity. To estimate whether the degree of dual ownership holding - in addition to its existence - intensifies the results, we run a separate set of tests using the continuous measure: $log(E^{DH}/E + 1)$.

Because bank risk can be affected by many factors that might correlate with dual holding, we include a number of controls identified following Srivastav, Armitage, Hagendorff, and King (2018) and Van Bekkum (2016). To control for the effect of blockholders and ownership concentration, we estimate the shareholder concentration as the Herfindahl Hirschman Index (HHI) ranging from 0 for fragmented (atomistic) ownership to 1 capturing single ownership, respectively[1]. We control for asset value volatility by computing the ratio of intangible assets (intan_ratio). Numerous studies have suggested that independent un-entrenched boards are a desirable governance attribute of banks that may help in mitigating managerial discretion (Aebi, Sabato, and Schmid (2012)). Accordingly, we include board independence $Board\_Indp$ measured as the ratio of the number of independent directors to the total number of board members. A possible concern is that the value of bank charters may affect our results. In fact, the charter value reflects future economic rents that banks obtain from privileged access to markets shielded from competition. The higher the charter value, the lower is the incentive to engage in risk taking, because it could lead to the loss of the charter (Greenbaum, Thakor, and Boot (2019)). This effect holds unconditionally and may therefore affect our results. We accordingly control for this possible confounding factor using a bank's market-to-book ratio. In untabulated specifications we replace Tobin's Q with leverage and find qualitatively similar results. Finally we include firm size measured as the natural logarithm of total assets and bank performance measured as return on assets (RoA) in all specifications.

Jensen and Meckling (1976) argue that when an executive's debt-to-equity (D/E) ratio

[1] 0 and 1 are simply theoretical distribution boundaries

is similar to that of the firm, the executive would have no incentives to transfer wealth from debt holders to equity holders because the reallocation would have no effect on the value of his or her holdings in the firm. Edmans and Liu (2010) show that the increase in the value of debt portion in the CEO compensation, known as inside debt, leads to conservative investment choices, which in turn leads to a increase (decrease) in the value of the firm's debt (equity). Van Bekkum (2016) show that inside debt affects risk taking in banks and that a higher debt portion of the CEO compensation results in lower level of bank risk. A concern could therefore be that our results might simply be picking up the effect of inside debt in banks. We therefore run several robustness specifications to control for inside debt, measured by the debt to equity ratio of the executive's current and accrued compensation, scaled by the debt to equity ratio of the bank (inside debt ratio):

$$insideDebt\_ratio = \frac{D^{CEO}/E^{CEO}}{D^{firm}/E^{firm}} = \frac{(pension\_value\_tot + defer\_balance\_tot)/(inside\_stock + inside\_option)}{(LTDEBT + CDEBT)/(P \times CSHO)}$$

$insideDebt\_ratio$ proxies for the incentive of the manager in favor of or against risk shifting. Jensen and Meckling (1976) original framing proposes that a $insideDebt\_ratio > 1$ characterizes managers that would be against risk shifting, while a $insideDebt\_ratio < 1$ would be indicative of risk shifting prone managers. Indifference would observed at $insideDebt\_ratio = 1$. Edmans and Liu (2010) showed that the separating threshold is a number smaller than 1, and it depends on the characteristics of the firm. More generally, comparatively lower levels of the $insideDebt\_ratio$ indicate a higher risk-taking propensity as opposed to its higher levels. Given that the level of inside debt has a highly skewed distribution, we adopt a logarithmic transformation of the estimated inside debt ratio and compute $log(InsideDebtRatio)$.

The data on inside debt and equity is obtained from Compustat Execucomp. Inside debt (D^{CEO}) is calculated as the present value of both the accumulated pension benefits ($pension\_value\_tot$) and the fiscal year-end balance non-qualified deferred compensation

($defer\_balance\_tot$), taken from the firm's proxy statements collected in Execucomp. Inside equity (E^{CEO}) is defined as the value of stock and option owned by the manager. Stock ownership ($inside\_stock$) is calculated by multiplying the number of the common shares held by the manager times the stock price at the end of the year. Stock ownership also includes unvested stock and equity incentive plan awards ($stock\_unvest\_val + shrown\_excl\_opts \times prc$). The value of stock options ($inside\_option$) is calculated as the sum of unexercised exercisable options and unexercised unexercisable options ($opt\_unex\_exer\_est\_val + opt\_unex\_unexer\_est\_val$) (Cassell, Huang, Sanchez, and Stuart (2012)). Firm's debt (D^{firm}) is the long term debt ($LTDEBT$) plus current debt ($CDEBT$).

Table (3) presents the results of the regressions.

[Insert Table 3 here]

Column (1) shows that the presence of dual holders, on average, decreases daily stock volatility by 1.8%. Based on the average values in table (2), this amounts to a 16% decrease in average stock volatility. In column 2 we test whether the effect of dual ownership is increasing with its intensity, by using an alternative continuous measure for dual holding. The negative coefficient reported Column (2) indicates that not only does the presence of dual holders decrease the risk, but also the magnitude of the decrease is proportional to their power and voting rights. In other words, larger equity share of dual holders leads to higher decrease in risk. This effect is also large in that a one standard deviation increase in $log(E^{DH}/E + 1)$ (reported in Table 1) decreases daily stock volatility by -0.183*0.049=0.897%. Finally, in Column (3), we control for the logarithm of inside debt ratio ($log\_insideDebt\_ratio$) to ensure that we are not merely capturing the effect of the structure of managerial compensation packages on bank risk. The coefficient of inside debt is negative and significant as found by Van Bekkum (2016). Yet, the explanatory power of dual ownership is largely unchanged both quantitatively and in terms of statistical significance. Furthermore, the magnitude of the effect of dual ownership on risk is substantially larger than that of inside debt, indicating

a superior risk-mitigation.

Switching to VaR as the risk measure yields similar conclusions. Columns (4) and (5) show that the presence of dual holders, on average, decreases the %5 Value at Risk ($-VaR(5\%)$) by 2%. Based on the average values reported in table (2), this represents a 25% decrease with respect to the average (unconditional) Value at Risk at 5% level. Similarly to model (3), model (6) controls for inside debt ratio. The coefficient for the explanatory variable is negative as expected and statistically significant well above the 5% level thus confirming that dual holding significantly limits risk when economic conditions deteriorate.

6.3. Endogeneity

As discussed in the previous sections, our empirical design helps mitigate endogeneity concerns because: first, as shown by Fahlenbrach and Stulz (2011) the financial crisis was truly an unanticipated event, therefore reverse causality of dual holding is unlikely; second, in a cross-sectional setup where the independent variable is estimated strictly before the dependent variable, simultaneity should be lesser of a concern. However, there may still be omitted variables driving our results. We address this possible issue developing a two-stage instrumental variable regression test. Following Jiang et al. (2010) we use as an instrument for dualholding the company's stock liquidity. The instrument validity can be argued as follows: trading liquidity is a key determinant for institutional equity ownership (by the existing bond holders), and has explanatory power for the presence of dual holders. In contrast, the liquidity-related characteristics that make a bank more or less attractive for institutional equity investing should not directly affect its risk. They could, however, indirectly affect bank risk through the effect of equity holding of the bondholders (dual holding).

We therefore run the following model:

$$Y_i = \beta_0 + \beta_1 log(E^{DH}/E + 1)_i + \beta_2 X_i + \epsilon_i$$

$$log(E^{DH}/E+1)_i^{\star} = \beta_0 + \beta_1 Z_i + \beta_2 X_i + \epsilon_i \tag{2}$$

where Z_i is logarithm of the relative bid-ask spread as a proxy for stock liquidity. Results are reported in Table 4

[Insert Table 4 here]

The first stage regression indicates that the instrument is significant and with the expected sign. The second stage results confirm and actually strengthen the previous findings. Both Risk measures, Volatility and VaR, appear significantly reduced by the presence of dual holders with a similar estimated economic value of the effect. The F statistic regression diagnostics further support the validity of the instrument and minimize concerns of weak identification. In our case the F statistic is 4.58, below the conventional 10 threshold for a strong instrument. However, this conventional threshold assumes a large number of samples, and therefore, in our case where the number of samples is low, 4,58 still represents a strong instrumental relevance.

6.4. Channels

We have shown that dual ownership mitigates risk taking unconditionally and conditionally on the CEO compensation structure. It is however important to understand the channel through which this effect unfolds. Hypothesis 2 conjectures that dual holders, having exposure to both groups of corporate claims, induce more conservative decisions by managers, leading to lower aggregate bank risk. Conservative decisions may entail a different composition of the investment portfolio such as a smaller fraction of nonperforming real estate assets and asset write-downs and conservative business portfolio selections such as a smaller fraction of nontraditional banking activities, among many others. We argue that if excessively risky investment decisions are taken prior to the crisis, their effects become visible once the crisis shock arrives in the following years. In fact, the vast majority of assets are stratified

over time and balance sheet items are the results of multi-period decisions. For example, a risky bank might lend to lower credit quality firms but may not experience significant delinquencies in normal economic condition. However, when a market-wide shock hits, the very same loan is more likely to reveal its quality turning to non-performing. Banks engaging in comparatively riskier investment policies before the crisis should therefore experience larger losses.

We test this potential transmission channel of the effect of dual ownership by looking at different proxies of risky investment policies. On the asset side of the bank's balance sheet, a bank's real estate portfolio is typically characterized by performing and nonperforming assets, the latter being: non-accrual loans in which payment of interest or principal is unlikely or where the borrower has fallen behind in interest payments, as well as foreclosed and repossessed properties.These are generally more visible than non-performing unsecured corporate loans. We therefore compute $LOW\_QUAL\_REAL\_EST$ as the amount of non-performing assets on real estate investments [NPAORE] given by non-accrual loans that are considered impaired because the payment of interest or principal is doubtful, plus other real estate owned assets [OREO], which represent properties acquired through foreclosure and repossession that serve as a total or partial repayment of a loan divided by total assets, measured at Dec 2008. On the income statement side, we measure write-downs as another proxy for risky investment. Although banks have some discretion over write-downs, they are required to take write-downs on investments that could ex ante be considered risky even if the assets do not actually result in realized losses. WR_DWNS is an aggregate measure given by the sum of: provisions for credit losses [PCL] and other provisions [PVON], pretax write-downs [WDP], losses on investment securities [INVSGL], and allowances or reserves for other losses [AROL], all measured over the period 2007-2008 and scaled by total assets. log_NONINT_INCOME is the logarithm of total non-interest income [NIINT] divided by net operating income (non-interest income + interest income [TNII] − interest expense [XINT]), all summed over 2007-2008. The model specification is (3):

$$Z_{i,MAR09} = \beta_0 + \beta_1 DH_{i,DEC06} + \beta_2 X_{i,DEC06} + \epsilon_{i,MAR09} \quad (3)$$

where $Z_{i,MAR09}$ is one the two alternative measures for the risky (or conservative) decisions of a bank.

[Insert Table 5 here]

Table (5) shows the results. Column (1) shows that the presence of dual holders, on average, decreases $LOW\_QUAL\_REAL\_EST$ (nonperforming assets on real estate) by 18%. Based on the average values in table (2), this amounts to 60% decrease with respect to the average ratio of nonperforming assets on real estate.

Similarly, column (2) shows that the presence of dual holders, on average, decreases WR_DWNS (write-downs) by 3%. Based on the summary descriptive table (2), this amounts to 90% decrease with respect to the average write-downs. Differently, results in column (3) while being negative as expected are insignificant thereby not fully supporting the existence of effects of dual holders on business portfolio riskiness.

6.5. The mechanics of dual ownership

In this section, we investigate the mechanism through which dual ownership deploys its influence on risk taking. In particular, as proposed in hypotheses (3-1) and (3-2), we identify two alternative but not mutually exclusive explanations: an alignment of incentives, or an improvement in the information flow that provides an information bridge between shareholders and bondholders. In order to test our hypotheses we follow Bodnaruk and Rossi (2016) and interact the dual holding variable with two measures of relative bond exposure and opacity, and estimate the interaction effects. To measure how much dual holders are exposed to and concerned about their debt, we calculate D^{DH}/E^{DH}, the percentage ratio of dual holders' debt to equity, and define bank's dual holders as "highly exposed to bonds" if the percentage is above the sample median. More precisely, the HBE (High Bond Exposure)

dummy takes the value of one if D^{DH}/E^{DH} is above the sample median, and zero otherwise. Similarly, the LBE (Low Bond Exposure) dummy takes the value of one if D^{DH}/E^{DH} is below the sample median, and zero otherwise. To measure the opacity of a bank and the severity of information asymmetry between outsiders and insiders of the bank, we use analysts' target price standard deviation, and define two dummy variables: $HSTDEV$ and $LSTDEV$. The dummy variable $HSTDEV$ (high standard deviation) takes the value of one if the standard deviation of analysts' target price estimates is above the sample mean, and zero otherwise. Similarly, $LSTDEV$ (low standard deviation) dummy takes the value of one if the standard deviation of analysts' target price estimates is below the sample mean, and zero otherwise. We then estimate the two following models:

$$Y_{i,MAR09} = \beta_0 + \beta_1 log(E^{DH}/E + 1)_i \times HBE_i + \beta_2 log(E^{DH}/E + 1)_i \times LBE_i + \beta_3 HBE_i + \beta_4 X_i + \epsilon_{i,MAR09}$$

$$Y_{i,MAR09} = \beta_0 + \beta_1 log(E^{DH}/E + 1)_i \times HSTDEV_i + \beta_2 log(E^{DH}/E + 1)_i \times LSTDEV_i + \beta_3 HSTDEV_i + \beta_4 X_i + \epsilon_{i,MAR09}$$

Table (6) shows the results of the regressions.

[Insert Table 6 here]

Columns (1) and (3) show that the decreases in stock volatility and value at risk are most apparent in banks with less transparency (high analysts' opinion dispersion). This evidence confirms the information bridge hypothesis and suggests that the presence of dual holders in opaque banks acts as an alternative information mechanism to the public disclosure of information, bridges debt holders and equity holders, and facilitates the communication between

the two groups. By having better communication and showing more signs of commitment to not pursue risky business policies, shareholders will reduce the debt agency cost. Differently, columns (2) and (4) lend only limited support to the incentive alignment hypothesis as the estimated effects are economically small and statistically weak. These findings are in fact consistent with the lower unconditional dual holders' portfolio balance, $(D^{DH}/(D^{DH} + E^{DH}))$, in banks (see Table (1)) as compared to corporations (Bodnaruk and Rossi (2016)). Since the debt exposure of banks' dual holders is typically very low, the ex ante incentive of dual holders is likely reduced leading to the weak results we obtain in our tests.

6.6. Bank Performance and Dual Holding

Our findings support the argument that banks that have dual holding exhibit lower risk. The reduction in risk comes from dual holders who act as debt holders with control rights and moderate risk shifting and agency costs. The decrease in debt agency cost should lead to higher stock value, everything else equal. To examine whether dual holders and their protective policies create value also for shareholders, we perform a set of regressions of stock prices and performance. Following Aebi et al. (2012), we use two measures for bank's stock performance: stock cumulative total return (CRET) and stock cumulative abnormal return (CAR), and calculate them over the crisis period. Both measures are calculated daily over the 35-month (371 days) period of Jan 2007 to Nov 2009. We use a Market-Adjusted Model to estimate the expected (normal) return. We select a 100-day window before the event to estimate the betas and a 50-day gap between the event and the window to minimize the information leakage effect. The model specification is reported in equation (4):

$$P_{i,MAR09} = \beta_0 + \beta_1 DH_{i,DEC06} + \beta_2 X_{i,DEC06} + \epsilon_{i,MAR09} \tag{4}$$

where $P_{i,MAR09}$ is alternatively the stock cumulative total return and the stock cumulative abnormal return.

Table (7) presents the results.

[Insert Table 7 here]

Column (1) shows that the presence of dual holders, on average, is associated with 24.9% higher cumulative raw returns. The economic value is large and equivalent to a 56.5% improvement versus the an unconditional mean return of -44%. Using the alternative continuous measure of dual ownership allows to estimate more granular marginal effects. Results in column (2) show that one standard deviation increase in $log(E^{DH}/E + 1)$ increases stock cumulative total return (CRET) by about 10.15% over the unconditional mean. Turning to risk adjusted measure the effect of dual holders appears even more pronounced with a 53.4% increase in stock cumulative abnormal returns over the sample period keeping all the other variables constant. This effect is economically large as it indicates that banks with dualholders experienced risk close to zero risk adjusted returns as opposed to large, negative returns for peer banks. The magnitude of the effect for the linear measure of dual holding is similar to the one estimated for raw returns but marginally insignificant.

7. Conclusions

In this paper we show that dual ownership, i.e. the simultaneous ownership of shares and bonds of the same issuer by one or more investors, significantly reduces bank risk. Using the great financial crisis as an exogenous shock, we found that banks with dual holdings while being virtually indistinguishable from their peers, following the crisis shock exhibit a substantially lower VaR and smaller stock volatility. In particular, the presence of dual holders on average, decreases stock volatility by 2%, and decreases Value at Risk at 5% by 2%, both economically large effects. The channel of transmission of these effects is through a decrease in the riskiness of banks'investment and business portfolio. Our estimates indicate that during the sample period the presence of dual holders, on average, leads to 18% decrease in nonperforming assets on real estate, and 3% decrease in write-downs.

To establish the mechanism of dual holders' effects, we further showed that their impact is

more dominant in opaque banks, indicating that banks' dual holders decrease the information asymmetry thus mitigating the debt holder-shareholder conflict. Finally, we showed that banks with dual holders exhibit superior stock performance due to the decrease in debt agency costs. Quantitatively, dual ownership is associated with a 2% increase in stock abnormal return. The results are robust to several definitions of dual holding and bank risk.

Our results can have profound policy implications in the ongoing quest for financial stability. In fact, a crucial feature of dual ownership as a mechanism to reduce risk taking, is its pure market-based nature that doesn't require the intervention and enforcement of regulators or the design of convoluted incentive-aligning compensation packages or securities. Also, being dual ownership largely observable it may lead to more granular capital adequacy requirements that may at once provide stability to the financial institutions while not limiting profitability.

References

Acharya, V. V., Johnson, T. C., 2007. Insider trading in credit derivatives. Journal of Financial Economics 84, 110–141.

Adams, R. B., Mehran, H., et al., 2003. Board structure, banking firm performance and the bank holding company organizational form. In: *Federal Reserve Bank of Chicago Proceedings*, no. 866.

Aebi, V., Sabato, G., Schmid, M., 2012. Risk management, corporate governance, and bank performance in the financial crisis. Journal of Banking & Finance 36, 3213–3226.

Anderson, R. C., Fraser, D. R., 2000. Corporate control, bank risk taking, and the health of the banking industry. Journal of Banking & Finance 24, 1383–1398.

Anton, M., Lin, L. X., 2020. The mutual friend: Dual holder monitoring and firm investment efficiency. Review of Corporate Finance Studies 9, 81–115.

Bebchuk, L. A., Spamann, H., 2009. Regulating bankers' pay. Geo. lJ 98, 247.

Berger, A. N., Kick, T., Schaeck, K., 2014. Executive board composition and bank risk taking. Journal of Corporate Finance 28, 48–65.

Berger, A. N., Turk-Ariss, R., 2015. Do depositors discipline banks and did government actions during the recent crisis reduce this discipline? an international perspective. Journal of Financial Services Research 48, 103–126.

Berkowitz, J., O'Brien, J., 2002. How accurate are value-at-risk models at commercial banks? The journal of finance 57, 1093–1111.

Bernanke, B. S., 1989. Is there too much corporate debt? Business Review Sep, 3–13.

Bodnaruk, A., Rossi, M., 2016. Dual ownership, returns, and voting in mergers. Journal of Financial Economics 120, 58–80.

Bodnaruk, A., Rossi, M., 2020. Shareholders as creditors of first resort. Management Science .

Bolton, P., Mehran, H., Shapiro, J., 2015. Executive compensation and risk taking. Review of Finance 19, 2139–2181.

Brunnermeier, M. K., 2009. Financial crisis: mechanism, prevention and management. Macroeconomic stability and financial regulation: key issue for the G 20, 91–104.

Cassell, C. A., Huang, S. X., Sanchez, J. M., Stuart, M. D., 2012. Seeking safety: The relation between ceo inside debt holdings and the riskiness of firm investment and financial policies. Journal of Financial Economics 103, 588–610.

Chava, S., Wang, R., Zou, H., 2019. Covenants, creditors' simultaneous equity holdings, and firm investment policies. Journal of Financial and Quantitative Analysis 54, 481–512.

Chen, C. R., Steiner, T. L., Whyte, A. M., 2006. Does stock option-based executive compensation induce risk-taking? an analysis of the banking industry. Journal of Banking & Finance 30, 915–945.

Chen, T., Zhang, L., Zhu, Q., 2019. Dual ownership and risk-taking incentives in managerial compensation. Available at SSRN 3427030 .

Chesney, M., Stromberg, J., Wagner, A. F., Wolff, V., 2020. Managerial incentives to take asset risk. Journal of Corporate Finance 65, 101758.

Chu, Y., 2018. Shareholder-creditor conflict and payout policy: Evidence from mergers between lenders and shareholders. The Review of Financial Studies 31, 3098–3121.

Chu, Y., Diep-Nguyen, H., Wang, J., Wang, W., Wang, W., 2019. Simultaneous debt-equity holdings and the resolution of financial distress. Kelley School of Business Research Paper .

DeYoung, R., Peng, E. Y., Yan, M., 2013. Executive compensation and business policy choices at us commercial banks. Journal of financial and Quantitative Analysis 48, 165–196.

Duchin, R., Sosyura, D., 2012. The politics of government investment. Journal of Financial Economics 106, 24–48.

Edmans, A., Liu, Q., 2010. Inside debt. Review of finance 15, 75–102.

Fahlenbrach, R., Stulz, R. M., 2011. Bank ceo incentives and the credit crisis. Journal of financial economics 99, 11–26.

Flannery, M. J., Rangan, K. P., 2008. What caused the bank capital build-up of the 1990s? Review of Finance 12, 391–429.

Furfine, C. H., 2001. Banks as monitors of other banks: Evidence from the overnight federal funds market. The Journal of Business 74, 33–57.

Galai, D., Masulis, R. W., 1976. The option pricing model and the risk factor of stock. Journal of Financial economics 3, 53–81.

Greenbaum, S. I., Thakor, A. V., Boot, A. W., 2019. Contemporary financial intermediation. Academic Press.

Gropp, R., Heider, F., 2010. The determinants of bank capital structure. Review of finance 14, 587–622.

Gropp, R., Vesala, J., Vulpes, G., 2006. Equity and bond market signals as leading indicators of bank fragility. Journal of Money, Credit and Banking pp. 399–428.

Hagendorff, J., Keasey, K., Vallascas, F., 2017. When banks grow too big for their national economies: Tail risks, risk channels, and government guarantees. Journal of Financial and Quantitative Analysis, Forthcoming .

Hagendorff, J., Vallascas, F., 2011. Ceo pay incentives and risk-taking: Evidence from bank acquisitions. Journal of Corporate Finance 17, 1078–1095.

Hamilton, D., Irlbeck, S., McKee, E., 2019. Dual ownership as a market solution to risk shifting: Evidence from loan covenant violations. Available at SSRN 3022273 .

Houston, J. F., Lin, C., Lin, P., Ma, Y., 2010. Creditor rights, information sharing, and bank risk taking. Journal of financial Economics 96, 485–512.

Ivashina, V., Sun, Z., 2011. Institutional stock trading on loan market information. Journal of financial Economics 100, 284–303.

Jensen, M. C., Meckling, W. H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of financial economics 3, 305–360.

Jiang, W., Li, K., Shao, P., 2010. When shareholders are creditors: Effects of the simultaneous holding of equity and debt by non-commercial banking institutions. The Review of Financial Studies 23, 3595–3637.

John, K., Saunders, A., Senbet, L. W., 2000. A theory of bank regulation and management compensation. The Review of Financial Studies 13, 95–125.

Johnson, S. A., 1998. The effect of bank debt on optimal capital structure. Financial Management pp. 47–56.

Kahn, C., Winton, A., 2004. Moral hazard and optimal subsidiary structure for financial institutions. The Journal of Finance 59, 2531–2575.

Kashyap, A., Rajan, R., Stein, J., 2008. The global roots of the current financial crisis and its implications for regulation. In: *Fifth ECB Central Banking Conference, Frankfurt am Main*, Citeseer, pp. 13–14.

Keswani, A., Tran, A. L., Volpin, P. F., 2019. Institutional debt holdings and governance. European Corporate Governance Institute-Finance Working Paper .

Kirkpatrick, G., 2009. The corporate governance lessons from the financial crisis. OECD Journal: Financial Market Trends 2009, 61–87.

Laeven, L., Levine, R., 2009. Bank governance, regulation and risk taking. Journal of financial economics 93, 259–275.

Levine, R., 2004. The corporate governance of banks: A concise discussion of concepts and evidence. The World Bank.

Liu, J. Y., 2019. Dual holdings and corporate cash holdings. In: *9th FIRN Annual Conference*.

Macey, J. R., O'hara, M., 2003. The corporate governance of banks. Economic policy review 9.

Manconi, A., Massa, M., 2009. Keeping a foot in both camps: The governance role of institutional investors holding equity and bonds of the same company. Unpublished manuscript .

Martinez Peria, M. S., Schmukler, S. L., 2001. Do depositors punish banks for bad behavior? market discipline, deposit insurance, and banking crises. The journal of finance 56, 1029–1051.

Morgan, D. P., 2002. Rating banks: Risk and uncertainty in an opaque industry. American Economic Review 92, 874–888.

Nier, E., Baumann, U., 2006. Market discipline, disclosure and moral hazard in banking. Journal of Financial Intermediation 15, 332–361.

Srivastav, A., Armitage, S., Hagendorff, J., King, T., 2018. Better safe than sorry? ceo inside debt and risk-taking in bank acquisitions. Journal of Financial Stability 36, 208–224.

Stulz, R. M., 2015. Risk-taking and risk management by banks. Journal of Applied Corporate Finance 27, 8–18.

Van Bekkum, S., 2016. Inside debt and bank risk. Journal of Financial and Quantitative Analysis 51, 359–385.

Yang, H., 2019. Institutional dual holdings and risk shifting: Evidence from corporate innovation. Available at SSRN 2837530 .

Fig. 1. Methodology
This figure reports the methodology

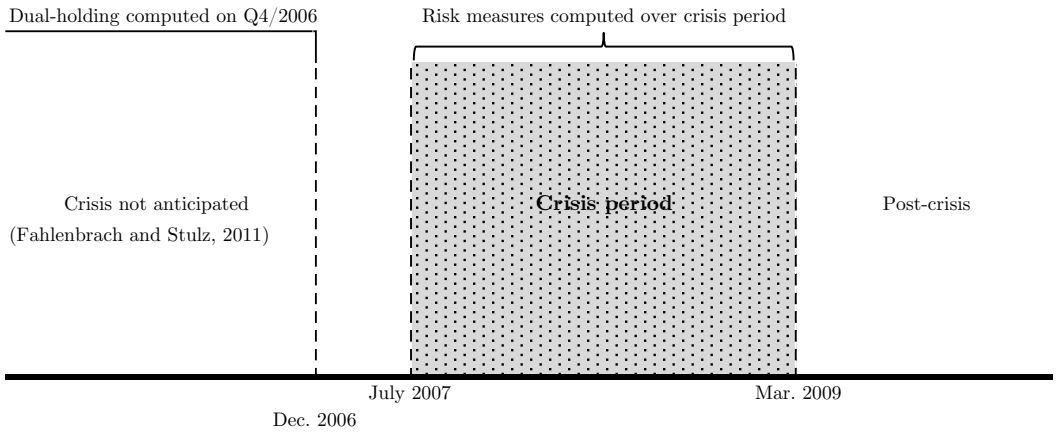

Fig. 2. Risk measures

This figure plots the risk measures levels before, during and after the crisis. The top panel plots the evolution of returns volatility. The bottom panel report Value at Risk

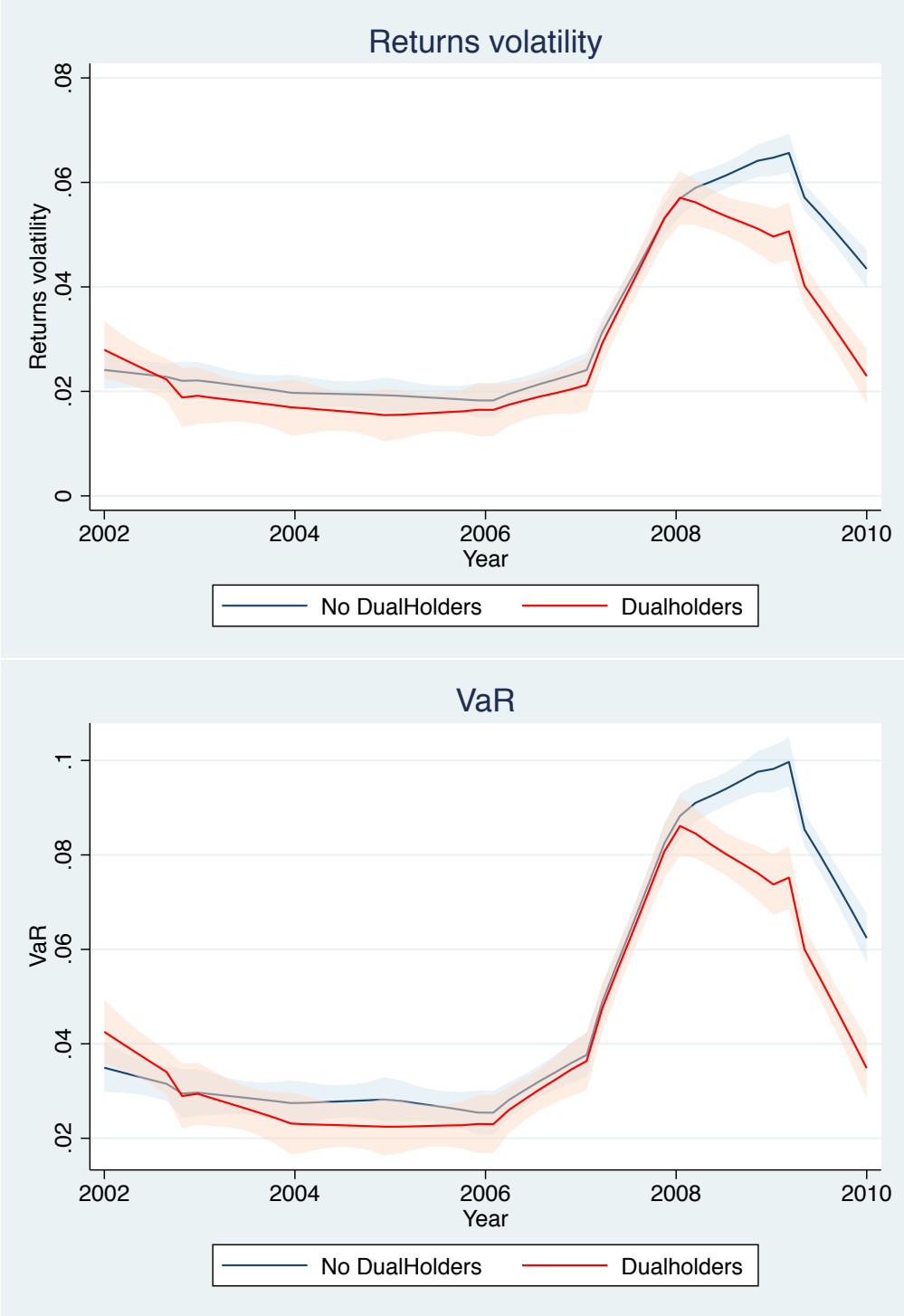

Table 1: Descriptive Statistics

This table presents descriptive statistics for banks in the last quarter of 2006. RoA is the ratio of EBIT to total assets. STDEV is standard deviation of analysts' target price estimation. Ownership HHI is Herfindahl Hirschman Index of institutional share ownership. Our sample consists of random 209 banks, including 64 banks with significant dual holding and 145 banks without significant dual holding, measured at the end of 2006.

	N	mean	median	stdev	min	max
Banks with Significant Dual Holding:						
Total assets (m$)	64	197,919	58,001	319,332	206	1,459,737
Bank's leverage(D/E)	64	10.942	9.343	7.962	.401	38.883
Bank's leverage($D/(E+D)$)	64	.84	.903	.174	.280	.973
RoA	61	.048	.033	.045	.0113	.180
Market capitalization(m$)	58	28,977	10,036	45,026	184	238,020
GINDEX	46	9.390	9	2.704	4	16
TobinQ	64	1.184	1.062	.331	.944	3.133
STDEV	64	5.620	3.794	6.441	.380	37.194
Board_Size	64	9.113	9	5.544	1	26
Board_Indp	64	.714	.941	.409	0	1
Ownership HHI	64	.060	.041	.072	.011	.503
VALUE_OF_INSIDE_DEBT (m$)	36	15.543	5.241	24.522	0	111.451
EXECUTIVE_D/E_RATIO	36	.203	.091	.252	0	1.010
log_insideDebt_ratio	32	-4.292	-3.825	1.952	-9.080	-.472
E^{DH}/E	64	.057	.036	.053	$\sim$0	.198
$log(E^{DH}/E+1)$	64	.054	.035	.049	$\sim$0	.181
D^{DH}/D	63	.002	0.001	.003	$\sim$0	0.015
D^{DH}/E^{DH}	63	.2	0.014	.812	$\sim$0	6.341
DHs' portfolio balance ($D^{DH}/(D^{DH}+E^{DH})$)	63	.073	.008	.171	1.70e-03	.860
Banks without Significant Dual Holding:						
Total assets (m$)	145	217,770	16,070	163,151	36.27	1,952,307
Bank's leverage(D/E)	145	9.153	9.095	4.721	.048	35.392
Bank's leverage($D/(E+D)$)	145	.832	.901	.184	.005	.970
RoA	137	.037	.020	.071	-.416	.546
Market capitalization(m$)	137	700	276	1,307	8.833	12,290
GINDEX	76	9.112	9	3.084	4	15
TobinQ	145	1.140	1.071	.441	.582	4.793
STDEV	142	3.591	1.883	6.812	0	77.681
Board_Size	144	7.130	7	4.413	1	21
Board_Indp	144	.762	.909	.352	0	1
Ownership HHI	140	.161	.103	.174	.021	1
VALUE_OF_INSIDE_DEBT (m$)	90	4.090	1.631	5.801	0	28.800
EXECUTIVE_D/E_RATIO	87	.843	.101	5.943	0	55.646
log_insideDebt_ratio	71	-4.061	-3.912	1.703	-8.824	1.852

Table 2: Descriptive Statistics (Risk-related Variables)

This table presents descriptive statistics for risk-related variables in banks, calculated over the period of 2007-2009. $CRET$ is stock cumulative total teturn and CAR is stock cumulative abnormal return; both are calculated daily over the 35-month (371 days) period of Jan 2007 to Nov 2009. $daily\_ret\_STDev$ is standard deviation of daily stock return (1-day standard deviation). WRITE-DOWNS is provisions for credit losses [PCL] and other provisions [PVON], pretax write-downs [WDP], losses on investment securities [INVSGL], and allowances or reserves for other losses [AROL], all summed over 2007-2008 and scaled by total assets. REPO GROWTH is the proportional change in repurchase agreements [RPAGQ] from Dec 2006 to July 2007. NONINTEREST INCOME is the logarithm of total noninterest income [NIINT] divided by net operating income (noninterest income plus interest income [TNII] minus interest expense [XINT]), all summed over 2007-2008.

	N	mean	median	stdev	min	max
Banks with Significant Dual Holding:						
$daily\_ret\_STDev$	64	.059	.055	.034	.006	.186
VaR	64	-.082	-.080	.030	-.163	-.013
CRET	53	-.387	-.382	.473	-.990	1.434
CAR	53	-.111	.037	.962	-3.645	1.703
LOW_QUALITY_REAL_ESTATE	46	.094	0	.181	0	.701
WRITE_DOWNS	52	.013	.013	.055	-.334	.098
NONINTEREST_INCOME	31	.844	.846	.484	.079	2
Banks without Significant Dual Holding:						
$daily\_ret\_STDev$	145	.052	.047	.025	.002	.196
VaR	145	-.082	-.073	.036	-.234	-.003
CRET	139	-.440	-.504	.426	-.993	1.561
CAR	139	-.412	-.245	1.163	-4.715	4.702
LOW_QUALITY_REAL_ESTATE	126	.275	.114	.378	0	1.650
WRITE_DOWNS	129	.030	.024	.081	-.384	.774
NONINTEREST_INCOME	112	.344	.340	.519	-2.684	2.290

Table 3: Effect of Dual Holding on Bank Risk

This table reports the OLS cross sectional regression of bank risk on dual holding. $-VaR(5\%)$ is negative of the value at risk at 5% level. *daily_ret_STDev* is the total stock return volatility. (E^{DH}/E) is the ratio of shares held by dual holders to all outstanding shares. Dual holding is measured in the last quarter of 2006. The risk measures are calculated over the period of Jan 2007 to March 2009. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. insideDebt_ratio equals the executive's personal D/E ratio divided by the firm's external D/E ratio. There are 209 financial firms in the sample; 64 of the firms have dual holding in the last quarter of 2006. Robust standard errors in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	$Volatility$			$-VaR$		
	(1)	(2)	(3)	(4)	(5)	(6)
DH	-0.018***		-0.021**	-0.021**		-0.024*
	(0.007)		(0.010)	(0.008)		(0.013)
$log(E^{DH}/E+1)$		-0.183*			-0.205*	
		(0.097)			(0.120)	
log_insideDebt_ratio			-0.008**			-0.004 **
			(0.02)			(0.01)
log_Assets	0.004***	0.004***	0.011***	0.004***	0.004***	0.011***
	(0.001)	(0.002)	(0.004)	(0.002)	(0.002)	(0.003)
RoA	0.091**	0.093**	0.498*	0.130**	0.133**	0.523
	(0.044)	(0.044)	(0.281)	(0.060)	(0.059)	(0.310)
TobinQ	-0.006	-0.005	-0.038	-0.008	-0.008	-0.044
	(0.004)	(0.004)	(0.023)	(0.006)	(0.006)	(0.027)
HHI	0.029***	0.030***	0.014	0.055***	0.056***	-0.138
	(0.011)	(0.011)	(0.149)	(0.018)	(0.018)	(0.169)
Intang Assets Ratio	-0.001	-0.024*	0.008	0.005	-0.021	0.026
	(0.016)	(0.013)	(0.027)	(0.024)	(0.021)	(0.032)
Num. Directors	-0.0003	-0.0002	0.00007	-0.0003	-0.0003	0.0007
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.019*	0.018	-0.021	0.050***	0.049***	0.016
	(0.012)	(0.013)	(0.044)	(0.015)	(0.016)	(0.052)
Observations	209	209	67	209	209	67
R^2	0.112	0.101	0.526	0.087	0.081	0.461

Table 4: Effect of Dual Holding on Bank Risk: 2SLS

This table reports a two-stage (2SLS) Instrumental variable analysis of bank risk on dual holding. In the first stage we instrument the continuous measure of dual holding, (E^{DH}/E) i.e. the ratio of shares held by dual holders to all outstanding shares, using the relative bid-ask spread as a proxy for stock liquidity, as suggested by Jiang et al. (2010). In the second stage we use the instrumented measure of dual holding against the two alternative risk measures. Controls are the ones used and described in Table 3. Robust standard errors in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	First Stage	Second Stage	
	$log(E^{DH}/E+1)$	$Volatility$	$-VaR$
log(bid-ask spread)	-.006**		
	(0.003)		
$log(E^{DH}/E+1)$		-1.438**	-2.406*
		(0.818)	(1.352)
log_Assets	0.008***	0.016**	0.024**
	(0.002)	(0.007)	(0.011)
RoA	0.093*	0.173**	0.272**
	(0.049)	(0.087)	(0.137)
TobinQ	-0.005	-0.009	-0.014
	(0.004)	(0.006)	(0.009)
HHI	0.128*	0.054**	0.097***
	(0.007)	(0.021)	(0.035)
Intang Assets Ratio	0.009	-0.015	-0.003
	(0.011)	(0.018)	(0.031)
Num. Directors	0.000	-0.000	-0.000
	(0.000)	(0.001)	(0.001)
Constant	-0.084***	-0.061	-0.091
	(0.022)	(0.050)	(0.083)
Observations	206	206	206
R^2	0.3841	0.6710	0.6252
Kleibergen-Paap LM Chi-sq		4.70**	
(H0: underidentified)		(0.030)	
Kleibergen-Paap Wald F statistic		4.58**	
(H0: weakly identified)		(0.034)	

Table 5: Effect of Dual Holding on Bank's Risk Taking Policies

This table reports the OLS cross sectional regression of bank risky actions on dual holding. $LOW\_QUAL\_REAL\_EST$ is nonperforming assets on real estate [NPAORE] plus other real estate owned assets [OREO] divided by total assets, measured at Dec 2008. WR_DWNS is provisions for credit losses [PCL] and other provisions [PVON], pretax write-downs [WDP], losses on investment securities [INVSGL], and allowances or reserves for other losses [AROL], all summed over 2007-2008 and scaled by total assets. log_NONINT_INCOME is the logarithm of total noninterest income [NIINT] divided by net operating income (noninterest income minus interest income [TNII] plus interest expense [XINT]), all summed over 2007-2008. Dual holding is measured at the last quarter of 2006. The risk measures are calculated over the period of Jan 2007 to March 2009. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. There are 209 banks in the sample. The description of the dependent variables can be found in table (2). Robust standard errors are in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	$LOW\_QUAL\_REAL\_EST$	WR_DWNS	log_NONINT_INCOME
	(1)	(2)	(3)
DH	-0.173**	-0.032*	-0.159
	(0.071)	(0.017)	(0.368)
log_assets	-0.026	-0.000	0.134**
	(0.019)	(0.002)	(0.052)
RoA	-1.867***	0.121	5.523
	(0.503)	(0.267)	(3.752)
TobinQ	0.057	-0.040	-0.619
	(0.037)	(0.025)	(0.916)
Ownership HHI	-0.155	-0.041**	0.339
	(0.172)	(0.018)	(0.273)
intan_ratio	0.004	0.101	2.303
	(0.217)	(0.111)	(4.039)
Board_Indp	-0.194	0.009	-0.040
	(0.147)	(0.008)	(0.147)
Constant	0.671**	0.071**	-1.597
	(0.260)	(0.034)	(1.134)
Observations	181	196	138
R^2	0.097	0.126	0.141

Table 6: Asymmetry of Information and Incentive Alignment

This table reports the OLS cross sectional regression of bank risk on dual holding. $VaR(5\%)$ is value at risk at 5% level. *daily_ret_STDev* is the total stock return volatility. (E^{DH}/E) is the ratio of shares held by dual holders to all outstanding shares. Dual holding is measured at the last quarter of 2006. The risk measures are calculated over the period of Jan 2007 to March 2009. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or 2 million USD. High bond exposure, HBE (Low bond exposure, LBE) dummy takes the value of one if $D^{DH}/(E^{DH}+D^{DH})$ of dual holders is above (below) sample median and zero otherwise. High opinion dispersion, $HSTDEV$ (Low opinion dispersion, $LSTDEV$) dummy takes the value of one if standard deviation of analysts' target price estimates is above (below) sample average and zero otherwise. There are 209 banks in the sample. Robust standard errors are in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	$Volatility$		$-VaR$	
	(1)	(2)	(3)	(4)
$log(E^{DH}/E+1)$ × HSTDEV	-0.278**		-0.288**	
	(0.108)		(0.139)	
$log(E^{DH}/E+1)$ × LSTDEV	0.304*		0.080	
	(0.180)		(0.128)	
HSTDEV	0.017***		0.021**	
	(0.006)		(0.009)	
$log(E^{DH}/E+1))$ × HBE		-0.168*		-0.192
		(0.097)		(0.141)
$log(E^{DH}/E+1)$ × LBE		-0.141		-0.157
		(0.116)		(0.134)
HBE		-0.012		-0.013
		(0.007)		(0.011)
Controls	YES	YES	YES	YES
Constant	0.048**	0.013	0.086***	0.039**
	(0.020)	(0.014)	(0.022)	(0.017)
Observations	131	64	131	64
R^2	0.204	0.117	0.102	0.094

Table 7: Effect of Dual Holding on Bank Performance

This table reports the OLS cross sectional regression of stock performance measured alternatively as the stock Cumulative Total Return and the stock Cumulative Abnormal Return, on dual holding. Both are calculated daily over the 35-month (371 days) period of Jan 2007 to Nov 2009. Dual holding is measured at the last quarter of 2006. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. There are 209 financial firms in the sample; 64 of the firms have dual holding in the last quarter of 2006. Robust standard errors in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	Cumulative returns		*CAR*	
	(1)	(2)	(3)	(4)
DH	0.249***		0.534**	
	(0.093)		(0.243)	
$log(E^{DH}/E+1)$		2.071*		1.865
		(1.140)		(3.138)
log_assets	-0.037**	-0.033	0.030	0.060
	(0.017)	(0.021)	(0.047)	(0.051)
RoA	0.516	0.499	3.793*	3.954*
	(0.816)	(0.809)	(2.179)	(2.174)
TobinQ	-0.016	-0.024	-0.549**	-0.575**
	(0.080)	(0.078)	(0.242)	(0.236)
HHI	-0.102	-0.107	1.103**	1.136**
	(0.146)	(0.151)	(0.523)	(0.532)
Intang Assets Ratio	-0.004	0.307	1.083	1.770**
	(0.334)	(0.298)	(0.800)	(0.701)
Num. Directors	0.0001	-0.0005	0.015	0.014
	(0.006)	(0.007)	(0.020)	(0.020)
Constant	-0.231	-0.241	-0.557	-0.737
	(0.189)	(0.208)	(0.493)	(0.520)
Observations	207	207	207	207
R^2	0.044	0.031	0.099	0.088

Internet Appendix

Table A1: Cross-correlation table

Variables	log_assets	RoA	TobinQ	HHI	intan_ratio	Board_indp	leverage
log_assets	1.0000						
RoA	-0.1003	1.0000					
TobinQ	-0.1471	0.8687	1.0000				
HHI	-0.3848	-0.1937	-0.1516	1.0000			
intan_ratio	0.0482	0.3623	0.3071	-0.1620	1.0000		
Board_indp	-0.1480	0.0860	0.0715	-0.0084	0.1047	1.0000	
leverage	0.4851	-0.4114	-0.3896	0.0111	-0.3516	-0.0727	1.0000

Table A2: Effect of Dual Holding on Bank Risk

This table reports the OLS cross sectional regression of bank risk on dual holding. $-VaR(5\%)$ is negative of the value at risk at 5% level. *daily_ret_STDev* is the total stock return volatility. (E^{DH}/E) is the ratio of shares held by dual holders to all outstanding shares. Dual holding is measured at the last quarter of 2006. The risk measures are calculated over the period of Jan 2007 to March 2009. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. *insideDebt_ratio* equals the executive's personal D/E ratio divided by the firm's D/E ratio. There are 209 banks in the sample. Robust standard errors are in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	$Volatility$			$-VaR$		
	(1)	(2)	(3)	(4)	(5)	(6)
DH	-0.018***		-0.022**	-0.021***		-0.026**
	(0.007)		(0.010)	(0.008)		(0.013)
$log(E^{DH}/E+1)$		-0.182*			-0.203*	
		(0.093)			(0.112)	
log_insideDebt_ratio			0.001			0.002
			(0.002)			(0.003)
log_assets	0.004***	0.004***	0.012***	0.004***	0.004***	0.013***
	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
RoA	0.094**	0.096**	0.462*	0.134**	0.136**	0.420
	(0.041)	(0.040)	(0.253)	(0.056)	(0.056)	(0.320)
TobinQ	-0.006*	-0.005	-0.034	-0.009*	-0.008	-0.032
	(0.004)	(0.004)	(0.021)	(0.005)	(0.005)	(0.028)
Ownership HHI	0.031***	0.031***	0.029	0.057***	0.058***	-0.052
	(0.011)	(0.011)	(0.133)	(0.018)	(0.018)	(0.161)
intan_ratio	-0.004	-0.027**	0.009	0.001	-0.025	0.030
	(0.016)	(0.013)	(0.027)	(0.024)	(0.021)	(0.034)
Board_Indp	0.005	0.005	0.011	0.009	0.009	0.022**
	(0.005)	(0.005)	(0.014)	(0.007)	(0.007)	(0.010)
Constant	0.012	0.012	-0.043	0.039**	0.038**	-0.030
	(0.013)	(0.014)	(0.041)	(0.016)	(0.017)	(0.052)
Observations	209	209	67	209	209	67
R^2	0.116	0.105	0.540	0.094	0.087	0.494

Table A3: Effect of Dual Holding on Bank's Risk Taking Policies

This table reports the OLS cross sectional regression of bank risky actions on dual holding. $LOW\_QUAL\_REAL\_EST$ is nonperforming assets on real estate [NPAORE] plus other real estate owned assets [OREO] in Dec. 2008, relative to total assets. WR_DWNS is provisions for credit losses [PCL] and other provisions [PVON], pretax write-downs [WDP], losses on investment securities [INVSGL], and allowances or reserves for other losses [AROL], all summed over 2007 and 2008 and scaled by total assets. log_NONINT_INCOME is the logarithm of total noninterest income [NIINT] divided by net operating income (noninterest income minus interest income [TNII] plus interest expense [XINT]), all summed over 2007 and 2008. Dual holding is measured at the last quarter of 2006. The risk measures are calculated over the period of Jan 2007 to March 2009. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. There are 209 financial firms in the sample; 64 of the firms have dual holding in the last quarter of 2006. The description of the dependent variables can be found in table (2). Robust standard errors in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	$LOW\_QUAL\_REAL\_EST$	WR_DWNS	log_NONINT_INCOME
	(1)	(2)	(3)
DH	-0.178**	-0.032*	-0.148
	(0.071)	(0.017)	(0.383)
log_Assets	-0.016	-0.0002	0.134***
	(0.019)	(0.002)	(0.049)
RoA	-2.000***	0.116	6.148
	(0.550)	(0.268)	(3.793)
TobinQ	0.065*	-0.039	-0.680
	(0.036)	(0.024)	(0.876)
HHI	-0.160	-0.043**	0.372
	(0.177)	(0.018)	(0.272)
Intang Assets Ratio	-0.063	0.105	2.085
	(0.201)	(0.111)	(4.011)
Num. Directors	-0.006	-0.0003	0.010
	(0.012)	(0.001)	(0.012)
Constant	0.494***	0.081**	-1.661
	(0.167)	(0.033)	(1.090)
Observations	181	196	138
R^2	0.080	0.124	0.145

Table A4: Effect of Dual Holding on Bank Performance

This table reports the OLS cross sectional regression of stock performance on dual holding. Performance is measured by the unconditional stock cumulative total daily return (CRET) or the risk-adjusted cumulative daily return (CAR). Both are calculated over the 35-month (371 days) period of Jan 2007 to Nov 2009. Dual holding is measured at the last quarter of 2006. DH is a binary variable which takes the value of 1 if dual holders hold more than 1% of the firm's shares or a value in excess of 2 million USD. There are 209 banks in the sample. Robust standard errors are in parentheses. Significance at 10%, 5% and 1% level is denoted by by *, ** and *** respectively.

	CRET		*CAR*	
	(1)	(2)	(3)	(4)
DH	0.249***		0.521**	
	(0.092)		(0.242)	
$log(E^{DH}/E+1)$		2.046*		1.846
		(1.114)		(3.099)
log_assets	-0.040**	-0.036*	0.036	0.064
	(0.017)	(0.020)	(0.047)	(0.051)
RoA	0.532	0.531	3.509	3.692*
	(0.772)	(0.768)	(2.136)	(2.114)
TobinQ	-0.017	-0.026	-0.529**	-0.556**
	(0.077)	(0.075)	(0.241)	(0.235)
Ownership HHI	-0.111	-0.113	1.037**	1.074**
	(0.142)	(0.147)	(0.513)	(0.521)
intan_ratio	0.033	0.343	1.151	1.819**
	(0.333)	(0.298)	(0.818)	(0.728)
Board_Indp	-0.088	-0.087	-0.075	-0.074
	(0.084)	(0.086)	(0.234)	(0.236)
Constant	-0.142	-0.158	-0.426	-0.607
	(0.205)	(0.220)	(0.555)	(0.577)
Observations	207	207	207	207
R^2	0.051	0.038	0.097	0.086