Journal of Corporate Finance 58 (2019) 142–168

Contents lists available at ScienceDirect

Journal of Corporate Finance

journal homepage: www.elsevier.com/locate/jcorpfin

Corporate governance and firm performance: The sequel☆

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A B S T R A C T

Director stock ownership is most consistently and positively related to future corporate performance. Public policymakers and long-term investors should find this result especially relevant given their strong interest in long-term corporate performance. Equally important, corporate governance researchers should consider director stock ownership as a measure of corporate governance; this will also aid in the comparability of results across different studies.

In our 2008 paper, *Corporate governance and firm performance*, we considered data through 2002. In this paper, we extend our sample period through 2016. These additional 14 years of data provide a powerful out-of-sample test of the specification and power of director stock ownership as a measure of corporate governance. Further, extending the period allows us to capture the dynamics of the financial crisis, the Great Recession, Sarbanes-Oxley (2002), and Dodd-Frank (2010). We find director stock ownership most consistently and positively related to future corporate performance in this out-of-sample period (2003–2016) across a battery of different specifications, estimation techniques, and for different sub-samples. One particular sub-sample of considerable public interest is the 100 largest U.S. financial institutions around 2008. Bank director stock ownership is positively related to future bank performance, and bank director stock ownership is negatively related to future bank risk, both prior to and during the financial crisis – both results of considerable interest to senior bank regulators.

1. Introduction

Corporate governance continues to be a focus of not just the financial media but the popular media, as well. The scandals at Wells Fargo and Equifax are just the most recent in the long line of scandals involving large well-known public U.S. corporations. Going back in time – the financial crisis of 2008 was triggered by the implosion of the big banks. Further back in time, at the turn of the new millennium, the scandals in Enron, WorldCom, Tyco, and Qwest led to their demise.

After each set of these scandals, policymakers raised questions about the effectiveness of corporate governance mechanisms in these companies. This led to the inevitable call for more regulation and laws to constrain and regulate corporate behavior, to wit, the Sarbanes Oxley Act of 2002 and the Dodd-Frank Act of 2010. Have these two rather extensive set of laws addressed the governance concerns of corporate America? The recent Wells Fargo and Equifax episodes would suggest otherwise; these are particularly noteworthy because they are both in finance industries, which Dodd-Frank 2010 was explicitly designed to address. We think a more fruitful approach to addressing the corporate governance concerns is to focus on possible common themes underpinning the Enron, WorldCom, Tyco, Qwest, the big banks circa 2008, Wells Fargo, and Equifax scandals. We propose, on the basis of our more recent research, that misaligned CEO incentive compensation is a common theme underpinning the above corporate scandals.[1]

In our 2008 paper, "Corporate governance and firm performance," we focused on the question: How is corporate governance

☆ We thank seminar participants at the U.S. Federal Reserve Board, the U.S. Federal Deposit Insurance Corporation, and Jeff Netter, the first referee, and an anonymous second referee for helpful comments on a previous version of this paper.

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[1] More recently, misrepresentation of executive compensation to the board and investors is one of the issues at the center of the scandal involving Mr. Carlos Ghosn, ex-chairman of Nissan, who was arrested in Japan in November 2018.

https://doi.org/10.1016/j.jcorpfin.2019.04.006
Received 21 January 2019; Received in revised form 29 March 2019; Accepted 10 April 2019
Available online 13 April 2019
0929-1199/

measured? We considered an extensive set of governance measures used in the finance, accounting, and law literature, as well as governance indices sold by commercial vendors. *We found director stock ownership is most consistently and positively related to future corporate performance.* The academic and commercial indices showed no relationship with (future) performance and the other individual measures were weakly or inconsistently related to (future) performance. Given that the essence of good governance is the set of processes that ensures outside investors a fair return on their investment, we suggested director stock ownership as a measure of corporate governance. Public policymakers and long-term investors should find this result especially relevant given their strong interest in long-term corporate performance. Equally important, corporate governance researchers should consider director stock ownership as a measure of corporate governance; this will also aid in the comparability of results across different studies.[2] We consider the dollar value of stock ownership of the median director as the measure of good corporate governance. Our focus on the median director's ownership, instead of the average ownership, is motivated by the political economy literature on the median voter; see Shleifer and Murphy (2004), and Milanovic (2004).[3] Also, directors, as economic agents, are more likely to focus on the impact on the dollar value of their holdings in the company rather than on the percentage ownership.

In our earlier paper we considered data through 2002. In this paper, we extend our sample period through 2016. These additional 14 years of data provide a powerful out-of-sample test of the specification and power of director stock ownership as a measure of corporate governance. We find director stock ownership most consistently and positively related to future corporate performance in several out-of-sample periods (2002–2006, 2007–2009, 2010–2016) across a battery of different specifications, estimation techniques, and for different sub-samples (S&P 500, S&P MidCap 400, S&P SmallCap 600). One particular sub-sample of considerable public interest is the 100 largest U.S. financial institutions during the financial crisis of 2008.[4] Bank director stock ownership is positively related to future bank performance prior to and during the financial crisis, and bank director stock ownership is negatively related to future bank risk prior to and during the financial crisis; both above results should be of considerable interest to senior bank regulators.

Recently, there has been a growing trend among companies to implement CEO and director stock ownership guidelines. However, based on our Bhagat and Bolton (2014) paper, the amount of stock an insider sells (or acquires) may be as informative about future firm performance as the amount of stock he/she owns at any time. Therefore, in this paper we also propose an executive incentive compensation policy consistent with long-term firm performance. Specifically, we argue that better-aligned incentive compensation policies should be correlated with less (abnormal) selling by the CEO.

The remainder of the paper is organized as follows. The next section describes some of the more popular governance measures considered in the literature. Section 3 notes our sample and data, discusses the estimation procedure and presents the results on the relation between governance and performance. Section 4 provides a conceptual overview of how misaligned executive compensation has contributed to the corporate scandals noted above and proposes a better-aligned compensation policy. Section 5 highlights the relations among, governance, risk-taking, performance, and compensation policy for a sample of the 100 largest U.S. financial institutions during the financial crisis of 2008. The final section concludes with a summary.

2. Measures of corporate governance

The governance literature has considered various measures of corporate governance and has studied the impact of these governance measures on firm performance. Gompers, Ishii and Metrick's (2003) (GIM) governance measure is an equally-weighted index of 24 corporate governance provisions compiled by the Investor Responsibility Research Center (IRRC), such as, poison pills, golden parachutes, classified boards, cumulative voting, and supermajority rules to approve mergers. Bebchuk et al. (2009) recognize that some of these 24 provisions might matter more than others and that some of these provisions may be correlated. Accordingly, they create an “entrenchment index” comprising of six provisions – four provisions that limit shareholder rights and two that make potential hostile takeovers more difficult. While the above noted studies use IRRC data, Brown and Caylor (2006) use Institutional Shareholder Services (ISS) data to create their governance index.[5] This index considers 51 corporate governance features such as board structure and processes, corporate charter issues such as poison pills, management and director compensation and stock ownership guidelines.[6]

[2] There is a vast and growing literature on the relation between governance and finance, accounting, and corporate law variables; a review of these papers highlights lack of an agreed upon measure of governance. An incomplete review of this literature would include Ashbaugh-Skaife, Collins, and Lafond (2006), Erickson et al. (2006), Wintoki et al. (2012), Armstrong et al. (2014), Cremers and Ferrell (2014), Jenter and Lewellen (2015), Appel et al. (2016), Ferreira et al. (2018), Anginer et al. (2018), and Bernile et al. (2018).

[3] Stock ownership within most boards is highly skewed. While the median ownership in our sample is about $1.7 million, the average ownership is over $30 million, usually driven by one large owner.

[4] The sample of 100 largest U.S. financial institutions is based on Fahlenbrach and Stulz (2011) and generally represents the 100 largest commercial and investment banks as of the end of 2006.

[5] There have been considerable changes in governance databases that can make this reflection confusing. IRRC founded two parallel databases, the governance and the directors databases, which became RiskMetrics in the mid-2000s. RiskMetrics was subsequently acquired by MSCI and ISS; MSCI subsequently spun-off ISS. The governance database has not been kept up-to-date, but the ISS directors database is predominantly the same as the IRRC directors database.

[6] There are other governance indices provided by commercial vendors. The Corporate Library (TCL) was a commercial vendor that used a proprietary weighting scheme to include over a hundred variables concerning board characteristics, management compensation policy, and anti-takeover measures in constructing a corporate governance index.

There is a related strand of the literature that considers single corporate board characteristics as important determinants of corporate governance: board independence (see Hermalin and Weisbach (1998, 2003), stock ownership of board members (see Bhagat and Bolton (2008)), and whether the Chairman and CEO positions are occupied by the same or two different individuals (see Brickley et al. (1997)). Can a single board characteristic be as effective a measure of corporate governance as indices that consider 51 (as in Brown and Caylor), 24 (as in GIM) or other multiple measures of corporate charter provisions, and board characteristics? While, ultimately, this is an empirical question, on both economic and econometric grounds it is possible for a single board characteristic, for example, board ownership, to be an effective measure of corporate governance. Corporate boards have the power to make, or at least, ratify all important decisions including decisions about investment policy, management compensation policy, and board governance itself. It is plausible that board members with appropriate stock ownership will have the *incentive* to provide effective monitoring and oversight of important corporate decisions noted above; hence board ownership can be a good proxy for overall good governance. Furthermore, the measurement error in measuring board ownership can be less than the total measurement error in measuring a multitude of board processes, compensation structure, and charter provisions. Finally, while board characteristics, corporate charter provisions, and management compensation features do characterize a company's governance, construction of a governance index requires that the above variables be weighted. The weights a particular index assigns to individual board characteristics, charter provisions, etc. is important. All of the aforementioned indices weight all of the components equally, despite no conceptual framework guiding this assumption. If the weights are not consistent with the weights used by informed market participants in assessing the relation between governance and firm performance, then incorrect inferences would be made regarding the relation between governance and firm performance.

3. Corporate governance and firm performance

A review of the inter-relationships among corporate governance, corporate performance, corporate capital structure, and compensation structure suggests that, from an econometric viewpoint, to study the relationship between corporate governance and performance, one would need to formulate a system of simultaneous equations that specifies the relationships among the above-mentioned variables.[7] Ex ante, it is unknown how these four variables interact; it is possible that better performance leads to better governance, just as it is possible that better governance leads to better performance. To account for the possibility of systemic endogeneity, we specify the following system of four simultaneous equations:

$$\text{Performance} = f_1(\text{Governance}, \text{CEO Ownership}, \text{Capital Structure}, V_1, \varepsilon_1), \tag{1a}$$

$$\text{Governance} = f_2(\text{Performance}, \text{CEO Ownership}, \text{Capital Structure}, V_2, \varepsilon_2), \tag{1b}$$

$$\text{CEO Ownership} = f_3(\text{Governance}, \text{Performance}, \text{Capital Structure}, V_3, \varepsilon_3), \tag{1c}$$

$$\text{Capital Structure} = f_4(\text{Governance}, \text{CEO Ownership}, \text{Performance}, V_4, \varepsilon_4), \tag{1d}$$

where the V_i are vectors of control variables and instruments influencing the dependent variables and the ε_i are the error terms associated with exogenous noise and the unobservable features of managerial behavior or ability that explain cross-sectional variation in performance, CEO ownership, capital structure and governance.

All variables and data sources are described in Table 1. Table 2 presents the descriptive statistics and sample sizes for the variables for the following sub-periods: 1998–2001, 2002–2006, 2007–2009, 2010–2016.

3.1. Estimation

When using a system of potentially simultaneous equations, the structure of the system is of critical importance. We use ordinary least squares and two-stage least squares (2SLS) estimation. With 2SLS, we must make sure the first-stage regression is econometrically consistent and efficient. The second-stage regression is only useful if the first-stage regression is both strong and valid. In order for the first-stage to be strong and valid, we must have predictor instruments that are strongly correlated with the potentially endogenous regressor but uncorrelated with the regression equation error term (that is, the instrument impacts the dependent variable only via the endogenous regressor). For example, in Eq. (1a) on firm performance, we need to identify an exogenous instrument that is strongly correlated with the governance variable, but is not correlated with the performance regression error term. Thus, for each of the endogenous variables, we identify (potentially) exogenous instruments to use in the first-stage predictor regressions. For performance, we use treasury stock to assets as the instrument. For governance, we use the percentage of directors who are currently active CEOs as the instrument. For CEO ownership, we use CEO tenure to CEO age as the instrument. And, for capital structure, we use Altman's modified *Z*-score as the instrument. We discuss our diagnostic tests for assessing both the strength and the validity/exogeneity of all of our instruments below in section 3.3.

Regarding the control variables: Prior literature, for example, Core et al. (1999), Gillan et al. (2003), and Core et al. (2006), suggests that industry performance, return volatility, growth opportunities and firm size are important determinants of firm performance. Yermack (1996) documents a relation between board size and performance. Demsetz (1983) suggests that small firms are more likely to be closely-held suggesting a different governance structure than large firms. Firms with greater growth opportunities

[7] Our 2008 paper contains a brief review of the related literature, and the estimation issues for the above equations.

Table 1
Description of variables.

Variable	Description	Years available
A. Governance variables		
Median director ownership, $ value	The dollar value of stock owned is calculated for all directors. For each board, we use the median dollar value of stock owned by the directors as this individual can be seen as having the 'swing' vote in governance related matters. (ISS data)	1998–2016
Median director ownership, log $ value	We take the natural logarithm of the dollar value of median director ownership. This is the variable used in regression analyses.	1998–2016
% holdings, median director	The percentage of outstanding stock is calculated for all directors. For each board, we use the median director's percentage of all outstanding stock. (ISS data)	1998–2016
% independent directors	The number of directors classified as independent on a board divided by the total number of directors on the board. (ISS data)	1998–2016
CEO-Chair duality	An indicator variable equal to 1 if the CEO is also the board chair and 0 otherwise. (ISS data)	1998–2016
% directors, CEOs	The number of directors on a board who are active CEOs divided by the total nuber of directors on the board. (ISS data)	1998–2016
B. Performance variables		
ROA, annual	Calculated as Operating Income divided by Total Assets. (Compustat data)	1998–2016
Stock return, annual	The buy-and-hold calendar year annual return. (CRSP data)	1998–2016
Tobin's Q, annual	Calculated as (Book Value of Assets + Market Value of Common Stock - Book Value of Common Stock - Deferred Taxes) / Book Value of Assets. (Compustat data)	1998–2016
C. Other variables		
Net CEO Trade ($)	CEO's sale of stock ($) – CEO's purchase of stock ($) – CEO's cash outlay for option exercise ($) (Thomson Reuters)	1998–2016
R&D-Adv Exp	Ratio of research and development plus advertising expenses to assets (Compustat)	1998–2016
Information Cost	Standard deviation of monthly stock returns (CRSP)	1998–2016
CEO Total Compensation	CEO salary plus bonus plus equity-based compensation (ISS data)	1998–2016
CEO holdings, %	The percentage of outstanding stock owned by the CEO. (ISS data)	1998–2016
Leverage (Debt / Assets)	Calculated as long-term debt divided by total assets. (Compustat data)	1998–2016
Assets (in millions)	Total assets of the firm. We use the natural logarithm of total assets in all of our regression analyses. (Compustat data)	1998–2016
CEO age	The age of the CEO as disclosed in the annual proxy filing. (ISS and Execucomp data)	1998–2016
CEO tenure	The number of years, or partial years if provided, that the current CEO has been CEO. (ISS and Compustat data)	1998–2016
Director tenure	The number of years, or partial years if provided, that each director has served on the board. (ISS data)	1998–2016

are likely to have different ownership and governance structures than firms with fewer growth opportunities; see, for example, Smith and Watts (1992), and Gillan et al. (2003). Demsetz and Lehn (1985), among others, suggest a relation between information uncertainty about the firm as proxied by return volatility and its ownership and governance structures. In all cases, our starting point for this study was the same methodology and specifications that we used in our 2008 paper to allow for consistency and comparability; we discuss several enhancements to this model in later sections.

Given the abovementioned findings in the literature, in Eq. (1a), the control variables include industry performance, log of assets, R&D and advertising expenses to assets, board size, standard deviation of stock return over the prior five years, and the instrument is treasury stock to assets. In Eq. (1b), the control variables include R&D and advertising expenses to assets, board size, standard deviation of stock return over the prior five years, and the instrument is percentage of directors who are active CEOs. In Eq. (1c), the control variables include log of assets, R&D and advertising expenses to assets, board size, standard deviation of stock return over the prior five years, and the instrument is CEO tenure to CEO age. In Eq. (1d), the control variables include industry leverage, log of assets, R&D and advertising expenses to assets, standard deviation of stock return over the prior five years, and the instrument is Altman's modified *Z*-score.

We estimate this system using ordinary least squares (OLS), and two-stage least squares (2SLS) to allow for potential endogeneity.[8] Section 3.3 provides detail on the diagnostic tests we perform to ensure that our endogeneity controls are appropriate, strong and valid.

3.2. Director ownership and performance

Table 3 Panel A and Fig. 1 highlight the positive relation between director ownership and future operating performance for the S&P Composite 1500 for the period 1998–2016. This is a robust relationship. Table 3, Panels B, C, D, and E highlight the positive relation between director ownership and future operating performance for the following sub-periods, respectively: 1998–2001, 2002–2006, 2007–2009, and 2010–2016. These sub-periods are selected based on macroeconomic and regulatory events: Sarbanes-

[8] We also consider three-stage least squares to allow for the possibility that the error terms across the four equations are correlated. In our analyses, there is no evidence that this is the case, so we only report the 2SLS results.

Table 2
Descriptive statistics, by time period.

	1998–2001		2002–2006		2007–2009		2010–2016		1998–2016	
	(2976 observations)		(4300 observations)		(2295 observations)		(5355 observations)		(14,926 observations)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
A. Governance variables										
Median director ownership, $ value	$779,524	$596,847	$1,210,457	$1,089,347	$1,724,814	$1,382,510	$2,346,218	$1,696,471	$1,686,846	$1,268,341
Median director ownership, log $	13.566	13.299	14.007	13.901	14.361	14.139	14.668	14.344	14.338	14.053
% holdings, median director	0.182%	0.030%	0.173%	0.000%	0.169%	0.000%	0.152%	0.000%	0.165%	0.000%
% independent directors	65.93%	66.94%	68.63%	67.48%	75.08%	74.73%	79.36%	78.26%	74.12%	73.18%
CEO-Chair duality	76.08%	100.00%	69.34%	100.00%	61.55%	100.00%	52.19%	100.00%	61.04%	100.00%
% directors, CEOs	22.15%	20.000%	22.11%	20.000%	16.50%	20.000%	11.77%	11.111%	17.59%	20.000%
% directors, on 4+ boards	3.42%	0.000%	3.83%	0.000%	3.25%	0.000%	1.84%	0.000%	2.93%	0.000%
% directors, 15+ years tenure	12.96%	0.000%	16.59%	0.000%	18.64%	0.000%	21.88%	0.000%	18.63%	0.000%
% directors, over 70	10.37%	0.000%	12.24%	0.000%	16.21%	0.000%	21.65%	0.000%	15.73%	0.000%
% directors, women	8.42%	9.090%	10.93%	11.111%	12.89%	11.111%	16.82%	18.182%	12.70%	11.111%
% directors, zero shares owned	6.55%	0.000%	3.68%	0.000%	3.70%	0.000%	4.99%	0.000%	4.12%	0.000%
B. Performance variables										
ROA, annual	12.69%	12.370%	12.98%	12.537%	10.63%	10.713%	12.96%	12.093%	12.80%	12.189%
Stock return, annual	16.02%	13.220%	15.24%	12.895%	7.37%	8.936%	15.24%	13.135%	14.31%	12.596%
Tobin's Q, annual	2.265	1.723	2.089	1.634	1.722	1.496	2.107	1.936	2.093	1.771
C. Other variables										
CEO holdings, %	2.813%	0.380%	2.938%	0.373%	3.142%	0.391%	2.736%	0.342%	2.855%	0.359%
Leverage (Debt / Assets)	42.910%	43.080%	44.177%	43.846%	44.617%	44.513%	43.582%	44.225%	43.917%	43.992%
Assets (in millions)	1338.169	1207.482	3242.365	2531.156	7163.984	5289.647	9361.168	8117.654	5836.468	4799.836
CEO age	54.820	55.000	56.010	55.000	56.325	56.000	57.497	57.000	56.245	56.000
CEO tenure	8.736	7.950	9.613	9.000	10.331	8.000	11.266	9.000	9.824	9.000
Director tenure	8.692	7.000	10.888	10.000	9.586	7.000	10.090	8.000	9.973	8.000

Oxley in 2002, the financial crisis in 2007–2009, and Dodd-Frank in 2010. Appendix A tables highlight the positive relation between director ownership and future operating performance for the S&P 500, the S&P 400 MidCap, and the S&P 600 SmallCap.

Table 4 summarizes our main results of the relationship between governance and performance. While previous studies have used both stock market-based and accounting measures of performance, we primarily rely on accounting performance measures. Stock market-based performance measures are susceptible to investor anticipation. If investors anticipate the corporate governance effect on performance, long-term stock returns will not be significantly correlated with governance even if a significant correlation between performance and governance indeed exists.[9]

Both the ordinary and two-stage least squares estimates are qualitatively identical. Our tests for endogeneity show that our regressors are indeed endogenously determined and that two-stage least squares is the appropriate estimation method, but that the errors in the equations are not correlated, so there is no added benefit of using three-stage least squares. Thus, we focus on the two-stage least squares estimates: Director ownership is positively and significantly related to future operating performance (ROA) for the entire period (1998–2016) and each of the four sub-periods: 1998–2001, 2002–2006, 2007–2009, and 2010–2016.[10] The coefficient

[9] In our 2008 paper and in Bhagat and Bolton (2013) we find that no governance measure is related to future stock returns. We find the same results here. Tobin's Q shows a weak and inconsistent relationship with the governance measures in some of our models. Thus, we focus on accounting operating performance.

[10] In Bhagat and Bolton (2013), we study the impact of Sarbanes-Oxley (SOX) on the relationship between corporate governance and company performance. A significant part of SOX and other exchange requirements increase the role of independent board members. We find a shift in the relationship between board independence and firm performance after 2002. Prior to 2002, we document a negative relationship between board independence and operating performance. After 2002, we find a positive relationship between independence and operating performance. We find this result is driven by firms that increase their number of independent directors. Importantly, we find a consistent positive performance-governance relationship for director ownership. On average, the median director's stock ownership is 45% greater in 2003–2007 than it was in 1998–2001 – and the relationship between director ownership and firm performance is consistently positive for both sub-periods; this relationship is robust to a battery of specification tests. Hence, we highlighted the governance measure, namely, the median director's stock ownership; this is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index.

Table 3
Director ownership, by quartile, and industry-adjusted ROA for the 2 subsequent years (t + 1 to t + 2), all S&P supercomposite 1500 firms.

Panel A					
S&P Supercomposite 1500: 1998–2016					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership	$1,686,846	$218,779	$812,515	$2,029,804	$5,348,599
Adjusted ROA: t + 1 to t + 2	0.05%	−0.87%	−0.35%	0.41%	0.86%
Panel BS&P Supercomposite 1500: 1998–2001					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership	$779,524	$154,964	$392,143	$1,107,684	$3,848,974
Adjusted ROA: t + 1 to t + 2	0.01%	−0.94%	−0.21%	0.08%	0.79%
Panel CS&P SuperComposite 1500: 2002–2006					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership	$1,210,457	$164,982	$724,698	$1,798,564	$4,236,984
Adjusted ROA: t + 1 to t + 2	−0.03%	−0.62%	−0.58%	0.49%	0.76%
Panel DS&P SuperComposite 1500: 2007–2009					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership	$1,724,814	$234,869	$864,875	$2,352,468	$5,697,581
Adjusted ROA: t + 1 to t + 2	−0.05%	−0.72%	−0.51%	0.54%	0.91%
Panel ES&P SuperComposite 1500: 2010–2016					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership	$2,346,218	$299,503	$1,073,748	$2,554,879	$6,825,593
Adjusted ROA: t + 1 to t + 2	0.04%	−0.80%	−0.46%	0.48%	0.88%

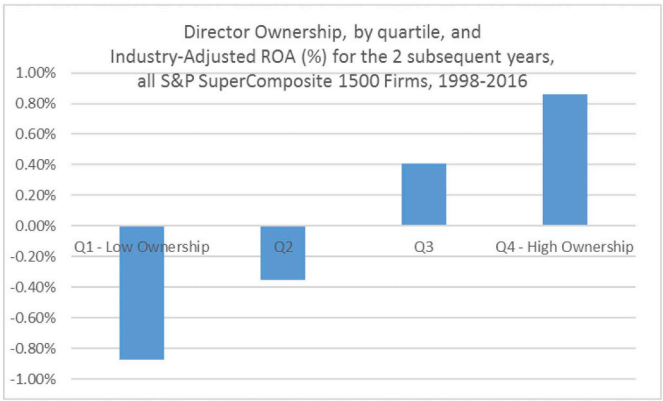

Figure 1. Director Ownership, by quartile, and Industry-Adjusted ROA (%) for the two subsequent years; all S&P SuperComposite 1500 firms, 1998-2016

estimate indicates that the positive relation between director ownership and future operating performance was strongest during the recent financial crisis (2007–2009). The results are also economically significant: A one standard deviation increase in median Director Ownership is associated with an increase in future ROA of 2.0%.

3.3. Validity and strength of instruments

As discussed above, the regression results from a system of equations is only as reliable as the process used for estimation and the

Table 4
Governance, compensation and performance

	Panel A: Governance, compensation and performance				
	Ordinary Least Squares Estimation (OLS)				
	Dependent Variable: Return on Assets (ROA $_{t+1 \text{ to } t+2}$)				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Director Ownership $_t$	**0.005*****	**0.006*****	**0.014*****	**0.009****	**0.020*****
	(0.002)	***(0.001)***	***(0.001)***	***(0.010)***	***(0.001)***
Net CEO Trades $_{t-2 \text{ to } t}$	**−0.130*****	**−0.163*****	**−0.264*****	**−0.081****	**−0.148*****
	(0.001)	***(0.001)***	***(0.001)***	***(0.048)***	***(0.001)***
Leverage $_{t-1}$	−0.101 **	−0.049 ***	−0.230 ***	−0.103 **	−0.117 ***
	(0.011)	*(0.007)*	*(0.002)*	*(0.014)*	*(0.002)*
Industry ROA $_{t+1 \text{ to } t+2}$	0.621 ***	0.479 ***	0.239 ***	0.727 ***	0.605 ***
	(0.001)	*(0.001)*	*(0.009)*	*(0.001)*	*(0.001)*
Firm Size $_t$	−0.005 ***	−0.006 ***	−0.010 ***	−0.004 **	−0.006 ***
	(0.001)	*(0.001)*	*(0.001)*	*(0.021)*	*(0.001)*
R&D-Adv Exp $_t$	−0.924 ***	−0.417 ***	−0.224 *	−0.391 **	−0.920 ***
	(0.003)	*(0.006)*	*(0.063)*	*(0.016)*	*(0.003)*
Board Size $_t$	−0.001 *	−0.001 *	0.002	−0.001	−0.001 *
	(0.081)	*(0.071)*	*(0.244)*	*(0.180)*	*(0.052)*
Information Cost $_t$	−0.094 ***	−0.365 ***	−0.231 ***	−0.179 **	−0.095 ***
	(0.007)	*(0.009)*	*(0.004)*	*(0.023)*	*(0.002)*
Treasury Stock $_t$	0.273 ***	0.181 ***	0.112 *	0.224 ***	0.281 ***
	(0.002)	*(0.003)*	*(0.071)*	*(0.001)*	*(0.001)*
Number of Observations	2944	4266	2260	5321	14,791
R-Squared	0.239	0.298	0.180	0.318	0.391
Estimation	OLS	OLS	OLS	OLS	OLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes

	Panel B: Governance, compensation and performance				
	Two-Stage Least Squares Estimation (2SLS)				
	Dependent variable: *Return on Assets* (*ROA* $_{t+1 \text{ to } t+2}$)				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Director Ownership $_t$	**0.021*****	**0.007****	**0.025*****	**0.015*****	**0.025*****
	(0.002)	***(0.031)***	***(0.001)***	***(0.001)***	***(0.001)***
Net CEO Trades $_{t-2 \text{ to } t}$	**−0.104*****	**−0.071*****	**−0.291*****	**−0.117****	**−0.162*****
	(0.001)	***(0.007)***	***(0.002)***	***(0.004)***	***(0.001)***
Leverage $_{t-1}$	−0.171 **	−0.581 ***	−0.707 ***	−0.483 **	−0.439
	(0.014)	*(0.003)*	*(0.002)*	*(0.021)*	*(0.004)*
Industry ROA $_{t+1 \text{ to } t+2}$	0.691 ***	0.552 ***	0.240 ***	0.649 ***	0.645 ***
	(0.001)	*(0.002)*	*(0.007)*	*(0.001)*	*(0.001)*
Firm Size $_t$	−0.005 ***	−0.005 ***	−0.009 ***	−0.003 **	−0.007 **
	(0.321)	*(0.007)*	*(0.002)*	*(0.001)*	*(0.011)*
R&D-Adv Exp $_t$	−0.734 ***	−0.451 ***	−0.241	−0.338 **	−0.527 **
	(0.009)	*(0.005)*	*(0.181)*	*(0.090)*	*(0.012)*
Board Size $_t$	−0.008 **	0.001	0.003	−0.001	−0.001 *
	(0.029)	*(0.360)*	*(0.414)*	*(0.148)*	*(0.082)*
Information Cost $_t$	−0.192 ***	−0.305 ***	−0.103 *	−0.123 **	−0.160 **
	(0.003)	*(0.004)*	*(0.071)*	*(0.011)*	*(0.017)*
Treasury Stock $_t$	0.366 ***	0.166 ***	0.092	0.225 ***	0.288 ***
	(0.001)	*(0.001)*	*(0.124)*	*(0.001)*	*(0.001)*
Number of Observations	2944	4266	2260	5321	14,791
R-Squared	0.106	0.131	0.127	0.169	0.220
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes

Dependent Variable: $ROA_{t+1 \text{ to } t+2}$

(*continued on next page*)

Table 4 (*continued*)

	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Endogeneity test					
Hausman Test	0.009	0.005	0.010	0.004	0.001
Instrument tests					
Stock & Yogo					
Governance	0.009	0.003	0.013	0.018	0.009
Performance	0.017	0.021	0.007	0.012	0.003
Ownership	0.009	0.001	0.027	0.011	0.032
Leverage	0.069	0.107	0.063	0.057	0.078
Hahn & Hausman	0.036	0.067	0.073	0.052	0.034
Cragg-Donald	0.003	0.005	0.001	0.002	0.002
Hansen-Sargan	0.394	0.417	0.591	0.602	0.580
Anderson-Rubin	0.054	0.026	0.035	0.008	0.058
Shea Partial R^2					
Governance	0.348	0.334	0.255	0.229	0.236
Performance	0.249	0.263	0.211	0.197	0.223
Ownership	0.307	0.395	0.232	0.318	0.307
Leverage	0.255	0.330	0.290	0.333	0.200

Panel C: Impact of *Board Ownership*$_t$ on *ROA* $_{t+1 \text{ to } t+2}$

Two-Stage Least Square (2SLS) Estimation

Sample: Only includes firm-years with no CEO stock trades (Net CEO Trades $_{t-2 \text{ to } t}$)

	Dependent Variable: *Return on Assets* (*ROA* $_{t+1 \text{ to } t+2}$)				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Board Ownership $_t$	0.033 ***	0.015 **	0.037 ***	0.020 ***	0.031 ***
	(0.003)	*(0.035)*	*(0.001)*	*(0.004)*	*(0.002)*
Net CEO Trades $_{t-2 \text{ to } t}$	–	–	–	–	–
	–	–	–	–	–
Leverage $_{t-1}$	−0.182 **	−0.591 ***	−0.721 ***	−0.506 **	−0.439 ***
	(0.020)	*(0.008)*	*(0.004)*	*(0.031)*	*(0.008)*
Industry ROA $_{t+1 \text{ to } t+2}$	0.705 ***	0.573 ***	0.255 ***	0.681 ***	0.674 ***
	(0.003)	*(0.005)*	*(0.009)*	*(0.001)*	*(0.001)*
Firm Size $_t$	−0.008 **	−0.007 ***	−0.019 ***	−0.014 **	−0.010 **
	(0.030)	*(0.009)*	*(0.001)*	*(0.008)*	*(0.015)*
R&D-Adv Exp $_t$	−0.801 **	−0.489 ***	−0.267	−0.351 *	−0.546 **
	(0.031)	*(0.009)*	*(0.206)*	*(0.098)*	*(0.018)*
Board Size $_t$	−0.009 **	0.002	0.002	−0.002	−0.001 *
	(0.035)	*(0.392)*	*(0.434)*	*(0.191)*	*(0.094)*
Information Cost $_t$	−0.168 *	−0.290 **	−0.083 *	−0.104 **	−0.144 **
	(0.069)	*(0.048)*	*(0.089)*	*(0.039)*	*(0.027)*
Treasury Stock $_t$	0.383 ***	0.145 ***	0.082	0.197 ***	0.266 ***
	(0.003)	*(0.002)*	*(0.136)*	*(0.002)*	*(0.001)*
Number of observations	1383	2007	1029	2615	7034
R-Squared	0.098	0.114	0.109	0.150	0.203
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes

Instrumental variables tests - for endogeneity, instrument strength and instrument validity

Hausman (1978) test for endogeneity – This tests for differences between the OLS (or one-stage robust regressions) and IV estimates. The test statistic normalizes the differences in coefficients by the differences in standard errors. Large differences between OLS and IV will result in large test statistics and low p-values, suggesting that endogeneity is a problem and that the IV results are more consistent than OLS results.

Stock and Yogo (2005) test for weak instruments – This test evaluates the strength of the first stage regression by considering the F-statistic of the reduced form first stage regression of excluded instruments. High F-statistics and low *p*-values suggest strong instruments. (This test was derived from the Cragg and Donald (1993) test. The two tests are the same when there is only one endogenous regressor, as is the case in our study.)

Hahn and Hausman (2002) test for instrument validity – This test is a variation of the Hausman (1978) test for endogeneity, applied to the instruments rather than the specification. This test compares the 'forward' and 'reverse' IV estimates. If the instruments are valid, the difference between the 'forward' and the inverse of the 'reverse' estimates should be small, leading to large test statistics and small p-values.

Hansen-Sargan – This is a test for overidentifying restrictions, testing the joint significance of the set of endogenous variables in the system of equations. It has a Chi-square distribution.

For the Stock and Yogo (2005) test, the first-stage p-value is given. For the Shea Partial R^2, the statistic is for the first-stage equation. For the other tests, the p-value is for the second stage equation.

Hausman Test Low p-values suggest endogeneity is affecting the model and needs to be controlled for.
Stock & Yogo Low p-values suggest that first-stage F-statistic is higher than Stock & Yogo critical values; instruments are strong.
Hahn & Hausman Low p-values suggest there is little difference between the 'forward' and 'reverse' estimates. Instruments are valid.
Cragg-Donald Low p-values suggest that first-stage F-statistic is higher than critical values; instruments are strong.
Hansen-Sargan High p-values suggest that instruments are valid.
Anderson-Rubin Low p-values on excluded instruments suggest that instruments are valid.
Shea Partial R^2 Relatively high R^2 suggests that instruments are adequate.
Variables in bold are the variables of special interest in the regression; remaining are control variables.
* for 10% significance.
** for 5% significance.
*** for 1% significance.

characteristics of the variables used in the estimation. We allow for our four variables of interest to potentially be endogenous; to address this, we use an instrumental variables approach to estimation. Using two-stage least squares, we identify (presumably) exogenous instruments to use in the first-stage to obtain predicted values of the endogenous regressors. However, that first-stage regression is only appropriate if the instruments used to predict the endogenous regressors are both strong and valid. We consider the following diagnostic tests:

First, we use the Hausman (1978) test to determine if our equations are indeed affected by endogeneity. In all cases, we find at least moderate evidence that the system is simultaneously determined. Thus, assuming that our instruments are strong and valid, we can rely on the 2SLS results to be more efficient and consistent than the OLS results.

Second, to assess the strength of our instruments, we conducted the Stock and Yogo (2004) test. In all cases, the test shows that our instruments are strong. We also perform the Hahn and Hausman (2002) weak instrument test, and the Hansen-Sargan over-identification test as discussed in Davidson and Mackinnon (2004); inferences from these tests are consistent with the reported Stock and Yogo test results.

Third, following the suggestions of Stock et al. (2002) and Hall et al. (1996) we perform the Cragg-Donald test for model identification. The Cragg-Donald test indicates that our system of equations is well-specified.

Fourth, we perform the Anderson-Rubin test suggested by Dufour (1997) to test the joint significance of the set of endogenous variables in our system of equations. The Anderson-Rubin test supports the joint significance of our set of endogenous variables.

Finally, following the suggestion of Larcker and Rusticus (2010), we consider an alternate set of instruments in addition to the instruments noted above. For example, we consider (one year) lagged performance for performance, lagged director ownership for director ownership, lagged CEO ownership for CEO ownership, and lagged leverage for leverage. Results using these instruments are consistent with the results reported above. However, we rely on the four primary unique instruments because they are conceptually more appropriate than lagged instruments.[11]

Overall, the diagnostic tests for endogeneity, instrument strength, instrument validity and system overidentification show that our instruments are strong and appropriate and that our system is well-identified. Thus, we can rely on the two-stage least squares estimates as being the most efficient and consistent estimators.

3.4. Additional robustness tests

Managers and directors who think their firm has great prospects will increase (or least maintain their level of ownership) and the opposite is true of firms where managers think their firm may face headwinds. In this scenario, causality runs not from ownership to performance, but from expected performance to ownership. We address this concern by considering firm-years when the CEO does not trade any stock in the two previous years.[12] The insider trading literature (for example, Cohen et al. (2012) and Brochet (2010)) documents that insiders sell (buy) stock in anticipation of abnormal negative (positive) future performance. Hence, CEOs that do not trade likely do not have expectations of abnormal future performance. In Table 4, Panel C, we consider only firm-years when the CEO does not trade any stock in the two previous years.[13] Consistent with the results in Table 4, Panels A and B, we find a consistently positive and significant relation between director ownership and future firm performance. In Table 6, Panel C, we consider only bank-years when the CEO does not trade any stock in the two previous years. Consistent with the results in Table 6, Panels A and B, we find a consistently positive and significant relation between bank director ownership and future bank performance.

Per Grieser and Hadlock (2019), we considered the strict exogeneity of future instruments. In untabulated results, we find Future % of Directors Who Are CEOs is uncorrelated with Contemporaneous Firm Performance, Future Treasury Stock / Assets is uncorrelated with Contemporaneous Median Director Ownership, Future CEO Tenure / CEO Age is uncorrelated with Contemporaneous

[11] In addition to Larcker and Rusticus (2005), popular econometrics textbooks have also recommended using lagged endogenous regressors as instruments (e.g. Johnston and DiNardo (1997). However, in our case, three of our four endogenous variables have very high autocorrelation: director ownership (over 60%), CEO ownership (over 80%) and debt (over 90%). Thus, lagged regressors may not satisfy the exogeneity condition for 2SLS. See Grieser and Hadlock (2019) for detailed discussion of strict exogeneity requirements.

[12] We measure CEO stock trades as Net CEO Trades ($) = CEO's sale of stock ($) – CEO's purchase of stock ($) – CEO's cash outlay for option exercise ($) within a firm's fiscal year.

[13] In about 50% of firm-years, the CEO does not trade any stock.

Median Director Ownership, and Future Altman's *Z*-Score is uncorrelated with Contemporaneous Median Director Ownership.

4. Executive compensation and misaligned incentives

The scandals at Wells Fargo and Equifax are just the most recent in the long line of scandals involving large well-known public U.S. corporations. Going back in time, the financial crisis of 2008 was triggered by the implosion of the big banks. Further back in time, at the turn of the new millennium, the scandals in Enron, WorldCom, Tyco, and Qwest led to their demise.

After each set of these scandals, policymakers raised questions about the effectiveness of corporate governance mechanisms in these companies. This led to the inevitable call for more regulation and laws to constrain and regulate corporate behavior, to wit, the Sarbanes Oxley Act of 2002 and the Dodd-Frank Act of 2010. In both cases, it seems that the regulations were not a response to what firms were actually doing: in 2001, prior to Sarbanes-Oxley mandating independent audit committees, more than 70% of publicly listed companies had completely independent audit committees and in 2009, more than 93% of publicly listed companies had completely independent compensation committees.[14] This raises the question: have these two rather extensive set of laws addressed the governance concerns of corporate America? The recent Wells Fargo and Equifax episodes would suggest not. We think a more fruitful approach to addressing the corporate governance concerns is to focus on possible common themes underpinning the Enron, WorldCom, Tyco, Qwest, the big banks circa 2008, Wells Fargo, and Equifax scandals. We propose, on the basis of Bhagat (2017) and Bhagat and Bolton (2014), that misaligned CEO incentive compensation is a common theme underpinning the above corporate scandals.

How might the incentives generated by incentive compensation programs lead to excessive risk-taking and short-term profits and benefit executives at the expense of long-term shareholders? Consider the stylized example in Bhagat, Bolton, and Romano (2014): an investment project that in any given year can lead to six cash flow outcomes with equal probability. One could think of the six outcomes of this investment project as the outcome from rolling a fair dice. Five of these are a positive $500 million and the sixth is a random loss that increases over time (until a certain future period) denoted by the following time-varying random variable:

$$\begin{aligned}\text{Sixth outcome} &= -\$(0.5+\varepsilon) * (t) \text{ billion; for t between years } t_1 \text{ and } t_2, \text{ and Sixth outcome} \\ &= -\$(0.5+\varepsilon) * (t_2) \text{ billion; for t greater than } t_2 \text{ years,}\end{aligned} \tag{2}$$

where, ε is an error term with mean zero and standard deviation σ.

Given the above payoffs, the expected cash flow from the investment project is positive for the first few years. However, after these initial years the expected cash flow from the investment project turns negative. Additionally, the life of the project is such that its net present value ("NPV") is negative.[15] The probability, the magnitude of the cash flows of the six outcomes, and the life of the project are known only to the firm's senior executives. Given the information available to or processed by the investing public, were the project announced in advance, they would not perceive the sixth outcome's loss as increasing over time, and therefore the stock market would have a different – positive – valuation of the project from management, as indicated in Example 1.

Example 1 Expected cash flows (executives know true probabilities).

	Expected cash flows:	
	Belief of bank executives	Belief of investing public
Outcome 1:	+ $500 million	+ $500 million
Outcome 2:	+ $500 million	+ $500 million
Outcome 3:	+ $500 million	+ $500 million
Outcome 4:	+ $500 million	+ $500 million
Outcome 5:	+ $500 million	+ $500 million
Outcome 6:	- $(0.5 + ε)*(t) billion for t between years t_1 and t_2; - $(0.5 + ε)*($t_2$) billion for t greater than t_2 years	- $500 million
NPV	Negative	Positive
Investment decision	Do not i nvest	Invest

How should the CEO respond to the above investment project if he or she were acting in the interest of the long-term shareholders? As indicated in Example 1, because the NPV of the investment project is negative, this investment project should be rejected.[16]

[14] We recognize that both Sarbanes-Oxley (2002) and Dodd-Frank (2010) addressed more than just committee independence; but audit and compensation committee independence were the two most unique, observable aspects of corporate governance covered in the two regulations.

[15] Simplified cash flows and probabilities have been used for illustrative purposes to clarify the intuition of the analysis. The project's *expected* cash flows, as in the numerical illustration, need only have the pattern that early on there are positive expected cash flows and later on they turn negative, such that the net present value is negative.

[16] Griffin et al. (2014) construct a model with similar implications.

But will the individual undertake the investment project? Assume the CEO owns a significant number of the firm's shares. Furthermore, these shares are unrestricted, that is, they have either vested or have no vesting requirements.[17] If the firm adopts the above project, then given the belief of the stock market about this investment project the firm's share price will increase. In any given year there is a very high probability (5/6 = 83%) that the project will generate a very large positive cash flow of $500 million. If the realization from the project is one of the positive cash flow outcomes (and there is an 83% probability of this), the firm's share price will rise, the firm in response will award incentive compensation to key employees, including the CEO, and the CEO can then liquidate a significant part of her equity holdings at a profit.[18]

To be sure, in this stylized example, the CEO knows that the expected cash flow from this trading strategy will be negative in the later years. There is also some probability (17% in this example) that in any given year the trading strategy will lead to a negative cash flow outcome.[19] What then? In the textbook corporate finance paradigm, the firm's share price will decline, and, depending on the firm's equity capitalization, the firm will be insolvent or close to insolvent. This insolvency or close-to-insolvency scenario will certainly have a significantly negative impact on the value of the CEO's stockholdings. However, if during the first few years of this trading strategy the cash flow outcomes have been positive and the CEO has liquidated a significant amount of shares, then despite the CEO's experiencing large losses on her remaining holdings as the firm faces large losses or possibly insolvency in a future year, the CEO's net payoff from employment in the firm (salary, bonus, plus proceeds from sale of stock) in the earlier years, may still be positive and even, possibly, substantial.[20]

It is not necessary to assume, as does our stylized example, that CEOs intentionally undertook negative NPV projects. An alternative scenario that could produce a similarly distorted investment outcome would occur if a CEO misperceives the probabilities of a project's negative cash flows, such that a value-destroying project appears to be value creating. If, for instance, executives have a rosier picture of a project's outcomes than warranted because, say, they are over-confident in their abilities to manage it, or they are overly optimistic about the future, then we do not have to posit managers who intentionally seek to rip off shareholders. We would only be acknowledging human nature “as we know it,” that individuals quite often believe they are more talented than most and therefore are overly confident and more optimistic regarding the success of their endeavors than the objective situation would warrant (in this instance, the executive is overconfident with regard to project selection and hence overly optimistic about projected cash flows).[21] A similar misalignment could occur without behavioral assumptions of overconfidence and optimism if the CEO miscalculates a project's expected outcomes due to inadequate internal organization information flows or simply sloppiness (e.g., lack of effort).

The above concern with self-serving CEO behavior, as a result of misaligned compensation policy, is not mere theoretical speculation. Consider the cases of Enron, WorldCom and Qwest, circa 2000, whose senior executives have been convicted of criminal violation of insider trading laws.[22,23] Senior executives in these companies made misleading public statements regarding the earnings of their respective companies. These misleading statements led to a temporary rise in the share prices of these companies. These executives liquidated significant amounts of their equity positions during the period while their companies' share price was temporarily inflated. Long-term shareholders of these companies incurred significant losses as the market learnt of the firm's long-term earnings prospects – usually much after the executives had liquidated significant amounts of their equity positions. Bhagat and Bolton

[17] Our research Bhagat, Bolton, and Romano (2014) suggests that the typical issue of restricted stock is restricted for 3 years or less (we found it to be 2.5 years in that study). Further, restricted stock typically vests upon retirement or separation; in many cases, the restricted stock vests to cash.

[18] In an efficient market, the share price would rise by the expected value of the trading strategy were it announced in advance, because it is a positive NPV project according to the publicly available information. Accordingly, the stock price would not rise that much upon the subsequently realized positive cash flows, affecting the matching of the size of the payout of an incentive compensation system based on annual stock price increases. For the purpose of simplifying the example, we ignore that timing issue by making the plausible assumption that the trading strategy is not public information when adopted and the public valuation (stock price) depends only on the realized cash flow each year.

[19] Additionally, the magnitude of the negative outcome increases over time.

[20] While compensation clawbacks have become more prevalent since 2010, they still might be ineffective in preventing the gambles captured in this model. Most clawbacks recapture compensation earned through fraud and some recapture compensation earned through less malicious misstatements, but few recapture compensation earned as a simple result of the company making bad decisions and bad investments.

[21] The behavioral psychology literature finds that individuals are overly self-confident and optimistic, often referred to as the “better than average effect.” For a corporate finance application in which optimistic managers perceive negative NPV projects as positive NPV projects (they overestimate the probability of positive cash flows and thereby underestimate the probability of losses), which fits with empirical patterns of corporate financing and free cash flow usage, see Heaton (2002). The literature provides empirical support for such posited behavior. E.g., Malmendier and Tate (2005). For the classic review of behavioral finance (the application of the psychological literature to financial decision-making), see DeBondt and Thaler (1996).

[22] See, for example, http://www.forbes.com/2005/03/15/cx_da_0315ebbersguilty.html; “Appeals Court Restores Qwest Insider Trading Conviction,” at http://www.nytimes.com/2009/02/26/business/26qwest.html. Jeffrey Skilling's indictment in the Second District of Texas is particularly illustrative; United States of America v Jeffrey K. Skilling and Richard A. Causey, Cr. No. H-04-25. Also, see http://www.accounting-degree.org/scandals/

[23] The cases of Equifax and Towers Watson provides more recent examples. “The Equifax scandal was one of the largest data breaches in history… Even worse, some of the company's top executives sold over $1.8 million worth of shares in the company just days after the breach was discovered. The public was not aware of the breach until more than six weeks later. The scandal prompted CEO Richard Smith to abruptly step down, and Equifax's shares fell more than 30% in seven days.” http://wallstreetexaminer.com/2017/10/5-shameful-corporate-scandals-wont-go-away-2018/

“Towers CEO Sold Stock Ahead of Big Deal. As Towers Watson & Co was negotiating a merger earlier this year *that would later cause its stock to fall*, Chief Executive John Haley netted nearly $10 million from selling the consulting company's shares.” Wall Street Journal (September 24, 2015; C1).

(2014) highlight evidence of similar self-serving behavior, again as a result of misaligned compensation policy, on the part of big-bank CEOs prior to and during the financial crisis of 2008.[24] For more recent anecdotal evidence, in the two years prior to resigning from Wells Fargo in 2016, CEO John Stumpf was a net seller of more than $100 million of stock; in the two years prior to resigning from Equifax in 2017, CEO Richard Smith was a net seller of more than $70 million of stock. While Wells Fargo's stock price has since returned to pre-crisis levels after falling 20% after the scandal became public, Equifax's stock price is still more than 28% below its pre-hack levels (as of December 2018).

4.1. Better-aligned compensation policy focused on long-term shareholder value

Bhagat, Bolton, and Romano (2014) recommend the following compensation structure for CEOs: incentive compensation should consist only of restricted stock and restricted stock options – restricted in the sense that the CEO cannot sell the shares or exercise the options for one to two years after his or her last day in office. They contend that this incentive compensation package will focus managers' attention on the long run and discourage them from investing in high-risk, value-destroying projects. Bhagat (2017) discusses and provides solutions to many of the caveats that arise.[25]

As discussed earlier, Table 4 summarizes the relation between director ownership and future firm performance. Table 4 also highlights the relation between CEO stock sales (Net CEO Trades) and future operating performance. For both the ordinary and two-stage least squares estimations, we observe a negative and statistically significant relation between CEO stock sales and future firm performance for the entire period (1998–2016) and each of the four sub-periods: 1998–2001, 2002–2006, 2007–2009, and 2010–2016. A one standard deviation increase in median *Net CEO Trades* is associated with a decrease in $ROA_{t\ to\ t+2}$ of 1.3%.

5. 100 financial institutions: bank governance, compensation, risk, and performance

The financial crisis of 2008 has left a scar on the national psyche. The regulation and deregulation of the banks (big and small) continues to engage our nation's senior policymakers, regulators and corporate leaders.[26] Despite the best intentions of Dodd-Frank (2010) and other bank-centric regulations since the financial crisis, it is unclear how much impact those regulations have had on the safety and resiliency of the banking industry.[27] Given the continued interest in the financial crisis, the following questions are very relevant for the big U.S. banks:

- What is the relation between bank governance and bank performance?
- What is the relation between bank governance and bank risk-taking?
- What is the relation between bank executive compensation and bank risk-taking?

Table 5, Panels A, B, C, D, and E, and Fig. 2 highlight the positive relation between bank director ownership (our measure of good bank governance) and future bank performance. Table 6 summarizes the ordinary and two-stage least squares estimates of the relation between director ownership and future bank performance, and CEO stock sales (Net CEO Trades) and future bank performance. Focusing on the two-stage least squares results: Bank director ownership is positively and significantly related to future bank performance for the overall period (1998–2016) and each of the sub-periods (1998–2001, 2002–2006, 2007–2009, and 2010–2016).

[24] There are other important reasons why CEOs might liquidate portions of their vested stock and option holdings. Theories of optimal diversification and liquidity (for example, see Hall and Murphy (2002)) predict that risk-averse and undiversified executives would exercise options and sell stock regardless of whether they believed stock prices would fall in the future. Bhagat and Bolton (2014) construct a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading and use this model to determine unexpected CEO selling of their company's shares.

[25] There are three important concerns with this compensation plan structure. First, if executives are required to hold restricted shares and options, they would most likely be under-diversified. Second, if executives are required to hold restricted shares and options post-retirement, they may be concerned with lack of liquidity. Third, this kind of a compensation plan could lead to early managerial departures as executives seek to convert illiquid shares and options into more liquid assets after the one- to three-year waiting period.

The deliberate under-diversification brought about by being subject to a restricted equity plan would lower the risk-adjusted expected return for the executive. One means of bringing an executive's risk-adjusted expected return back up to the previous level would be to increase the expected return by granting additional restricted shares and options to the executive. As a result, the amount of equity awarded under the above plan will be higher than that awarded under a short-term incentive plan.

Concerns regarding lack of liquidity and early departure are also valid. To address these concerns, we recommend managers should be allowed to annually liquidate 5% to 10% of their awarded incentive restricted shares and options. The requirement that they must retain the majority of the shares for several years after retirement or departure will provide sufficient incentive to advance long-term shareholder interests, and eliminate the need for future tax-payer funded bailouts.

[26] For example, see https://finance.yahoo.com/news/senate-passes-bill-easing-dodd-frank-rules-banks-224443217–finance.html and https://www.congress.gov/bill/115th-congress/house-bill/10.

[27] Perhaps the most highly touted goal of Dodd-Frank was to make “too-big-to-fail” banks a thing of the past. However, senior policymakers believe that many big banks are still too big to fail. For example, the Federal Reserve Bank of Richmond documents that the federal government's financial safety net still covers about 60% of the financial system's liabilities – unchanged from before Dodd-Frank; see Marshall, Pellerin and Walter (2017). The four largest banks in the U.S. – JP Morgan Chase, Bank of America, Citigroup and Wells Fargo – controlled a combined $8.6 trillion in assets at the end of 2017; that is 42% *more* than the same four banks controlled at the end of 2007.

Table 5
100 largest U.S. financial institutions: *Director Ownership*, by quartile, and *ROA* for the 2 subsequent years (t + 1 to t + 2).

Panel A					
100 financial institutions: 1998–2016					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director ownership $_t$	$1,615,545	$179,850	$1,004,761	$2,684,337	$24,062,486
ROA: t + 1 to t + 2	0.67%	−0.17%	0.36%	0.96%	1.50%
Panel B					
100 financial institutions: 1998–2001					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership $_t$	$1,085,038	$186,935	$1,106,474	$2,153,493	$22,342,228
ROA: t + 1 to t + 2	1.09%	1.05%	1.09%	1.12%	1.12%
Panel C					
100 financial institutions: 2002–2006					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership $_t$	$1,155,031	$160,475	$1,089,224	$3,215,459	$27,395,938
ROA: t + 1 to t + 2	0.93%	0.06%	0.40%	0.73%	2.51%
Panel D					
100 financial institutions: 2007–2009					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership $_t$	$1,009,787	$130,474	$927,489	$1,780,860	$19,999,116
ROA: t + 1 to t + 2	−0.37%	−1.70%	−0.49%	0.06%	0.64%
Panel E					
100 financial institutions: 2010–2016					
	All firms	Q1 - Low ownership	Q2	Q3	Q4 - High ownership
Director Ownership $_t$	$2,600,610	$254,540	$1,219,370	$3,428,477	$29,732,179
ROA: t + 1 to t + 2	0.69%	−0.36%	0.30%	1.42%	1.38%

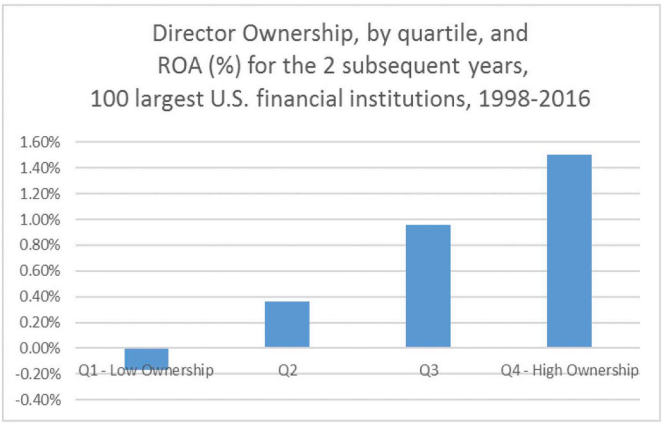

Figure 2. Director Ownership, by quartile, and ROA (%) for the two subsequent years; 100 largest U.S. financial institutions, 1998-2016

Table 6
Bank governance, compensation and performance

Panel A: Bank governance, compensation and performance[a]

Ordinary Least Squares Estimation (OLS)

	Dependent Variable: *Return on Assets* (*ROA* $_{t+1\ to\ t+2}$)				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Board Ownership $_t$	**0.009****	**0.008*****	**0.010*****	**0.009****	**0.008*****
	(0.019)	***(0.001)***	***(0.001)***	***(0.001)***	***(0.001)***
Net CEO Trades $_{t-2\ to\ t}$	**−0.209****	**−0.345*****	**−0.414*****	**−0.182****	**−0.179*****
	(0.011)	***(0.001)***	***(0.001)***	***(0.024)***	***(0.001)***
Leverage $_{t-1}$	−0.006 *	−0.033 **	−0.007 *	−0.010 **	−0.005 *
	(0.098)	*(0.018)*	*(0.061)*	*(0.017)*	*(0.067)*
Industry ROA $_{t+1\ to\ t+2}$	0.396 ***	0.780 ***	0.750 ***	0.825 ***	0.617 ***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Firm Size $_t$	−0.015 ***	−0.020 *	−0.005 ***	−0.006 ***	−0.004 ***
	(0.001)	*(0.076)*	*(0.005)*	*(0.008)*	*(0.001)*
R&D-Adv Exp $_t$	0.227	0.114	−0.085 *	0.127	−0.311
	(0.794)	*(0.824)*	*(0.637)*	*(0.526)*	*(0.739)*
Board Size $_t$	−0.028	−0.001	−0.001	−0.014 *	−0.001
	(0.203)	*(0.260)*	*(0.355)*	*(0.093)*	*(0.226)*
Information Cost $_t$	−0.338 ***	−0.189 ***	−0.482 ***	−0.179 **	−0.312 ***
	(0.002)	*(0.002)*	*(0.001)*	*(0.015)*	*(0.001)*
Treasury Stock $_t$	0.230 ***	0.091 ***	0.082 ***	0.188 ***	0.117 ***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Number of Observations	386	488	281	543	1698
R-Squared	0.098	0.361	0.389	0.155	0.167
Estimation	OLS	OLS	OLS	OLS	OLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes

Panel B: Bank governance, compensation and performance[b]

Two-stage Least Squares Estimation (2SLS)

	Dependent Variable: Return on Assets (ROA $_{t+1\ to\ t+2}$)				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Board Ownership $_t$	**0.018*****	**0.011****	**0.014*****	**0.011*****	**0.012*****
	(0.001)	**(0.002)**	**(0.001)**	**(0.001)**	**(0.001)**
Net CEO Trades $_{t-2\ to\ t}$	**−0.260*****	**−0.418*****	**−0.427*****	**−0.210****	**−0.245*****
	(0.001)	**(0.004)**	**(0.001)**	**(0.050)**	**(0.001)**
Leverage $_{t-1}$	−0.107 **	−0.048 *	−0.010 **	−0.019 **	−0.007 **
	(0.023)	(0.069)	(0.033)	(0.028)	(0.040)
Industry ROA $_{t+1\ to\ t+2}$	0.489 ***	0.828 ***	0.841 ***	0.774 ***	0.699 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm Size $_t$	−0.009 ***	−0.003 **	−0.004 ***	−0.004 **	−0.006 ***
	(0.001)	(0.041)	(0.008)	(0.028)	(0.004)
R&D-Adv Exp $_t$	0.459	0.089 ***	−0.112	−0.237 **	0.223
	(0.641)	(0.630)	(0.683)	(0.637)	(0.489)
Board Size $_t$	−0.033	−0.002	−0.002	−0.001	−0.002 *
	(0.362)	(0.194)	(0.307)	(0.193)	(0.093)
Information Cost $_t$	−0.394 ***	−0.247 ***	−0.503 ***	−0.441 **	−0.277 ***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.003)
Treasury Stock $_t$	0.279 ***	0.128 ***	0.103 ***	0.200 ***	0.241 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of Observations	386	488	281	543	1698
R-Squared	0.106	0.318	0.127	0.162	0.269
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes

	Dependent Variable: $ROA_{t+1\ to\ t+2}$				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Endogeneity test					

(*continued on next page*)

Table 6 (*continued*)

	Dependent Variable: $ROA_{t+1\ to\ t+2}$				
	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Hausman Test	0.003	0.010	0.003	0.010	0.006
Instrument tests					
Stock & Yogo					
Governance	0.004	0.008	0.016	0.017	0.016
Performance	0.006	0.010	0.012	0.014	0.018
Ownership	0.021	0.023	0.007	0.029	0.026
Leverage	0.050	0.097	0.134	0.098	0.109
Hahn & Hausman	0.041	0.009	0.012	0.079	0.024
Cragg-Donald	0.003	0.004	0.008	0.004	0.011
Hansen-Sargan	0.870	0.441	0.244	0.613	0.199
Anderson-Rubin	0.064	0.005	0.077	0.021	0.015
Shea Partial R^2					
Governance	0.274	0.334	0.227	0.214	0.223
Performance	0.249	0.236	0.174	0.249	0.223
Ownership	0.294	0.349	0.223	0.272	0.184
Leverage	0.275	0.373	0.281	0.303	0.276

Panel C: Impact of *Board Ownership*$_t$ on *ROA* $_{t+1\ to\ t+2}$[c]

Two-Stage Least Squares (2SLS) Estimation

Dependent Variable: *Return on Assets* (*ROA* $_{t+1\ to\ t+2}$)

	1998–2001	2002–2006	2007–2009	2010–2016	1998–2016
Board Ownership $_t$	0.027 ***	0.019 **	0.036 ***	0.025 ***	0.026 ***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Net CEO Trades $_{t-2\ to\ t}$	–	–	–	–	–
	–	–	–	–	–
Leverage $_{t-1}$	−0.118 **	−0.056 *	−0.027 **	−0.022 **	−0.011 **
	(0.024)	*(0.073)*	*(0.029)*	*(0.037)*	*(0.042)*
Industry ROA $_{t+1\ to\ t+2}$	0.607 ***	0.892 ***	0.851 ***	0.803 ***	0.744 ***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Firm Size $_t$	−0.007 ***	−0.005 **	−0.008 ***	−0.002 **	−0.010 ***
	(0.002)	*(0.044)*	*(0.008)*	*(0.037)*	*(0.004)*
R&D-Adv Exp $_t$	0.341	0.029	−0.176	−0.103	0.136
	(0.695)	*(0.801)*	*(0.799)*	*(0.748)*	*(0.539)*
Board Size $_t$	−0.027	−0.003	−0.002	−0.002	−0.003
	(0.398)	*(0.207)*	*(0.344)*	*(0.203)*	*(0.128)*
Information Cost $_t$	−0.409	−0.208 *	−0.476 **	−0.415 *	−0.240 **
	(0.130)	*(0.078)*	*(0.047)*	*(0.081)*	*(0.045)*
Treasury Stock $_t$	0.394 ***	0.246 ***	0.187 ***	0.245 ***	0.270 ***
	(0.004)	*(0.005)*	*(0.001)*	*(0.003)*	*(0.001)*
Number of Observations	176	209	119	255	759
R-Squared	0.091	0.286	0.108	0.139	0.237
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Year Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes
Industry Controls	No	No	No	No	No

Hausman (1978) test for endogeneity – This tests for differences between the OLS (or one-stage robust regressions) and IV estimates. The test statistic normalizes the differences in coefficients by the differences in standard errors. Large differences between OLS and IV will result in large test statistics and low p-values, suggesting that endogeneity is a problem and that the IV results are more consistent than OLS results.

Stock and Yogo (2005) test for weak instruments – This test evaluates the strength of the first stage regression by considering the F-statistic of the reduced form first stage regression of excluded instruments. High F-statistics and low *p*-values suggest strong instruments. (This test was derived from the Cragg and Donald (1993) test. The two tests are the same when there is only one endogenous regressor, as is the case in our study.)

Hahn and Hausman (2002) test for instrument validity – This test is a variation of the Hausman (1978) test for endogeneity, applied to the instruments rather than the specification. This test compares the 'forward' and 'reverse' IV estimates. If the instruments are valid, the difference between the 'forward' and the inverse of the 'reverse' estimates should be small, leading to large test statistics and small p-values.

Hansen-Sargan – This is a test for overidentifying restrictions, testing the joint significance of the set of endogenous variables in the system of equations. It has a Chi-square distribution.

For the Stock and Yogo (2005) test, the first-stage p-value is given. For the Shea Partial R^2, the statistic is for the first-stage equation. For the other tests, the p-value is for the second stage equation.

Hausman Test Low p-values suggest endogeneity is affecting the model and needs to be controlled for.

Stock & Yogo Low p-values suggest that first-stage F-statistic is higher than Stock & Yogo critical values; instruments are strong.
Hahn & Hausman Low p-values suggest there is little difference between the 'forward' and 'reverse' estimates. Instruments are valid.
Cragg-Donald Low p-values suggest that first-stage F-statistic is higher than critical values; instruments are strong.
Hansen-Sargan High p-values suggest that instruments are valid.
Anderson-Rubin Low p-values on excluded instruments suggest that instruments are valid.
Shea Partial R^2 Relatively high R^2 suggests that instruments are adequate.
Instrumental variables tests - for endogeneity, instrument strength and instrument validity

[a] Sample: 100 largest U.S. financial institutions. *Note: 2018 financial / ROA information is not yet available. ROA is only measured through 2017, so the 4th and 5th columns are only capturing* ROA_{2017} *for Board* $Ownership_{2016}$*, not* $ROA_{2017–2018}$*. For Board* $Ownership_{2015}$ *we are using* $ROA_{2016–2017}$*, and similar for all prior years.*

[b] Sample: 100 largest U.S. financial institutions. *Note: 2018 financial / ROA information is not yet available. ROA is only measured through 2017, so the 4th and 5th columns are only capturing* ROA_{2017} *for Board* $Ownership_{2016}$*, not* $ROA_{2017–2018}$*. For Board* $Ownership_{2015}$ *we are using* $ROA_{2016–2017}$*, and similar for all prior years.*

[c] Sample: Bhagat and Bolton (2014) 100 financial institutions. Only includes bank-years with no CEO stock trades (Net CEO Trades $_{t\text{-}2 \text{ to } t}$)

* for 10% significance.
** for 5% significance.
*** for 1% significance.

CEO stock sales (Net CEO Trades) is negatively and significantly related to future bank performance for the overall period (1998–2016) and each of the sub-periods (1998–2001, 2002–2006, 2007–2009, and 2010–2016). Interestingly, the coefficient on Net CEO Trades is largest (in absolute size) during the crisis period (2007–2009).[28] This suggests that misaligned executive compensation had a particularly negative impact on bank performance during the recent financial crisis; however, banks that were better governed (whose directors owned more stock in their banks) performed better during the recent financial crisis.

Table 7, Panels A1, A2, and A3 summarize the relation between bank capital and future CEO stock sales (Net CEO Trades). We consider three measures of bank capital[29]:

- (Total Assets – Liabilities) / Total Assets
- Tier 1 Capital = ((Common Equity + Preferred Equity) / Total Assets)
- Tangible Equity / Total Assets

We find a consistently negative and significant relation between each of the three measures of bank capital and future CEO stock sales for the pre-crisis (2000–2006), crisis (2007–2009), and post-crisis (2010–2016) periods in Table 7, Panels B1, B2, and B3. Additionally, we find a consistently negative and significant relation between good bank governance (measured as bank director stock ownership) and future CEO stock sales for the pre-crisis (2000–2006), crisis (2007–2009), and post-crisis (2010–2016) periods.

Table 8, Panels A1 and A2, and Panels B1 and B2, summarize the relation between director ownership and future bank riskiness, and bank Net CEO Trades and future bank riskiness. *Z*-score and Merton's distance to default (DD) are measures of bank safety.[30] We find that bank governance (measured as bank director stock ownership) is positively correlated with future bank safety, and this relationship is strongest during the crisis. These results are economically meaningful; a one standard deviation increase in median Director Ownership is associated with a 10.6% (9.6%) increase in Z-score (Merton's DD). Also, we find that bank CEO stock sales is negatively correlated with future bank safety; again, this relationship is strongest during the crisis. This has implications for bank regulators, institutional investors, and bank directors: If they are concerned about bank safety, especially during a financial crisis, they should focus on bank director stock ownership, and on compensation policies that discourage the bank CEO from selling large amounts of their stock-holdings while they are still employed at the bank.

[28] This is consistent with the evidence in Cziraki (2018).

[29] Tier 1 Capital measures funds contributed cumulatively by common and preferred shareholders that can bear losses before the bank is insolvent. We consider Tangible Equity for the following reason: Common equity consists of tangible equity and intangible equity (goodwill, tax deferred assets, mortgage servicing rights, minority interests in financial intermediaries). Given the limited loss absorption ability of intangible capital, we consider tangible equity as a measure of loss-absorbing capital.

[30] *Z*-score, which equals the average return on assets (ROA) plus the capital asset ratio (CAR), divided by the standard deviation of asset returns (σ(ROA)): Z-score = ((ROA + CAR))/(σ(ROA)). Higher values of Z-score indicate less risk-taking. Our second measure of risk-taking is Merton distance to default (Merton DD), with higher values indicating less risk-taking. Merton DD has been used in the literature to forecast bankruptcy. Merton DD builds on Merton (1974) where firm equity is modeled as a call option on the underlying value of the firm with an exercise price equal to the face value of the firm's liabilities. Similar to Z-score as a measure of risk-taking, the Merton DD measure also attempts to gauge the probability that a firm will go bankrupt over the forecasting horizon. Unlike Z-score, which is based solely on accounting information, the Merton DD measure is based on market and accounting data. Note that the "Z-score" used to measure financial institution's risk is a different measure than the "Altman's modified Z-score" used as an instrument for capital structure earlier in this paper. Both measures are constructed and named following the extant literature. See Bhagat et al., 2015, for details.

Table 7
Bank capital, bank CEO trading, and bank director ownership

Panel A1 – Net CEO Trades, by quartile, and Capital Ratio [(Total Assets – Liabilities) / Total Assets] in the previous year; 100 largest U.S. financial institutions

100 Financial Institutions: 1998–2016

	All firms	Q1 - Low CEO Trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,732,991	-$969	$340,293	$1,361,274	$12,738,751
Capital Ratio $_{t-1}$	9.01%	10.14%	9.19%	8.89%	7.88%

100 Financial Institutions: 1998–2001

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,648,385	-$857,811	$1801	$873,053	$11,296,592
Capital Ratio $_{t-1}$	8.33%	10.59%	8.21%	9.09%	7.24%

100 Financial Institutions: 2002–2006

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$3,213,422	-$203,605	$56,049	$835,047	$14,311,788
Capital Ratio $_{t-1}$	9.29%	10.83%	9.30%	8.88%	8.39%

100 Financial Institutions: 2007–2009

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,065,231	-$328,900	$157,960	$361,776	$15,571,678
Capital Ratio $_{t-1}$	8.94%	9.31%	9.46%	8.29%	7.25%

100 Financial Institutions: 2010–2016

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,363,819	-$244,236	$100,452	$569,485	$1,352,685
Capital Ratio $_{t-1}$	9.07%	10.10%	9.38%	8.93%	8.30%

Panel A2 – Net CEO Trades, by quartile, and Tier 1 Capital in the previous year; 100 largest U.S. financial institutions

100 Financial Institutions: 1998–2016

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,732,991	-$969	$340,293	$1,361,274	$12,738,751
Tier 1 Capital $_{t-1}$	11.28%	12.11%	12.09%	11.20%	9.92%

100 Financial Institutions: 1998–2001

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$2,648,385	-$857,811	$1801	$873,053	$11,296,592
Tier 1 Capital $_{t-1}$	10.56%	13.45%	10.38%	10.78%	7.98%

100 Financial Institutions: 2002–2006

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_{t}$	$3,213,422	-$203,605	$56,049	$835,047	$14,311,788
Tier 1 Capital $_{t-1}$	11.83%	12.75%	11.96%	11.80%	10.87%

(*continued on next page*)

Table 7 (*continued*)

100 Financial Institutions: 2007–2009

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_t$	$2,065,231	-$328,900	$157,960	$361,776	$15,571,678
Tier 1 Capital $_{t-1}$	10.17%	9.82%	10.41%	9.52%	9.09%

100 Financial Institutions: 2010–2016

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_t$	$2,363,819	-$244,236	$100,452	$569,485	$1,352,685
Tier 1 Capital $_{t-1}$	11.86%	13.36%	13.40%	11.57%	10.93%

Panel A3 – Net CEO Trades, by quartile, and Tangible Common Equity Ratio in the previous year; 100 largest U.S. financial institutions

100 financial institutions: 1998–2016

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_t$	$2,732,991	-$969	$340,293	$1,361,274	$12,738,751
Tangible Equity Ratio $_{t-1}$	16.82%	19.15%	17.25%	16.51%	14.24%

100 Financial Institutions: 1998–2001

	All Firms	Q1 - Low CEO Trading	Q2	Q3	Q4 - High CEO Trading
Net CEO Trades $_t$	$2,648,385	-$857,811	$1801	$873,053	$11,296,592
Tangible Equity Ratio $_{t-1}$	17.15%	22.83%	15.04%	16.76%	12.02%

100 Financial Institutions: 2002–2006

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_t$	$3,213,422	-$203,605	$56,049	$835,047	$14,311,788
Tangible Equity Ratio $_{t-1}$	18.10%	19.56%	17.75%	17.27%	17.45%

100 Financial Institutions: 2007–2009

	All Firms	Q1 - Low CEO Trading	Q2	Q3	Q4 - High CEO Trading
Net CEO Trades $_t$	$2,065,231	-$328,900	$157,960	$361,776	$15,571,678
Tangible Equity Ratio $_{t-1}$	14.47%	13.67%	14.16%	12.04%	10.13%

100 Financial Institutions: 2010–2016

	All firms	Q1 - Low CEO trading	Q2	Q3	Q4 - High CEO trading
Net CEO Trades $_t$	$2,363,819	-$244,236	$100,452	$569,485	$1,352,685
Tangible Equity Ratio $_{t-1}$	17.11%	20.22%	18.29%	16.16%	15.58%

Impact of Director Dollar Ownership and Bank Capital on CEO Net Trades in the following year; 100 largest U.S. financial institutions

Panel B1: [(Total Assets – Liabilities)/Total Assets] as the measure of Bank Capital

	100 Financial Institutions		
	Dependent Variable: Net CEO Trades$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.930 **	−1.802 ***	−1.426
	(0.032)	*(0.003)*	*(0.288)*
Book-to-Market $_t$	−2.693 **	−3.460 *	−3.002 **
	(0.022)	*(0.069)*	*(0.024)*

(*continued on next page*)

Table 7 (*continued*)

Impact of Director Dollar Ownership and Bank Capital on CEO Net Trades in the following year; 100 largest U.S. financial institutions			
Panel B1: [(Total Assets – Liabilities)/Total Assets] as the measure of Bank Capital			
	100 Financial Institutions		
	Dependent Variable: Net CEO Trades$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Return $_{t-1}$	−0.308	−0.401 ***	−0.499 **
	(0.239)	*(0.004)*	*(0.025)*
Stock Volatility $_t$	32.702	41.428 **	40.022 *
	(0.191)	*(0.019)*	*(0.094)*
CEO Total Compensation $_{t-1}$	1.874 **	2.386 **	2.005 **
	(0.013)	*(0.021)*	*(0.041)*
CEO % Equity Compensation $_{t-1}$	9.244 ***	11.402 ***	8.687 ***
	(0.001)	*(0.001)*	*(0.003)*
CEO Equity Holdings (log) $_{t-1}$	1.044 ***	1.601 ***	0.948 ***
	(0.001)	*(0.001)*	*(0.008)*
[(Total Assets – Liabilities) / Total Assets] $_{t-1}$	**−34.608***	**−51.233***	**−40.073**
	(0.002)	***(0.001)***	***(0.019)***
Median Director Ownership (log) $_{t-1}$	**−1.377***	**−2.259***	**−1.821***
	(0.006)	***(0.001)***	***(0.061)***
TBTF Dummy	**3.148***	**6.584***	**−2.118**
	(0.061)	***(0.001)***	***(0.598)***
Number of Observations	674	277	540
R-Squared	0.181	0.152	0.201
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
Panel B2: Tier 1 Capital as the measure of *Bank Capital*			
Tier 1 Capital = ((Common Equity + Preferred Equity) / Total Assets); 100 largest U.S. financial institutions			
	100 Financial Institutions		
	Dependent Variable: Net CEO Trades$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.881 **	−1.786 ***	−1.444
	(0.033)	*(0.003)*	*(0.251)*
Book-to-Market $_t$	−2.534 **	−3.638 *	−3.018 **
	(0.025)	*(0.067)*	*(0.019)*
Return $_{t-1}$	−0.319	−0.493 ***	−0.577 **
	(0.239)	*(0.008)*	*(0.031)*
Stock Volatility $_t$	33.193	41.430 **	40.238 *
	(0.159)	*(0.022)*	*(0.092)*
CEO Total Compensation $_{t-1}$	1.817 **	2.250 **	2.041 **
	(0.018)	*(0.013)*	*(0.028)*
CEO % Equity Compensation $_{t-1}$	9.393 ***	11.399 ***	8.396 ***
	(0.001)	*(0.001)*	*(0.006)*
CEO Equity Holdings (log) $_{t-1}$	1.017 ***	1.592 ***	1.186 ***
	(0.001)	*(0.001)*	*(0.005)*
Tier 1 Capital $_{t-1}$	**−30.210***	**−51.922***	**−40.397***
	(0.002)	***(0.001)***	***(0.007)***
Median Director Ownership (log) $_{t-1}$	**−1.475***	**−2.301***	**−1.702**
	(0.009)	***(0.001)***	***(0.044)***
TBTF Dummy	**3.360***	**6.66***	**−2.286**
	(0.063)	***(0.001)***	***(0.611)***
Number of Observations	571	226	424
R-Squared	0.162	0.139	0.192
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes

(*continued on next page*)

Table 7 (*continued*)

Panel B3: [Tangible Common Equity/Assets] as the measure of *Bank Capital;* 100 largest U.S. financial institutions.

	100 Financial Institutions		
	Dependent Variable: Net CEO Trades$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.929 **	−1.785 ***	−1.601
	(0.034)	*(0.005)*	*(0.298)*
Book-to-Market $_t$	−2.761 **	−3.645 *	−3.201 **
	(0.020)	*(0.062)*	*(0.021)*
Return $_{t-1}$	−0.316	−0.408 ***	−0.504 **
	(0.244)	*(0.004)*	*(0.024)*
Stock Volatility $_t$	32.63	41.668 **	40.187 *
	(0.172)	*(0.031)*	*(0.092)*
CEO Total Compensation $_{t-1}$	1.835 **	2.329 **	2.186 **
	(0.014)	*(0.012)*	*(0.033)*
CEO % Equity Compensation $_{t-1}$	9.400 ***	11.189 ***	8.550 ***
	(0.001)	*(0.001)*	*(0.004)*
CEO Equity Holdings (log) $_{t-1}$	1.129 ***	1.351 ***	0.928 **
	(0.001)	*(0.001)*	*(0.011)*
Tangible Common Equity to Assets $_{t-1}$	**−34.837*** **	**−49.511*** **	**−40.003** **
	(0.003)	***(0.001)***	***(0.019)***
Median Director Ownership (log) $_{t-1}$	**−1.452*** **	**−2.333*** **	**−1.699** **
	(0.007)	***(0.001)***	***(0.040)***
TBTF Dummy	**3.277** *	**6.8718*** **	**−1.928**
	(0.055)	***(0.002)***	***(0.692)***
Number of Observations	674	277	540
R-Squared	0.183	0.149	0.199
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes

* for 10% significance.
** for 5% significance.
*** for 1% significance.

6. Summary and conclusions

Corporate governance continues to be a focus of not just the financial media but the popular media, as well. The scandals at Wells Fargo and Equifax are just the most recent in the long line of scandals involving large well-known public U.S. corporations. Going back in time, the financial crisis of 2008 was triggered by the implosion of the big banks. Further back in time, at the turn of the new millennium, the scandals in Enron, WorldCom, Tyco, and Qwest led to their demise.

After each set of these scandals, policymakers raised questions about the effectiveness of corporate governance mechanisms in these companies. This led to the inevitable call for more regulation and laws to constrain and regulate corporate behavior, to wit, the Sarbanes Oxley Act of 2002 and the Dodd-Frank Act of 2010. Have these two rather extensive sets of laws addressed the governance concerns of corporate America? The recent Wells Fargo and Equifax episodes would suggest otherwise. We think a more fruitful approach to addressing the corporate governance concerns is to focus on possible common themes underpinning the Enron, WorldCom, Tyco, Qwest, the big banks circa 2008, Wells Fargo, and Equifax scandals. We propose, on the basis of our more recent research, that misaligned CEO incentive compensation is a common theme underpinning the above corporate scandals.

In our 2008 paper, "Corporate governance and firm performance," we focused on the question: How is corporate governance measured? We considered an extensive set of governance measures used in the finance, accounting, and law literature, as well as governance indices sold by commercial vendors. *We find director stock ownership is most consistently and positively related to future corporate performance.* Given that the essence of good governance is the set of processes that ensures outside investors a fair return on their investment, we suggest director stock ownership as a measure of corporate governance. Public policymakers and long-term investors should find this result especially relevant given their strong interest in long-term corporate performance. Equally important,

Table 8
Bank director ownership, bank CEO trading, and future bank risk

Bank director ownership, bank CEO trading, and future bank risk			
Panel A1: *Z-score* as the measure of risk-taking, OLS			
100 largest U.S. financial institutions			
	Dependent Variable		
	ln *(Z-score)*$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.024 *	−0.035 *	−0.022 *
	(0.013)	*(0.072)*	*(0.095)*
Market-to-Book $_t$	0.166 *	0.179 *	0.136
	(0.084)	*(0.070)*	*(0.239)*
Median Director Ownership (log)$_{t-1}$	**0.075*****	**0.123*****	**0.088***
	(0.001)	***(0.002)***	***(0.051)***
Abnormal CEO Trading$_{t-2\ to\ t-1}$	**−1.539*****	**−2.746*****	**−1.317*****
	(0.001)	*(0.001)*	*(0.006)*
Constant	3.440 ***	3.662 ***	4.702 ***
	(0.001)	*(0.001)*	*(0.001)*
Number of Observations	851	409	742
R-Squared	0.487	0.269	0.324
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
Estimation Method	OLS	OLS	OLS

Bank director ownership, bank CEO trading, and future bank risk			
Panel A2: *Z-score* as the measure of risk-taking, 2SLS			
	100 largest U.S. financial institutions		
	Dependent Variable:		
	ln (Z-score)$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.039 **	−0.082 ***	−0.045 **
	(0.013)	*(0.006)*	*(0.037)*
Market-to-Book $_t$	0.239 *	0.207 *	0.209 **
	(0.069)	*(0.095)*	*(0.044)*
Median Director Ownership (log)$_{t-1}$	**0.142*****	**0.292*****	**0.189*****
	(0.001)	***(0.001)***	***(0.002)***
Abnormal CEO Trading$_{t-2\ to\ t-1}$	**−2.076*****	**−3.825*****	**−1.327****
	(0.001)	***(0.001)***	***(0.026)***
Constant	3.055 ***	4.061 ***	4.605 ***
	(0.001)	*(0.001)*	*(0.001)*
Number of Observations	851	409	742
R-Squared	0.491	0.298	0.344
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
Estimation Method	2SLS	2SLS	2SLS

(*continued on next page*)

Table 8 (*continued*)

	Bank director ownership, bank CEO trading, and future bank risk		
	Panel B1: *Merton Distance-to-Default* as the measure of risk-taking, OLS		
	100 largest U.S. financial institutions		
	Dependent Variable:		
	ln (Merton Distance to Default)$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.072 ***	−0.080 ***	−0.031 **
	(0.002)	*(0.006)*	*(0.029)*
Market-to-Book $_t$	0.569 **	0.571 *	0.41
	(0.044)	*(0.083)*	*(0.216)*
Median Director Ownership (log)$_{t-1}$	**0.203*** **	**0.192** **	**0.195***
	(0.009)	***(0.033)***	***(0.058)***
Abnormal CEO Trading$_{t-2\ to\ t-1}$	**−2.448*** **	**−3.745*** **	**−1.958** **
	(0.001)	***(0.004)***	***(0.037)***
Constant	3.713 ***	3.615 ***	3.826 ***
	(0.001)	*(0.001)*	*(0.001)*
Number of Observations	851	409	742
R-Squared	0.458	0.272	0.331
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
Estimation Method	OLS	OLS	OLS

	Bank director ownership, bank CEO trading, and future bank risk		
	Panel B2: *Merton Distance-to-Default* as the measure of risk-taking, 2SLS		
	100 largest U.S. financial institutions		
	Dependent Variable		
	ln (Merton Distance to Default)$_t$		
	2000–2006	2007–2009	2010–2016
	Pre-Crisis	Crisis	Post-Crisis
Assets (log) $_t$	−0.045 **	−0.100 ***	−0.059 **
	(0.034)	*(0.009)*	*(0.041)*
Market-to-Book $_t$	0.566 *	0.580	0.739*
	(0.059)	*(0.109)*	*(0.092)*
Median Director Ownership (log)$_{t-1}$	**0.385*** **	**0.487*** **	**0.319***
	(0.001)	***(0.001)***	***(0.052)***
Abnormal CEO Trading$_{t-2\ to\ t-1}$	**−2.341*** **	**−3.398*** **	**−1.483***
	(0.001)	***(0.001)***	***(0.052)***
Constant	2.859 ***	3.959 ***	3.723 ***
	(0.001)	*(0.001)*	*(0.001)*
Number of Observations	851	409	742
R-Squared	0.302	0.219	0.235
Year Controls	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
Estimation Method	2SLS	2SLS	2SLS

	Dependent Variable:			Dependent Variable:		
	ln(Z-Score)$_t$			*ln (Merton Distance-to-Default)$_t$*		
	2000–2006	2007–2009	2010–2016	2000–2006	2007–2009	2010–2016
Endogeneity test						
Hausman Test	0.012	0.004	0.008	0.022	0.016	0.028

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Table 8 (*continued*)

	Dependent Variable:			Dependent Variable:		
	$ln(Z\text{-}Score)_t$			$ln\ (Merton\ Distance\text{-}to\text{-}Default)_t$		
	2000–2006	2007–2009	2010–2016	2000–2006	2007–2009	2010–2016
Instrument tests						
Stock & Yogo	0.004	0.004	0.002	0.005	0.005	0.003
Hahn & Hausman	0.005	0.023	0.001	0.055	0.011	0.079
Cragg-Donald	0.002	0.004	0.001	0.002	0.004	0.001
Hansen-Sargan	0.792	0.407	0.737	0.594	0.484	0.517
Anderson-Rubin	0.019	0.033	0.057	0.018	0.026	0.011
Shea Partial R^2	0.297	0.173	0.486	0.231	0.187	0.610

Instrumental variables tests - for endogeneity, instrument strength and instrument validity.
Hausman (1978) test for endogeneity – This tests for differences between the OLS (or one-stage robust regressions) and IV estimates. The test statistic normalizes the differences in coefficients by the differences in standard errors. Large differences between OLS and IV will result in large test statistics and low p-values, suggesting that endogeneity is a problem and that the IV results are more consistent than OLS results.
Stock and Yogo (2005) test for weak instruments – This test evaluates the strength of the first stage regression by considering the F-statistic of the reduced form first stage regression of excluded instruments. High F-statistics and low *p*-values suggest strong instruments. (This test was derived from the Cragg and Donald (1993) test. The two tests are the same when there is only one endogenous regressor, as is the case in our study.)
Hahn and Hausman (2002) test for instrument validity – This test is a variation of the Hausman (1978) test for endogeneity, applied to the instruments rather than the specification. This test compares the 'forward' and 'reverse' IV estimates. If the instruments are valid, the difference between the 'forward' and the inverse of the 'reverse' estimates should be small, leading to large test statistics and small p-values.
Hansen-Sargan – This is a test for overidentifying restrictions, testing the joint significance of the set of endogenous variables in the system of equations. It has a Chi-square distribution.
For the Stock and Yogo (2005) test, the first-stage p-value is given. For the Shea Partial R^2, the statistic is for the first-stage equation. For the other tests, the p-value is for the second stage equation.
Hausman Test Low p-values suggest endogeneity is affecting the model and needs to be controlled for.
Stock & Yogo Low p-values suggest that first-stage F-statistic is higher than Stock & Yogo critical values; instruments are strong.
Hahn & Hausman Low p-values suggest there is little difference between the 'forward' and 'reverse' estimates. Instruments are valid.
Cragg-Donald Low p-values suggest that first-stage F-statistic is higher than critical values; instruments are strong.
Hansen-Sargan High p-values suggest that instruments are valid.
Anderson-Rubin Low p-values on excluded instruments suggest that instruments are valid.
Shea Partial R^2 Relatively high R^2 suggests that instruments are adequate.
* for 10% significance.
** for 5% significance.
*** for 1% significance.

corporate governance researchers should consider director stock ownership as a measure of corporate governance; this will also aid in the comparability of results across different studies.[31]

In our earlier paper we considered data through 2002. In this paper, we extend our sample period through 2016. These additional 14 years of data provide a powerful out-of-sample test of the specification and power of director stock ownership as a measure of corporate governance. We find director stock ownership most consistently and positively related to future corporate performance in several out-of-sample periods (2002–2006, 2007–2009, 2010–2016) across a battery of different specifications, estimation techniques, and for different sub-samples (S&P 500, S&P MidCap 400, S&P SmallCap 600). One particular sub-sample of considerable public interest is the 100 largest U.S. financial institutions during the financial crisis of 2008. Bank director stock ownership is positively related to future bank performance prior to and during the financial crisis, and bank director stock ownership is negatively related to future bank risk prior to and during the financial crisis; both above results should be of considerable interest to senior bank

[31] In addition to identifying director stock ownership as the most consistent and informative measure of corporate governance, our 2008 paper also formalized a process for addressing endogeneity within corporate governance studies (and corporate finance studies, in general). It is common to design studies to determine the effect that certain measures of corporate governance have on other company-specific variables of interest; in this study, our focus is on the impact that corporate governance has on firm financial performance. But, ex ante, it is frequently unclear whether performance is a function of governance or if governance is a function of performance. In such situations with possible reverse causality (endogeneity), simple OLS estimates will likely be biased and inconsistent. Treating this bias, however, is not always straightforward; all available treatments impose unique assumptions on the relationship that may or may not exist. Without a properly designed treatment for endogeneity, the cure may be worse than the disease. In our 2008 study, we analyzed the governance-performance relationship using instrumental variables in a two-stage least squares model. The key to such a process is theoretically identifying instruments that are highly correlated with the potentially endogenous regressor but unrelated to the variable of interest; finding such variables is never easy (especially when the endogenous regressor is an index or a binary variable). Our approach clarifies the process for (a) identifying instruments and (b) performing diagnostic tests on those instruments and the entire system. This process includes an unavoidable circularity: we can only test for endogeneity if our instruments are strong and valid, yet we need exogenous instruments if the system is endogenous. The process and tests we employ are the best we can do to correct for this and to produce relatively unbiased and consistent 2SLS estimates.

regulators. Specifically, if bank regulators are concerned about bank performance, and excessive risk-taking by banks, they should focus on bank director ownership, and on compensation policies that discourage the bank CEO from selling large amounts of their stock-holdings while they are still employed at the bank.[32]

Appendix A

Table A1
Director Ownership, by quartile, and *Industry-Adjusted ROA* for the 2 subsequent years (t + 1 to t + 2), all S&P 500 Firms.

Panel A					
S&P 500: 1998–2016					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$2,143,981	$336,920	$1,077,395	$2,945,246	$7,135,031
Adjusted ROA: t + 1 to t + 2	0.03%	−0.52%	−0.18%	0.24%	0.39%
Panel B					
S&P 500: 1998–2001					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$1,110,822	$223,303	$498,806	$1,691,433	$5,754,216
Adjusted ROA: t + 1 to t + 2	0.03%	−0.42%	−0.18%	0.18%	0.36%
Panel C					
S&P 500: 2002–2006					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$1,693,429	$241,039	$1,092,845	$2,291,371	$5,330,126
Adjusted ROA: t + 1 to t + 2	−0.01%	−0.25%	−0.25%	0.24%	0.43%
Panel D					
S&P 500: 2007–2009					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$2,671,737	$302,276	$1,154,608	$3,411,079	$7,606,271
Adjusted ROA: t + 1 to t + 2	−0.03%	−0.36%	−0.30%	0.31%	0.47%
Panel E					
S&P 500: 2010–2016					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$3,582,675	$459,438	$1,378,692	$3,640,703	$9,398,842
Adjusted ROA: t + 1 to t + 2	0.02%	−0.38%	−0.20%	0.23%	0.48%

[32] More generally, bank regulators should focus on bank director compensation policy (and bank executive compensation policy); see Bhagat (2017).

Table A2
Director Ownership, by quartile, and *Industry-Adjusted ROA* for the 2 subsequent years (t + 1 to t + 2), all S&P MidCap 400 Firms.

Panel A					
S&P 400 MidCap: 1998–2016					
	All Firms	**Q1 - Low Ownership**	**Q2**	**Q3**	**Q4 - High Ownership**
Director Ownership	$1,653,109	$206,090	$736,139	$2,021,685	$5,209,535
Adjusted ROA: t + 1 to t + 2	0.02%	−0.47%	−0.21%	0.24%	0.47%
Panel B					
S&P 400 MidCap: 1998–2001					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$785,760	$153,414	$372,928	$1,021,285	$3,987,537
Adjusted ROA: t + 1 to t + 2	0.02%	−0.44%	−0.17%	0.22%	0.49%
Panel C					
S&P 400 MidCap: 2002–2006					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$1,257,665	$171,416	$758,034	$1,721,226	$3,987,002
Adjusted ROA: t + 1 to t + 2	−0.02%	−0.37%	−0.25%	0.29%	0.38%
Panel D					
S&P 400 MidCap: 2007–2009					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$1,571,306	$245,673	$791,361	$2,234,845	$5,304,448
Adjusted ROA: t + 1 to t + 2	−0.02%	−0.42%	−0.23%	0.24%	0.42%
Panel E					
S&P 400 MidCap: 2010–2016					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$2,111,596	$301,600	$1,035,093	$2,396,477	$6,265,894
Adjusted ROA: t + 1 to t + 2	0.02%	−0.34%	−0.20%	0.20%	0.38%

Table A3
Director Ownership, by quartile, and *Industry-Adjusted ROA* for the 2 subsequent years (t + 1 to t + 2), all S&P SmallCap 600 Firms.

Panel A					
S&P 600 SmallCap: 1998–2016					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$887,281	$138,487	$576,886	$1,376,207	$2,866,849
Adjusted ROA: t + 1 to t + 2	0.02%	−0.37%	−0.17%	0.24%	0.42%
Panel B					
S&P 600 SmallCap: 1998–2001					
	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$608,808	$105,995	$299,989	$585,965	$2,005,315
Adjusted ROA: t + 1 to t + 2	0.03%	−0.44%	−0.16%	0.23%	0.49%

Panel C

S&P 600 SmallCap: 2002–2006

	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$656,068	$110,043	$540,625	$1,165,469	$2,190,521
Adjusted ROA: t + 1 to t + 2	−0.02%	−0.28%	−0.24%	0.28%	0.42%

Panel D

S&P 600 SmallCap: 2007–2009

	All Firms	Q1 - Low Ownership	Q2	Q3	Q4 - High Ownership
Director Ownership	$1,069,385	$160,885	$631,359	$1,658,490	$3,959,819
Adjusted ROA: t + 1 to t + 2	−0.03%	−0.42%	−0.23%	0.30%	0.46%

Panel E

S&P 600 SmallCap: 2010–2016

	All Firms	**Q1 - Low Ownership**	**Q2**	**Q3**	**Q4 - High Ownership**
Director Ownership	$1,722,124	$166,224	$607,741	$1,527,818	$3,897,414
Adjusted ROA: t + 1 to t + 2	0.02%	−0.44%	−0.22%	0.22%	0.42%

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