Risky Business: Institutional Logics and Risk Taking at Large U.S. Commercial Banks*

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Objective. This article aims to answer whether increased securitization and/or increased shareholder value pressures at commercial banks have led to higher levels of risk. *Methods.* Using data on large U.S. commercial banks from several sources, I estimate linear partial-adjustment models to predict the effects of securitization, as well as CEO incentives to increase shareholder value, on leverage. *Results.* These models provide evidence that increases in the relative size of trading securities at a commercial bank are significantly associated with increases in leverage. Meanwhile, the relative size of total securities and CEO incentives to increase shareholder value do not appear to affect leverage. *Conclusion.* These findings suggest that limiting commercial bank speculation in securities markets may reduce the likelihood that commercial banks face large losses or become insolvent in financial downturns.

The determinants of risk taking at U.S. commercial banks have become a politically salient topic of debate in the aftermath of the 2007–2009 financial crisis, in which highly leveraged commercial banks contributed to greater systemic risk in the financial system (Papanikolaou and Wolff, 2010). One common claim brought by pundits (e.g., Reich, 2015) is that the demise of the Glass-Steagall Act allowed commercial banks to trade and hold greater amounts of securities, which is thought to be inherently riskier than traditional commercial banking activities of lending and collecting deposits. A separate argument (e.g., Stan, 2011) posits that the increasing use of stock and option grants in executive compensation packages led banks to increase risk in pursuit of short-term gains in stock price.

These arguments recognize the emergence of two *institutional logics*—systems of symbols and beliefs that not only indicate which goals are appropriate for organizations to pursue, but also which actions are appropriate for organizations to take in pursuit of those goals and which roles different actors within organizations should play in this process (Friedland and Alford, 1991)—in the field of large commercial banks in the United States at the end of the 20th century. One logic—termed by Lounsbury (2002) as the *market logic*—emphasized entering markets for securities, and thus increasing their reliance on professionals trained in financial economics to trade and managing securities portfolios. A second logic—the *shareholder value logic*—held that banks should deliver greater returns to shareholders, and provide incentives to executives to increase the bank's stock price.

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In this article, I test novel hypotheses that the adoption of practices associated with each institutional logic is associated with increased leverage at commercial banks. Banks that increase securitization may increase their leverage because of their reliance on financial professionals whose training in financial economics may predispose them toward risk. This relationship may be especially pronounced for banks that trade (rather than just hold) securities, since securities traders often trade using borrowed money and may face financial incentives to make riskier decisions. Meanwhile, because bank shareholders are generally less risk averse than executives, increasing executive incentives to maximize shareholder value may also lead to higher leverage.

Results from linear partial-adjustment models show that increases in trading securities as a percentage of assets are significantly associated with increased leverage. However, I find no significant relationship between increases in total securities as a percentage of assets, or increases in CEO incentives to increase shareholder value, and increased leverage.

Market Logic

Rise of Logic

In the commercial banking industry, the market logic was preceded by what Lounsbury (2002) has called the *regulatory logic*, which reflected regulatory restrictions designed to limit the functional and geographic reach of commercial banks in order to contain risk and prevent banks from becoming too large. Perhaps the most important of these regulations was the 1933 Glass-Steagall Act, which prevented bank holding companies (BHCs) from owning both commercial and investment banks and limited the interest rates that commercial banks could pay on savings accounts, under the notion that competition among commercial banks to attract deposits had encouraged risky behavior (Friedman, 1975). This logic held that commercial banks should limit their activities in order to minimize risk—notably, not dealing securities on behalf of clients—and instead make money chiefly off of net interest income (the difference between the interest collected on loans and that paid on deposits).

Commercial banks thrived under this logic for much of the 20th century. However, commercial banks lost their position as central financial intermediaries in the 1970s as corporations and individuals began to self-finance or look to financial markets to raise cash at more favorable rates than could be found at commercial banks (Davis, 2009:18). In response to this decline, commercial banks turned toward a *market logic* (Lounsbury, 2002) that emphasized generating income from securitization and from the provision of a wider array of financial services to customers alongside traditional lending practices. Large commercial banks exploited regulatory ambiguity to begin trading in new financial products that were difficult to classify under existing regulation (Funk and Hirschman, 2014), and successfully lobbied for deregulation in the 1980s and 1990s that eliminated some of the barriers between commercial and investment banks (Suarez and Kodolny, 2011).

Adoption of Practices Associated with the Market Logic

The adoption of the market logic can be seen in the turn toward securitization—and, in particular, toward trading securities—in the commercial banking industry. In 1995,

securities held for trading constituted 3.4 percent of all assets in the commercial banking system; by 2007, this percentage had risen to 9.1 percent. Securities classified as "available-for sale" made up roughly 15 percent of bank portfolios throughout this time period (Vickery, Deng, and Sullivan, 2015).

This turn toward securitization at commercial banks led to a greater reliance on professionals trained in financial theory, which structured and shaped markets for securities. While the tools of this theory—mathematical formulae that predicted optimal behavior within financial markets—were initially treated with skepticism or resistance within the community of financial practitioners when introduced in the 1950s, they became widely used by the 1960s and 1970s (Bernstein, 1992). Financial theory had a further performative effect on financial markets thereafter by shaping financial regulation, risk management practices, and even the development and legitimization of markets for new securities and derivatives (Mackenzie, 2006).

Commercial banks' turn toward securitization buoyed the professionalization efforts of workers trained in financial theory, who increasingly laid claim to control over applicable work activities (Lounsbury, 2002). In particular, since managing the tradeoffs between risk and return is central to financial theory, financial professionals laid claim to the management of risk at commercial banks that began to deal in securities.

Implications for Bank Leverage

There is good reason to think that the use of financial professionals to manage risk may lead commercial banks that adopt the market logic (as measured by their relative level of securitization) to face higher levels of leverage. Specifically, the frames that financial professionals use to make financial decisions may predispose them to make riskier decisions.

A long line of work in the social sciences has shown that decision making under conditions of uncertainty is powerfully governed by heuristics that lead to biased judgment. Two such heuristics discovered by Tversky and Kahneman (1974) are the *availability heuristic*—decisionmakers are more likely to take into account information that is easily retrievable from memory—and *anchoring bias*—decisionmakers are unlikely to deviate much from the reference point or framework that is used when a decision is first presented. The determinants of what information is most easily retrievable and of what frameworks are used by a decisionmaker are past and present interactions with social institutions (Douglas, 1986), which provide experiences that can be recalled from memory when making decisions, and classification systems that lead to framing choices in predictable ways (Heimer, 1988).

Financial professionals are trained in quantitative models in which risk is seen as manageable and, to some extent, desirable in order to maximize returns (e.g., Markovitz, 1952). Because financial professionals at banks use these quantitative models to frame decisions about portfolio management, they may be more likely to be more tolerant of risk than other actors. This would be consistent with research that finds that taking classes in economics makes students more likely to act in accordance with behavior suggested by economic models (Frank, Gilovich, and Regan, 1993).

In addition, the use of quantitative models as a frame may provide financial professionals with overconfidence when making decisions about risk. Quantitative risk models highlight the importance of known inputs to the model and downplay the importance of factors not included in the model. Those who use quantitative models thus consider fewer factors that could affect risk, which has been shown to result in more risky decision making (Nisbett,

Zukier, and Lemley, 1981). Further, those trained in finance may be more likely to associate the mathematical complexity of models with reduced uncertainty (Stimmler, 2013). This suggests that, as quantitative risk models used by banks have become more complex (e.g., Milne, 2009), financial professionals may become more confident in their ability to manage risk. This would be consistent with research showing that the use of quantitative risk-based measures by commercial and investment banks is positively associated with greater risk taking (Stimmler, 2013).

The reliance of securities-holding commercial banks on financial professionals to manage risk thus implies the following hypothesis:

Hypothesis 1: Increases in the relative level of securities at commercial banks will be associated with higher levels of leverage.

Further, commercial banks that actively trade securities may be even more likely to take on leverage than banks that hold securities but do not engage in speculation. This is because speculation—or trading of securities with the intent to profit from short-term fluctuations (rather than long-term growth) in the price of the security—tends to be riskier than buy-and-hold investing, as investors often finance speculation through buying assets "on margin" with borrowed money.

In addition, banks that trade securities mainly compensate financial professionals who trade securities through year-end bonuses tied to the revenue they generate for the bank. This compensation scheme encourages short-term profits but can leave banks vulnerable to longer-term risks (Ho, 2009:258; Valukas, 2010:162). This research also suggests that the fate of securities traders is not closely tied to the fate of their bank because it is relatively common for traders to bounce between jobs. Thus, rather than managing risks, securities traders may instead seek to increase leverage in the hopes of maximizing their personal rewards (Ho, 2009:259).The above implies a second hypothesis:

Hypothesis 2: Increases in the relative level of *trading securities* at commercial banks will be associated with higher levels of leverage.

Shareholder Value Logic

Rise of Logic

Alongside changes in the commercial banking industry, the late 20th century saw a wholesale change in corporate governance practices in publicly held American firms. The dominant conception of corporate control across most of the 20th century held that managers of a firm should have little interference from the firm's shareholders in operating the firm (Fligstein, 1990). However, partially driven by poor corporate performance in the 1970s, shareholders began to push for policies that would maximize shareholder value (and, thus, stock prices). The ideological foundation of the *shareholder value logic* was agency theory (Jensen and Meckling, 1976), which held that shareholders are the only legitimate "residual claimants" on profits that remain after contractual claims are paid to other stakeholders like workers (Lazonick and O'Sullivan, 2000), and that managers should be contracted to act on behalf of shareholders. Jensen and Meckling (1976) argued that, without mechanisms for shareholders to discipline managers, managers would pursue their own interests in lieu of maximizing the firm's stock price.

Aided by legal and regulatory changes that provided ways for shareholders to control managerial behavior, firms began to align their practices with shareholder interests in earnest in the late 20th century. Like other publicly held corporations, commercial banks faced pressures to adopt the shareholder value logic. These pressures can be seen in the wave of bank mergers in the 1980s and 1990s, which were chiefly motivated by a desire to increase shareholder value through economies of scale, improved efficiency, or increased access to a regulatory safety net (Berger, Desmetz, and Strahan, 1999). At the 1996 annual convention of the American Bankers Association, then-Chairman of the Federal Reserve Alan Greenspan highlighted the growth of this logic in the commercial banking field, remarking that maximizing shareholder value was "a major theme of the conference" (Greenspan, 1996).

Adoption of Practices Associated with the Shareholder Value Logic

Perhaps the most common practice used by shareholders to align the interest of managers with that of shareholders has been compensating executives in stock and option grants.[1] Jensen and Murphy (1990), among others, argued that giving executives financial incentives to raise the firm's stock price would align the interests of managers with those of shareholders. By the late 1990s, option grants comprised the largest portion of CEO compensation packages (Murphy, 1999); in the 2000s, restricted stock grants replaced option grants as the largest share of CEO pay (Frydman and Jenter, 2010).

Implications for Risk Taking

A clear prescription of the shareholder value logic was that firms should increase their leverage in order to return greater profits to shareholders (Jensen and Meckling, 1976; Dobbin and Jung, 2010). Agency theory holds that managers keep leverage below the value that would be preferred by shareholders because managers are more risk averse than are shareholders. Managers whose firms fail or lose much of their value face the undiversifiable risk of losing employment, while shareholders can hedge against the losses of investments into a risky company through portfolio diversification. Managers who want to move to a different firm also face greater frictions than do shareholders who wish to sell their shares in a firm, who can more quickly exit bad investments, limiting their downside risk (Lazonick, 2011). The difference in risk preference between shareholders and managers should be especially pronounced in banks, since existence of deposit insurance makes shareholders more indifferent to the risk a bank faces (Houston and James, 1995).

Shareholders also reward firms that finance new operations through borrowing (which increases liabilities and therefore increases leverage) instead of raising capital through issuing equity. According to agency theory (Jensen and Meckling, 1976), firms will take on debt when they are confident that their new operations will provide greater returns than the interest they will pay on the debt. Shareholders soon began to view debt financing positively, as it signaled managerial confidence in the firm's new activities (Dobbin and Jung, 2010). This made debt financing an attractive option for firms concerned about responding to shareholders' interests.

[1] Option grants in compensation packages give the holder the option to buy shares of the company at some point in the future at a price that is fixed at the beginning of the grant.

Dobbin and Jung (2010) also argue that, in practice, firms were quick to implement prescriptions of agency theory that encouraged risk taking while being more likely to ignore prescriptions of agency theory that sought to limit risk taking. These authors further suggest that commercial banks were pressured to offer their executives stock and option grants in their compensation packages, both in order to align executive incentives with those of shareholders and also to compete with other financial firms that offered lucrative equity grants in their compensation packages (2010:58). These grants gave executives incentives to take risks in pursuit of short-term stock price gains. Because shareholders generally react positively to increased bank leverage, it follows that executives will be more likely to take actions to increase bank leverage when they can benefit from the resulting stock price gains.

This implies the following hypothesis:

Hypothesis 3: Increases in the sensitivity of compensation of CEOs at commercial banks to gains in the bank's stock price will be associated with higher levels of leverage.

Data

Sample

My sample consists of bank-years for large U.S. commercial banks (Standard Industrial Classification code = 6020, 6021, or 6022) for years between 1996 and 2016, aggregated at the level of the BHC. I focus on commercial banks large enough to be listed in the S&P 1000, both because they are more central financial intermediaries in the economy and because they were more likely to adopt the market and shareholder value logics (Almandoz, 2014). Though commercial banks began to hold greater amounts of securities and offer stock and option grants in executive compensation packages beginning in the 1980s, consistent time series for securities holdings and detailed information about executive compensation packages are not available until 1993, while detailed information on the composition of boards of directors are not available until 1996. Thus, while I cannot study how the advent of the market and shareholder value logics affected leverage, the remaining time frame allows for the test of changes in the prevalence of each logic on risk taking.

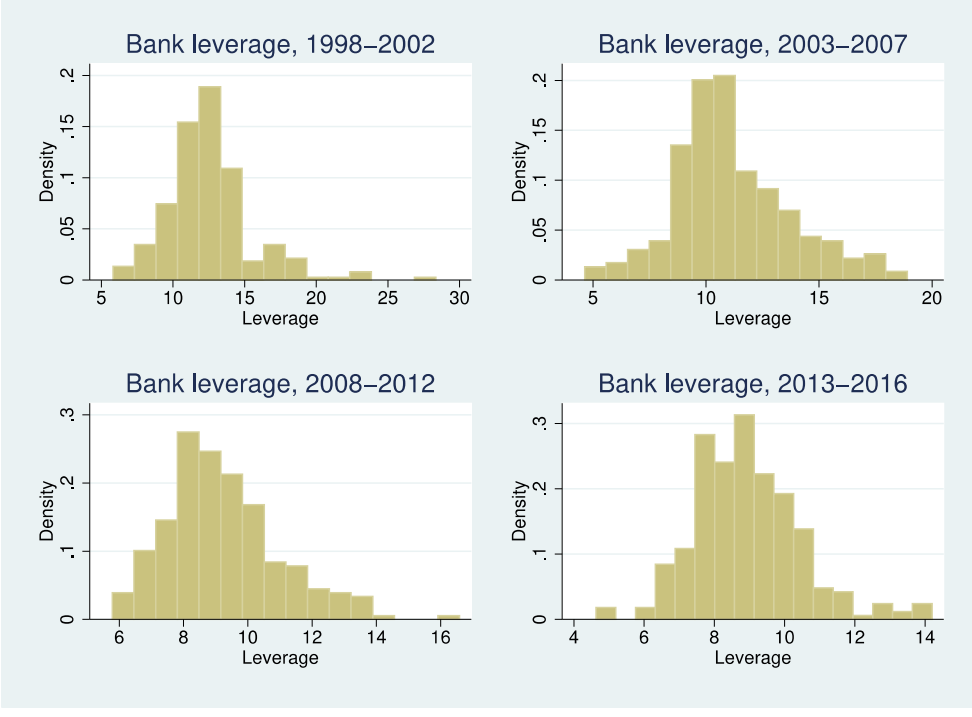
Bank Leverage

Bank leverage is defined as assets over equity (alternatively, assets minus liabilities). Banks that wish to fund asset purchases beyond their current levels of equity must borrow money, in the hopes that the return they will receive on the assets bought with borrowed money will be greater than the interest paid on the loan. This has the effect of increasing bank leverage, since assets rise but equity stays the same (because the bank takes on liabilities in equal amount to the asset bought).

Leverage is one of the most common risk-taking measures used within the field of finance, and as such is a focus for financial professionals as well as shareholders. Leverage allows banks to magnify the size of their investments, leading to greater gains on successful investments and greater losses on unsuccessful ones. Thus, high leverage increases the risks that commercial banks face, leaving them more susceptible to large losses or insolvency in

FIGURE 1

Distribution of Leverage at Large Commercial Banks



the event of a downturn (Estrella, Park, and Peristiani, 2000).[2] This variable is constructed using Compustat's Bank Fundamentals Annual data set.

A possible objection to the use of leverage to test the effects of implementing practices associated with the market and shareholder value logics on risk taking is that commercial banks face regulatory limits on the amount of leverage they face to ensure that they have a sufficient buffer of equity for financial downturns. Economic theory predicts that, because banks face high costs for holding equity, bank leverage will be solely determined by capital regulations. Thus, banks should have little room to increase leverage, since they will have already maximized their leverage under current regulations (Mishkin, 2000:227). This would imply nearly identical leverage across banks in our sample. However, as seen in Figure 1, there is wide variance in leverage across banks, even within similar time periods. This suggests that most banks in our sample kept leverage below the regulatory maximum and had room to increase leverage, consistent with previous research on commercial banks' capital structure (Gropp and Heider, 2009; Kalemli-Ozlan, Sorensen, and Yesiltas, 2011).

[2]Importantly, in testing the relationship between the prevalence of the market and shareholder value logics at commercial banks and leverage, I do not claim to directly test causes of the financial crisis. Though commercial bank leverage did contribute to greater systemic risk during the recent financial crisis (Papanikolaou and Wolff, 2010), leverage was not the proximate cause of the crisis, and in fact declined at large commercial banks in the years before the crisis (Kalemli-Ozlan, Sorensen, and Yesiltas, 2011).

Securitization

I operationalize the prevalence of the market logic at commercial banks as extent of securitization, defined by the percentage of bank assets classified as "trading securities," "available for sale securities," or "held to maturity securities." Trading securities are debt and equity securities that are intended to be sold in the near term, and are generally bought in order to earn a profit off of short-term price fluctuations. Held to maturity securities are debt securities that the bank intends to hold until the repayment date; all other debt and equity securities are classified as available for sale (Financial Accounting Standards Board [FASB] 1993). I measure the prevalence of trading securities at a commercial bank by the percentage of bank assets classified as trading securities.[3] Data on securities holdings come from Compustat's Bank Fundamentals Annual data set.

It may be argued that commercial banks may not have had sufficient securities available to buy or sell. While this is possible, there are two reasons why this is unlikely. First, in 1997, the Federal Reserve removed most of the last restrictions on the amount of securities that commercial banks could have (Kwan, 1998), which suggests that there were no regulatory limits preventing banks from increasing their securities holdings in most of our sample. Second, banks deal in and hold securities as a way to ensure liquidity (Elliott, 2014), which implies that there are active markets in which banks can buy and sell securities.

Sensitivity of CEO Compensation to Shareholder Value

I operationalize the prevalence of the shareholder value logic at commercial banks by the *wealth-performance sensitivity* of the CEO's compensation package, defined by Edmans, Gabaix, and Landier (2009) as the percentage increase in a commercial bank CEO's compensation package (including stock and option grants from previous years' compensation packages) that stems from a 1 percent increase in the stock price of the bank. I estimate this variable using Compustat's Execucomp data, which contain information on stock grants, option grants, and other forms of compensation in the yearly compensation packages of executives at S&P 1000 firms. Before 2006, Execucomp does not contain all information needed to calculate the sensitivity of option grants to changes in a bank's stock price; I follow the recommendations of Edmans, Gabaix, and Landier (2009) in calculating CEO wealth-performance sensitivity in these years.

Controls

I control for several variables that may confound the relationship between bank leverage and securitization and/or CEO wealth-performance sensitivity: bank size (log total assets, adjusted for inflation), net interest margin, a national stock index (S&P 500), a national home price index (Case-Shiller), CEO age, indicator variables for whether a CEO has a law degree and/or a business degree, the size of the bank's board of directors, and the percentage of board directors who are classified as independent (i.e., who are not employees of the bank and are not otherwise linked to the bank). Bank size and net interest margin come from Compustat's Bank Fundamentals Annual data set, while CEO age comes from Compustat's

[3]Only banks with at least $1 billion in total assets need report trading securities; all banks in this sample exceed this threshold.

Execucomp data. I collected information on CEO education from several sources, primarily using data from Marquis's Who's Who and S&P's NetAdvantage. Finally, data on board composition come from Institutional Shareholder Services. The supplementary Appendix contains a more detailed discussion of how these variables are defined and how they may serve as confounders. I also include categorical variables for year to account for changes in the regulatory and economic environment.

Analysis

I test the above hypotheses using a linear partial-adjustment model (Haveman, 1993; Kennan, 1979), which is ideally suited for studying organizational processes where inertia causes a target variable to adjust slowly to organizational pressures. This model is justified in this study because banks are not likely to be able to frictionlessly adjust the amount of leverage they face; thus, the current amount of leverage a bank faces is a compromise between the value of leverage in the previous period and what would be currently justified by current values of relevant covariates.

Formally, a partial-adjustment model can be written as follows:

$$\frac{dY(t)}{dt} = r[Y^*(t) - Y(t)],$$

where $Y^*(t)$ is the target value of the dependent variable given a set of exogenous covariates $X(t)$, $Y(t)$ is the observed value of the dependent variable, and r represents the speed of adjustment toward the target. Under the assumptions that the target value is a linear function of the set of covariates:

$$Y^*(t) = \beta X(t),$$

and that changes in the exogenous covariates are a linear function of time:

$$\Delta X = k\Delta t,$$

the differential equation that specifies the partial-adjustment model can be integrated to find:

$$Y_t = \alpha Y_{t-1} + \beta_1 X_{t-1} + \beta_2 \Delta X_{t-1,t}.$$

Thus, the partial-adjustment model estimates current level of the dependent variable as a function of the previous values of the dependent and independent variables and changes in independent variables. The coefficients from this estimated equation are related to the differential equation in the partial-adjustment model as follows:

$$r = \log[\alpha]/\Delta t$$

$$\beta \approx \beta_1 r/(\alpha - 1)$$

$$\beta \approx \beta_2 r^2/\left(\alpha - 1 - \log[\alpha]\right).$$

The coefficient on β can thus be approximated by two expressions that, though they have the same asymptotic expected value, may differ due to misspecification of the estimated equation or a violation of the assumption that the changes in the exogenous covariates are

TABLE 1

Summary Statistics of Model Variables

Variable	Observations	Mean	*SD*	Min	Max
Leverage	1,050	10.37	2.69	4.63	28.35
Total securities/assets	1,050	23.36	11.75	0.11	94.54
Trading securities/assets	1,050	0.98	3.82	0	45.07
Wealth-performance sensitivity	1,050	17.46	40.56	0	567.85
Log assets	1,050	10.14	1.43	7.68	14.68
Net interest margin	1,050	3.71	0.90	0.66	11.11
Case-Shiller HPI	1,050	150.49	19.38	118.45	194.62
S&P 500	1,050	1,408.41	379.47	919.32	2,111.73
CEO age	1,050	57.31	6.28	32	81
CEO has law degree	1,050	0.09	0.29	0	1
CEO has business degree	1,050	0.71	0.45	0	1
Board of director size	1,050	13.14	3.41	6	28
Percentage of outside directors	1,050	0.76	0.13	0.22	1

a linear function of time (Haveman, 1993). I follow the suggestion in Tuma and Hannan (1984) in averaging the two expressions that approximate β to find a point estimate:

$$\beta = .5(\beta_1 r/(\alpha - 1) + \beta_2 r^2/\left(\alpha - 1 - \log[\alpha]\right).$$

To estimate standard errors for β, I use the delta method (Rao, 1973), which allows for the calculation of the standard error of any function of two normally distributed variables:

$$\text{Var}\ (f(W, V)) = \nabla f(W, V)^T \,\text{Cov}\,(W, V)\,\nabla f\,(W, V).$$

Letting $W = \frac{\beta_1 r}{\alpha - 1}$ and $V = \frac{\beta_2 r^2}{\alpha - 1 - \log[\alpha]}$, I set $f\,(W, V) = 0.5(W + V)$, which implies $\nabla f\,(X, Y) = \begin{bmatrix} 0.5 \\ 0.5 \end{bmatrix}$. Using $\text{Cov}\,(W, V) = \frac{r^3}{(\alpha-1)(\alpha-1-log[\alpha])}\,\text{Cov}(\beta_1, \beta_2)$, it is possible to solve for Var($f(W, V)$).

Because the partial-adjustment model includes lagged values of the bank leverage, it is likely that error terms will be correlated with one another, which leads to biased coefficient estimates. To correct for autocorrelation, I instrument for one-period-lagged bank leverage using one- and two-period lags of the other independent variables (Greene, 1990:448):

$$Y_{t-1} = a_1\, X_{t-1} + \alpha_2 X_{t-2.}.$$

Using instruments for lagged values of leverage in the partial-adjustment model reduces the sampling frame to 1998–2016 and the sample size to 1,050 bank-years. Table 1 shows summary statistics for model variables in this sample.

I estimate two linear partial-adjustment models to test hypotheses about the relationship between the market and shareholder logics and leverage at commercial banks. The first model predicts leverage as a function of total securities as a percentage of assets, CEO wealth-performance sensitivity, and other controls, testing Hypotheses 1 and 3. The second model replaces total securities as a percentage of assets with *trading* securities as a percentage of assets, testing Hypotheses 2 and 3. Both models include firm-level fixed effects to account for unobserved time-invariant features of each bank that may influence the level of leverage it faces and to correct for the nonindependence of observations in the panel data set. Standard errors are also specified to be robust to heteroskedasticity and are clustered by bank.

I check the robustness of the model results using several tests. First, I split the sample into banks that do and do not carry trading securities, since these groups of banks may differ from each other in ways not observed by our model. For banks that do not hold trading securities, I only estimate the effect of relative holdings of total securities on bank leverage. Second, to test for the influence of outliers, I remove observations in which one of the four main independent or dependent variables has a value above the 99th percentile within the original sample. I then estimate four sets of the partial-adjustment models, with outliers on one of the four variables removed in each set. Third, I limit the sample to years 2000 and after in order to ensure that partial-adjustment model (which uses three years of data) does not capture any years in which commercial banks may have been restricted in the amount of securities they could hold. Finally, I split the sample into years before 2007 and after 2008 to account for the possibility that commercial banks fundamentally changed how they considered risk after the ramifications of the collapse of the mortgage-backed securities market became clear.

Results

Table 2 contains the summary statistics and correlation matrix of model variables. There is a moderate correlation between leverage and the relative amounts of both total and trading securities at large commercial banks. On the other hand, there is almost no correlation between bank leverage and CEO wealth-performance sensitivity.

While these correlations are suggestive, they do not account for the potential effects of confounding variables, other unobserved time-invariant features of each bank, or changes in the banking field over time. Table 3 presents estimates from the two linear partial-adjustment models, which account for these factors. Model 1 estimates the effect of total securities as a percentage of assets and CEO wealth-performance sensitivity on bank leverage, testing Hypotheses 1 and 3. Model 2 replaces the total securities as a percentage of assets with *trading* securities as a percentage of assets in order to test Hypotheses 2 and 3.

Model 1 shows no significant relationship between a commercial bank's securities as a percentage of assets or CEO wealth-performance sensitivity and leverage. These results do not support Hypotheses 1 or 3. However, Model 2 shows that *trading* securities as a percentage of assets is significantly and positively related to bank leverage ($\beta = 0.175$, $p < 0.01$), while CEO wealth-performance sensitivity remains not significantly related to bank leverage. The predicted marginal effect of an increase in trading securities as a percentage of assets implies that, for a commercial bank whose leverage is at the mean of the sample (10.37), a 1 percentage-point increase in the bank's relative size of trading securities is associated with a 1.7 percent increase in the bank's leverage.

Robustness Tests. Supplementary Appendix Tables 1–4 contain the results of the robustness tests outlined above. By and large, the results of the robustness checks are consistent with those in Table 3. Supplementary Appendix Table 1 shows that there remains a significant positive relationship between the relative size of trading securities and leverage in banks that hold trading securities. Interestingly, for banks that do not hold trading securities, the relative size of *total* securities holdings is significantly positively associated with leverage. This could suggest that the relationship between securitization and leverage may differ depending on whether the bank trades in securities or not.

TABLE 2

Correlation Matrix of Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	0.24	1											
3	0.31	0.19	1										
4	0.00	−0.05	−0.01	1									
5	0.17	−0.01	0.50	0.05	1								
6	−0.22	−0.29	−0.29	0.09	−0.37	1							
7	−0.09	0.00	−0.05	0.08	−0.03	−0.10	1						
8	−0.30	−0.04	−0.06	−0.06	−0.03	−0.19	0.07	1					
9	−0.16	−0.16	−0.03	0.25	0.10	−0.05	0.03	0.16	1				
10	−0.08	−0.09	−0.01	0.02	−0.01	0.12	−0.04	−0.02	−0.03	1			
11	0.01	−0.09	0.01	0.00	0.14	−0.04	0.04	0.04	−0.04	−0.10	1		
12	0.16	−0.17	0.11	0.12	0.31	0.01	−0.13	−0.18	0.04	−0.02	0.17	1	
13	−0.14	0.07	0.05	−0.17	0.14	−0.29	0.07	0.29	−0.02	−0.16	0.08	−0.13	1

NOTE: Variable key: (1) leverage, (2) trading securities/assets, (3) total securities/assets, (4) wealth-performance sensitivity, (5) log assets, (6) net interest margin, (7) Case-Shiller HPI, (8) S&P 500, (9) CEO age, (10) CEO has law degree, (11) CEO has business degree, (12) board of director size, and (13) percentage of outside directors.

TABLE 3

Model Results

	Model 1	Model 2
Controls		
Log assets	0.285	0.269
Net interest margin	−1.066†	−1.013*
Case-Shiller HPI	0.015	0.015
S&P 500 index	0.001	0
CEO age	−0.017	−0.017
CEO has law degree	−1.096	−1.036
CEO has business degree	−0.117	−0.079
Board of director size	0.007	0.006
Percentage of outside directors	0.517	0.505
Implementation of market logic		
Securities/assets	0.028	
Trading securities/assets		0.175**
Implementation of SV logic		
Wealth-performance sensitivity	−0.002	−0.001
Bank fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
N	1,050	1,050

†$p < 0.1$; *$p < 0.05$; **$p < 0.01$.

In Supplementary Appendix Table 2, which checks for the removal of observations with outlier values of key variables, we again see generally similar results as in the main model. In the model where observations with high relative levels of trading securities are dropped, the coefficient on relative levels of trading securities loses significance, suggesting that banks that most actively trade securities may take on the most leverage as well. However, the magnitude of this coefficient is similar to that estimated in the main specification and in other models where outliers are removed.

Supplementary Appendix Table 3 limits the sample of commercial banks to years after 2000. Here there continues to be a significant positive relationship between the relative size of trading securities and bank leverage, while there is no such relationship for the relative size of total securities or for CEO wealth-performance sensitivity.

Finally, Supplementary Appendix Table 4 contains results of estimations of the linear partial-adjustment model on subsamples of commercial banks before and after the financial crisis. These results suggest that the effect of increasing trading securities on leverage was more prominent before the financial crisis ($\beta = 0.221$, $p < 0.05$) than after ($\beta = 0.145$, $p > 0.05$).

Discussion

In sum, the results of the linear partial-adjustment models offer qualified support for the hypothesis that adoption of the market logic led to greater risk taking at commercial banks: in particular, commercial banks that turned toward *trading* securities (rather than other types of securities) appear to have also increased their leverage. This relationship could hold because banks with trading securities could chiefly be buying these securities using borrowed money, or because securities traders have pecuniary incentives to take

risks. Securitization was also proposed to affect leverage through an increased reliance on financial professionals (and, hence, quantitative modeling) to manage securities portfolios. It is possible that financial professionals play a more prominent role in managing trading securities than other types of securities, since it may require more active management to ascertain the appropriate time to buy and sell securities.

However, these results do not support the hypothesis that adoption of the shareholder value logic—as measured by increasing CEO incentives to increase the bank's stock price—affected bank leverage. This is somewhat surprising given that, for example, similar measures predicted bank performance during the 2007–2009 financial crisis (Fahlenbrach and Stulz, 2011). It should be noted, though, that this finding is agnostic to whether or not shareholders at commercial banks have encouraged banks to increase leverage through other means besides equity-based compensation.

Though the above findings appear to be quite robust, they cannot cleanly identify the mechanisms through which having larger amounts of trading securities leads to higher leverage, or the possible ways through which the drive for shareholder value could affect securitization or risk taking. Future ethnographic research at commercial banks could examine, for instance, whether large commercial banks manage trading securities differently than other securities, what role financial professionals and quantitative portfolio management techniques play in managing both types of securities, and how the shareholder value logic does (or does not) affect operations at commercial banks. Another possible research project could examine why banks varied in the degree to which they adopted each logic.

The findings of this article have implications for the debate about commercial bank regulation in the United States. Though this article does not attempt to test whether trading securities at commercial banks had a causal effect on the severity of the 2007–2009 financial crisis, the results provide robust evidence that banks' relative level of trading securities is associated with higher leverage. While large commercial banks have been subject to increased capital requirements in the wake of the financial crisis, reinstating the wall between commercial and investment banks could additionally reduce the probability that large commercial banks will become insolvent in the event of another financial crisis.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1: Subsamples of Banks With and Without Trading Securities
Table S2: Estimating Models After Removing Outliers
Table S3: Estimating Models on Years 2000–2016
Table S4: Estimating Models Before and After Financial Crisis