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The Hazards of Expert Control: Chief Risk Officers and Risky Derivatives

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Abstract

At the turn of the century, regulators introduced policies to control bank risk-taking. Many banks appointed chief risk officers (CROs), yet bank holdings of new, complex, and untested financial derivatives subsequently soared. Why did banks expand use of new derivatives? We suggest that CROs encouraged the rise of new derivatives in two ways. First, we build on institutional arguments about the expert construction of compliance, suggesting that risk experts arrived with an agenda of maximizing risk-adjusted returns, which led them to favor the derivatives. Second, we build on moral licensing arguments to suggest that bank appointment of CROs induced "organizational licensing," leading trading-desk managers to reduce policing of their own risky behavior. We further argue that CEOs and fund managers bolstered or restrained derivatives use depending on their financial interests. We predict that CEOs favored new derivatives when their compensation rewarded risk-taking, but that both CEOs and fund managers opposed new derivatives when they held large illiquid stakes in banks. We test these predictions using data on derivatives holdings of 157 large banks between 1995 and 2010.

Keywords

organizations, institutional theory, economic sociology, corporate governance

In the 1990s and 2000s, risk-taking among big U.S. banks reached new heights, eventually setting off a massive global financial crisis with severe and wide-ranging consequences. Household net worth plummeted (Lutrell, Atkinson, and Rosenblum 2013), and unemployment and household debt skyrocketed (Hurd and Rohwedder 2010). States made broad cuts in spending and public employment (Grovum 2013). Conservative estimates peg the total cost of the crisis at $6 to $14 trillion (Lutrell et al. 2013). Almost a decade later, the U.S. economy has yet to fully recover.

Financial derivatives played a key role in the crisis (Hera 2011; Lewis 2010; *The Economist* 2008). After the late 1990s, bank holdings of new forms of derivatives, such as credit-default swaps and synthetic CDOs, spiked. These complex financial instruments exposed banks to known risks, and when the crisis hit, this added risk exposure led to massive losses for America's most systemically important financial institutions (Nocera and McLean 2011; Stiglitz 2009a).

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U.S. and global regulators had sought to limit bank risk-taking in the years leading up to the crisis (Basel Committee on Banking Supervision 2004; Sarbanes-Oxley Act of 2002), but their efforts did not dampen bank enthusiasm for these new derivatives. Why did banks embrace new forms of derivatives that carried substantial risk, especially in the face of regulatory pressure to limit risk? To explain this, economists have focused on implicit government subsidies, liberal monetary policy, and broad macroeconomic trends (Dell'Ariccia, Laeven, and Marquez 2014; Schularick and Taylor 2012). Organizational theorists have focused on the design of risk modeling and relationships between financial market participants (MacKenzie 2011; Millo and MacKenzie 2009; Pernell-Gallagher 2015), and economic sociologists have highlighted the failure of credit rating agencies (Carruthers 2010; Rona-Tas and Hiss 2010), gaps in the regulatory oversight of financial innovations (Funk and Hirschman 2014), and the perverse incentives that accompanied the vertical integration of financial firms (Goldstein and Fligstein 2017) and the growing complexity of financial instruments (Fligstein and Roehrkasse 2016). We offer a complementary account that calls attention to the role of chief risk officers, who were charged with managing regulatory compliance, and to the interests of CEOs and professional fund managers.

Following regulatory changes at the turn of the century, risk experts moved up to the c-suite as chief risk officers (CROs). We suggest that CROs promoted new derivatives in two ways. First, we build on the institutional theory of regulatory compliance, which suggests that compliance experts often champion over-compliance (Dobbin 2009; Dobbin and Kelly 2007; Edelman 1990, 1992). We offer a more general mechanism: the expert group tasked with compliance pursues its preexisting agenda, whatever that may be. The group's agenda may be orthogonal or counter to regulatory intent (Mun 2016). In this case, risk experts had a long-standing agenda of maximizing risk-adjusted returns. They viewed derivatives as tools for pursuing that agenda, by enabling quick, precise, and efficient adjustments to mortgage, bond, and currency exposures.

Second, we build on the "moral licensing" literature from psychology, which suggests that good behavior gives individuals license to reduce self-monitoring of bias (Castilla and Benard 2010; Monin and Miller 2001; Uhlmann and Cohen 2007). We suggest that a form of organization-level moral licensing was at work in this case: in appointing CROs, banks signaled to trading-desk managers that they worked at a "risk aware" firm, and that risk management was someone else's job. This, we propose, reduced desk managers' self-monitoring of risky behavior. Creating a new office to manage compliance can lull managers into a false sense of security, promoting exactly the behavior that regulation was intended to prevent.

Our third insight builds on the institutional theory of group interest and power (Jung 2016). Scholars of corporate response to regulation largely focus on effects of compliance experts (but see Dobbin, Kim, and Kalev 2011; Kellogg 2009), yet other powerful stakeholders—executives and investors—can also influence compliance. Moreover, their interests in doing so may be read from their financial stakes in a firm. We suggest that the interests of CEOs and institutional investors shaped whether they encouraged or discouraged use of derivatives. When these actors were rewarded for boosting short-term profits but not penalized for losses—as when CEO compensation was weighted toward performance pay—we predict that they favored the new derivatives. But when they had an interest in restraining risk—as when CEOs and fund managers held large, illiquid ownership stakes—we predict that they resisted new derivatives. The interests of those with the power to influence corporate strategy can be predicted and modeled in organizational studies, and attention to stakeholder interests helps explain why compliance can vary markedly across organizations with similar compliance experts.

We proceed in four stages. First, we explain how the introduction of regulations designed to temper risk-taking contributed to the spread of chief risk officer positions among large U.S. commercial banks. Second, we develop theory to explain how the power and interests of different groups shape the success of compliance strategies advanced by expert groups. Third, after discussing our sample and methods, we model the creation of chief risk officer positions among 157 large, publicly traded commercial banks, many of which transitioned into investment banking activity in this period. Fourth, we use Heckman sample selection models to investigate how CROs, CEOs, and fund managers influenced the spread of different types of derivatives between 1995 and 2010. To assess model robustness, we introduce instrumental variables for the derivatives analyses. We also examine the possibility that only banks labeled too-big-to-fail took outsize risks with derivatives, confident that they would be rescued.

ORGANIZATIONAL RESPONSE TO LEGAL AND REGULATORY CHANGE

Rules governing bank risk management and disclosure changed dramatically after 2000, stimulating banks to pay greater attention to risk. In 1999, the Gramm-Leach-Bliley Act allowed commercial banks to enter new product areas, like securities underwriting, but it also imposed new policies to protect the security of customer information (Federal Trade Commission 2002). The Patriot Act of 2001 established new bank reporting requirements to prevent money laundering by terrorists. Then, in 2002, in response to accounting scandals at Enron and other major corporations, Congress adopted the most far-ranging overhaul of corporate governance regulation since the Great Depression. The Sarbanes-Oxley Act of 2002 (SOX) expanded corporate financial disclosure requirements to fight malfeasance, moderate risk-taking, and stem accounting fraud. SOX put responsibility for managing risk exposure on bank executives and mandated greater financial transparency (Sarbanes-Oxley Act 2002). Next, in 2004, the Basel Committee, which sets regulatory standards for internationally active banks, issued new capital-adequacy and reporting guidelines known as Basel II (Basel Committee on Banking Supervision 2004).

The regulations imposed new responsibilities and new penalties on bank executives without specifying precise compliance standards. Section 404 of SOX required executives to attest to the efficacy of their internal risk-control structures and to establish financial reporting procedures to prevent fraud; however, it did not detail how compliance would be judged (Sarbanes-Oxley Act 2002). Similarly, Basel II directed banks to adopt "conceptually sound" systems to manage operational risks, but it gave few clues as to what that meant (McConnell 2005).

Institutionalists show that in the face of new regulations with ambiguous compliance standards, in areas such as equal employment opportunity, occupational health and safety, and pension security, executives respond by hiring experts to take charge (Dobbin and Sutton 1998; Edelman 1990). We suggest that CEOs were particularly keen to signal they were serious about compliance because SOX made them personally responsible for risk control. Risk experts argued that they could keep executives out of jail. The nation's first "Chief Risk Officer," James Lam (2003:8–9) of GE Capital Market Services, wrote shortly after SOX passed:

> On an individual level, perhaps the most compelling benefit of risk management is that it promotes job and financial security, especially for senior managers . . . senior executives involved in corporate frauds and accounting scandals have appeared on national television being led away in handcuffs and face the potential of severe criminal sentences.

Moreover, although SOX did not require banks to appoint CROs, the Securities and Exchange

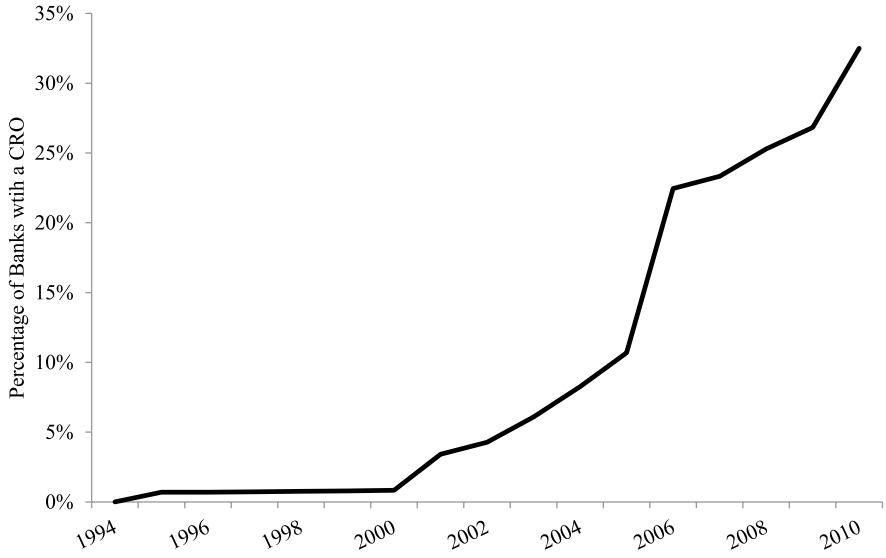

Figure 1. Percentage of Banks with a Chief Risk Officer, 1994 to 2010

Commission (SEC), which Congress charged with enforcement, signaled that risk officers had the tools to comply. The Commission ruled that firms must implement an "established" internal control framework, and explicitly vetted an existing framework developed by risk experts (COSO 1992; Securities and Exchange Commission 2003). Many firms responded by appointing CROs to implement "enterprise risk management" (ERM) programs, which involved centralized modeling and management of all risk across a firm's departments and business units (Deloitte 2004; Risk and Insurance Management Society 2012).

Financial journalists and industry executives saw CROs as the lynchpin of compliance. As Lawrence Richter Quinn (2008) wrote, "[H]ow do you know who's working hard at effective ERM? . . . One way to quickly see if the company you are researching does have ERM is to check for a Chief Risk Officer" (see also Aksel 2003; Atkinson 2003; Power 2005). Experts evaluating Basel II compliance came to similar conclusions. Two years after the new standards took effect in 2005, industry analysts interpreted the appointment of a CRO practicing ERM as evidence of intent to comply (McConnell 2007).

If banks appointed CROs in response to heightened regulatory pressures, two patterns should hold in the analyses. First, banks' likelihood of appointing CROs should rise in the wake of the new regulations. Figure 1 is suggestive: CRO positions began to spread in the early 2000s, following the passage of the Gramm-Leach-Bliley Act (1999), the Patriot Act (2001), and Sarbanes-Oxley (2002), and accelerated in 2005 after Basel II was published (June 2004) and SOX took effect (January 2005). Second, banks that previously appointed other types of compliance officers should appoint risk compliance officers, either because these banks are sensitive to regulatory pressure or because those officers lobby for experts to handle risk compliance (Sutton and Dobbin 1996).

EXPERT CONSTRUCTION OF ORGANIZATIONAL COMPLIANCE

Institutionalists argue that expert groups fashion regulatory compliance programs. Where the law is ambiguous, they actively construct its meaning—sometimes by rebranding items

from their professional toolkits as compliance solutions (Edelman 1990, 1992). Institutionalists have drawn lessons about the construction of compliance from the behavior of experts who share regulators' goals. Equal-opportunity specialists brought the Civil Rights movement into the firm, advocating for reforms to level the playing field for women and minorities (Dobbin 2009). Safety engineers charged with Occupational Safety and Health Act compliance believed work could be safer, and tax accountants charged with Employee Retirement Income Security Act compliance were sticklers for strong fiduciary controls to protect pensions. Environmental engineers charged with Environmental Protection Act compliance were environmentalists (Dobbin and Sutton 1998; Jennings and Zandbergen 1995).

In these cases, the objectives of government regulators and corporate compliance experts were one. However, that is not always the case; compliance experts' preexisting agendas matter. In our case, both lawmakers and risk specialists wanted firms to adopt better, more effective risk-management practices. But what "effective risk management" entailed was a matter of interpretation. Congress sought to eliminate the possibility of catastrophic failure, whereas risk specialists advocated "maximizing risk-adjusted returns" in pursuit of shareholder value.

The Project of Risk Managers: Joining the Shareholder-Value Movement

Risk-management experts first rose to power in U.S. banks during the 1980s. To prevent a replay of the catastrophic losses from the Latin American debt crisis, the commercial real estate bubble, and sky-high interest rates, banks appointed experts to keep a lid on risk (Wood 2002). Yet as the crises of this era receded, so did executives' enthusiasm for risk management (Power 2005).

By the late 1980s, the shareholder-value management paradigm, rooted in agency theory (Jensen and Meckling 1976), had taken hold. Proponents argued that the malaise of the 1970s was the fault of overly cautious managers, and they prescribed measures that would encourage executives to take risks to boost share value. Under the new shareholder-value paradigm, risk experts saw their influence wane. In a context where managers erring on the side of caution was defined as the major problem to be resolved, the original mission of risk management—encouraging managers to maintain conservative margins of error to reduce the probability of bank distress—now appeared to violate shareholder interests.

In the 1990s, leading risk experts within banks responded to their declining importance by promoting a new approach: enterprise risk management (ERM). ERM was sold as a tool for boosting shareholder value through modeling, assessing, and managing risk centrally, across the entire firm, to better "maximize risk-adjusted returns" (Power 2005; Wood 2002). Both the format and the goals of risk management changed with the rise of ERM. Risk experts had previously thought their duty was to minimize costs, prevent major losses, and avoid catastrophe (Wood 2002). Now the goal of *avoiding* risk was supplanted by the goal of *optimizing* risk (Nocco and Stulz 2006). Risk experts now defined their work as maximizing bank profitability, while remaining mindful of risk (Banham 2004). As two risk experts later argued,

> What [risk] management can accomplish through an ERM program, then, is not to minimize or eliminate, but rather to limit, the probability of distress to a level that management and the board agrees is likely to maximize firm value. Minimizing the probability of distress . . . is clearly not in the interests of shareholders. Management's job is rather to optimize the firm's risk portfolio. (Nocco and Stulz 2006:11)

Before the first CRO was named in the early 2000s, risk managers saw themselves as guardians of shareholder value, with a duty to bring enterprise-wide risk to limits set by

senior management with no wasteful margin of error (see Lam 2003; Liebenberg and Hoyt 2003; Nocco and Stulz 2006). Anything short of that would be an abrogation of their duty to shareholders.

Risk Managers' Spin on Derivatives: Maximizing Risk-Adjusted Returns

CROs viewed derivatives as important components of the enterprise risk management toolkit (see Banham 2000; Baranoff 2004; Moeller 2011; Moody 2003). Most CROs at big banks came up through credit risk management, where the use of derivatives to adjust portfolio risk was common (Wilson 1998; Wood 2002). Risk specialists saw derivatives as tools for reallocating exposure to particular kinds of investments quickly, precisely, and at low cost (Barrickman 2001; Collins and Fabozzi 1999). Derivatives allowed banks to hedge their bets by offsetting risk exposures. Derivatives were also expected to enhance a bank's overall portfolio efficiency by redirecting resources to investments that promised the greatest returns. They allowed banks to more easily unwind investments with declining prospects and acquire exposure to promising alternatives (Collins and Fabozzi 1999; Minton, Stulz, and Williamson 2005).

ERM called for CROs to develop strategies to assess, evaluate, and reallocate risk at the enterprise level, and to help trading desks execute these strategies (Banham 2000, 2004; Investment Company Institute 2007). We suggest that in working with these desks, CROs promoted new derivatives as tools for adjusting exposure to optimize risk-adjusted returns.

Derivatives come in different forms. Certain types of derivatives—such as futures and forwards contracts written on agricultural commodities—have traded in U.S. financial markets for centuries. The first wave of innovation came in the early 1970s, with futures and forwards written on financial assets (stocks, bonds, currencies) and the formation of an exchange to trade options (Whaley 2006). The second wave of innovation occurred in the 1980s and early 1990s, with the rise of swaps, credit derivatives, and over-the-counter options executed through complex, non-standard contracts (Becketti 1993; Whaley 2006). The new derivatives traded not on organized exchanges, but in over-the-counter (OTC) markets: they were one-off deals negotiated between counterparties.[1] They were wildly successful. In 1980, virtually all derivatives traded on exchanges. By 1991, the value of derivatives traded in the OTC market surpassed the value traded on exchanges (Whaley 2006).

Two features of the new derivatives appealed to CROs. First, contracts were bespoke, which meant they gave portfolio managers "a means to obtain a *customized* investment or risk management vehicle that exactly meets their goals" of fine-tuning exposures as circumstances change (Collins and Fabozzi 1999:13; see also Lam 2003). Second, they made it easy to alter exposure to particular asset classes. Previously, it had been difficult for banks to offload the risk associated with the mortgages or loans they had underwritten, or to acquire exposure to loans or complex securities they did not own. The new derivatives made these things possible. For instance, synthetic CDOs allowed banks to acquire exposure to the performance of mortgage assets with high rates of return, without actually buying the mortgages (Financial Crisis Inquiry Commission 2011). Similarly, OTC options and swaps gave banks the tools to partake in risk-transfer transactions—like swapping payments in U.S. dollars for payments in Canadian dollars, or changing an option from a put to a call at a later point in the option's life—that had previously been impossible or prohibitively expensive to execute.

New derivatives also presented new risks to banks. As bilateral contracts that traded over-the-counter, the new derivatives exposed banks to greater credit risk (the risk that the other party to a contract will not pay up), and the more complex and opaque structures of these instruments also exposed banks to greater liquidity risk (the risk that the bank will not be able to unwind the contract for its expected value) (Davi 2009; Stiglitz 2009b).

CROs knew the risks, but they also viewed the new derivatives as powerful aids to risk optimization (Baranoff 2004). We suggest that CROs were comfortable using the new derivatives to adjust exposures, and that this increased department managers' comfort. Accordingly, we predict that banks that appoint CROs will increase holdings of new derivatives. We do not expect lower-level risk managers to have the same effect, because those managers lacked enterprise-wide authority to shape strategy.

How Risk Managers Create Organization-Level Moral Licensing

We also suggest that by centralizing risk management under the oversight of a CRO, banks encouraged derivative use indirectly. Drawing from the literature on moral licensing in social psychology and organizational theory (Castilla and Benard 2010; Monin and Miller 2001; Uhlmann and Cohen 2007), we predict that the presence of a CRO implementing ERM lowered desk managers' self-monitoring of derivative risk.[2]

The "moral license effect" occurs when an individual's need to display moral rectitude is decreased by previous displays of rectitude (Monin and Miller 2001). When individuals have been induced to display a lack of bias, the licensing effect increases the likelihood they will subsequently display bias (Crandall and Eshleman 2003; Monin and Miller 2001; Uhlmann and Cohen 2007). Castilla and Benard (2010) extended these insights to the organizational level in a series of experiments, finding that when subjects were told their organization espoused meritocratic values, they were less likely to control their own gender bias. The authors call this effect the "paradox of meritocracy."

We suggest that a "paradox of risk management" may have propelled the diffusion of new derivatives in U.S. banking. CROs overseeing ERM programs may create organizational licensing much as meritocratic policies do in the Castilla and Benard (2010) experiment. We expect desk managers working in banks with CROs to be less anxious to guard against imprudent investment behavior than managers in otherwise similar banks. Where desk managers believe they work for a "risk-aware" bank, as signaled by the presence of an enterprise "risk function [that] owns and actively monitors and manages key risks centrally" (Pergler 2012:7), we expect they will feel less personal responsibility for policing their own risk-taking.

In summary, we identify two general mechanisms through which the presence of a CRO might increase bank exposure to the new derivatives. CROs could promote new derivatives directly, in the course of implementing an ERM program, or indirectly, by creating "organizational licensing" that permits desk managers to offload responsibility for risk. Adjudicating between these mechanisms remains a task for future research; however, available evidence suggests that both factors likely operated. There is abundant evidence that risk managers viewed new derivatives as crucial components of their enterprise risk management toolkit (e.g., Banham 2000; Baranoff 2004; Lam 2003; Moody 2003; Rogers 2009). There is also evidence that managers in firms with CROs overseeing ERM programs felt more confidence in the efficacy of their risk-management systems. A 2008 survey administered by Deloitte found that 64 percent of respondents in organizations with a single executive in charge of ERM felt "prepared" to manage their risks, but only 28 percent of respondents in organizations without ERM chiefs felt the same (Deloitte 2008:15). For our purposes, the two arguments suggest a single hypothesis—banks that appoint chief risk officers should be more likely to expand reliance on new derivatives.

> *Hypothesis 1:* Appointment of a chief risk officer will increase a bank's reliance on new derivatives.

We also predict that the positive effect of CROs on new derivatives will decrease in the period after the credit crisis. The role of derivatives in spreading and amplifying risk

became evident after the collapse of the mortgage market in 2007. We expect that witnessing the disastrous consequences of heavy derivatives exposure affected how CROs viewed these instruments. CROs came to see derivatives not as important aids to risk optimization, but as toxic instruments that threatened their job security. We also expect the organizational licensing effect to decline in the aftermath of the crisis, once it became obvious these programs had failed. Thus, we predict that the positive effect of CROs on new derivatives will decline after 2007.

Hypothesis 2: The positive effect of CROs on exposure to new derivatives will decline in the aftermath of the credit crisis.

THE VETO POWER OF CEOS AND FUND-MANAGERS

Institutionalists were criticized early on, by both insiders (DiMaggio 1988) and outsiders (Perrow 1986), for neglecting the role of power in institutionalization. Although they have since explored the role of powerful groups in pushing for change (Fligstein 1990), they rarely consider contention between groups within firms. One exception is Jung's (2016) study of how managers, workers, and institutional investors influence downsizing decisions. Two studies explore how internal groups influence regulatory compliance. Kellogg (2009) shows that in teaching hospitals responding to the regulation of surgical residents' hours, entrenched opponents can thwart change. Dobbin and colleagues (2011) show that in corporations responding to equal-opportunity laws, women in management can reinforce personnel's advocacy for diversity programs.

We expand this approach by considering not only the role of group representation in firms, but group members' specific economic interests. Two groups with the power to shape corporate strategy had clear financial interests in the risk profiles of banks—chief executive officers (CEOs) and institutional investors. We suggest that their interests in potentially lucrative, but risky, derivatives are shaped by their compensation and shareholding.

Headlines throughout the 1990s and 2000s touted the new derivatives not merely as risk-management tools for quick adjustments to asset exposure, but as instruments for supercharging risk and profits. Derivatives could facilitate large speculative plays by leveraging small amounts of capital. The ability to gain exposure to upside (and downside) risk without a lot of cash multiplied potential profits (and losses). The high-profile collapses of Barings Bank in 1995 and Long-Term Capital Management in 1998 underscored the risks these instruments carried (Barboza and Gerth 1998; Stevenson 1995). CEOs were wary of embracing complex tools they did not fully understand, lest they find themselves in the position of American Express CEO Kenneth Chenault, who was forced to admit that he "did not fully comprehend the risk" of his firm's exposure to collateralized debt obligations that cost AmEx $800 million in 2001 (Norris 2001).

We predict that CEO and fund-manager support for the new derivatives varied with their interest in maximizing short-term profits and their aversion to risk. When CEOs and institutional investors had more to lose from risk-taking, we expect they put the brakes on exposure to new derivatives. But when they had much to gain and little to lose, we expect they promoted new derivatives.

Equity-Holding Makes CEOs and Fund Managers Wary

When CEOs and fund managers hold large illiquid stakes in banks, we expect they will resist exposure to new derivatives. CEO equity-holding is typically locked in through long-term incentive plans that require continued shareholding. Proponents of these plans argue that they prevent myopic short-termism by CEOs hoping to maximize performance pay, and the downside exposure "motivates managers to look beyond next quarter's results" and moderate risk (Murphy 1986:125). Moreover, markets pay close

attention to CEO trades, making even executives whose equity is not locked in reluctant to dump stock for fear of alarming investors. Thus as their equity rises, CEOs should resist bank exposure to new derivatives. They should be less likely to directly boost new derivatives, and more likely to restrain CRO and investment-manager enthusiasm.

Hypothesis 3: As CEO shareholding increases, banks will reduce their exposure to new derivatives.

Hypothesis 4: The positive effects of CROs on new derivatives will decline as CEO shareholding rises.

Major institutional investors have considerable power over bank executives (Davis, Diekmann, and Tinsley 1994; Pfeffer and Salancik 1978). Investors with large blocks of stock, moreover, find that their holdings are illiquid because dumping stock can cause their shares to drop in value before they can get out (Hambrick and Finkelstein 1995; Tosi and Gomez-Mejia 1989). Lacking an easy exit, blockholding fund managers have sought to shape firm strategy (Useem 1996). Blockholding institutions (with over 5 percent of shares) should be less likely to champion risky derivatives, and more likely to restrain CROs and desk managers.

Hypothesis 5: As institutional blockholding increases, banks will reduce their exposure to new derivatives.

Hypothesis 6: The positive effects of CROs on new derivatives will decrease as institutional blockholding rises.

Performance Pay Promotes Risk-Taking

Conversely, we expect that when CEO compensation rewards increases in share price without punishing decreases, CEOs will favor strategies that promise big payoffs even when they come with risks. Scheduled bonuses reward executives for increasing share price but do not punish them when the share price drops—thus such bonuses encourage risk-taking (Burns and Kedia 2006; Dobbin and Jung 2010; Sanders and Hambrick 2007; Zhang et al. 2008). We expect that compensation packages weighted toward performance pay will boost CEO enthusiasm for the new derivatives.

Hypothesis 7: As CEO performance pay increases, banks will increase their holdings of new derivatives.

Hypothesis 8: The positive effects of CROs on new derivatives will increase with the level of CEO performance pay.

DATA AND METHODS

We present models exploring (1) the role of legal and regulatory pressures in promoting the creation of CRO positions, (2) the role of CROs in promoting bank reliance on six types of derivatives; and (3) the role of CEO and fund-manager interests in blocking or facilitating CRO promotion of new derivatives.

Sample and Data Collection

We examine the derivatives activities of large U.S. banks, as smaller banks rarely use derivatives (Booth, Smith, and Stolz 1984; Carter and Sinkey 1998; Gunther and Siems 1996; Kim and Koppenhaver 1993; Koppenhaver 1990). We begin with all 163 commercial banks that ever appeared on Standard and Poor's 1500 index between 1995 and 2010, and exclude six banks that lack data on derivatives holdings. Derivatives data come from the Bank Regulatory database, which contains commercial bank filings for the Report of Condition and Income ("Call Report") submitted to the Federal Reserve. The database includes information on derivatives transactions from 1995. Non-depository institutions are not required to file call reports and are thus excluded from the sample. After imputing missing values for control variables, we have data on 157 banks and 1,304 bank-years.

Table 1. Description of Derivatives Types

Derivative Type	Description
Futures	A futures contract is an agreement to buy or sell a specified asset of standardized quality and quantity traded on a futures exchange at a certain date in the future, at a previously specified price. A centralized clearinghouse manages transactions on the exchange.
Forward	A forward contract is an agreement to buy or sell an asset at a previously specified price at a certain date in the future. Assets are not standardized and the contract trades over-the-counter, or directly between two parties without the supervision of an exchange.
Option (exchange-traded)	An exchange-traded options contract gives the right, but not obligation, to buy ("call") or sell ("put") an asset at a previously specified price on, or up to, a certain date in the future. Trades on a regulated exchange, terms of the contract are standardized.
Option (over-the-counter)	An over-the-counter options contract gives the right, but not obligation, to buy ("call") or sell ("put") an asset at a previously specified price on, or up to, a certain date in the future. Terms are not standardized, trades over-the-counter.
Swap	A swap contract is an agreement in which two counterparties exchange the cash flows of one party's financial instrument for those of the other party's financial instrument. Terms are not standardized, trades over-the-counter.
Credit Derivative	A credit derivative is an agreement to assume or offload the credit risk associated with an underlying reference asset. The party transferring risk (the beneficiary) receives credit protection from the counterparty (the guarantor). The guarantor assumes the credit risk without owning the reference asset. Terms not standardized, trades over-the-counter.

Dependent Variables

CRO adoption. Data on the presence of CROs are hand-coded from Standard & Poor's *Register of Corporations, Directors, and Executives.* We compare consecutive volumes of Standard & Poor's *Register* to identify the first year in which a bank appointed a CRO, and we use this information to construct a binary variable (1 = year the bank adopted a CRO; 0 = years beforehand). Banks are removed from the risk set following the creation of a CRO position.

Derivatives activity. We examine bank holdings of six types of derivatives. Table 1 describes each derivative type: futures, forwards, exchange-traded options, over-the-counter options, swaps, and credit derivatives. We use the notional amount held in each market to measure the extent of derivatives activity. The notional amount (contract size × unit price of reference assets) reflects the value of the *underlying assets* against which claims are traded in derivatives markets, not the amount a bank has at risk (see Stulz 2004:178–79). However, the notional amount held is an appropriate *relative* indicator of the extent of bank activity in derivative markets used in accounting and finance research (cf. Adkins, Carter, and Simpson 2007; Knopf, Nam, and Thornton 2002). All notional amounts are log-transformed to address skew. Models for credit derivatives cover 1997 to 2010. Figure 2 shows the notional amount held for each of the six types of derivatives for banks in our sample.

Independent Variables

In CRO adoption models, we use a binary variable to represent regulatory reforms, coded as 1 after Sarbanes-Oxley passed (2002). We use the presence of non-CRO corporate compliance officers to reflect non-risk-related motivations for appointing a CRO. Banks with other compliance officers may be more sensitive to regulatory pressure, or non-CRO compliance officers may promote the use of experts to manage this new

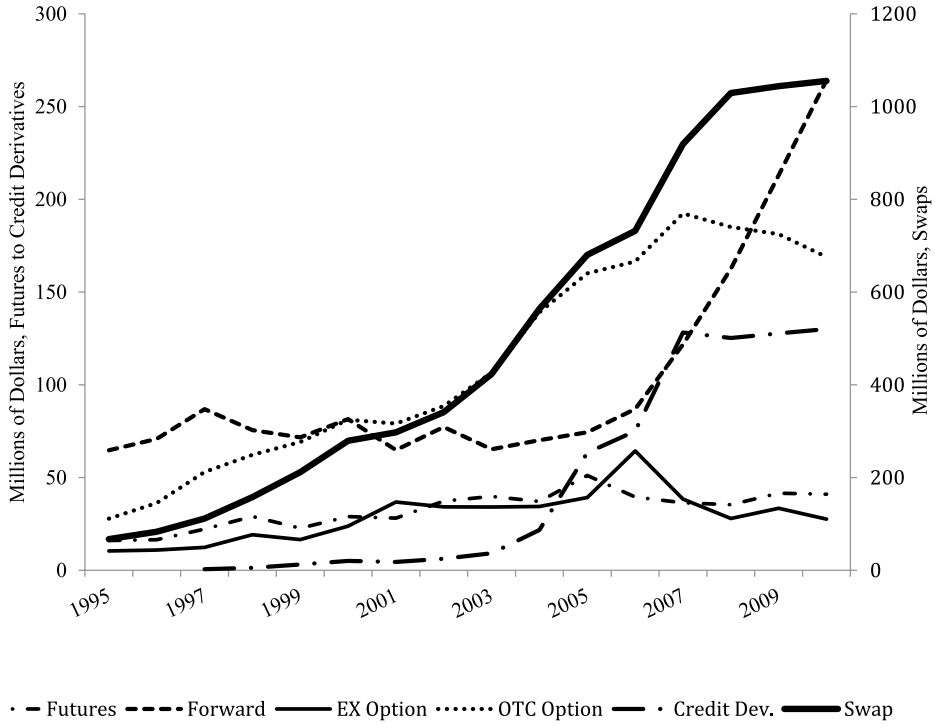

Figure 2. Notional Amount Held of Six Types of Derivatives, 1995 to 2010

compliance area. In derivatives models, we capture the interests of executives and fund managers with CEO performance pay and shareholding and institutional investor blockholding (i.e., shares held by institutions with at least 5 percent). We also interact CRO presence with these three variables.

Controls

We control for bank and market characteristics known to influence the creation of organizational positions and derivatives activity. Appendix Table A1 provides univariate statistics and data sources. Appendix Table A2 provides a correlation matrix. We use multiple imputation to substitute for missing values for control variables (King et al. 2001). For most variables, missing observations range from 5 to 10 percent. Results are robust to excluding cases with missing data.

Size and performance. Large banks were most active in derivatives markets (Hirtle 2009; Johnson and Kwak 2010; Minton et al. 2005), and large corporations were most likely to appoint compliance officers (Edelman 1990). We control for bank size with total assets, logged to address skew. Bank performance may also affect the decision to appoint a CRO and a bank's derivatives holdings. We control for performance using return on assets (ROA) to capture profitability, cumulative stock returns (percent change in share price over 12 months) to capture stock-market performance, and market-to-book ratio to capture market valuation.

Bank activities and risk exposure. Bank activities may affect CRO appointments and derivatives holdings. Commercial banks that expand into new activities—including investment banking—may be more likely to appoint CROs, and they may also use derivatives differently than do other banks. The Banking Act of 1933 barred deposit institutions from securities underwriting, insurance, and retail brokerage. This legal boundary began to erode after 1987, when regulators permitted particular bank holding companies

(BHCs) to underwrite certain securities via "Section 20" subsidiaries. The 1999 Gramm-Leach-Bliley Act allowed BHCs to reorganize as financial holding companies combining traditional banking and other financial activities. Traditional banking activities (e.g., loans to corporations) generate interest income, whereas non-traditional activities (securities underwriting, insurance, or retail brokerage) typically generate non-interest income, including service charges and fees (Stiroh 2004). We use the ratio of net interest income to total income to control for the extent of a bank's expansion into non-traditional banking activities—this outperformed the simple presence of a "Section 20" subsidiary.

Derivatives were often used to manage exchange risk and interest rate risk (Ahmed, Beatty, and Takeda 1997; Brewer, Jackson, and Moser 1996; Carter and Sinkey 1998). Banks relying on foreign income face exchange risk, and they may use derivatives to manage exposure. We use the ratio of pretax foreign net income to total sales to control for exposure to exchange risk. We use two variables to capture interest rate risk: (1) interest income over total income and (2) demand deposits over total liabilities. Banks dependent on interest income, and funding sources beyond demand deposits (which banks do not pay interest on), may use derivatives to manage exposure to interest rate risk.

We control for systemic risk, common to all traded firms, and unsystematic risk, specific to the bank. Leverage increases a bank's risk of insolvency, as does inadequate capital. Following conventions in the banking and finance literature, we use the ratio of total assets to shareholder equity to measure bank leverage, and the regulatory capital ratio (Tier 1 + Tier 2 regulatory capital/risk-weighted assets) to measure capital adequacy. In CRO adoption models, we also control for a bank's derivatives activity.

Risk appetite. CEO and fund manager interests in boosting, or restraining, risk may also shape the decision to appoint a CRO. Therefore, we control for the economic interests of CEOs and fund managers with CEO performance pay, CEO shareholding, and institutional blockholding. A firm's governance structure may also influence risk appetite. In the U.S. context of dispersed shareholding (Berle and Means 1932; Roe 1994), independent boards are thought to quell executives' penchant for using excessive risk to boost their own performance pay (Jensen and Meckling 1976). Both CRO adoption and derivatives models control for board independence using outside directors (Gordon 2007).

Other bank characteristics have also been tied to risk appetite. High-value bank charters may dampen executive enthusiasm for risk, so we control for charter value (intangible assets that a bank can receive only if it survives) using market-to-book equity (Galloway, Lee, and Roden 1997; Keeley 1990). Equity capital may discourage risk (Demsetz and Strahan 1997; Furlong and Keeley 1989), so we control for shareholder equity. We control for female directors, as they have been shown to increase corporate monitoring and compliance (Adams and Ferreira 2009).

Banks designated as too-big-to-fail (TBTF) may expect bailouts if they crash, so they may ignore risk (Afonso, Santos, and Traina 2014). The too-big-to-fail regime was established in 1984, after the Federal Deposit Insurance Corporation provided an unlimited guarantee to all creditors of the struggling Continental Illinois Bank. This protection was subsequently extended to the 11 largest U.S. commercial banks, and later to other large banks. In the Robustness Checks section we report results excluding TBTF banks—the 20 largest in 2004.

We also include a variable indicating the presence of non-CRO risk-management executives, such as a vice president of risk, to see if lower-level risk managers influenced derivatives holdings.

Market characteristics. The industry popularity of a practice may affect the speed at which firms take it up. We control for CRO prevalence in the CRO adoption models (banks with CROs as a proportion of all

banks), and for the popularity of derivatives in the derivatives models (percent of other banks holding each category of derivative). In the derivatives analysis, we also include an annual time trend to capture unmeasured trends, as well as a binary variable for 2007 to 2010 to capture the financial crisis.

Estimation

For the analysis of CRO adoption, we use complementary log-log models (Allison 1995). If a bank did not adopt a CRO before the end of 2010, its series is right-censored. No bank in our sample appointed a CRO before 1995.

For the derivatives analysis, we use Heckman (1974) selection models to account for the process that led banks to hold derivatives. Only a subset of sampled banks held particular types of derivatives, and ignoring selection into derivatives usage may lead to biased estimates of derivatives holdings. Below, we report results of outcome models; results of selection models are posted in an online supplement. Because the selection equation must include at least one predictor that is excluded from the outcome equation, we exclude derivatives density. Covariates in the selection and outcome equations are otherwise identical.

In derivatives models, we report bank-clustered robust standard errors to account for multiple observations from the same bank. Reverse causality is a concern, as banks with larger derivatives holdings or risk appetites may be more likely to appoint CROs. To address reverse causality, we replicate the analysis using instrumental variables (Angrist and Pischke 2009). Instrumental variable methods allow for consistent estimation when error terms are correlated with the covariates. Two conditions must hold: (1) the instrument must be correlated with the endogenous explanatory variables, conditional on other covariates, and (2) the instrument cannot predict the dependent variable directly. We use two variables expected to affect a bank's decision to appoint a CRO, but not its derivatives holdings: presence of other (non-risk-related) compliance officers, and female board members. Compliance officers in one domain have been shown to affect officers in other domains (Dobbin and Sutton 1998). Female board members have been shown to increase corporate monitoring and compliance (Adams and Ferreira 2009). Data on compliance officers and female board members are collected from 1995 to 2010. To simultaneously address sample selection bias and endogeneity, we follow a two-stage procedure described in Wooldridge (2010). For each type of derivative, we first estimate a probit model of a bank's holding of any derivatives of the type and generate the inverse Mills ratio (IMR). In the second stage, we include the IMR in modeling derivatives holdings and instrument for the CRO variable.

FINDINGS

The models suggest that heightened legal and regulatory pressures led banks to appoint Chief Risk Officers. CROs, in turn, predict the extent of bank exposure to the new, riskier, and untested derivatives. However, the interests of two powerful groups within banks—CEOs and institutional investors—moderate CRO promotion of riskier derivatives.

CRO Diffusion

We find evidence that regulatory changes at the turn of the century popularized chief risk officers among large commercial banks. In the baseline model (Table 2, Model 1), large banks and banks experiencing share-price volatility (*beta*) were more likely to appoint CROs. Industry CRO popularity also predicts change. Model 2 confirms that banks were more likely to appoint CROs following major regulatory changes (2003 to 2010). In unreported analyses, we tested whether these results are sensitive to the choice of cut-point, by redefining the post-regulatory-change period to include years after 1999, 2000, 2001, 2002, or 2004. The results are robust to these alternative specifications.

Model 4 in Table 2 reveals that banks responsive to regulation were significantly more likely to appoint CROs. In the period

Table 2. Complementary Log-Log Models of CRO Adoption, 1995 to 2010

	M1	M2	M3 (1996 to 2010)	M4 (1996 to 2006)
Post-SOX (Years 2003 to 2010)		2.226***	2.354***	2.413*
		(.598)	(.632)	(.996)
Compliance Officers			1.060	2.225**
			(.668)	(.782)
% Female Board Members			.040	.015
			(.023)	(.032)
CRO Density	.065***	.012	.007	.212***
	(.019)	(.023)	(.023)	(.060)
Bonus/Salary	.011	–.013	.016	–.272
	(.071)	(.072)	(.084)	(.182)
Institutional Blockholding	.004	.003	–.007	–.051
	(.022)	(.020)	(.023)	(.038)
CEO Stock Ownership	–.167	–.162	–.134	–.124
	(.091)	(.093)	(.071)	(.085)
Board Independence	–.004	–.008	–.012	–.028
	(.021)	(.020)	(.020)	(.021)
Capital Ratio, Tier 1 and 2	–.033	–.029	–.058	–.002
	(.073)	(.069)	(.081)	(.115)
Leverage	–.126	–.087	–.093	.020
	(.072)	(.066)	(.070)	(.125)
Demand Deposits/Total Liabilities	–.091**	–.054	–.065	–.038
	(.034)	(.034)	(.034)	(.046)
Net Interest Income/Net Income	–.105	–.075	–.048	.305
	(.165)	(.155)	(.176)	(.248)
Foreign Exchange Income/Net Income	–.022	–.020	–.027	–.051
	(.022)	(.021)	(.022)	(.039)
Bank Assets	.049***	.054***	.055***	.112***
	(.014)	(.015)	(.014)	(.027)
Return on Assets	–.644	–.610	–.536	–.508
	(.442)	(.420)	(.461)	(.767)
Cumulative Stock Returns	.399	.637	.701	1.176
	(.454)	(.520)	(.545)	(.646)
Market-to-Book	.013	–.145	–.117	.047
	(.174)	(.257)	(.276)	(.302)
Systematic Risk	.731*	.948**	1.005**	.935
	(.341)	(.354)	(.368)	(.510)
Nonsystematic Risk	–.724	–.618	–.530	1.997
	(.544)	(.546)	(.527)	(1.107)
Constant	–3.008	–5.583	–5.539	–17.490**
	(3.562)	(3.320)	(3.199)	(5.652)
Log Likelihood	–172.115	–164.302	–155.780	–80.040
Bank-Years	1,648	1,648	1,504	1,270
Banks	158	158	154	154

*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

leading to the credit crisis of 2007 and 2008, each additional compliance officer raises the likelihood of CRO appointment by 825 percent, which suggests that CRO uptake was faster and more extensive among banks concerned about compliance. In Model 3, regulatory compliance officers do not significantly affect CRO creation for the full period (1996 to 2010), which suggests that banks' motives for creating CROs changed after the crisis.

Did banks appoint CROs to manage anticipated or existing risk? In Table 2, none of the key predictors of bank risk-taking predict CRO appointment. The risk appetites of CEOs and institutional investors, as measured by CEO performance pay, CEO shareholding, and institutional blockholding, did not affect CRO appointment. Board independence does not predict CRO appointment. Bank risk exposure, measured by financial leverage, capital ratio, extent of non-traditional banking activity, and exposure to interest rate risk and exchange risk, does not predict CRO uptake; neither does bank performance or charter value. In unreported models, we also find that a bank's prior derivatives activity does not predict the creation of a CRO position, which suggests that banks did not appoint CROs to manage existing derivatives. Taken together, these findings suggest that firms likely installed CROs to handle new regulations rather than to manage planned or current risk-taking.

CROs and Derivatives

Consistent with Hypothesis 1, we find that CRO presence predicts holdings of the three new derivatives (see Table 3). Before the credit crisis (1995 to 2007), a CRO raised holdings of over-the-counter options by 247 percent, swaps by 169 percent, and credit derivatives by 644 percent. However, CRO presence does not predict holdings of more conventional derivatives: futures, forwards, and exchange-traded options.

Several other findings confirm expectations. Large banks held more of all six derivatives. Share price volatility (systematic risk) raised exposure to forwards and over-the-counter options, and market volatility (unsystematic risk) raised exposure to conventional derivatives and credit derivatives. Leverage raised use of over-the-counter options and credit derivatives, in support of the idea that risk-seeking banks favor new derivatives. Dependence on interest income raised exposure to the three conventional derivatives but not to new derivatives. Banks facing greater exchange risk held more forwards, which are often used to manage that form of risk (Papaioannou 2006).

Table 4 presents the instrumental variable analysis, which demonstrates that CRO effects on derivatives holdings are substantially similar when instrumental variables are included in the model. After incorporating the instruments, we find that the presence of a CRO is still associated with greater holdings of over-the-counter options, swaps, and credit derivatives.

How CEOs and Institutional Investors Shape Derivatives Activity

In Tables 5 through 9, we explore how CEO and institutional investor interests influence derivatives activity. We predicted that CEOs compensated with upside-driven performance pay in the form of annual bonuses favor new derivatives. Results show that the ratio of bonus to salary compensation predicts all six forms of derivatives. The effect of bonus pay does not change with CRO presence—the interactions in Table 5 are not significant. This suggests that CEOs dependent on performance pay boost derivatives holdings, regardless of whether they work alongside CROs.

Yet institutional blockholding and CEO shareholding restrict CRO promotion of new derivatives. Consistent with Hypothesis 6, we find that institutional blockholding reduces CRO promotion of derivatives. Table 6 shows that the presence of a CRO becomes less predictive of bank exposure to new derivatives as institutional blockholding increases. In Table 7, we calculate effects of a CRO at the

Table 3. Heckman Selection Models of Bank Derivatives Holdings, 1995 to 2010, with Robust Standard Errors (Outcome Model)

	Futures		Forwards		Ex. Options		OTC Options		Swaps		Credit Derivatives	
	1995 to 2010										1997 to 2010	
Chief Risk Officer (CRO)	.128	.887	.305	.577	.075	−.090	.535	1.245**	.495*	.988***	1.346*	2.007***
	(.670)	(.696)	(.330)	(.535)	(.688)	(.720)	(.334)	(.453)	(.234)	(.297)	(.560)	(.484)
CRO × Period 2007 to 2010		−1.990*		−.467		.522		−1.177*		−.756*		−1.476
		(1.004)		(.575)		(1.089)		(.570)		(.371)		(.787)
Bonus/Salary	.197**	.168*	.209***	.201***	.296**	.306**	.335***	.321***	.231***	.224***	.226***	.206***
	(.072)	(.073)	(.052)	(.052)	(.098)	(.104)	(.079)	(.084)	(.053)	(.054)	(.061)	(.061)
Institutional Blockholding	−.037	−.044	.013	.014	−.071*	−.069*	−.006	−.006	−.005	−.004	−.021	−.029
	(.029)	(.029)	(.017)	(.017)	(.029)	(.029)	(.015)	(.014)	(.010)	(.010)	(.029)	(.029)
CEO Stock Ownership	.039	.040	.003	.004	.329	.328	−.006	−.009	.027	.025	.095	.073
	(.054)	(.054)	(.023)	(.023)	(.199)	(.198)	(.026)	(.027)	(.015)	(.014)	(.161)	(.161)
Board Independence	.008	.009	−.015	−.015	−.009	−.009	−.009	−.010	−.012	−.012	−.044*	−.041
	(.027)	(.027)	(.011)	(.011)	(.028)	(.029)	(.015)	(.015)	(.011)	(.011)	(.021)	(.021)
Other Senior Executive of Risk Mgt.	.463	.418	.519	.526	.691	.724	.661	.666	.046	.051	−.451	−.491
	(.534)	(.511)	(.326)	(.330)	(.633)	(.629)	(.358)	(.360)	(.256)	(.257)	(.424)	(.436)
Capital Ratio, Tier 1 and 2	−.013	−.014	.069	.071	.067	.063	−.045	−.040	−.007	−.003	−.217	−.215
	(.089)	(.089)	(.038)	(.038)	(.138)	(.137)	(.057)	(.057)	(.059)	(.058)	(.118)	(.110)
Leverage	−.152	−.158	.040	.038	.180	.184	.134*	.134*	.063	.063	.323**	.312**
	(.113)	(.110)	(.070)	(.070)	(.129)	(.128)	(.063)	(.062)	(.046)	(.045)	(.104)	(.103)
Demand Deposits/Total Liabilities	−.749	−.838	−.104	−.116	.350	.401	−.027	−.074	−.174	−.195	−.092	−.167
	(.498)	(.514)	(.210)	(.206)	(.602)	(.603)	(.261)	(.265)	(.171)	(.172)	(.362)	(.384)
Net Interest Income/Net Income	−.328*	−.347*	−.482***	−.485***	−.525*	−.527*	.084	.081	−.095	−.096	−.098	−.118
	(.156)	(.162)	(.128)	(.129)	(.251)	(.251)	(.145)	(.143)	(.094)	(.093)	(.151)	(.147)
Foreign Exchange Income/Net Income	−.008	−.012	.021*	.021*	−.029	−.028	.000	−.001	−.001	−.002	.009	.006
	(.015)	(.015)	(.010)	(.010)	(.019)	(.019)	(.006)	(.006)	(.005)	(.005)	(.007)	(.008)
Bank Assets	.200***	.198***	.197***	.199***	.175***	.177***	.178***	.179***	.185***	.185***	.231***	.228***
	(.023)	(.022)	(.012)	(.011)	(.022)	(.022)	(.010)	(.010)	(.008)	(.008)	(.022)	(.022)
Return on Assets	−.244	−.298	−.984**	−.995**	−1.107	−1.126	.333	.323	−.321	−.326	−.089	−.146
	(.458)	(.477)	(.321)	(.324)	(.632)	(.625)	(.359)	(.356)	(.233)	(.230)	(.411)	(.417)
Cumulative Stock Returns	.264	.218	.266	.270	.635	.655	.506	.527*	.297	.312	.476	.399
	(.451)	(.430)	(.215)	(.210)	(.586)	(.564)	(.270)	(.264)	(.165)	(.161)	(.452)	(.465)
Market-to-Book	−.321	−.282	.119	.123	−.302	−.311	−.344**	−.343**	−.147	−.148	−.137	−.110
	(.286)	(.271)	(.090)	(.090)	(.202)	(.197)	(.134)	(.128)	(.090)	(.088)	(.167)	(.163)
Systematic Risk	.225	.252	.581**	.579**	.717	.740	.432*	.423*	.168	.166	.285	.336
	(.289)	(.289)	(.185)	(.186)	(.492)	(.497)	(.179)	(.176)	(.142)	(.141)	(.245)	(.234)

(continued)

Table 3. *(continued)*

	Futures		Forwards		Ex. Options		OTC Options		Swaps		Credit Derivatives	
	1995 to 2010										1997 to 2010	
Nonsystematic Risk	1.790*	1.964*	1.112***	1.135***	1.506*	1.477*	.509	.581	.060	.103	.938	1.145**
	(.866)	(.864)	(.250)	(.250)	(.732)	(.731)	(.332)	(.328)	(.231)	(.231)	(.481)	(.440)
Annual Time Trend	−.170*	−.205*	−.083*	−.089**	−.025	−.014	−.054	−.069	−.038	−.046	.154*	.107
	(.080)	(.086)	(.032)	(.034)	(.096)	(.091)	(.035)	(.036)	(.028)	(.028)	(.078)	(.079)
Period 2007 to 2010	−.359	.560	.487*	.585*	.070	−.226	.045	.306	.065	.209	−.203	.547
	(.376)	(.587)	(.221)	(.239)	(.687)	(.787)	(.261)	(.299)	(.225)	(.245)	(.395)	(.561)
Constant	−7.999	−7.198	−12.907***	−13.003***	−15.900**	−16.328**	−14.331***	−14.251***	−10.378***	−10.271***	−23.875***	−23.285***
	(4.500)	(4.442)	(2.632)	(2.615)	(5.269)	(5.249)	(2.935)	(2.871)	(2.087)	(2.070)	(5.100)	(4.929)
Rho	.229	.188	.394	.438	−.017	.010	.437	.450	.342	.338	.693	.675
Sigma	2.131	2.096	1.560	1.566	2.122	2.120	1.860	1.855	1.390	1.382	1.794	1.759
Log Likelihood	−1,076.274	−1,071.531	−2,067.066	−2,061.247	−867.177	−864.186	−2,210.129	−2,205.315	−2,181.154	−2,169.021	−639.430	−636.259
Observations	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,133	1,133
Uncensored Observations	332	332	851	851	244	244	809	809	956	956	230	230
Banks	157	157	157	157	157	157	157	157	157	157	145	145
Uncensored Banks	55	55	122	122	50	50	127	127	131	131	42	42

*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

Table 4. Instrumental Variable Regression (Instruments: Compliance Officer and Percent Female Board Members), 1997 to 2010

	Futures	Forwards	Ex. Options	OTC Options	Swaps	Credit Deriv.
Chief Risk Officer (CRO)	.533	1.450	−.263	2.439*	1.568**	3.933**
	(2.025)	(.854)	(1.718)	(1.030)	(.581)	(1.495)
Bonus/Salary	.246*	.205***	.297	.363***	.206***	.361**
	(.106)	(.055)	(.174)	(.099)	(.057)	(.110)
Institutional Blockholding	−.068	.021	−.034	.014	−.002	.036
	(.037)	(.018)	(.033)	(.018)	(.013)	(.037)
CEO Stock Ownership	.079	.019	.391	.023	.025	.108
	(.057)	(.026)	(.271)	(.028)	(.015)	(.187)
Board Independence	.021	−.015	−.023	.019	.004	−.054*
	(.038)	(.012)	(.034)	(.017)	(.012)	(.027)
Other Senior Executive of Risk Mgt.	.430	.748*	−.183	1.060*	.423	.138
	(.714)	(.351)	(.751)	(.437)	(.293)	(.590)
Capital Ratio, Tier 1 and 2	−.039	.081	.029	−.115	−.030	−.198
	(.101)	(.045)	(.173)	(.063)	(.043)	(.138)
Leverage	−.153	.027	.114	.119	.065	.261*
	(.147)	(.076)	(.140)	(.066)	(.047)	(.119)
Demand Deposits/Total Liabilities	−.059	−.001	.095	.021	−.048*	.019
	(.073)	(.025)	(.065)	(.025)	(.024)	(.047)
Net Interest Income/Net Income	−.217	−.429**	−.415	.075	−.036	−.092
	(.204)	(.141)	(.298)	(.164)	(.110)	(.177)
Foreign Exchange Income/ Net Income	.005	.021*	−.014	.017	.002	.019
	(.019)	(.010)	(.016)	(.010)	(.007)	(.012)
Bank Assets	.221***	.203***	.194***	.192***	.193***	.286***
	(.033)	(.019)	(.036)	(.019)	(.013)	(.028)
Return on Assets	−.130	−.864**	−.920	.167	−.154	−.037
	(.585)	(.329)	(.745)	(.399)	(.262)	(.514)
Cumulative Stock Returns	.250	.044	.647	.331	.182	.625
	(.538)	(.234)	(.741)	(.287)	(.187)	(.453)
Market-to-Book	−.388	.238**	−.380	−.286	−.092	−.295
	(.414)	(.091)	(.297)	(.190)	(.107)	(.200)
Systematic Risk	.106	.320	.102	.214	.137	.093
	(.276)	(.203)	(.495)	(.213)	(.145)	(.381)
Nonsystematic Risk	1.381	1.098***	1.083	.226	.079	.657
	(.776)	(.306)	(.743)	(.385)	(.255)	(.627)
Annual Time Trend	−.223	−.092	−.010	−.071	−.076	−.080
	(.176)	(.050)	(.180)	(.070)	(.042)	(.147)
Period 2007 to 2010	−.013	.321	−.066	.107	−.025	.535
	(.527)	(.235)	(.893)	(.276)	(.212)	(.563)
Inverse Mills Ratio	1.380	1.193*	−.122	2.512***	1.603**	3.001***
	(.991)	(.529)	(1.301)	(.678)	(.598)	(.659)
Constant	−13.006	−14.552***	−14.442*	−18.128***	−13.064***	−28.966***
	(6.964)	(3.433)	(7.355)	(3.749)	(2.676)	(6.708)
R^2	.696	.811	.724	.720	.818	.740
Uncensored Observations	252	666	174	649	761	218
Uncensored Banks	41	104	39	111	113	39

Note: Inverse Mills ratios are from probit models that predict whether a bank holds each type of derivative. Including these variables handles omitted-variable bias.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

25th, 50th, and 75th percentile of values of institutional blockholding. Among banks at the 25th percentile, CRO presence is associated with a 219 percent increase in holdings of OTC options, a 158 percent increase in holdings of swaps, and a 549 percent increase in holdings of credit derivatives. At this level of blockholding, CROs had a significant and

Table 5. Heckman Selection Models of Bank Derivatives Holdings, 1995 to 2010, Interactions with CEO Performance Pay (Outcome Model)

	Futures	Forwards	Ex. Options	OTC Options	Swaps	Credit Deriv.
Chief Risk Officer (CRO)	.009	.176	.259	.439	.513*	.926
	(.835)	(.380)	(.944)	(.404)	(.256)	(.713)
CRO × Bonus/Salary	.053	.093	−.087	.069	−.011	.204
	(.156)	(.159)	(.202)	(.129)	(.078)	(.152)
Bonus/Salary	.189**	.198***	.305**	.327***	.232***	.199**
	(.070)	(.047)	(.103)	(.090)	(.058)	(.066)
Institutional Blockholding	−.038	.014	−.071*	−.006	−.005	−.023
	(.029)	(.016)	(.029)	(.014)	(.010)	(.029)
CEO Stock Ownership	.038	.003	.329	−.006	.027	.092
	(.054)	(.023)	(.198)	(.027)	(.015)	(.161)
Rho	.197	.393	−.008	.435	.338	.675
Sigma	2.124	1.558	2.119	1.859	1.389	1.766
Log Likelihood	−1,075.506	−2,065.897	−866.252	−2,209.609	−2,179.099	−637.718
Observations	1,304	1,304	1,304	1,304	1,304	1,133
Uncensored Observations	332	851	244	809	956	230
Banks	157	157	157	157	157	145
Uncensored Banks	55	122	50	127	131	42

Note: Models include all control variables listed in Table 2. For credit derivatives, 1997 to 2010.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

Table 6. Heckman Selection Models of Bank Derivatives Holdings, 1995 to 2010, Interactions with Institutional Blockholding (Outcome Model)

	Futures	Forwards	Ex. Options	OTC Options	Swaps	Credit Deriv.
Chief Risk Officer (CRO)	.837	.925*	.253	1.160**	.949***	1.870**
	(.612)	(.391)	(.714)	(.389)	(.280)	(.640)
CRO × Institutional Blockholding	−.139***	−.072***	−.044	−.073**	−.054***	−.077*
	(.040)	(.021)	(.039)	(.024)	(.015)	(.035)
Bonus/Salary	.196**	.213***	.294**	.338***	.231***	.229***
	(.071)	(.052)	(.099)	(.079)	(.051)	(.059)
Institutional Block-holding	−.005	.025	−.061	.007	.004	.006
	(.032)	(.016)	(.036)	(.015)	(.010)	(.034)
CEO Stock Ownership	.037	.000	.332	−.009	.024	.106
	(.051)	(.023)	(.199)	(.026)	(.014)	(.158)
Rho	.181	.382	−.016	.414	.324	.683
Sigma	2.089	1.543	2.119	1.839	1.378	1.767
Log Likelihood	−1,07.158	−2,057.849	−865.067	−2,204.363	−2,175.454	−636.939
Observations	1,304	1,304	1,304	1,304	1,304	1,133
Uncensored Observations	332	851	244	809	956	230
Banks	157	157	157	157	157	145
Uncensored Banks	55	122	50	127	131	42

Note: Models include all control variables listed in Table 2. For credit derivatives, 1997 to 2010.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

Table 7. Effects of CROs at Different Levels of Institutional Blockholding

Derivative Type	25th (0%)	Median (6%)	75th (12%)
Futures	131%	1%	–55%
Forwards	152%*	64%	8%
Ex. Options	29%	0%	–23%
OTC Options	219%**	107%*	36%
Swaps	158%***	88%**	37%
Credit Derivatives	549%***	311%*	163%

*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

Table 8. Heckman Selection Models of Bank Derivatives Holdings, 1995 to 2010, Interactions with CEO Stock Ownership (Outcome Model)

	Futures	Forwards	Ex. Options	OTC Options	Swaps	Credit Deriv.
Chief Risk Officer (CRO)	.321	.769*	.263	.938**	.686**	1.720**
	(.716)	(.358)	(.708)	(.357)	(.255)	(.614)
CRO × CEO Stock Ownership	–.793	–1.524***	–1.082	–1.419***	–.688*	–1.290**
	(.743)	(.349)	(.800)	(.404)	(.287)	(.433)
Bonus/Salary	.196**	.212***	.293**	.331***	.230***	.227***
	(.071)	(.052)	(.098)	(.079)	(.052)	(.060)
Institutional Blockholding	–.030	.018	–.062	–.002	–.003	–.004
	(.030)	(.016)	(.033)	(.014)	(.010)	(.029)
CEO Stock Ownership	.039	.002	.333	–.006	.027	.110
	(.053)	(.022)	(.202)	(.026)	(.014)	(.154)
Rho	.217	.367	–.025	.410	.334	.682
Sigma	2.124	1.539	2.118	1.839	1.385	1.761
Log Likelihood	–1,075.593	–2,058.453	–866.447	–2,204.947	–2,177.867	–636.448
Observations	1,304	1,304	1,304	1,304	1,304	1,133
Uncensored Observations	332	851	244	809	956	230
Banks	157	157	157	157	157	145
Uncensored Banks	55	122	50	127	131	42

Note: Models include all control variables listed in Table 2. For credit derivatives, 1997 to 2010.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

positive effect on new derivatives. Among banks at the 75th percentile of institutional blockholding, CRO effects are not significant and are smaller, at 36 percent (OTC options), 37 percent (swaps), and 163 percent (credit derivatives). In banks with high levels of institutional blockholding, fund managers appear to constrain the popularity of the new derivatives.

We see a similar pattern for banks whose CEOs have substantial equity. In Table 8, CROs become less predictive of new derivatives as CEO shareholding rises. In Table 9, we calculate CRO effects at the 25th, 50th, and 75th percentiles of CEO shareholding. At the 25th percentile, CROs are associated with a 112 percent increase in holdings of OTC options, an 82 percent increase in swaps, and a 372 percent increase in credit derivatives. All three effects are significant. Among banks at the 75th percentile, effects are no longer significant, and decline to −39 percent (OTC options),

Table 9. Effects of CROs at Different Levels of CEO Stock Ownership

Derivative Type	25th (0.1%)	Median (0.3%)	75th (1%)
Futures	24%	7%	–38%
Forwards	77%	32%	–53%*
Ex. Options	13%	–8%	–56%
OTC Options	112%*	62%	–39%
Swaps	82%*	59%*	–1%
Credit Derivatives	372%**	269%*	53%

*$p < .05$; **$p < .01$; ***$p < .001$ (two-sided tests).

–1 percent (swaps), and 53 percent (credit derivatives). In banks with high levels of CEO stock ownership, CEOs appeared to restrain CROs from popularizing the new derivatives.

In short, when top executives have an interest in boosting short-term returns, they are more likely to favor new derivatives. When institutional investors and CEOs have an interest in limiting risk, as when they hold large and illiquid stakes, they restrain CRO promotion of new derivatives.

Robustness Checks

We evaluate the robustness of the findings to the exclusion of large banks and to variation in CRO background (models available from the authors upon request).

Dealer banks and too-big-to-fail banks. We explore the possibility that the activities of very large banks are driving the results, for one of two possible reasons. First, big banks can act as *derivatives dealers* (making markets for these financial instruments) and as *derivatives end-users*. We have focused on how CROs shape end-user activity; however, CRO effects on dealer activities might be driving the results. To account for this possibility, we re-ran all models excluding dealer banks, as described below.

Second, systemically important banks may take outsize risks in the belief that the government has insured them against failure, and they may be more likely to appoint CROs because of their visibility to regulators and the public. We control for bank size, but a continuous size variable cannot exclude the possibility that the activities of a small group of extremely large banks drive the CRO effect for derivatives.

To account for both of these possibilities—that the CRO derivatives findings are driven by the actions of dealer banks, and that they are an artifact of risk-seeking by too-big-to-fail banks—we re-ran models after excluding the 20 largest banks as of December 31, 2004. This group includes all banks ever deemed too-big-to-fail (Brewer and Jagtiani 2007). It also covers all significant dealer banks, because only a handful of banks had the capacity to act as dealers in markets for new derivatives (Carter and Sinkey 1998). Five dealer banks controlled 97 percent of the market in OTC derivatives in 2007 (Comptroller of the Currency 2007). All key findings hold after excluding the 20 largest banks, which suggests that neither dealer banks nor too-big-to-fail banks drive the results.

CRO background. We tested whether CEO risk appetite affected the appointment of CROs, finding that it did not. But CEOs may have appointed different kinds of CROs to suit their risk preferences. Perhaps CEOs seeking to use risk managers to justify increasing exposure to high-risk/high-reward derivatives were more likely to appoint company insiders, who would follow their dictates. Or they may have been more likely to appoint experts with backgrounds in credit risk management, who were already familiar with the use of portfolio management techniques to maximize risk-adjusted returns. If risk-seeking CEOs were cherry-picking such risk managers, then we would expect insider

CROs (70 percent of the sample) and credit risk experts (also 70 percent of the sample) to have had particularly strong effects on derivatives usage. Instead, we find that internal CROs did not behave differently from external CROs, and CROs with backgrounds in credit risk management did not behave differently from those with other backgrounds.

CONCLUSION

Many U.S. banks came to rely heavily on new derivatives, such as credit-default swaps and synthetic CDOs, in the years leading up to the Great Recession. That practice compounded the consequences of the crisis that began in 2007 by amplifying bank exposure to certain classes of investments (Johnson and Kwak 2010; Nocera and McLean 2011). When the housing market collapsed, many banks that had used derivatives to leverage investments in subprime mortgages found themselves on the hook for much more than they had on hand. Lenders unable to determine bank exposure to illiquid bespoke derivatives, or bank obligations to particular counterparties, stopped lending (Partnoy and Eisinger 2013; Stiglitz 2009b). Wary investors declined to recapitalize troubled banks with opaque derivatives holdings (Bass 2010; Greenburger 2010). Bank exposure to new derivatives thus helped bring the financial system to the brink of collapse (Nocera 2010).

Economists, sociologists, and organizational theorists have tied banks' embrace of risky, illiquid, and unproven financial instruments to government subsidies, organizational mimicry, sanguine credit rating, imperfect risk modeling, and profligate mortgage lending (Dobbin and Jung 2010; Fligstein and Goldstein 2010; MacKenzie 2011; Pernell-Gallagher 2015; Stiglitz 2009a). We augment these arguments by calling attention to two additional factors: first, the preexisting agenda of an expert group promoted to handle new regulations, and the effect of that group on desk managers' policing of their own risk-taking (organizational licensing), and second, the interests of powerful CEOs and fund managers in potentially lucrative, if risky, derivatives.

We argue that regulations led banks to appoint chief risk officers. In turn, CROs promoted new derivatives as part of a regime of enterprise risk management designed not to eliminate risk but to maximize returns. Moreover, the new risk officers may have produced organization-level "moral licensing" that led desk managers to reduce policing of their own risky behavior. The experts' risk-management model evolved from their experiences in the 1980s and 1990s. Risk specialists first gained traction with banks when executives sought their expertise to prevent a replay of the banking crises of the 1980s. When those crises faded from memory, risk managers jumped on the shareholder-value bandwagon, arguing that they could help banks maximize "risk-adjusted returns" using tools like new derivatives.

The interests of CEOs and institutional investors, determined by the structure of their compensation and shareholding, shaped bank exposure to potentially lucrative derivatives. In banks that relied on performance pay, which rewarded CEOs for share-price gains without punishing them for losses, CEOs boosted exposure to new derivatives. In banks where they held large illiquid ownership stakes, CEOs and fund managers alike put the brakes on new derivatives.

Compliance Experts' Agendas

Institutionalists have explained organizational compliance strategies by attending to the strategic behavior of expert groups. The experts who take charge of complying with new regulations often champion the cause the law promotes. Equal-opportunity experts managed Civil Rights Act compliance; environmental engineers took charge of the Environmental Protection Act; tax accountants headed compliance with the Employee Retirement Income Security Act; and safety engineers handled the Occupational Safety and Health Act (Dobbin and Sutton 1998; Jennings and Zandbergen 1995). In these cases, the group handling compliance had long championed the same objectives as regulators.

If the lesson from previous cases is that experts often promote elaborate compliance systems, the lesson from our case is that an expert group's specific goals shapes its approach. In the case we consider, both risk experts and bank regulators favored effective risk management. However, the two groups had different goals. Regulators sought to minimize the likelihood of catastrophic failure, whereas risk experts operating in the age of shareholder value sought to maximize risk-adjusted returns. They encouraged use of new derivatives that facilitated hedging to offset specific risks and the quick fine-tuning of exposure to different classes of assets as market conditions changed. Yet these derivatives carried known credit and liquidity risks, and they had never been exposed to the extreme stress of a financial crisis. We argue for a more general theory of how experts' agendas shape compliance, for not all groups of compliance experts share the goals of regulators.

Organizational Licensing

The finding that CROs promoted derivatives may also provide support for an organizational version of moral licensing theory. Castilla and Benard's (2010) experimental study suggests that organizational culture can adversely affect behavior. People who are told that their employer is meritocratic are less likely to self-monitor for bias—an effect the authors call the "paradox of meritocracy." We suggest that a structural change, in the creation of a high-level position, can have a similar effect. When organizations appoint CROs, employees may be less likely to self-monitor for risky behavior in the belief that risk management is being effectively handled elsewhere. This proposition is in line with results from a 2008 Deloitte survey, which found that nearly two thirds of respondents from firms with a single executive in charge of enterprise risk management reported they felt the organization was "prepared" to manage its risks, compared to less than a third of those from firms without a top risk executive (Deloitte 2008:15). This idea is also in line with Perrow's (1984) theory of tight coupling and system failure, which suggests that centralized safety control promotes the relaxation of control within subunits. How much of the CRO effect on derivatives resulted from the pursuit of risk-optimization, and how much from organizational licensing, remains a question for future research. Future studies might explore whether organizational licensing effects follow the creation of new compliance offices in other realms, such as environmental protection, safety and health, or equal opportunity. The real paradox is that in trying to institutionalize new goals, such as meritocracy or risk reduction, organizations may undermine manager attention to those goals.

Group Interests and Compliance

Our second contribution is to consider how powerful insiders and outsiders mediate the spread of innovations (Fligstein 1990; Jung 2016). Bank executives and large investors have the clout to influence strategy, and their interests follow from compensation and ownership arrangements. The new derivatives could ramp up exposure to high-risk, high-return assets. Executives and fund managers recognized both the risk and return potential of these instruments. When either the CEO or fund managers held substantial illiquid equity, and thus had an interest in minimizing risk, they prevented CROs from expanding exposure to new derivatives. But CEOs dependent on upside-only performance pay were less risk averse, and promoted the new derivatives.

We suggest that group power and interests have been neglected in compliance studies, which focus on the institutional entrepreneurs who develop innovations but ignore their accomplices and opponents (but see Dobbin et al. 2011; Kellogg 2009). Attention to executives and fund managers with the clout to restrain, or green-light, new derivatives improves our ability to explain the uneven uptake of innovations across organizations. The findings also make clear that executives and professional investors understood the

credit and liquidity risks behind the new derivatives—and how these risks aligned with their own interests.

Risk, Regulation, and Shareholder Value

CROs have become more popular since the crisis. In 2007, 22 percent of large commercial banks had CROs; by 2010, 32 percent had them (see Figure 1). Management consultants and the business press now promote CROs and ERM as solutions to the risk-management deficiencies that the credit crisis uncovered (Dobbs 2008; Sterngold 2014) and advocate for the expansion of CROs outside of financial services (Deloitte 2008). Congress responded to the crisis with the Dodd-Frank Act of 2010, which required financial institutions to establish enterprise risk management programs. Our findings suggest that these trends are worrisome. Results show that CROs backed away from new, untested derivatives after 2007. But they have not abandoned the mantra of optimizing risk-adjusted returns.

We show that CROs implementing ERM increased bank exposure to derivatives known to carry credit risk and liquidity risk so as to maximize returns, not to minimize the risk of failure (Nocco and Stulz 2006; Wood 2002). For shareholder-value proponents, a bank that has zero risk of failure is not serving investors. Yet for systemically important institutions like banks, regulators and risk experts should establish acceptable failure odds at levels much lower than those for the average pharmacy chain.

Perrow's (1984) warning against delegating risk assessment to organizational experts is as timely as ever. He worried that centralized risk management would lull managers into complacency. Our findings validate his concerns, and add a twist. We suggest that when regulators assign compliance management to corporations, experts may take control and implement reforms that serve their own purposes. The interests of corporate leaders, and the experts they charge with compliance, may be at odds with public purposes. That is the hazard of expert control.

What, then, should regulators be doing to curtail risk? Our findings suggest that extant corporate risk-management programs failed. As these programs have only changed at the margins, they are likely to fail again. Instead of delegating risk oversight to experts within corporations, policymakers might follow the lead of organizational theorists, who see corporations not as persons with clear-cut interests, but as agglomerations of individuals and groups with interests and motives deriving from their positions and professional backgrounds. In the shareholder-value era, the groups that shaped corporate risk strategy—CROs, CEOs, and fund managers—developed interests in maximizing risk to boost returns. As a first step toward effective regulation, policymakers must recognize when these interests do not align with those of lawmakers and the public.

As a second step, policymakers should take note of how organizational arrangements mediate the interests of these groups, and target their interventions accordingly. Our findings about CEOs and fund managers suggest that with the right incentives, these groups can put the brakes on risk-seeking. Where they had skin in the game, in the form of large, illiquid stakes, both groups curtailed exposure to riskier new derivatives. It is unfortunate, then, that few corporations have followed agency theorists' advice to use long-term incentive plans to ensure that executives hold equity (Jensen and Meckling 1976) and to back away from performance pay (Jensen and Murphy 1990). When investment banks were private partnerships, their partners were fully exposed to risks. A return to the partnership model would surely make banks more cautious. But the popularity of performance pay, which can make bank executives immensely wealthy overnight, makes a return to that model unlikely.

APPENDIX

Table A1. Univariate Statistics and Data Sources

Variable	Mean	SD	Data Sources
CRO Adoption	.040	.197	S&P Register
Notional Amount ($1MM): Futures	34.005	182.111	Bank Regulatory
Notional Amount ($1MM): Forwards	107.070	653.339	Bank Regulatory
Notional Amount ($1MM): Exchange-Traded Options	31.978	202.846	Bank Regulatory
Notional Amount ($1MM): Over-the-Counter Options	123.254	858.500	Bank Regulatory
Notional Amount ($1MM): Swaps	525.574	4,050.424	Bank Regulatory
Notional Amount ($1MM): Credit Derivatives	50.418	502.970	Bank Regulatory
Chief Risk Officer (CRO)	.083	.275	S&P Register
Bonus/Salary	1.175	1.518	ExecuComp
CEO Shareholding	1.398	3.720	ExecuComp
Institutional Blockholding	7.006	7.651	Thomson Financial
Board Independence	83.476	9.167	S&P Register
Other Senior Executive of Risk Mgt.	.100	.301	S&P Register
Capital Ratio, Tier 1 and 2	12.898	2.235	Compustat
Leverage	12.071	2.583	Compustat
Demand Deposits/Total Liabilities	10.976	6.104	Bank Regulatory
Net Interest Income/Net Income	3.059	1.182	Compustat
Foreign Exchange Income/Net Income	4.800	12.591	Compustat
Bank Assets ($MM)	58,986.720	176,852.000	Compustat
Return on Assets	1.220	.420	Compustat
Cumulative Stock Returns	.170	.334	CRSP
Market-to-Book	2.345	1.045	Compustat
Systematic Risk	.730	.441	CRSP
Nonsystematic Risk	.667	.250	CRSP

Table A2. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Notional Amount (Logged): Futures																							
2. Notional Amount (Logged): Forwards	.772																						
3. Notional Amount (Logged): Ex Options	.827	.643																					
4. Notional Amount (Logged): OTC Options	.805	.786	.741																				
5. Notional Amount (Logged): Swaps	.727	.747	.653	.782																			
6. Notional Amount (Logged): Credit Derivatives	.802	.729	.825	.736	.693																		
7. Chief Risk Officer (CRO)	.155	.120	.103	.166	.173	.150																	
8. Bonus/Salary	.596	.523	.642	.525	.474	.603	−.034																
9. CEO Shareholding	−.101	−.144	−.121	−.140	−.117	−.143	−.088	−.127															
10. Institutional Blockholding	−.239	−.095	−.156	−.123	−.065	−.122	.135	−.079	−.017														
11. Board Independence	.121	.144	.057	.162	.162	.103	.001	−.016	.013	−.079													
12. Other Senior Executive of Risk Mgt.	.223	.269	.227	.318	.326	.287	−.025	.074	.027	−.053	.013												
13. Capital Ratio, Tier 1 and 2	−.015	.081	−.081	−.041	−.006	−.051	.077	−.037	.373	.061	.017	−.123											
14. Leverage (Logged)	.216	.250	.150	.142	.262	.182	−.119	.193	.054	−.055	.030	.106	−.128										
15. Demand Deposits/Total Liabilities	.037	.021	.085	−.013	−.118	−.006	.020	−.058	−.013	−.212	.160	−.097	.103	−.003									
16. Net Interest Income/Net Income	−.300	−.369	−.212	−.236	−.207	−.280	.029	−.389	−.014	.085	−.085	.035	−.167	−.110	−.013								
17. Foreign Exchange Income/Net Income	.521	.661	.349	.483	.479	.459	.086	.334	−.124	−.114	.118	.075	.137	.267	.003	−.371							
18. Bank Assets (Logged)	.752	.836	.680	.772	.793	.765	.183	.492	−.174	−.100	.116	.306	−.041	.223	−.083	−.263	.562						
19. Return on Assets	.093	.038	.074	.040	−.085	.059	.023	.209	.040	−.094	−.009	−.099	.126	−.191	.222	−.644	−.036	−.031					
20. Cumulative Stock Returns	.016	.006	.033	−.018	−.043	−.033	−.144	.196	.016	−.085	−.011	−.044	.036	.193	.138	−.156	.000	−.120	.108				
21. Market-to-Book	.125	.240	.082	.052	.101	.081	−.058	.293	−.029	−.060	.043	−.131	.039	.390	.231	−.428	.257	.066	.317	.517			
22. Systematic Risk	.269	.317	.263	.274	.319	.258	.174	.223	−.080	.016	−.036	.014	.037	.141	.042	−.157	.295	.317	.031	−.134	.132		
23. Nonsystematic Risk	−.127	−.157	−.096	−.196	−.158	−.174	.049	−.062	.073	.087	−.128	−.083	.160	.080	−.108	.258	−.122	−.184	−.150	.089	.064	−.043	
24. Annual Time Trend	−.303	−.243	−.307	−.209	−.182	−.175	.179	−.227	−.021	.312	−.084	−.007	.064	−.508	−.312	.168	−.149	−.163	−.091	−.373	−.384	−.149	.0291

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Notes

1. Forwards also trade over the counter, but they are less complex than the new derivatives (Phillips et al. 2003).
2. We thank a reviewer for drawing our attention to the moral licensing literature.

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