The Rise of Risky Derivatives:

Chief Risk Officers, CEOs, and Fund Managers

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**ABSTRACT**

At 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. Institutionalists suggest that firms respond to regulations by appointing compliance experts, who sometimes exaggerate legal requirements. We propose a more nuanced institutional theory of expert interests, and highlight effects of other powerful groups. Rather than overstating what the law required, risk experts sought to cement their role in shareholder-value management with compliance strategies that they also marketed as maximizing risk-adjusted returns. This agenda, we predict, led them to promote new derivatives. Powerful CEOs and fund managers had their own interests vis-à-vis derivatives, which promised high returns but carried known risks. CEOs boosted derivatives, we predict, when their compensation rewarded risk-taking. But neither CEOs nor fund managers backed derivatives when they held large illiquid ownership stakes. We test these predictions using data on derivatives holdings of 157 large banks between 1995 and 2010. We suggest that existing agendas of expert groups shape regulatory compliance, as do the interests of other powerful groups. The findings have important substantive implications, for the new derivatives precipitated the Great Recession.

In the 1990s and 2000s, risk-taking among U.S. investment and commercial banks reached new heights, eventually setting off a massive global financial crisis. The consequences were severe and wide-ranging. Household net worth plummeted (Lutrell, Atkinson, and Rosenblum 2013), while 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: 2). Almost a decade later, the American economy has yet to fully recover.

Financial derivatives played a key role in the crisis (Lewis 2010; Hera 2011; *The Economist* 2008). After the late 1990s, bank holdings of new forms of derivatives, such as credit-default swaps and synthetic CDOs, spiked. These financial instruments were negotiated through complex, one-off contracts that could not be traded on established exchanges. They contributed to the crisis in two major ways: by allowing banks to amplify their exposure to risky subprime mortgages, and by exposing banks to greater credit risk (the risk that the other party to a contract won’t pay up) and liquidity risk (the risk that that the bank won’t be able to unwind the contract for its expected value) (Davi 2009; Stiglitz 2009b). When the crisis hit, these factors led to massive losses for America’s most systemically important financial institutions (Nocera and McLean 2011; Stiglitz 2009a).

U.S. and global regulators had sought to limit bank risk-taking in the years leading up to the crisis (Sarbanes-Oxley Act of 2002; Basel Committee for Banking Supervision 2004), but their efforts did not dampen bank enthusiasm for these new derivatives. Why did banks embrace complex, novel derivatives that carried substantial risk 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 (DellʼAriccia, Laeven, and Marquez 2014; Schularick and Taylor 2012). Organizational theorists have focused on the design of risk modeling and on relationships between financial market participants (Millo and MacKenzie 2009; MacKenzie 2011; Pernell-Gallagher 2015), while economic sociologists have highlighted the failure of credit rating agencies (Carruthers 2010) and gaps in regulatory oversight of financial innovations (Funk and Hirschman 2014). We offer a complementary account that calls attention to the agenda of chief risk officers, who were charged with managing regulatory compliance, and to the interests of CEOs and professional fund managers.

We argue that when risk experts were appointed as CROs, they brought an agenda of maximizing risk-adjusted returns, which led them to promote new derivatives as tools to facilitate efficient resource allocation and risk management. Derivatives are financial contracts that allow users to acquire, or shed, exposure to the risks of an asset without affecting the asset’s ownership. Risk experts seeking to maximize profit saw the new derivatives as powerful tools that enabled users to adjust their exposures to particular investments (e.g. mortgages, corporate bonds, or currency holdings) quickly, precisely, and cheaply. The ability to rapidly and flexibly adjust exposures was a priority for risk specialists who sought to bring risk, and thus profit potential, as close to the maximum limits as possible.

CEOs and fund managers saw derivatives differently. New derivatives such as credit-default swaps and synthetic CDOs had also gained attention for their capacity to amplify exposure to high-risk, high-return speculative investments. We argue that when influential groups were motivated by short-term profits, as when CEOs were loaded up with performance pay, they favored the new derivatives. Conversely, when CEOs and fund managers had an interest in restraining risk, as when they held large, illiquid stakes in banks, they resisted expanding reliance on new derivatives.

Beyond offering a new perspective on the momentous rise in bank derivatives holdings leading up to the credit crisis, we also contribute to institutional theory. Institutionalists have focused on the expert groups that take charge of compliance, showing that experts often serve as internal champions for the external causes new laws promote (Edelman 1990; 1992; Dobbin and Kelly 2007; Dobbin 2009). But we suggest that compliance experts need not share the goals of lawmakers, and that when they do not, they may champion reforms that are orthogonal to regulatory intent. The pre-existing agenda of the expert group shapes the content and the objectives of reform. Paying closer attention to that agenda, we argue, allows us to better predict compliance strategies. It also helps to explain cases of “means-ends decoupling” (Bromley and Powell 2012), in which organizations fully implement policies that are only loosely connected to stated goals.

Institutionalists have also neglected how the interests of other powerful groups shape the success of expert-led reforms (but see Kellogg 2009; Dobbin, Kim, and Kalev 2011). We highlight the power of CEOs and fund managers, suggesting that when reforms align with group interests, firms are more likely take them up. Our theory helps to explain why compliance can vary markedly across organizations that put seemingly identical experts in charge, but have different ownership and compensation arrangements.

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 deemed 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 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 (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 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 have responded by hiring experts to take charge (Edelman 1990; Dobbin and Sutton 1998). We suggest that CEOs were particularly keen to signal that 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. As James Lam of GE Capital Market Services, the nation’s first “Chief Risk Officer,” 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 (Lam 2003: 8-9).

Moreover, while SOX did not require banks to appoint CROs, the Securities and Exchange 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 (the COSO framework of enterprise risk management) developed by risk experts (COSO 1992; SEC Final Rule 2003). Many firms responded by appointing CROs to implement “enterprise risk management” (ERM) programs, which prescribed centralized modeling and management of all risk across a firm’s departments and business units (RIMS 2012; Deloitte 2004).

Financial journalists, and members of the finance industry more broadly, saw CROs as the lynchpin of compliance. As Lawrence Richter Quinn wrote, “how 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” (Quinn 2008; see also Power 2005, Atkinson 2003: 1; Aksel 2003). 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. First, banks’ likelihood of appointing CROs should rise in the wake of the new regulations. We test this idea below. The pattern of diffusion supports this proposition: Figure 1 shows that CROs began to spread in the early 2000s, shortly after the passage of Gramm-Leach-Bliley in 1999, the Patriot Act in 2001, and Sarbanes-Oxley in 2002. Diffusion picked up in 2005, after Basel II was published (June 2004) and after SOX took effect (January 2005). Second, banks sensitive to regulatory pressures should be more likely to appoint CROs (Sutton and Dobbin 1996). We capture regulatory sensitivity using a bank’s previous appointment of other types of compliance officers.

**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 tool-kits as compliance solutions (Edelman 1990; 1992). Institutionalists have drawn lessons about the construction of compliance from the behavior of experts drawn to their specialties through commitment to the same goals as regulators. 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 compliance experts within the firm were one. However, it does not follow that this will always be the case. We suggest that correspondence between the objectives of regulators and experts may vary across settings, and that the pre-existing agendas of compliance experts matter for the results that follow. In our case, lawmakers and risk specialists sought to accomplish the same broad goal: encouraging firms to adopt better, more effective risk management practices. But what “effective risk management” entailed was a matter of interpretation. While Congress sought to eliminate the possibility of catastrophic failure, risk specialists were advocates for “maximizing risk-adjusted returns” in pursuit of shareholder value.

In what follows, we detail the history of the risk management specialty, and develop predictions for risk manager effects on derivatives use by banks. We suggest that risk specialists appointed to new positions as CROs paradoxically increased risk by promoting new derivatives.

**The Emergence and Agenda of Risk Experts**

Risk management experts first rose to power in American 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: 1). Yet as the crises receded, so did executives’ enthusiasm for risk management (Power 2005: 134). In the 1990s, a group of risk experts promoted a new approach -- enterprise risk management (ERM) -- and framed this approach as a strategy to enhance shareholder value (Wood 2002). ERM involved modeling, assessing, and managing risk across the entire firm, with the goal of reallocating and recalibrating aggregated risk to “maximize risk-adjusted returns” (Wood 2002; Power 2005).

In emphasizing how risk management can promote shareholder value, risk experts followed a time-honored strategy among groups peripheral to the mission of the corporation, of linking their professional project to a key goal (Ashforth and Kreiner 1999; Dobbin and Sutton 1998; Zorn 2004). Their intent was to demonstrate that risk management could enhance profitability (Wood 2002: 2; see also Power 2005). However, in focusing on shareholder value, experts also changed the purpose of risk management. 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).

Shareholder value proponents had argued that the malaise of the 1970s was the fault of overly cautious managers. One solution was to encourage executives to take risks to boost the value of their companies. Because erring on the side of caution was the very problem that the shareholder value paradigm was supposed to address, the idea of managing risk to minimize the chance of distress seemed to violate shareholder interests. Risk experts now defined their work as maximizing bank profitability, while remaining mindful of risk (Banham 2004: 6). As two risk experts 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).

Thus before the first CRO was named, 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 Nocco and Stulz 2006: 11; Lam 2003; Liebenberg and Hoyt 2003: 40). Anything short of that would be an abrogation of their duty to shareholders. In what follows, we explain how this agenda led CROs to promote new, more complex and untested forms of derivatives.

**CROs Promote New Derivatives to Maximize Risk-Adjusted Returns**

CROs viewed derivatives as important components of the enterprise risk management toolkit(see Moody 2003; Moeller 2011; Baranoff 2004: 24; Banham 2000). Most CROs at large commercial banks came from backgrounds in credit risk management, where the use of derivatives to adjust portfolio risk was already common (Wilson 1998; Wood 2002). Risk specialists saw derivatives as tools for adjusting exposure to particular kinds of investments quickly, precisely, and at low cost (Collins and Fabozzi 1999; Barrickman 2001). Derivatives were expected to enhance a bank’s overall portfolio efficiency by redirecting resources to investments that promised the greatest returns. They enabled banks to unwind investments with declining prospects or acquire exposure to promising investments more quickly and easily (Collins and Fabozzi 1999: 10; Minton et al. 2005).

ERM called for CROs to develop strategies to assess, evaluate, and reallocate risk at the enterprise level, and to work in conjunction with key business departments within banks to execute these strategies (Banham 2000; Investment Company Institute 2007; Banham 2004). We suggest that in working with these units, CROs promoted newer derivatives as tools that would help units, and the entire enterprise, adjust their current exposures to better maximize risk-adjusted returns.

Certain types of derivatives – such as futures and forwards contracts written on agricultural commodities -- have traded in American financial markets for centuries. However, the pace of innovation in derivatives markets increased markedly in the early 1970s. This period witnessed a dramatic expansion in derivatives trading to include futures and forwards written on financial assets (stocks, bonds, currencies), as well as the formation of a formal exchange to trade options contracts (Whaley 2006: 16). A second wave of innovation followed in the 1980s and early 1990s. Hoping to capitalize on the growing popularity of derivatives written on financial assets, investment banks created new, different types of derivatives (Whaley 2006: 18). These new derivatives, which included swaps, credit derivatives, and over-the-counter options, featured complex, non-standard contracts (Carmichael and Rosenfield 2003: 41; Becketti 1993). Unlike more conventional derivatives, like futures or exchange-traded options, they traded on over-the-counter (OTC) markets, rather than on organized exchanges: they were created in one-off deals negotiated between counterparties.[[1]](#endnote-1) The new derivatives were wildly successful. In 1980, virtually all derivatives traded on exchanges, but by 1991, the notional amount of derivatives traded in the OTC market equaled (and soon surpassed) the amount traded in exchange-traded markets (Whaley 2006: 19).

Two features of the new derivatives appealed to CROs. First, contracts were bespoke, which made them particularly useful to portfolio managers as “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; Lam 2003). Second, they made it easier to shed or acquire exposure to new categories of investments. 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 American dollars for payments in Canadian dollars, or choosing whether an option is a put or call at a later point in the option’s life - that had previously been impossible, or prohibitively expensive, to execute.

We suggest that CROs encouraged departments to use new derivatives in the course of implementing enterprise risk management. 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 they did not have the authority to direct corporate strategy.

*Hypothesis 1: Appointment of a chief risk officer will increase a bank’s reliance on the newer types of derivatives.*

**How Power Dynamics Mediate the Success of Expert Projects**

Institutionalists were criticized early on, by both insiders (DiMaggio 1988) and outsiders (Perrow 1986), for neglecting the role of power in institutionalization. While they have since explored the role of powerful groups in pushing for change (Fligstein 1990), they have rarely considered contention between groups within firms. One exception is Jung’s (2016) study of how managers, workers, and institutional investors influence downsizing decisions. Two studies have explored 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, Kim, and Kalev (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 presence of different groups, but their interests vis-à-vis risky, potentially lucrative, innovations. 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 the interests of particular CEOs and institutional investors are shaped by their compensation and shareholding. Below, we explain our predictions regarding how these powerful group interests shaped bank derivatives activity.

**CEOs, Fund Managers, and Derivatives**

The new derivatives won attention not merely because they facilitated quick shifts in exposure to investments, but because they could boost profits. Derivatives were also known to facilitate large speculative plays by allowing investors to leverage small amounts of capital. Banks could gain exposure to upside (and downside) risk without a lot of cash, thereby multiplying potential profits (and losses).

Headlines throughout the 1990s and 2000s illustrated the promise of the new derivatives, but the high-profile collapses of Long-Term Capital Management and Barings Bank also underscored to 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 predict, they put the brakes on exposure to new derivatives. But when they had much to gain and little to lose, we expect that they promoted exposure.

**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 those plans argue that they prevent myopic short-termism by CEOs hoping to maximize performance pay; the downside exposure “motivates managers to look beyond next quarter’s results” and moderate risk (Murphy 1986, p. 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 CEO equity rises, they should resist bank exposure to the risk associated with new derivatives. They should be less likely to directly boost new derivatives, and more likely to restrain the CRO’s enthusiasm for them.

*Hypothesis 2: As CEO shareholding increases, banks will reduce their exposure to new derivatives.*

*Hypothesis 3: The CRO’s positive effect on exposure to new derivatives will decline as CEO shareholding rises.*

Large institutional investors exert considerable influence over bank executives (Davis, Diekmann and Tinsley 1994; Pfeffer and Salancik 1978). Fund managers 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 more than 5% of shares) should be less likely to champion new derivatives, and more likely to restrain the CRO.

*Hypothesis 4: As institutional blockholding increases, banks will reduce their exposure to new derivatives.*

*Hypothesis 5: The CRO’s positive effect on exposure to 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 share price drops – thus they encourage risk-taking (Burns and Kedia 2006; Sanders and Hambrick 2007; Zhang et al. 2008; Dobbin and Jung 2010). We expect that compensation packages weighted toward performance pay will boost CEO enthusiasm for the new derivatives.

*Hypothesis 6: As CEO performance pay increases, banks will increase their holdings of derivatives.*

*Hypothesis 7: The CRO’s positive effect on holdings of new derivatives will increase with the level of CEO performance pay.*

**DATA AND METHODS**

We present several sets of models exploring: (a) the role of legal and regulatory pressures in promoting the creation of CRO positions, (b) the role of the CRO in promoting bank reliance on six types of derivatives; and (c) the role of CEO and fund manager interests in blocking or facilitating the CRO’s promotion of new derivatives.

**Sample and Data Collection**

We examine the derivatives activities of large U.S. banks, as smaller banks rarely used derivatives (Booth, Smith, and Stolz 1984; Koppenhaver 1990; Kim and Koppenhaver 1993; Gunther and Siems 1996; Carter and Sinkey 1998). We begin with all 163 commercial banks that ever appeared on Standard and Poor’s 1500 index between 1995 and 2010, excluding 6 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 excluded from the sample. After imputing missing values for control variables, we have data on 1304 bank-years.

**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 use this information to construct a binary variable (1=the 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 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: 178-179).[[2]](#endnote-2) However, the notional value amount held is the conventional, *relative* indicator of the extent of bank activity in each derivative markets, used in accounting and finance research (cf. Knopf, Nam, and Thornton 2002; Adkins, Carter, and Simpson 2007). All notional amounts are log-transformed to address skew. Models for credit derivatives cover 1997-2010.

**Independent Variables**

In CRO adoption models, we use a binary variable to represent regulatory reforms, coded as 1 after Sarbanes-Oxley passed (2002). We capture a bank’s regulatory sensitivity with a count of non-CRO corporate compliance officers. For derivatives models, we include the presence of a CRO, and the interests of CEOs and fund managers, captured with CEO performance pay and shareholding and blockholding by institutional investors (those holding more than 5% of shares). We also interact CRO presence with these three CEO- and fund manager-interest variables.

**Controls**

We control for bank and market characteristics known to influence creation of organizational positions or derivatives activity. Appendix A provides univariate statistics and data sources. Appendix B 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 (Johnson and Kwak 2010; Minton et al. 2006; Hirtle 2009), and large corporations are most likely to appoint compliance officers (Edelman 1990). We control for bank size with log total assets. Bank performance may also affect both 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 both CRO appointment and derivatives holdings. 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.

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 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, while 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.[[3]](#endnote-3)

Derivatives were often used to manage exchange risk and interest rate risk (Brewer et al. 1996; Ahmed et al. 1997; Carter and Sinkey 1998). We use the ratio of pre-tax foreign net income to total sales to control for exposure to exchange risk. Banks relying on foreign income face exchange risk, and may usederivatives to manage exposure to that 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 both 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. For leverage we use the ratio of total assets to shareholder equity. For capital adequacy, we use regulatory capital ratio, or Tiers 1 and 2 regulatory capital over risk-weighted assets. In CRO adoption models, we also control for the 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 influence risk appetite. In the American context of dispersed shareholding (Berle and Means 1932; Roe 1994), independent boards are thought to quell the penchant of executives to use 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 been tied to risk appetite. High-value bank charters may dampen executive enthusiasm for risk – we control for charter value (the worth of a bank’s ability to continue operating) using market-to-book equity (Keeley 1990; Galloway et al. 1997). Equity capital may discourage risk (Furlong and Keeley 1989; Demsetz and Strahan 1997); we control for shareholder’s equity. Banks designated as too-big-to fail (TBTF) may expect bailouts if they crash, and so may ignore risk (Afonso et al. 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. Theprotection was subsequently extended to the eleven largest U.S. commercial banks, and later to other large banks. In the robustness check section, we report results of analyses excluding TBTF fail banks, defined as the largest 20 banks in terms of assets in 2004. We also control for percent female directors, as female board members have been shown to increase corporate monitoring and compliance (Adams and Ferriera 2009).

*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 (% 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 the period between 2007 and 2010 to capture the recent 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. Left-censoring is not a concern, as no bank in our sample appointed a CRO before 1995.

For the derivatives analysis, we use Heckman (1974) selection models to account for the selection process that led some banks, but not others, to hold derivatives (see Appendix B for the selection model). Many sampled banks never held particular derivatives. 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 Ferriera 2009). 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 stimulated 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)* are more likely to appoint CROs. Industry CRO popularity also predicts change. Model 2 confirms that banks are more likely to appoint CROs following major regulatory changes (2003-2010). In unreported analyses, we also test whether these results are sensitive to the choice of cut-point, by redefining the post-regulatory-change period to include years after 1999, 2000, 2002, 2003, or 2004. The results are robust to these alternative specifications.

Model 4 reveals that banks responsive to regulation are significantly more likely to appoint CROs. In the period leading to the credit crisis of 2007-2008, 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 significant affect CRO creation for the full period (1996-2010), which suggests that bank motives for creating CROs changed after the crisis.

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, do 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, nor 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 indicate that CRO diffusion was more likely a response to new regulations than an imperative to manage (or cover up) 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 (1995-2007), a CRO raises 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, like futures, forwards, or exchange-traded options.

Several other findings confirm expectations. Large banks hold more of all six derivative types. Share price volatility (systematic risk) raises exposure to forwards and over-the-counter options, while market volatility (unsystematic risk) raises exposure to conventional derivatives and credit derivatives. Leverage raises 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 raises exposure to the three conventional derivatives, but not new derivatives. Banks facing greater exchange risk hold more forwards, which are often used to manage that form of risk (Papaioannou 2006: 11).

In Table 4, we present the instrumental variable analysis, which demonstrates that the CRO’s effect on derivatives holdings is 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 7, 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, would 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, which suggests that CEOs dependent on performance pay boost derivatives holdings whether or not they have CROs.

Yet CEO shareholding and institutional blockholding restrict the CRO’s promotion of new derivatives. Consistent with Hypotheses 4 and 6, we find that the interactions of CRO presence with (a) CEO equity and (b) institutional blockholding are negative and significant.

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

**Robustness Checks**

We evaluate the robustness of the findings to the exclusion of large banks and to variation in CRO background.

*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 both 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, it is possible that the CRO’s effect on dealer activities drives the reported 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 may also 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 twenty 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% of the market in OTC derivatives in 2007 (Comptroller of the Currency 2007). All key findings hold even after excluding the 20 largest banks, which suggests that neither dealer banks nor too-big-to-fail banks drive the results.

*CRO background.* While we tested whether CEO risk appetite affected the appointment of CROs, finding that it did not, CEOs may have appointed different kinds of CROs to suit their 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 CEOs were cherry picking risk-seeking risk managers, then we would expect insider CROs (70% of the sample) and credit risk experts (also 70% 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 that CROs with backgrounds in credit risk management did not behave differently from those from other backgrounds.

**CONCLUSION**

Many American banks came to rely heavily on new derivatives, such as credit-default swaps and synthetic CDOs, in the years leading to the Great Recession. That practice compounded the consequences of the crisis that began in 2007 by multiplying 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. Meanwhile, lenders that could not determine the extent of borrower exposure to bespoke derivatives that did not trade on formal exchanges, or borrower obligations to particular counterparties, stopped lending (Stiglitz 2009b; Partnoy and Eisinger 2013). Investors that could not easily assess the extent of bank derivatives exposure declined to recapitalize troubled institutions (Greenburger 2010; Bass 2010). Thus bank exposure to new derivatives helped to bring the financial system to the brink of collapse (Nocera 2010).

Economists, sociologists, and organizational theorists have tried to understand why banks embraced risky, illiquid, and unproven financial instruments in the lead-up to the crisis, and have highlighted implicit government subsidies, organizational mimicry, sanguine credit rating, imperfect risk modeling, and profligate mortgage lending as potential causes (Stiglitz 2009a; Dobbin and Jung 2010; Pernell-Gallagher 2015; MacKenzie 2011; Fligstein and Goldstein 2010). We augment these arguments by calling attention to three additional factors: the unintended consequences of the regulatory changes of the early 2000s; the effects of an ascendant expert group within banks; and the interests of powerful CEOs and fund managers in strategies to boost risk.

We argue that new regulations led banks to appoint chief risk officers, who implemented a model of risk management designed not to eliminate risk but to maximize returns. That model evolved from their experiences in the 1980s and 1990s. Risk specialists first gained traction with banks in the 1980s, when executives sought their expertise to prevent a replay of the many crises of that decade. When those crises faded from memory, risk managers argued that they could help banks enhance shareholder value by maximizing “risk-adjusted returns.” Pursuit of “risk-adjusted returns,” we argue, led CROs to promote new derivatives.

We also argue that the interests of CEOs and institutional investors, determined by the structure of their compensation and shareholding, shaped bank exposure to these new 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 and cheered CROs on. In banks where they held large illiquid ownership stakes, CEOs and fund managers alike put the brakes on the CRO’s promotion of new derivatives. We describe the implications for theory and policy.

**Compliance Experts’ Pre-existing 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; 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 a professional commitment to promoting the same objectives as regulators.

If the lesson from previous cases is that experts often promote elaborate compliance systems in pursuit of group advancement, the lesson from our case is that an expert group’s specific goals shape the compliance strategies they promote. We suggest that the broad mandates of law are often open to interpretation, and that understanding the pre-existing agenda of experts helps us understand the form compliance takes, and whether regulators’ goals are achieved.

In the case we consider, risk experts and bank regulators sought the same broad objective: to encourage banks to develop more effective risk management systems. However, they held different understandings of what “effective risk management” entailed. While regulators sought to minimize bank failure and catastrophe, we suggest that risk experts, with an agenda shaped by the shareholder-value paradigm that corporate leaders lived by, sought to maximize risk-adjusted returns. In pursuit of this agenda, CROs encouraged banks to expand their reliance on tools like new derivatives, which facilitated the quick fine-tuning of exposures as market conditions changed. Yet these derivatives also introduced additional credit and liquidity risk, and had never been exposed to extreme stress. CROs should not have been surprised by the negative consequences that followed.

We also suggest that closer attention to the pre-existing agendas of compliance experts helps to explain the rising incidence of “means-end decoupling”, in which new organizational policies are followed to the letter, but are only loosely tied to specified ends (Bromley and Powell 2012). Our findings suggest that means-ends decoupling may be driven by growing pressure on experts to cast their innovations in terms that appeal to corporate leaders, which are generally the terms of shareholder value.

**Group Interests and Compliance**

Our second contribution is to consider how economic interests shape the behavior of other groups with the power to influence strategy. Organizational scholars have explored how groups promoting new management paradigms gain power in the interorganizational field, and push innovations through (Fligstein 1990; Jung 2016). They have not explored how the concrete interests of already powerful groups shape corporate take-up of innovations. We suggest that executives and large investors have the capacity to influence compliance outcomes, and that their interests were shaped by compensation and ownership arrangements. New derivatives could facilitate leveraged exposure to high-risk, high-return assets. Executives and fund managers recognized their potential to boost share price, while recognizing that they came with risks. Those with an interest in minimizing risk, due to substantial illiquid equity-holding, prevented CROs from expanding bank reliance on new derivatives. But CEOs dependent on upside-only performance pay promoted use of the new derivatives and seconded the enthusiasm of the CRO.

We suggest that the ecology of group power, and interests, has been neglected in studies of legal compliance. Studies have pointed to the institutional entrepreneurs who promote innovations while neglecting their accomplices and opponents (but see Kellogg 2009; Dobbin, Kim, and Kalev 2011). In this case, executives and fund managers demonstrated the capacity to restrain, or green-light, compliance innovations recommended by experts. Attention to powerful groups beyond compliance entrepreneurs improves our ability to explain the uneven uptake of innovations across otherwise similar organizations.

**Risk, Regulation, and Shareholder Value**

CROs have become more popular since the crisis. While 22% of large commercial banks had CROs in 2007, 32% had them by 2010 (see Figure 1). The business press now promotes CROs and ERM as solutions to the risk management deficiencies that the credit crisis uncovered (Dobbs 2008; Sterngold 2014). Congress responded to the crisis with the Dodd-Frank Act of 2010, requiring financial institutions to establish enterprise risk management programs (Atkinson 2003: 1; Proviti 2007). Our findings suggest that this trend is worrisome. While results show that CROs backed away from new, untested derivatives after 2007, their agenda of “optimizing” risk remains unchanged.

We show that CROs implementing ERM increased exposure to derivatives known to carry greater uncertainty, credit risk, and liquidity risk, based on a model of adjusting risk to maximize returns, not of eradicating risk of bank 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, regulators and risk experts might consider building in a greater margin of error into their models, and setting acceptable failure odds much lower than those for the average pharmacy chain.

When regulators delegate compliance management to corporations, they should not be surprised to find experts implementing reforms that serve their own purposes. Corporate leaders, and the experts they charge with compliance, may pursue goals at odds with public purposes. Perrow’s (1984) warning against delegating risk assessment to organizational experts is as timely as ever. What, then, should regulators be doing to curtail risk? Our findings suggest that extant corporate risk management programs are unlikely to solve the problem. Instead, policymakers might give greater thought to how individuals within firms will respond to their initiatives, taking a lesson from organizational theorists, who see the corporation not as a person with a single vector of interests, but as an agglomeration of individuals with interests and motives deriving from their positions and professional backgrounds.

Our findings about CEOs and fund managers suggest that with the right incentives, those 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) or to back away from performance pay (Jensen 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.

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**TABLES**

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**FIGURES**

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**APPENDICIES**

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1. **ENDNOTES**

   Forwards also trade over-the-counter. However, they generally have a simpler structure than new derivatives (Carmichael and Rosenfield 2003: 41). [↑](#endnote-ref-1)
2. Notional amount held is calculated as contract size (units per contract) multiplied by current unit price of reference asset. [↑](#endnote-ref-2)
3. In unreported analyses, we also control for a binary indicator of bank expansion into non-traditional banking activities, denoting creation of a Section 20 subsidiary or reorganization as a financial holding company (1=bank adopted structural change; 0 otherwise). The continuous measure outperforms the binary measure in all models; thus we use the continuous measure in reported models. [↑](#endnote-ref-3)