

Pay for Prudence

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Abstract

We provide the first evidence that prudential safety and soundness principles shape executive compensation in the banking sector, a phenomenon we call “pay for prudence” (PfP). PfP pre-dates the Great Recession of 2007 - 2009 and is pervasive in a large cross section of bank compensation contracts. PfP is positively associated with bank size and loans to assets. Banks which compensate executives with equity incentives (i.e. have more shareholder friendly compensation structures) are also more likely to feature PfP. Finally, PfP usage is not merely window dressing, but is negatively associated with non-performing loans, stock return volatility, and tail risk during the Great Recession. Overall, our evidence reveals a new dimension of executive pay which also dovetails with regulatory objectives.

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1. Introduction

In the aftermath of the financial crisis, academics and policymakers argued that flawed compensation practices in the banking sector helped create the crisis and called for the regulation of bank executive compensation. For example, Jean Tirole argued for reform of “the measures taken to reinforce external supervision of executive compensation in regulated segments. Banking supervisors should have a say in the structure of compensation to the extent that the form of compensation has a strong impact on the risk behavior of regulated entities” (Tirole, 2010). In addition, in their report on fixing the financial system, leading academics including Douglas Diamond, Frederic Mishkin, Raghuram Rajan, David Scharfstein, Robert Shiller, Hyun Song Shin, Jeremy Stein and René Stulz recommended involving regulators in the design of bank compensation with the goal of “changing the structure of executive compensation to reduce risk-taking and the possibility of taxpayer bailouts” (French et al., 2010). Further, Fed Chair Ben Bernanke suggested that bank regulators pay close attention to compensation practices that could lead to mismatches between risks and rewards and that “management compensation policies should be aligned with the long-term prudential interests of the institution” (Bernanke, 2009).

Such views led to the inclusion of provisions in the 2010 Dodd-Frank Act to regulate the structure of compensation in banks and prohibit structures that incentivize excessive risk-taking. Strikingly, these provisions have still not been implemented in the ten years since their passage (Ramonas and Vittorio, 2019). Moreover, the debate over regulating bank compensation is not one-sided. In Congressional testimony, Kevin Murphy maintained “there is nothing inherent in the current structure

of compensation in financial service firms that lead to obvious incentives to take excessive risks. To the extent that the firms, indeed, took such risks, we need to look beyond the compensation structure to explain it...it is highly unlikely that compensation practices can be improved through increased government rules and regulations” (Murphy, 2009). Compensation scholars John Core and Wayne Guay expressed reservations regarding such reforms, contending that “although we agree broadly with regulators’ views on the principles that should guide executive compensation practices, we believe that many of these principles are already ingrained in the typical executive compensation plan...[these] principles seem quite straight forward and non-controversial, so much so in fact, that it seems plausible that existing compensation practices already largely conform to such principles” (Core and Guay, 2010a,b).

This paper sheds light on this debate by analyzing whether, and to what extent, compensation contracts in the banking sector feature provisions relating to prudential safety and soundness principles. We refer to these compensation contract features as ‘pay for prudence’, or PFP. Prior literature focuses on classic return- and profit-focused performance compensation parameters, which are structured to motivate risk-taking and effort. However, economic theory also suggests that bank managers may act imprudently. The risk preferences of bank shareholders and regulators are often assumed to diverge (Jensen and Meckling, 1976), and incentive compensation – to the extent that it aligns managers’ risk preferences with shareholders’ – can drive a wedge between managers’ preferences and regulators’ long-term prudential

interests (Hölmstrom, 1979, Smith and Stulz, 1985, Haugen and Senbet, 1981).¹ By contrast, contracts that include PfP reflect prudential regulatory principles, whereby aspects of bank safety and soundness enter the mix of factors by which managers are evaluated and compensated. Since the primary objective of bank regulators is to ensure bank safety and soundness, PfP creates incentives aligned with regulators' objectives, consistent with the central conjecture of Core and Guay (2010a,b).

To capture PfP, we analyze the text of compensation proxy statements filed by publicly traded bank holding companies and measure whether factors associated with safety and soundness, such as bank leverage, asset quality, and regulatory ratings, are included as factors by which executives are compensated.²

Our investigation begins with three, largely descriptive, results. First, consistent with the conjecture by Core and Guay (2010a,b) that bank compensation contracts likely reflect prudential interests, we find that PfP has been widespread since the early 1990s and that nearly 80% of compensation contracts incorporate PfP since 2010. Second, when observable, the value of grants based on PfP is economically meaningful. Specifically, we find that the average fair value of PfP-contingent grants on the grant date is approximately \$7.6 million. Third, while many studies attempt to capture incentives for increased risk-taking, we demonstrate that existing data sets commonly used in compensation research do not adequately capture the phenomenon of PfP. This shortfall runs along two dimensions: the two data sets used

¹Jensen and Meckling (1976) provide an early, and general, characterization of the risk-based agency problems that arise between owners and creditors. The information asymmetry that fuels this agency problem is even more acute between banks and their diffuse creditors, i.e. depositors.

²We base this list on the principles emphasized in regulators' examination manuals. We discuss this list in greater detail in section 2.

most widely by compensation researchers only cover a fraction of the public bank holding companies in the economy. Further, even when these firms are covered by these data sets, PfP terms are not regularly measured.³ Collectively, our descriptive analysis demonstrates that PfP is widely used in practice. However, its usage and determinants are not well understood, potentially due to measurement limitations in existing data sources.

Having provided descriptive evidence on the existence of PfP, we examine which bank-specific factors are associated with PfP usage. First, PfP use is a concave function of bank size. Specifically, while PfP is increasing in bank size ($\ln Assets$), it is decreasing in its square ($\ln AssetsSq$). Since Hirtle et al. (2019) document a corresponding discontinuity in regulator attention among the largest banks, this result may suggest that regulator attention and PfP are substitutes.⁴ Second, we find that PfP is increasing in the bank's focus on lending (loans as a portion of total assets), which is broadly consistent with the notion that PfP use is concentrated among bank holding companies whose business is focused on core banking activities rather than on other investing activities.

We next examine whether managers' equity incentives play a role in the use of PfP by firms. Our logic rests on the notion from Jensen and Meckling (1976) that equity grants align the objectives of employees with the objectives of owners by making employees partial owners of the firm. Thus, if shareholders' objectives

³Table 2 reports the descriptive statistics regarding the magnitudes of this deficiency.

⁴Indeed, when we replace the squared term with the Hirtle et al. (2019) instrument for regulatory attention (an indicator for whether the bank is among the top five by assets in its Fed District) we find a significantly negative association between regulator attention and PfP use (untabulated).

align with regulators', then we expect a positive relationship between shareholder alignment and PfP use. However, if shareholders' and regulators' objectives diverge, we expect a negative relation between shareholder alignment and PfP use. We test this using three proxies for managers' equity incentives. First, we use firms' choice to grant equity to employees to measure shareholder-manager alignment.⁵ Second, we measure the value of CEO firm-related wealth (i.e. the entire portfolio of stock and options) within the limited sample of bank holding companies covered by Execucomp where this data is available. Third, we measure the sensitivity of the CEO's firm-related wealth to changes in volatility (Vega) because equity, particularly options, are hypothesized to incentivize risk-taking by managers (Haugen and Senbet, 1981, Smith and Stulz, 1985). We find a positive association between PfP use and all three proxies for managers' equity incentives, consistent with shareholders sharing regulators' preference for prudence.

Up to this point, our results indicate that shareholders' use of PfP dovetails with regulators' objectives for safety and soundness. However, an attractive alternative hypothesis is that PfP is simply included in contracts as window dressing to circumvent regulatory scrutiny. In order to distinguish between these hypotheses, we follow the empirical methodology in Ellul and Yerramilli (2013) and examine whether PfP usage prior to the financial crisis is associated with outcomes during the financial crisis. We find that banks that use PfP before the crisis have fewer non-performing loans, lower tail risk, and lower return variance during the crisis. Collectively, the

⁵For this analysis, we use the Compustat item `stkco` to capture equity grants, in order to avoid limiting our sample to only those banks covered by Execucomp or Incentive Lab.

results do not suggest that PfP is driven by window dressing.

This study makes three primary contributions. First, we document a previously undiscovered contracting mechanism in executive compensation: the use of prudential safety and soundness measures in bank compensation contracts. This evidence extends prior literature in compensation contracting, which largely focuses on contract terms based on stock and/or accounting parameters such as profitability, sales, and cash-flows. Further, our empirical results are consistent with Core and Guay (2010a,b), who analyze the debate over regulating executive pay in the banking industry and conjecture that, while regulatory principles should guide compensation practices, these principles already enjoy widespread adoption in bank compensation plans. Our evidence is also consistent with the theory of Hölmstrom (1979) that owners will design contracts based on outcomes that are observable and informative about future cash flows.

Second, prior work often characterizes shareholders and regulators as having conflicting interests. Indeed, Dewatripont and Tirole (1994, pp. 32–34) argue that regulation arises to manage the agency problems that arise between the bank and its diffuse depositors.⁶ However, our empirical evidence suggests that banks routinely incorporate prudential principles into the design of executive compensation contracts, consistent with the arguments of Core and Guay (2010a,b). This alignment of regulator and shareholder interests may arise to mitigate costs from political or regulatory interference (Watts and Zimmerman, 1986, John and John, 1993), or

⁶When we refer to ‘the bank’ we mean the employees and shareholders acting together, while when we refer to the employees we will call them ‘bankers’ or ‘bank executives’, which we will use interchangeably.

because prudence is associated with more attractive firm fundamentals. Similarly, a commonly held view is that shareholders and bondholders have conflicting interests, resulting in tension over issues such as capital structure, payout policies and risk-taking. Since regulators represent diffuse depositors who are the creditors of banks (Dewatripont and Tirole 1994), the existence of PfP demonstrates the potential for shareholders, regulators and creditors to have their interests represented in the design of managerial incentives.

Third, we provide new evidence on the effectiveness of executive compensation in the banking industry. DeYoung et al. (2013) provide empirical evidence that risk-taking incentives in compensation contracts are positively associated with bank operational policies and risk-taking. Armstrong et al. (2020) provide empirical evidence that risk-taking incentives (vega) affect the bank's future systematic risk during economic downturns. Kleymenova and Tuna (2020) find that UK banks' contribute less to systematic risk compared to other UK firms following the passage of the UK Remuneration Reform of 2010, which attempted to change bank risk-taking through compensation regulation. Colonnello et al. (2020) study the cap of bonuses to banks' executive directors in the European Union, and do not find evidence that the regulation reduced bank risk.

In contrast, we study prudential performance measures in US bank compensation contracts that broadly dovetail with regulatory interests and are utilized in the absence of formal regulatory requirements. Our evidence suggests that banks with PfP provisions have fewer non-performing loans, lower return volatility, and less tail risk during the financial crisis, consistent with more prudent managerial behavior when

incentive contracts include PfP terms. Taken together, our results suggest that shareholders recognize the benefits of prudential managerial actions in the banking industry and incentivize such behavior via executive compensation contracts.

2. Sample Selection and Data Sources

2.1. Existing Data Sources

A primary motivation for our study is that existing datasets that track executive compensation are incomplete, especially in the banking industry. For example, Execucomp only tracks the realization of bankers' pay, rather than the contract features, like performance targets, that form the basis of incentive compensation. In addition, Execucomp is limited to past and present members of the S&P 1500 index from 1992 to present.

This narrow sampling choice limits the number of observations in existing studies, such as Fahlenbrach and Stulz (2011), relative to the overall population of publicly traded banks. Specifically, the banks included in Execucomp are less than 10 percent of all public bank holding companies that file quarterly financial reports (such as Call Reports) and proxy statements. A similar dataset, Equilar, has a much broader scope and covers most public firms, but, like Execucomp, it does not capture the contract features that determine executive incentives and pay.

To complement Execucomp, more recent studies have used data from Incentive Lab. A beneficial feature of Incentive Lab is that it includes specific performance targets used in compensation contracting (Bennett et al., 2017). However, in constructing the panel of firm-year observations, Incentive Lab focuses its attention

on compensation contract features which are common among large industrial firms. These contract features are primarily concerned with firm profitability, such as returns on assets, returns on equity, and stock returns (Bennett et al., 2017). Due to its focus on the most prevalent contract features, Incentive Lab does not collect information on industry-specific contracting terms, such as banks' use of safety and soundness measures. Moreover, Incentive Lab only collects data based on firm disclosures from 2006 onwards. As a result, Incentive Lab data cannot provide much insight into compensation practices in the lead up to the financial crisis.

2.2. Building a Pay for Prudence Panel Dataset

To build our panel dataset of bank-by-year PfP terms, we begin with the universe of publicly traded bank holding companies listed in the Federal Reserve Bank of New York's RSSD ID - PERMCO linking table. We then match PERMCOs with CIK identifiers to query the SEC EDGAR database. We download all Def 14a filings from our list of matched banks in order to ascertain whether commercial banks include PfP-related contract features in executive compensation.

Within this set of annual filings, we use a series of regular expressions to remove formatting information and identify compensation discussions. We define a compensation discussion as a paragraph (1000 characters) that contains a key compensation term. The key compensation terms we search for are "award", "bonus", "compensation", and "incentive" with their common variants. We do not search for the term "pay" as the term is not unique to compensation discussion. We use this approach, rather than using the Compensation Discussion and Analysis (CD&A) section to focus our search, because the CD&A only appears after 2006. As a result, the CD&A

cannot provide information about the incentive structures that were in place leading up to the financial crisis.

Having isolated compensation discussions, we determine the presence of PfP related contract features within these discussions by searching for terms related to the Federal Reserve’s priorities laid out in Supervisory Letter SR-96-38 ”Uniform Financial Institutions Rating System” (UFIRS) and section A.5020.1 of the *Commercial Bank Examination Manual* (CBEM). These sources outline the inputs to the private supervisory ratings that Federal Reserve examiners assign to banks after examinations, referred to as CAMELS ratings. CAMELS ratings are the primary quantitative output from periodic examinations and summarize banks’ safety and soundness with an integer from 1 to 5. These ratings combine analyses of capital adequacy (C), asset quality (M), management (M), earnings (E), liquidity (L), and sensitivity to market risk (S) (Agarwal et al., 2014, Gopalan, 2018).

To conduct this search we develop a set of regular expressions to match variants of safety and soundness terminology used in the UFIRS and CBEM discussion of the CAMELS rating. The terms we consider are “regulatory capital”, “tier 1”, “capital adequacy”, “well capitalized”, “coverage ratio”, “asset quality”, “delinquent loans”, “charge offs”, “risk weighted assets”, “loan quality”, “reserves”, “all”, “the allowance”, “loan loss allowance”, “lease loss allowance”, and “liquidity”.

Our reliance on the CBEM and UFIRS for the list of terms allows us to avoid a lengthy and subjective model training process, which researchers rely on for more nuanced natural language processing tasks. For example, Gow et al. (2020) spend considerable effort to assemble a group of constructs that allow them to identify non-

answers in conference calls. The Federal Reserve manuals provide us with a basic corpus of these terms; thus, our task is to merely show the existence of these terms rather than their non-existence.

Our set of terms focuses specifically on unique aspects of bank supervision. As such, we set aside two aspects of the CAMELS framework. We do not consider earnings-based compensation targets (the ‘E’ in the CAMELS rating), as this is a constant feature of all publicly traded firms. We also do not track terms related to examiners’ private information set, such as their assessment of managerial quality (the ‘M’ in the CAMELS rating). The M component of the CAMELS system appraises “the capability of the board of directors and management to identify, measure, monitor, and control the risks of the bank’s activities and to ensure that the bank has a safe, sound, and efficient operation that is in compliance with applicable laws and regulations”. Since this element of the rating is based on regulators’ soft information about management, and capability itself is not something that is readily contractible without the regulators’ assessment, we also do not include it in our definition of PfP.

We use the occurrence of these terms within the compensation discussion identified above, to define our main variable of interest. We define *Pay-for-Prudence Use* $_{i,t}$ to be an indicator variable equal to 1 if, at year t , proxy statements for BHC i feature any form of these terms within one paragraph of a compensation term.⁷ Our simple proximity based-approach is flexible and performs similarly in text filings

⁷Based on a series of spot checks we judge that the frequency of these terms within the document varies with formatting conventions more than with any economic difference between firms. Some disclosures are more laconic while reporting the same information, in particular, many firms list common pay components once for all named executive officers, while many others simply repeat the information verbatim.

early in the EDGAR database as well as the later HTML formatted filings. However, this approach is vulnerable to false positives, in particular when credit quality and compensation are discussed in quick succession but not together, or when PfP terms are used in unanticipated ways. To determine the extent to which this may be a problem in our data we reviewed 100 Def-14as from banks of various sizes, and found only two such false positives.

3. Descriptive Results

3.1. Initial Evidence on PfP Usage

Table 1 presents descriptive statistics for our sample. Ex-ante, it is unclear whether banks include pay-for-prudence in their incentive contracts. Therefore, we begin our analysis by demonstrating that these terms do indeed occur in practice. Table 1 presents the frequency with which our data collection process identifies PfP. On average, over the full sample period, more than 55% of Bank Holding Companies incorporate some level of PfP into their compensation structures. The prevalence of these terms in the raw data suggests that PfP is widespread among bank holding companies during our sample period.

Like many compensation contract terms, PfP exhibits strong time trends.⁸ In Figure 1 we plot term use over time along with vertical lines indicating major credit events, such as the 1998 Russian Debt Crisis and the 2007 - 2009 financial crisis, with several striking associations. First, PfP term use increases significantly over time and is pervasive in the economy. Second, while term use in our sample is approximately

⁸See i.e. Murphy (1999), Hayes and Schaefer (2009), and Bettis et al. (2018)

80% in later years after Dodd-Frank (2010), PfP term use at the beginning of our sample period (1994) is around 40% and had already reached nearly 60% in 2007 prior to the start of the financial crisis. Collectively, the descriptive evidence provided by Table 1 and Figure 1 is broadly consistent with the arguments of Core and Guay (2010a) that banks include PfP in their compensation contracts.

3.2. Comparison of Pay-for-Prudence Coverage across Datasets

Having documented the existence of PfP, we now examine the extent to which PfP could be documented based on existing datasets commonly used by compensation researchers. Of the three major commercial compensation databases, only Incentive Lab is capable of capturing PfP because it provides compensation targets, rather than realizations of pay. Incentive Lab begins in 2006, so, to evaluate the extent to which Incentive Lab captures PfP, we match our PfP data to the Incentive Lab records. The first column of Table 2 compared with our estimation sample in Table 3 Column 1 indicates that our dataset covers an order of magnitude more bank-years than Incentive Lab, where we are only able to find performance compensation information for 580 bank-years.

Incentive lab reports performance targets in two variables, `metric` and `metricother`. Based on analysis of the standard measures captured in Incentive Lab (`metric`) it appears that Incentive Lab captures commonly-used performance metrics like earnings⁹, and profitability,¹⁰ reasonably well. Incentive Lab reports the text associated with non-standard performance measures in `metricother`. To determine whether

⁹27% of metrics in the “Absolute Target” file are related to earnings.

¹⁰ROA is 11% and ROE is 5% of the “Absolute Target” file.

Incentive Lab captures PfP we search the text in `metricother` for the Pfp terms listed above. Similar to the construction of our main variable, *Pay-for-Prudence Use*, if we match any of the terms to any performance target in a bank-year we consider Incentive Lab to have captured Pfp use in that bank-year. As indicated in Column 2 of Table 2 Incentive Lab only identifies Pfp use in 10% of the 580 bank-years that they cover. However, within the same sample of 580 bank-years covered by Incentive Lab, we find that over 88% of these bank-years use Pfp terms in the compensation discussions filed in banks' proxy statements. Incentive Lab data cover large banks from 2006 to the present, so this high level of Pfp use is consistent with the descriptive evidence in Figure 1 and Table 3 Column 1. All together the first three rows of Table 2 suggest that Incentive Lab substantially understates the prevalence of Pfp use.

Finally, we attempt to quantify the economic magnitude of Pfp. The final row of table 2 reports the average grant-date fair value of the Pfp-contingent grants collected by Incentive Lab. We find that the grant date fair value of Pfp contingent grants is approximately \$7.6 million. While this calculation requires a number of assumptions on the part of the bank, and is only available for a small number of banks (the 59 bank-years that Incentive Lab identifies as using Pfp), we believe that the values are high enough to suggest that Pfp is not window dressing, but a serious part of incentive pay in the banking industry.

4. Regression-based Results

4.1. Determinants of PfP

We empirically examine the determinants of PfP terms in banking compensation contracts using the following regression model:

$$\text{Pay-for-Prudence Use}_{t+1} = \lambda_t + \phi_f + \beta \mathbf{X}_{i,t} + \varepsilon_{i,t} \quad (1)$$

where *Pay-for-Prudence Use*_{*t*+1} indicates whether the CEO’s incentive contract includes pay-for-prudence terms in year *t* + 1, the λ_t are year effects, the ϕ_f are Federal Reserve district fixed effects, and $\mathbf{X}_{i,t}$ is a vector of time-varying bank holding company attributes.

We report the results of equation 1 in column 1 of Table 3. Several descriptive results are noteworthy. First, we find that PfP term use is a concave function of bank size. Specifically, the main effect of $\ln(\text{Assets})$ is positively associated with PfP use, while its squared term is negatively associated with PfP use. Hirtle et al. (2019) provide empirical evidence that the largest banks in each regulatory district receive greater regulatory scrutiny. Because equation 1 includes regulatory federal district and year fixed effects, the negative association between PfP term use and squared assets may suggest that PfP use and regulatory oversight are substitutes in mitigating excessive risk-taking.

Additionally, PfP use is unrelated to bank complexity (*lnEntities*). Furthermore, we find that the magnitude of the bank’s loan portfolio (*Loans/Assets*) is positively associated with PfP use, suggesting that PfP use is more common among banks that

focus on core lending activities. Finally, we find that PfP use is positively associated with the bank’s expected growth opportunities (*BTM*), suggesting that high growth firms are more likely to include PfP.

Next, we address whether firms that use equity compensation to address shareholder-manager agency problems are more or less likely to use PfP. If shareholders’ objectives align (diverge) with regulatory objectives, we expect a positive (negative) association between shareholder alignment and PfP use. We examine the relationship between whether managers’ equity incentives is associated with the use of PfP in columns 2 through 4 of Table 3 using the following augmented version of Eq. 1:

$$\text{Pay} - \text{for} - \text{Prudence } Use_{t+1} = \lambda_t + \phi_f + \beta \mathbf{X}_{i,t} + \gamma \text{Equity Incentives}_{i,t} + \varepsilon_{i,t} \quad (2)$$

The terms in equation (2) are the same as those defined in Eq. 1, and variable *Equity Incentives*_{*i,t*} is measured using three different proxies. First, to provide the broadest possible sample, we use the equity compensation expense reported on the income statement (Compustat mnemonic: *sktco*) to identify firms that grant equity to their employees to create an indicator *Equity Compensation* equal to 1 if the bank reports equity compensation expense and zero otherwise. This variable has two limitations, first it is not reported before 2001, and, second when options are expensed at face value rather than fair value, the compensation expense line will under report option grants.¹¹ Thus, this variable captures the relationship between

¹¹This practice was common before SFAS 123R and prohibited afterward.

restricted stock and PfP use most broadly. Next, we use data from Execucomp to capture the extent of equity incentives in the subset of banks covered by Execucomp. As a second measure of equity incentives, we use the log of firm related wealth, i.e. the value of stock and options held by the bank CEO. Finally, we split the sensitivity of the CEO's wealth to changes in stock price and changes in volatility, *Delta* and *Vega*.

Results using the *Equity Compensation* indicator are presented in column 2 of Table 3. We document a positive association between *Equity Compensation* and *Pay-for-Prudence Use_{t+1}*, and this association is statistically significant at the 10% level.

In column 2 of Table 3 we measure the use of equity compensation using *Firm Related Wealth* within the Execucomp subsample. Again we find a significantly positive association between $\ln(\text{Firm Related Wealth})$ and *Pay-for-Prudence Use_{t+1}*. Collectively, the evidence reported in columns 1 and 2 suggests that firms that manage agency problems by providing equity incentives to managers are also more likely to use PfP. Though the analysis in column 1 is limited by our reliance on the `stkco` variable from Compustat, and the analysis in column 2 is limited to the Execucomp subsample, collectively these analyses make the positive association between equity grants and PfP use quite clear.

Finally, in column 3 we measure equity incentives based on the sensitivity of the CEO's wealth to changes in stock price and changes in volatility (*Delta* and *Vega*). Since equity, particularly options, are hypothesized to incentivize risk-taking by managers (Haugen and Senbet, 1981, Smith and Stulz, 1985), banks that provide

greater equity incentives may incorporate PfP into to their compensation contracts in order to refine the incentives created by options. For example, a firm that wants the manager to increase risk while maintaining credit quality may grant options to provide risk-taking incentives while also making a portion of pay contingent on measures of credit quality. Vega captures the sensitivity of managers' firm related wealth (Black-Scholes value) with respect to stock price volatility, and delta is the derivative of managers' firm related wealth with respect to changes in stock price.

The results in column 4 of Table 3, we find a positive relationship between Vega and Pfp, and no significant relationship with Delta. While interesting, we interpret these results with caution as the subsample is small and substantial changes in option granting behavior occur in the middle of the sample.¹²

Collectively, the results reported in Table 3 are consistent with Pfp use as reflecting shareholder interest in prudent management decision making.

4.2. Financial crisis performance and pay for prudence

To this point we argue that Pfp is used by shareholders to encourage managers to pursue prudent strategies. However, Pfp may also be window dressing intended to deter regulatory oversight. If Pfp arises from window dressing motives, banks that use it may be more risky compared to banks that do not use Pfp. On the other hand, if Pfp is used to encourage prudence we expect it to be associated with less risky outcomes. To address this question we model performance during the 2007-2009 financial crisis as a function of pre-crisis adoption of pay for prudence. To do this

¹²See. Hayes et al. (2012), Bettis et al. (2018) for evidence on the impact of SFAS 123R on option grants in 2006.

we estimate the following model:

$$Crisis\ Performance = \beta Pay - for - Prudence\ Use_{i,t-1} + \gamma \mathbf{X}_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where *Pay-for-Prudence Use*_{*i,t-1*} is an indicator equal to 1 if the bank adopts PfP in the six years proceeding the financial crisis and zero otherwise. We measure four proxies for bank conditions during the financial crisis. First, we measure the bank’s non-performing loans (*Bad Loans / Assets*); bank regulators’ spend considerable time assessing the loan portfolio and asset quality. Our next three proxies are based on the bank’s stock price over the period from 1 December 2007 to 1 June 2009, the NBER dates for the recession precipitated by the financial crisis. Specifically, we measure the firm’s stock returns (*Crisis Return*), stock return volatility (*Crisis Variance*), and extreme negative stock returns during the crisis (*Crisis High Tail Risk*). Because this test reduces the sample size substantially, we adopt a parsimonious set of controls.

In column 1 of Table 4, we find a negative association between PfP use and non-performing loans during the crisis. In column 2 of Table 4, we find a positive association between stock returns and PfP during the crisis, although this association is not statistically significant at the conventional levels. However, in columns 3 and 4 of Table 4 we find that PfP banks exhibit significantly lower return variance and have a significantly lower likelihood of negative tail risk during the crisis. Together the results in columns 1 through 4 of Table 4 suggest that PfP is associated with less risky behavior and outcomes.

4.3. Pay for prudence and post-crisis performance

Building on the evidence reported in the previous section, we examine whether PfP is associated with bank performance in the post-crisis period. We create a panel dataset of bank performance outcomes for the years 2009 through 2018, measuring PfP adoption over a rolling six-year window and controls at the beginning of the fiscal year. Using this sample, we re-estimate equation 3 using this sample and report the results in columns 1 through 4 of Table 5. We find some evidence directionally consistent with our expectations. For instance, we find a negative association between PfP and non-performing loans (tail risk) in column 1 (4). However, none of these associations are statistically significant at the conventional levels. The fact that we do not find a statistically significant association between PfP and performance in the post-crisis period may not be surprising. Recall from the trend in PfP use reported in Figure 1 that approximately 60% of banks use PfP by the financial crisis and approximately 80% banks use PfP by 2010. Therefore, we may lack sufficient power to identify a significant difference between treatment and control banks in the post-crisis period.

We further explore the role of PfP in the post-crisis period by re-examining the key terms in compensation contracts associated with prudent decision making. Our primary proxy of PfP measures whether the bank's compensation contract includes references to balance sheet items associated with prudential preferences of regulators, including capital adequacy, asset quality, and liquidity. However, following the financial crisis in particular, we also find a significant increase in adoption of PfP-related terms associated with regulatory evaluations. These terms include references

to regulatory assessments themselves and risk assessment. The evaluation terms are “CAMELS rating”, “BOPEC rating”, “RFIC rating”, “regulatory rating”, “stress test”, “examination results”, “enforcement action”, “safety and soundness”, “risk assessment”, and “regulatory assessment”. In addition to references to “risk assesment” we also look for references to the concept of excessive risk-taking by searching for variants of “undue” or “excessive” with variants of “risk” with or without “take”. We define *Evaluations* as an indicator equal to 1 if the bank’s proxy statement includes any form of an evaluation term within one paragraph of the key compensation terms above.

In Table 6, we re-examine the association between PfP and annual performance following the financial crisis using *Evaluations* as the proxy of pay-for-prudence. Overall, we find some evidence that evaluation-based PfP is associated with better ex-post performance following the financial crisis. Specifically, in column 2 of Table 6 we find a significantly positive association between *Evaluations* and annual stock returns. Additionally, in column 4 of Table 6, we ind a significantly negative association between *Evaluations* and negative tail risk. Overall, the evidence in Table 6 suggests that banks that adopt PfP-related terms referencing regulatory evaluations in their compensation contracts following the financial crisis exhibit better ex-post performance following the financial crisis.

5. Conclusion

In this study we provide the first evidence that prudential principles shape executive compensation contracts in the banking industry. We show that this practice

increases significantly over time, but pre-dates the financial crisis and is pervasive in a large cross-section of bank holding company compensation contracts. Pay-for-prudence adoption is positively associated with bank size, risk-taking incentives and loans to assets. Finally, we argue that our results are inconsistent with the idea that these contract terms are merely “window dressing.” We find that banks with PfP exhibit less risk-taking during the financial crisis, and we find some evidence that PfP is associated with better risk characteristics around the financial crisis. Taken together, our results suggest that shareholders recognize the benefits of prudential managerial actions in the banking industry and therefore incentivize such behavior via executive compensation contracts.

Appendix A: Variable Definitions

Variable Definitions

Variable Name	Description
<i>Pay-for-Prudence Use</i>	An indicator equal to one if the bank holding company includes any of the prudential terms from Section ?? in their proxy-statement discussions of compensation. <i>SEC EDGAR</i>
<i>Equity Compensation</i>	An indicator variable equal to one if the firm grants equity to it's employees (<i>stkco</i> >0). <i>Compustat via WRDS</i>
<i>Firm Related Wealth</i>	The value of the CEO's stock and option portfolio in thousands of US Dollars. Calculated following Coles et al. (2006). <i>Execucomp via WRDS</i>
<i>Delta</i>	Sensitivity of the CEO's wealth to a 1% change in value of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). <i>Execucomp via WRDS</i>
<i>Delta</i>	Sensitivity of the CEO's wealth to a 1% change in volatility of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). <i>Execucomp via WRDS</i>
<i>Tail Risk</i>	The mean of the lowest 5% of the firm's daily return for the year. <i>CRSP via WRDS</i>
<i>ROA</i>	Ratio of income before extraordinary items (BHCK4300) to total assets (BHCK2170) <i>BHC Call Reports via WRDS</i>
<i>AnnualReturn</i>	Annual return <i>Compustat via WRDS</i>
<i>ReturnVolatility</i>	Volatility of daily returns over the fiscal year <i>CRSP via WRDS</i>

Variable Definitions, continued

Variable Name	Description
<i>Deposits/Assets</i>	Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>Tier – 1 Ratio</i>	Ratio of Tier-1 capital (BHCK8274 until 2014, BHCK8274 thereafter) to total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>Loans/Assets</i>	Ratio of total loans (BHCK2122) to total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>Bad Loans/Assets</i>	Ratio of the sum of loans past due 90 days or more (BHCK5525) and non-accrual loans (BHCK5526) to assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>Private MBS</i>	The total value of private-label mortgage-backed securities held in both trading and investment portfolios; this excludes mortgage-backed securities that are either issued or guaranteed by government-sponsored enterprises. This measure is computed as the sum of BHCK1709, BHCK1733, BHCK1713, BHCK1736 and BHCK3536 divided by total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>Deriv. Trading/Assets</i>	Total gross notional amount of derivative contracts held for trading. The sum of interest rate contracts (BHCKA126), foreign exchange contracts (BHCKA127), equity derivative contracts (BHCK8723), and commodity and other contracts (BHCK8724) divided by total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>

Variable Definitions, continued

Variable Name	Description
<i>Inst.Ownership</i>	Portion of the firm held by institutions. <i>Thompson-Reuters via WRDS</i>
<i>lnAssets</i>	Natural logarithm of the book value of total assets (BHCK2170). <i>BHC Call Reports via WRDS</i>
<i>lnAssets</i> ²	Square of logged book value of total assets (BHCK2170) <i>BHC Call Reports via WRDS</i>
Crisis Performance Measures	
Crisis Return	Returns from 1 December 2007 to 1 June 2009 (https://www.nber.org/cycles.html) adjusted for splits and disbursements (https://wrds-www.wharton.upenn.edu/pages/support/support-articles/compustat/global/computing-returns/)
Crisis Stock Volatility	The variance of daily stock return from 1 December 2007 to 1 June 2009.
Crisis Tail Risk	The average of the bank's worst 5% daily returns between 1 December 2007 and 1 June 2009.

Appendix B: Examples

This appendix includes a diverse set of examples of PfP-related language which our algorithm captures. We have bolded illustrative terms, and provided minimal comments in italics. Non-italic passages are quotes.

Zions Bankcorporation 1999 Def 14A

1. The Plan is intended to create an **incentive** for increasing shareholder value. However, this is not to be accomplished by reducing capital levels or assuming extraordinary or unwarranted risks. Accordingly, it is expected that total risk-based capital levels shall be maintained at a level at least 125% of “**well-capitalized**” regulatory requirements.
2. The Company’s **reserve** levels are to be conservatively maintained. To the extent that the consolidated **Allowance for Loan and Lease Losses** is less than 110% of the peer group level, as expressed in terms of reserves/non-current loans as reported in the most current Uniform Bank Performance Report available at December 31, 2001, an appropriate adjustment shall be made to after-tax earnings (for purposes of calculating Award Funds only) to compensate for any deficit relative to the 110% minimum target level. Actual reserve levels are, of course, subject to Board and/or regulatory decisions. No upward adjustments shall be made in “pro forma” earnings in the event actual reserve levels exceed 110% of the peer group target.

Zions Bancorporation 2015 Def 14A

*Zions includes several terms in their “Omnibus **incentive** plan”:*

Performance Goals. The Committee may grant **awards** under the Incentive Plan subject to the attainment of certain specified performance goals. The performance goals applicable to an **award** may provide for a targeted or measured level or levels of achievement or change using one or more of the following measures: measures of efficiency (including operating efficiency, productivity ratios or other similar measures); measures of achievement of expense targets, costs reductions, working capital, cash levels or general expense ratios; asset growth; earnings per share; enterprise value, shareholder value added or value creation targets; combined net worth; debt to equity ratio; revenues, sales, net revenues or net sales measures; gross profit or operating profit measures (including before or after taxes or other similar measures); investment performance; income or operating income measures (with or without investment income or income taxes, before or after risk-adjustment, or other similar measures); cash flow; margin; net income, before or after taxes; earnings before interest, taxes, depreciation and/or amortization; return measures (including return on capital, total capital, tangible capital, expenses, tangible expenses, equity, revenue, assets, or net assets or total shareholder return or similar measures); market share measures; measures of balance sheet achievements (including debt reductions, **leverage ratios** or other similar measures), increase in fair market value of the Company's common stock, **regulatory rating, credit quality, and loan charge-offs. ...** ”

Tier 1 Ratio is included in their LTIP plan:

- Performance metrics: Goals for **Compensation** Committee assessment established:
 - (i) Pre-tax, Pre-provision earnings
 - (ii) **Net charge-offs**
 - (iii) Total direct expense
 - (iv) Noninterest income

- (v) Strategic progress goals
- (vi) Return on assets
- (vii) **Tier 1 common equity ratio**

*Pay-for-prudence terms also come up in the “**Compensation** decisions” section:*

- Harris H. Simmons, Chief Executive Officer
 - Financial results are tracking well versus plan, but return on capital remains below peer performance
 - Sound risk management as evidenced by better than average credit outcomes (NCOs/loans) both recently and over a number of years; high levels of **liquidity** and conservative interest rate risk positioning; and relatively low levels of operational losses
 - Solid execution and progress on projects addressing the Company’s most pressing challenges
 - Notable improvement in risk management and regulatory matters as well as strengthened **stress testing** and capital planning processes

JP Morgan

JP Morgan exemplifies and early, consistent used of PfP.

2000 Quantitative **performance** goals may vary from year to year and have included such factors as earnings per share growth, revenue growth, return on common equity, shareholder value added, income before income tax expense, **credit quality**, and management indicators.

2005 We evaluate executive performance on a variety of quantitative and qualitative **performance** measures, including the criteria listed below. ... We assess executive officers on such key measures as: (Quantitative criteria) operating earnings, **credit and risk management**, revenue growth, expense management, investing for growth – business expansion and technology, **capital and leverage ratios**, improving client satisfaction, executing merger integration tasks, executing other major projects, improving operational efficiency.

2017 **Performance Awards.** The 2018 Plan provides that the CMDC may specify **performance** criteria or standards with respect to an **award** based upon one or more of the following criteria: stock price, shareholder value added, earnings per share, income before or after taxes (including income before interest, taxes, depreciation and amortization), return on common equity including return on tangible common equity, revenue growth, efficiency ratio, expense management, return on investment, **ratio of non-performing assets to performing assets**, return on assets, profitability or performance of identifiable business units, **credit quality** ...

USBANCORP 2005

The Company administers an annual **incentive** plan through which participants can earn **performance**-based **compensation**. The **bonuses** of the Named Officers were based on the following **performance** measures-corporate return on equity (ROE), total return to shareholders, a third-party comparative estimate of the holding company's **CAMEL rating** (an overall indicator of the performance and

financial soundness of the institution), efficiency ratio, and individual performance.

FirstFed Bancorp

The Company maintains the **Incentive Compensation** Plan, the purpose of which is to provide **incentive compensation** for eligible employees and directors in the event the Company achieves certain **performance** goals indicative of its profitability and stability.

A mathematical formula set forth in the **Incentive** Plan determines three forms of **incentive compensation** that participants may receive: (i) quarterly cash **bonuses** (“**Bonuses**”), (ii) restricted stock **awards** (“Restricted Stock”), and (iii) stock options (“Options”). For each year in which the **Incentive** Plan is in effect, the Company will pay each participant a **Bonus** equal to the product of (i) the participant’s annual base salary or director’s fees, and (ii) a “**Bonus Percentage**,” defined as the sum of (a) “Safe ROA **Bonus Percentage**” which considers return-on-assets (“ROA”) compared to the median ROA of other members of a peer group in the Southeast, the **nonperforming assets** (“**NPA**”) compared to the peer group, and the **CAMEL rating** of First Financial, plus (b) “Growth Rewards,” which are determined by the Board of Directors each year.

BNY Mellon Corp.

- We identify employees who, individually or as a group, are responsible for activities that may expose us to material amounts of risk, using a risk-related **performance** evaluation program with adjustments determined by a committee comprised of members of senior management responsible for control functions

with such adjustments later reviewed by the HRC Committee. The **incentive compensation** of identified employees is directly linked to **risk-taking** either through a “risk scorecard” or through the inclusion of a standard risk goal as part of our performance management process

- Subjecting all equity awards to 100% forfeiture during the vesting period based on ongoing **risk assessments**, which contributes to a comprehensive risk adjustment process.
- Achievement of a Basel I **Tier 1** common ratio of at least 9% as a condition for funding awards under the EICP and time-based restricted stock units under the LTIP. *(This language is in both LTIP and Annual plans)*
- *The discussion in BNY Mellon’s filings are extensive:*
 - Compensation and risk section of the Def 14A
 - Annual Incentives section of the Def 14A

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6. Figures and Tables:

Figure 1: Use of prudence terms by year

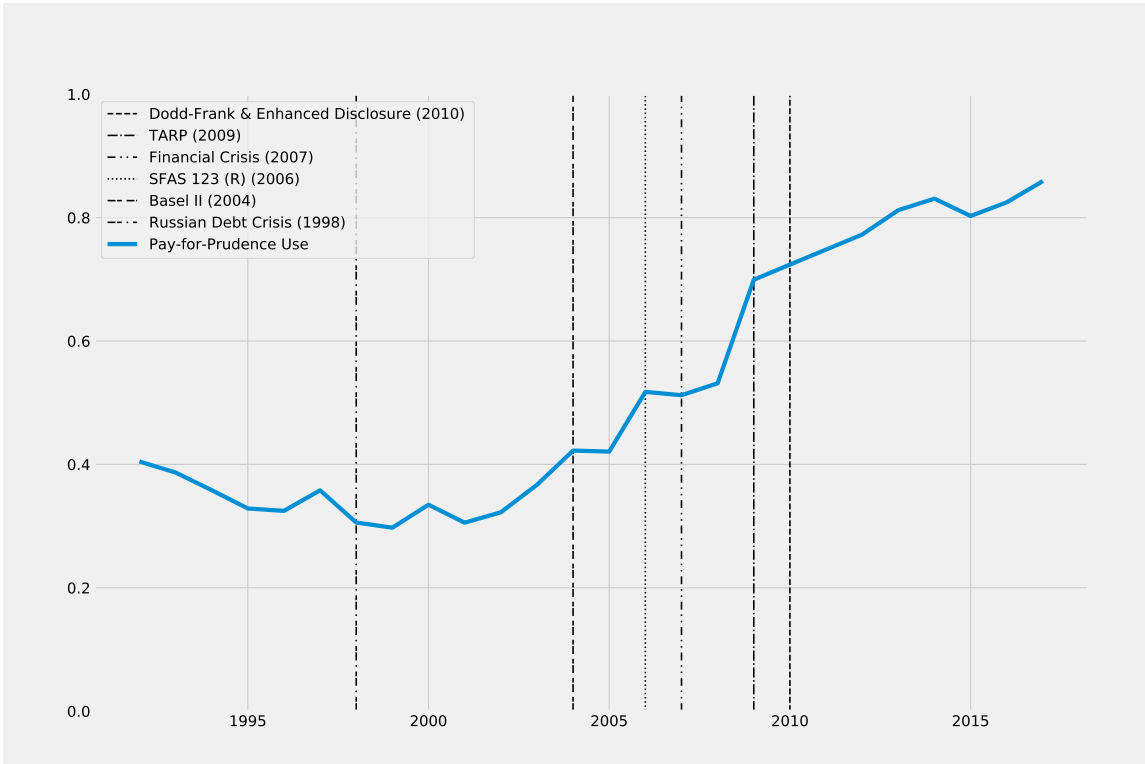


Table 1: Descriptive statistics

	μ	σ	25 th %ile	50 th %ile	75 th %ile
Pay-for-Prudence Use	0.553	0.497	0.000	1.000	1.000
Evaluation Term Use	0.403	0.491	0.000	0.000	1.000
Equity Compensation	0.658	0.474	0.000	1.000	1.000
ln(Firm Related Wealth)	9.278	2.072	8.374	9.434	10.534
ln(Vega)	0.093	0.163	0.005	0.027	0.095
ln(Delta)	0.295	0.396	0.051	0.146	0.389
CEO Tenure	8.008	6.912	3.000	6.000	12.000
ln(Assets)	0.806	1.601	-0.333	0.454	1.628
lnAssetsSq	3.212	6.910	0.151	0.727	2.825
lnEntities	1.398	0.995	0.693	1.386	1.946
Loans/Assets	0.668	0.124	0.608	0.683	0.749
Deposits/Liab.s	0.845	0.103	0.788	0.867	0.921
Loan Concentration	0.577	0.191	0.442	0.581	0.717
ROA	0.008	0.009	0.006	0.009	0.012
Tier 1 Ratio	0.127	0.039	0.104	0.120	0.141
Book to Market	0.804	0.686	0.488	0.663	0.909
Annual Return	0.110	0.350	-0.097	0.086	0.299
Return Variance	0.001	0.027	0.000	0.000	0.001

Table 2: Comparison of Pay for Prudence Coverate Incentive Lab (iLab) vs. EDGAR, 2006-2017

		% PfP Use
Bank Years in Incentive Lab	580	
Identified with iLab		10.34
Identified with EDGAR		88.10
Grant Date FV (000)	7,619	

This table reports the number of bank-years covered by Incentive Lab and our EDGAR-based dataset in the first column, we do not apply any control-variable restrictions in these counts. In the next three columns we report the percentage of the observations in iLab that iLab identifies as using PfP, the percentage of iLab observations that we find to use PfP using our data from EDGAR, the portion of EDGAR bank-years that we identify as using PfP, and the average value of PfP contingent grants (when observable) in thousands of USD.

Table 3: Determinants of Pay-for-Prudence Use

	Pay-for-Prudence Use _{t+1}			
	(1)	(2)	(3)	(4)
Equity Compensation		0.052* (1.80)		
ln(Firm Related Wealth)			0.028*** (3.60)	
ln(Vega)				0.294*** (2.91)
ln(Delta)				-0.004 (-0.07)
ln(Assets)	0.082*** (5.59)	0.085*** (5.42)	-0.016 (-0.49)	0.019 (0.60)
ln(Assets) ²	-0.006** (-2.51)	-0.008*** (-3.18)	0.002 (0.56)	-0.003 (-0.76)
lnEntities	0.020 (1.33)	0.024 (1.59)	0.053** (2.60)	0.053*** (2.63)
Loans/Assets	0.265*** (3.01)	0.224** (2.38)	0.270** (2.26)	0.272** (2.25)
Dep/Liab.s	0.097 (0.84)	0.014 (0.11)	0.217 (1.43)	0.209 (1.38)
ROA	0.278 (0.36)	-0.061 (-0.08)	0.448 (0.38)	0.579 (0.51)
Tier 1 Ratio	-0.103 (-0.43)	-0.130 (-0.46)	0.114 (0.21)	0.184 (0.33)
Book to Market	-0.026** (-2.05)	-0.030** (-2.19)	0.045 (1.53)	0.037 (1.26)
Annual Return	0.004 (0.20)	0.017 (0.73)	-0.039 (-1.06)	-0.019 (-0.52)
Return Variance	-0.000*** (-7.14)	-0.000 (-0.89)	-0.002 (-1.11)	-0.002 (-1.01)
CEO Tenure			-0.002 (-1.10)	-0.001 (-0.23)
Year FE	Yes	Yes	Yes	Yes
Fed. Dist. FE	Yes	Yes	Yes	Yes
N	6,523	4,993	1,750	1,748
Adj. R ²	0.24	0.23	0.25	0.25

Significance levels are indicated by * $p < .1$, ** $p < .05$, *** $p < .01$, standard errors are clustered at the bank holding company level.

Table 4: Pre-crisis PfP Adoption and Crisis Performance

	Bad Loans/Assets	Crisis Return	Crisis Variance	Crisis High Tail Risk
Pay-for-Prudence Use _{pre-crisis}	-0.003* (-1.85)	0.594 (0.16)	-4.814** (-1.99)	-0.135** (-2.46)
lnAssets	0.001** (2.07)	-3.935** (-2.51)	5.853*** (4.84)	0.094*** (4.08)
Loans/Assets	0.026*** (3.82)	-89.974*** (-4.75)	56.442*** (4.33)	1.060*** (3.75)
Deposits/Liab.s	-0.010 (-1.11)	-15.181 (-0.68)	-7.903 (-0.53)	-0.314 (-0.99)
Tier 1 Ratio	0.007 (0.20)	132.282* (1.72)	63.719 (1.33)	0.145 (0.14)
Book to Market	0.018*** (2.76)	-33.145*** (-3.11)	18.928** (2.42)	0.346** (2.02)
Annual Return	-0.005 (-1.13)	-14.307 (-1.34)	7.195 (1.05)	0.247 (1.61)
Return Variance	0.002** (2.41)	-1.412 (-1.05)	3.872*** (4.29)	0.090*** (5.09)
N	318	329	329	347
Adj. R^2	0.12	0.14	0.12	0.10

Significance levels are indicated by * $p < .1$, ** $p < .05$, *** $p < .01$, standard errors are clustered at the bank holding company level. To avoid micronumerosity we only use one size control in this table. Controls are all measured during the 2006 fiscal year.

Table 5: PfP Adoption and post-Crisis Performance

	(1)	(2)	(3)	(4)
	<i>Bad Loans/Assets</i> _{t+1}	<i>Annual Return</i> _{t+1}	<i>Return Variance</i> _{t+1}	<i>Tail Risk</i> _{t+1}
<i>Pay-for-Prudence Use</i> _[t,t-6]	-0.003 (-1.17)	0.006 (0.22)	0.000 (0.69)	-0.003 (-1.56)
Controls	Yes	Yes	Yes	Yes
N	2,119	2,220	2,161	2,161
Adj. R^2	0.35	0.07	0.17	0.55

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 6: PfP Adoption and post-Crisis Performance (Evaluation Terms)

	(1)	(2)	(3)	(4)
	<i>Bad Loans/Assets</i> _{t+1}	<i>Annual Return</i> _{t+1}	<i>Return Variance</i> _{t+1}	<i>Tail Risk</i> _{t+1}
<i>Evaluation Term Use</i> _[t,t-6]	-0.002 (-1.09)	0.038* (1.81)	-0.000 (-0.06)	-0.002* (-1.71)
Controls	Yes	Yes	Yes	Yes
N	2,119	2,220	2,161	2,161
Adj. <i>R</i> ²	0.35	0.07	0.17	0.55

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$