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Pay for prudence

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ABSTRACT

We provide the first evidence that prudential principles shape bankers' executive compensation, a phenomenon we call "pay for prudence" (PfP). We conjecture that PfP incentivizes bankers to balance shareholders' preference for risk with regulators' preference for prudence. Although PfP terms are often used in bank compensation contracts, we find that the use of detailed and concrete PfP terms are positively associated with equity incentives for risk-taking. Furthermore, detailed and concrete PfP terms are associated with lower tail risk, fewer bad loans, and lower likelihood of regulatory downgrades. While we do not find evidence that PfP is associated with lower profitability, PfP is associated with more diversified loan portfolios and reduced exposure to real estate. Our results shed light on a new dimension of bankers' pay and suggest that PfP-based incentives complement widely studied equity-based incentives for risk-taking by acting as guard rails that guide managers' pursuit of investment opportunities.

1. Introduction

The recurring nature of banking crises coupled with their pernicious real effects has led to a vast regulatory infrastructure aimed at minimizing banks' likelihood of failure by influencing the types of risks they take.[1] As part of their oversight, regulators can intervene to curtail activities that maximize shareholder value if these activities also threaten the solvency of the bank (Gopalan, 2022). To pre-empt these costly interventions, bank boards may incorporate incentives based on

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[1] Reinhart and Rogoff (2008) and Admati and Hellwig (2014) review the history and consequences of banking crises.

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prudential regulators' objectives into managers' compensation packages. However, prior research is largely silent on the existence of such incentives.

We refer to prudence-based compensation targets as "pay for prudence" (PfP). PfP rewards managers for achieving outcomes that lower credit risk, a central objective of bank supervision. For example, managers may be paid bonuses when they achieve a satisfactory regulatory rating, reduce non-performing loans, minimize loan losses, or maintain high credit quality. Our study documents the existence of these compensation incentives and measures trends in their use over time. We also examine their association with other incentives for risk-taking, and with observable measures of bank risk.

Our empirical predictions are grounded in a standard principal-agent problem. As in other industries, bank shareholders and the board of directors provide incentives for management to maximize firm value. While bank shareholders may prefer risky actions that are likely correlated with increases in shareholder value, they must also gauge the likelihood of regulatory intervention (Gopalan, 2022). These conflicting preferences create a trade-off between risky (but potentially value-maximizing) projects and regulatory intervention.

There are several reasons why the inclusion of PfP goals may help calibrate this trade-off. First, PfP increases the sensitivity of managers' compensation to observable bank risk measures that are important to regulators, such as capital ratios and loan losses. Second, John and John (1993) predict that compensation contracts help resolve potential conflicts between managers, shareholders, and other stakeholders. In the banking industry, other stakeholders such as creditors may influence compensation practices directly or indirectly by withdrawing (or threatening to withdraw) funding in response to changes in insolvency risk (Iyer et al., 2016; Dewatripont and Tirole, 1994).

Third, beyond the direct monetary incentives provided by PfP goals, PfP may signal bankers' commitment to pursue prudent practices. Guay et al. (2019) show that boards use bonus plans to signal to outsiders what they believe drives value or what they explicitly monitor, and to encourage mutual monitoring and coordination among the executive team. Bushman (2021) argues that bonuses signal the firm's strategy, while Fershtman (1985) and Fershtman and Judd (1987) suggest that bonuses align incentives inside the firm and strategically position the firm relative to competitors. In our setting, PfP may coordinate actions among internal stakeholders and also signal the bank's commitment to manage insolvency risk to external stakeholders such as creditors and regulators.

However, there are compelling reasons why banks may not use PfP. Theory suggests that risk-averse and undiversified managers may forgo valuable projects, and that equity compensation helps overcome this aversion (Haugen and Senbet, 1981; Smith and Stulz, 1985; Guay, 1999). If PfP lowers managers' incentives to pursue profitable-but-risky projects, boards will not implement PfP if the expected loss of value associated with forgone risky projects is greater than the expected cost of regulatory intervention. Further, PfP may not exist if traditional performance measures (e.g., stock returns, profitability, etc.) are sufficient to incentivize prudent banking practices (Holmstrom and Milgrom, 1987; Banker and Datar, 1989).[2] In addition, some external stakeholders such as regulators have access to private information (Gopalan, 2022), which may diminish PfP's signalling value. Given this backdrop, our study aims to document whether, and to what extent, PfP exists in practice.

We construct a novel dataset of PfP using the compensation disclosures of all publicly traded bank holding companies (BHCs) in Def 14A filings. We search within compensation-related discussions and identify contract terms, performance vesting provisions, and bonuses that are contingent on prudence-related terms using a series of regular expressions based on a library of prudence-related terms from the Federal Reserve Board's Commercial Bank Examination Manual (CBEM). We create two measures of PfP designed to capture the extensive margin of PfP use. First, a "concrete" PfP discussion discloses actual targets and the levels managers must achieve to receive incentive compensation. Second, a "detailed" PfP discussion discloses the metrics considered, but may not disclose an actual target. We provide specific examples of both concrete and detailed PfP in Section 3 and Appendix B. In addition to these two proxies, we document instances of "vague" PfP discussions in which the bank simply lists a PfP measure among several other financial metrics considered without further clarification. These vague PfP targets may only provide weak incentives or signals. Therefore, we focus the majority of our analysis on concrete and detailed PfP targets.

Using our novel dataset, we document that PfP has existed since the beginning of our sample period in 2001.[3] *Detailed PfP* and *Concrete PfP*, though initially rare, reach 10% and 8% utilization across all banks by 2005, which then at least doubles over the second half of that decade. Thereafter, *Detailed PfP* and *Concrete PfP* both remain relatively steady at approximately 20% of banks through 2017. *Vague PfP* is significantly more common early in the sample period, reaching a peak of 67% in 2004, but falls precipitously with only 38% of banks disclosing *Vague PfP* by the end of our sample period. Thus, we document that while the aggregate use of PfP has decreased over time, the frequency of both detailed and concrete PfP goals have actually increased.

This descriptive analysis yields two important insights. First, PfP use substantially predates the financial crisis. Second, the sea change in PfP specificity, from vague to concrete and detailed, aligns with the implementation (2006) and enhancement (2010) of the Compensation Discussion and Analysis (CD&A) and the financial crisis of 2007–2009. This trend also persists to

[2] Current literature on bankers' pay focuses on these traditional measures, implicitly assuming that stock returns and profitability ratios are sufficient statistics for managerial prudence. See, for example, Fahlenbrach and Stulz (2011); Kleymenova and Tuna (2021); Armstrong et al. (2022); Bennett et al. (2021).

[3] Our main sample consists of bank-years available on Compustat from 2001 to 2017. We begin our sample in 2001 because equity compensation expense is available in Compustat from 2001 onward. In untabulated analysis we find that PfP use dates back to the introduction of the Summary Compensation Table in 1994.

the end of our sample period even though the PfP-related requirements of Troubled Asset Relief Program have long expired and the compensation-related provisions of Dodd-Frank remain unimplemented (Ramonas and Vittorio, 2019).

Having documented the prevalence of PfP, we study the association between PfP use and equity-based compensation incentives for risk-taking. Prior research suggests that equity-based incentives align managerial actions with shareholders' objectives (Jensen and Meckling, 1976; Haugen and Senbet, 1981; Smith and Stulz, 1985) but such alignment may induce the types of risk-taking that regulators find most concerning. Coles et al. (2006) and Shue and Townsend (2017) link these incentives to increased leverage. Armstrong and Vashishtha (2012) show that equity risk-taking incentives lead managers to pursue strategies which expose their firms to *systematic* risk, which they can hedge, and not idiosyncratic risk, which they cannot hedge, and Armstrong et al. (2022) show that these incentives are associated with an increase in *systemic* risk. Thus, equity-based incentives for risk taking can lead banks' managers to increase leverage and systemic risk, exactly the types of risks which concern regulators most.

We expect that bank boards design compensation contracts to consider both shareholders' desire to encourage value-enhancing risk while discouraging imprudent risks and the potential for costly regulatory intervention. Consistent with this, we find a positive association between the use of PfP goals and managers' equity compensation. These results are not subsumed by controls for performance, size, or banks' focus on traditional banking activities. We also find that the association between equity compensation and PfP use systematically varies with measures of bank risk. Specifically, the association between equity compensation and PfP use is increasing in return variance and decreasing in tier 1 capital. This suggests that banks put in place guard rails to complement equity incentives when insolvency risk is higher.

We next study the relation between PfP and observable measures of bank risk. If PfP fosters prudent behavior, PfP will be negatively associated with bank risk.[4] Alternatively, PfP may be 'window dressing' intended to distract regulators or other stakeholders. Under this view, PfP does not deter risk-taking and may even be associated with *greater* risk-taking. We find that PfP is associated with lower risk-taking. Specifically, both detailed and concrete PfP are associated with lower tail risk and fewer bad loans. We also find that the profitability of PfP banks is not significantly different from non-PfP banks on average.

We extend this analysis by examining cross-sectional variation in the association between PfP and bank performance. Our principal-agent framework predicts that PfP may be more beneficial when external stakeholders have stronger incentives to intervene in firm operations. For example, when banks are in financial distress, PfP may better align managerial actions with the preferences of stakeholders who prefer stability. To test this, we measure three bank characteristics related to instability: size, regulatory capital, and core deposits.[5] Accordingly, we find that the associations between PfP and performance are stronger among small banks, banks with low regulatory capital, and banks that are more reliant on non-core deposits.

Next, we examine whether PfP is associated with regulatory intervention. If PfP encourages prudent practices or signals banks' commitment to prudence, then we expect PfP banks to be downgraded less frequently by regulators. Alternatively, banks may use PfP to *appear* prudent when in fact they are not. In this case, we expect that banks that use PfP are more likely to be downgraded by regulators. We find a negative association between PfP and the likelihood of regulatory downgrades. Moreover, this result is stronger among small banks and poorly capitalized banks. These results reinforce the idea that PfP is associated with more prudent business practices.

Finally, we examine bank operations and find that PfP is associated with more diverse loan portfolios, and that this diversification is partially achieved by reducing exposure to real estate lending. Increased diversification through decreased specialization in real estate is likely perceived positively by bank regulators tasked with ensuring safety and soundness (OCC, 2020), as prior research suggests a link between real estate lending and heightened risk-taking (Costello et al., 2019; Granja et al., 2017). However, shareholders likely prefer banks to increase profitability by specializing in specific loan categories (Stomper, 2006; Rossi et al., 2009; Berger et al., 2010; Tabak et al., 2011) including lucrative real estate lending.

Collectively, our findings suggest that PfP complements risk-taking incentives, and that PfP is associated with lower bank risk. From the perspective of shareholders, the costs of PfP include limiting banks' appetite to pursue risky but positive NPV projects (such as real estate lending), and foregoing the benefits of specialization. Importantly, the voluntary nature of PfP adoption does not allow us to isolate the costs and benefits of PfP. In the absence of mandatory PfP adoption, we acknowledge that the banks that adopt PfP are those for which PfP provides net benefits.

This study makes several contributions. First, we uncover a hitherto undocumented governance mechanism: the use of prudential safety and soundness measures in bank compensation contracts. In so doing, we provide large-sample evidence that regulatory principles are ingrained in many banks' compensation contracts. This evidence informs the recurring debate over bankers' pay structure. In the aftermath of the financial crisis, many academics and policy makers called for regulatory intervention in bankers' compensation.[6] Conversely, Core and Guay (2010a,b) express reservation regarding proposals to regulate pay in the banking industry, suggesting that it is "plausible that existing compensation practices already largely conform to such

[4] In Section 4 we explore PfP's use as a direct monetary incentive by examining whether PfP is associated differences in the sensitivity of pay to measures of prudence, and find only weak evidence of these differences.

[5] We follow Ellul and Yerramilli (2013) and define core deposits as all deposits held in domestic offices of the BHC's subsidiaries, excluding time deposits greater than $100,000 and any brokered deposits. While core deposits can be withdrawn at any time, they have historically been viewed as stable sources of funding not susceptible to sudden withdrawals (Sheehan, 2013). As such, they are generally viewed as more stable funding sources than non-core deposits or other forms of wholesale funding. We elaborate on the definition of core deposits in section 4.5.

[6] For example, Tirole (2010) argued that "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."

principles." Our evidence supports this conjecture, though adoption is not universal. Second, we propose and test a new mechanism through which risk shapes managerial incentives. In contrast to prior work that focuses on how firms design compensation contracts to incentivize managers to pursue risky value-enhancing projects, PfP *disincentivizes* the pursuit of imprudent risks. PfP thereby enables boards to strike a necessary balance between encouraging risk-taking and safeguarding solvency.

We also contribute to the literature on how creditors affect managerial compensation, which argues that creditors exert their control rights to guide managers toward longer-term investments (Armstrong et al., 2021). Other studies, such as Anantharaman et al. (2014), find that debt-like managerial compensation results in less costly and restrictive debt. Other studies focus on how managerial compensation changes as firms near bankruptcy (Gilson and Vetsuypens, 1993; Eckbo et al., 2016; Akins et al., 2019). We add to this literature by documenting that as insolvency risk rises, the inclusion of PfP measures in compensation contracts is associated with a lower likelihood of distress as measured by tail risk, bad loans, and regulatory downgrades.

We also make a methodological contribution to the compensation literature. Neither Execucomp nor Equilar collects information on specialized performance goals in incentive contracts. Incentive Lab does collect performance goals for a small subset of firms, but it is much less widely used, and to our knowledge no studies have taken advantage of these data to explore non-standard performance measures.

Finally, we build on recent studies examining the role of executive compensation in the banking industry (DeYoung et al., 2013; Armstrong et al., 2022; Kleymenova and Tuna, 2021). The recent failures of Silicon Valley Bank, Signature Bank, and First Republic Bank highlight the importance of our study to researchers and regulators. PfP is conspicuously absent from the compensation discussions in Silicon Valley Bank's proxy statements, and while First Republic Bank's proxy statements include concrete PfP targets, Signature Bank's proxy statements only provide vague discussion of PfP. These anecdotes suggests that PfP is not a panacea, and raise important questions for future research about the role of boards and compensation practices in mitigating the risks associated with bank failures.

2. Economic framework and hypotheses

2.1. Economic framework

Our analyses explore a principal-agent problem in which shareholders and their representatives (the board of directors) delegate decision-making to management and provide incentives for managers to select projects that maximize shareholder value. Because of their high leverage, banks can pursue firm value maximization by increasing risk through asset substitution or risk shifting (Jensen and Meckling, 1976; Morgan, 2002). While shareholders may prefer these actions, they must weigh value maximization through increased risk against possible regulatory intervention, which could include restrictions on payouts and lending (Gopalan, 2022).

The inclusion of PfP goals in compensation contracts may allow managers to better calibrate the trade-off between maximizing shareholder value and curbing regulatory interference for several reasons. First, PfP makes managers compensation more sensitive to observable measures of bank riskiness (e.g., capital ratios), which are a key component of banking regulation. In particular, because bank regulators provide guidance to banks about acceptable levels for capital ratios and loan losses, PfP targets based on these measures may help managers internalize the costs associated with excess leverage or insufficient capital adequacy. Consistent with this argument, Core and Guay (2010a) conjecture that compensation contracts in the banking industry should reflect regulatory priorities.

Likewise, prior research shows that when powerful non-shareholding interests exist, executive compensation tends to reflect those interests (See e.g. John and John, 1993; John et al., 2000, 2010; Huang et al., 2017). In our setting, monitoring by creditors (i.e., depositors) may change banks' project selection and risk-taking activities. For example, Iyer et al. (2016) finds that as insolvency risk increases, depositors are likely to retract their funding. While these effects may be magnified for banks with uninsured deposits, deposit insurance does not fully insulate banks from sudden funding withdrawals (Davenport and McDill, 2006). One potential solution to decrease the threat of creditor intervention would be to lower pay-performance sensitivity (John and John, 1993; John et al., 2000, 2010; Akins et al., 2019; Huang et al., 2017), which may mean that shareholders settle for second-best levels of pay-performance sensitivity. However, John and Qian (2003) and John et al. (2010) posit that direct monitoring by the external stakeholder, such as monitoring by prudential regulators, can alleviate this incentive problem if the outside stakeholder is able to intervene in management decisions. We extend this logic and posit that banks may balance these agency problems by contracting with their managers directly on the prudential outcomes that reflect the safety and soundness of the bank.

Furthermore, although boards adjust equity compensation to alter management's incentives (Core and Guay, 1999), prior research suggests that firms may also signal their strategic objectives to external stakeholders through publicly observable bonus plans (Bloomfield, 2021; Bushman, 2021). Compensation contracts that include PfP can also serve as credible commitment mechanisms that allow bank managers to infer each other's commitment to balance value maximization through risk-taking while decreasing the likelihood of insolvency (Fershtman, 1985; Fershtman and Judd, 1987; Armstrong et al., 2022). Within this framework, PfP can signal the bank's commitment to limit excess risk-taking and to maintain adequate credit quality. As a tangible example of this signaling role, the OCC provides guidance on how regulators should evaluate the quality of a bank's corporate and risk governance systems. As part of their evaluation, the OCC recommends a

principles-based approach whereby banks incorporate goals to balance "risk and reward" and implement compensation policies that are "compatible with effective controls and risk management" (OCC, 2019).

Based on this discussion we predict that banks will use PfP; however there is considerable tension in this prediction. Indeed, in the aftermath of the financial crisis, critics commonly assumed that bankers' compensation incentives reflect only value maximization and do not include incentives to avoid the costs associated with regulatory intervention (Tirole, 2010; French et al., 2010). This assumption is consistent with the theoretical work on incentives for risk-taking that anticipates that shareholders' primary concern is that executives will take too little risk rather than too much or the wrong kind of risk (Haugen and Senbet, 1981; Smith and Stulz, 1985; Holmström and Ricart i Costa, 1986), and underpins much of the empirical literature on executive pay (Anantharaman et al., 2014; Cassell et al., 2012; Bennett et al., 2021; Armstrong et al., 2010, 2013).[7] Drawing on these competing arguments, we state our first hypothesis in the null form.

H1 Banks' executive compensation contracts do not include PfP.

2.2. The relation between PfP and equity-based incentives for risk-taking

The standard framework in the literature is that boards of directors can grant equity or stock option compensation to managers so that they become partial owners of the firm they manage in order to better align manager's risk preferences with those of shareholders (Jensen and Meckling, 1976; Haugen and Senbet, 1981). A robust empirical literature starting with Guay (1999) and Core and Guay (1999) supports the theory by linking risk-taking policies to the volatility sensitivity of managers' wealth (Vega).

While greater equity-based incentives for risk-taking may lead managers to accept risks that regulators view as imprudent in an attempt to maximize firm value, PfP rewards managers for taking actions that minimize insolvency risk. We posit that when shareholders believe that their bank has valuable opportunities for growth they may use equity and option compensation to motivate managers paired with PfP-based incentives that act as guard rails, guiding managers away from particularly imprudent strategies. For example, consider United Financial Bancorp, which places substantial weight on the non-performing loan ratio and the charge-off ratio in its incentive plan. These prudent incentives impose a cost on managers who pursue *imprudent* strategies that result in increased loan non-performance and charge-offs. When such incentives are paired with equity-based incentives, executives are encouraged to pursue value-increasing but risky opportunities that do not threaten these prudential ratios.

Thus, we predict that banks with more equity-based incentives for risk-taking will also use more PfP. This motivates one side of our second hypothesis.

H2a If PfP is used to guide risk-taking incentives, then we expect a positive relation between equity-based risk-taking incentives and PfP.

However, empirical evidence also suggests that at least some forms of risk-taking motivated by equity compensation incentives may not be deemed prudent by regulators. In a study of industrial firms, Coles et al. (2006) show that Vega motivates managers to invest more in R&D, invest less in PP&E, and increase leverage. Significant leverage is uniquely troubling for financial institutions, given the importance of capital ratios for bank solvency (Gopalan et al., 2021). In support of Coles et al. (2006), Shue and Townsend (2017) show that *only* leverage is causally related to plausibly exogenous increases in Vega. Armstrong and Vashishtha (2012) use an instrumental variables approach to make the more general point that Vega motivates managers to increase systematic risk, which they can hedge, rather than idiosyncratic risk, which they cannot hedge. This result raises the possibility, which Armstrong et al. (2022) confirm, that bankers' pursuit of *systematic* risk may lead to increases in *systemic* risk as executives across the banking sector pursue similar risks.

In contrast to PfP fine-tuning incentives for risk-taking, PfP may be used by banks that wish to be cautious and those that wish to emphasize prudential behavior in particular. This reasoning motivates an alternative form of our second hypothesis, which envisions PfP-based incentives as part of a more general risk-management regime.

H2b If PfP is used to limit risk-taking in general, then we expect a negative relation between equity-based risk-taking incentives and PfP.

2.3. The relation between PfP goals and future performance

Our next hypothesis examines the relation between PfP and banks' actions. This hypothesis follows naturally from our second hypothesis. Whether PfP is used to guide risk-taking at banks, or as part of a comprehensive strategy to reduce risk-taking overall, we expect PfP to be associated with more prudent outcomes. This motivates our third hypothesis.

H3a If PfP is used to guide or reduce risk-taking, we expect a positive relation between PfP and measures that reflect prudence.

[7] We note that an important stream of literature questions this perspective and suggests that limits on managerial hedging complicate the relation between equity incentives and the risks that managers choose to take (See e.g.: Lambert et al., 1991; Lewellen, 2006; Armstrong and Vashishtha, 2012; Armstrong et al., 2022). We rely on this literature below to motivate our second set of hypotheses below.

Table 1
Sample comparison.

	N
1. Bank-years with data available from Y9−C filings, Computstat, CRSP, and SEC EDGAR:	7635
2. Subset of 1. with equity compensation data in Compustat:	5839
3. Subset of 2. with dependant variables from CRSP or EDGAR measured in $t + 1$:	5470
4. Subset of 2. with dependant variables from Y9−C measured in $t + 1$:	5309
5. Subset of 1. covered by Execucomp with dependant variables measured in $t + 1$:	2022

However, a plausible alternative is that banks adopt PfP-based incentives to hide imprudent plans from regulators and other stakeholders. Banks that plan to pursue imprudent investment strategies may discuss PfP goals to create the mere appearance of prudence. If used in this way, PfP discussions may be window dressing, rather than substantive commitments to pursue prudent goals. This reasoning motivates an alternative version of our third hypothesis, which we refer to as the window-dressing hypothesis.

H3b If PfP is window dressing, we expect a negative relation between PfP and measures that reflect prudence.

While this discussion has focused on the potential use of PfP to balance the objectives of regulators and shareholders, we should emphasize that achieving this balance is unlikely to be costless for shareholders. In fact, this is precisely why regulators exist in the banking industry: to manage the agency conflict between the depositors they represent and shareholders. The crux of this problem is that shareholders may often prefer a riskier set of projects and policies than is optimal from the perspective of regulators. In our framework it is the threat of intervention from outside stakeholders that leads shareholders to put in place incentive structures that lead managers to pass up these risky-but-profitable strategies and policies. Thus, to the extent we find results consistent with the voluntary use of PfP to guide managers toward prudent policies, it is because bank shareholders find that the benefits of implementing PfP outweigh the costs.

3. Sample selection and PfP measurement

3.1. Sample selection

Our sample selection process begins with the bank holding companies listed in the Federal Reserve Bank of New York's RSSD ID - PERMCO linking table.[8] We measure banks' financial information from the bank holding company regulatory filings (Y9−C) on WRDS, and stock return data from CRSP. As we discuss below, we identify PfP compensation targets based on bank SEC filings, and therefore restrict the sample to publicly traded banks for which we can collect SEC filings from EDGAR. The intersection of these datasets yields 7635 bank-year observations. We further require equity compensation expense data in Compustat which limits our primary sample to 5839 bank-year observations from 2001 onward.

Throughout our main analyses, the sample size varies slightly based on the source and time period of the outcome variable examined. Table 1 summarizes these sample size differences. When our estimation is based on observations measured in t then we are able to use the entire sample of 5839 bank-year observations. When we measure dependent variables in $t + 1$ using data from EDGAR, CRSP, and supervisory ratings, we lose 369 observations.[9] When our dependant variables come from banks' Y9−C filing and are measured in $t + 1$ we lose an additional 161 observations. This reduction to a sample of 5309 observations is due to a drop in the number of banks that file Y9−Cs that occurs in the second quarter of 2018, but does not lead to reduced coverage by the SEC. Finally, in robustness tests we limit our analysis to those banks that are covered by Execucomp for which we can calculate Delta and Vega. This requirement limits our sample to 2022 observations.

3.2. Identification and types of PfP

Bank holding companies provide discussions of executive incentive compensation in their proxy statements. We rely on these discussions to identify the existence of prudence-based compensation targets.[10] In our first step, we extract the text of compensation disclosures from proxy statements filed with the SEC and posted on EDGAR between 1994 and 2018. Second, we use a dictionary-based algorithm to classify the extent to which the compensation discussion reports use of PfP. We develop two dictionaries for this approach. The first measure draws terms from descriptions of the CAMELS rating in bank

[8] This linking table is updated biannually. We use the 2018 vintage of this linking table. This means that the last year for which we have a valid link between BHCs and CUSIPs − i.e., EDGAR filings − is 2018. The Def 14A lags the end of the fiscal year by at least three months, so 2017 is the final fiscal year for which we are able to identify PfP.

[9] This sample of 5470 bank-year observations is our benchmark sample for our multivariate analyses, and our descriptive statistics are based on the characteristics of this sample.

[10] We considered using 8-K Item 5.02 (Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensatory Arrangements of Certain Officers) and attached material contracts to identify the existence of PfP. However, based on our review of these 8-K disclosures, the Def 14A filings generally contain greater detail regarding the targets used in compensation contracts and are more suited to identify PfP.

examination manuals,[11] while the second is a list of ratio-related terms. In Appendix Appendix B, we provide a detailed discussion of our construction and validation of these measures, including analysis based on hand collection of a random sample of 500 compensation discussions.

These dictionaries allow us to systematically classify the PfP discussions with three indicator variables. *Detailed PfP* equals 1 when a bank's compensation discussion includes more than three uses of terms from the first dictionary and equals zero otherwise. *Concrete PfP* equals 1 when the compensation discussion includes more than three uses of terms from the first dictionary, as well as more than one ratio. Thus, the classifications *Detailed PfP* and *Concrete PfP* are not mutually exclusive.[12]

Our third indicator variable, *Vague PfP*, is equal to 1 when compensation discussions include one to three mentions of terms from the first dictionary and equals zero otherwise. The interpretation of these vague statements is ambiguous because we cannot determine whether these vague statements arise from cheap talk, or instead from meaningful use of concrete prudence-based performance targets in compensation contracts. Due to this ambiguity we do not tabulate multivariate analysis using *Vague PfP*; however, we do include *Vague PfP* in our descriptive analysis and discussion of trends in PfP use. To summarize, we use *Detailed PfP* and *Concrete PfP* as proxies for PfP use, and, while we consider trends in *Vague PfP*, we do not use it as a proxy for PfP use. Finally, in this study we only address the adoption of PfP but do not measure the magnitude of PfP incentives. In this respect we face similar limitations to the related literature (See e.g.: Bloomfield, 2021; Bloomfield et al., 2022; Ma et al., 2021).

3.3. Descriptive evidence on PfP adoption

Our first set of analyses is descriptive in nature. Fig. 1 Panels A and B plot the proportion of proxy statements posted on EDGAR by public bank holding companies over our sample period that include *Detailed PfP* and *Concrete PfP*. The two measures follow similar trends. In 2001, 5% of banks use *Detailed PfP* and 6% of banks use *Concrete PfP*, with rates steadily rising to 10% and 8% respectively in 2005. Over the next five years we observe a sharp increase in both *Detailed PfP* and *Concrete PfP*, which is likely driven by a number of factors.

First, the 2008−2009 financial crisis likely impacted the costs and benefits of incorporating prudence-based compensation targets into incentive contracts. Indeed, the largest increase in the portion of banks using *Detailed PfP* and *Concrete PfP* occurs between 2008 and 2009, roughly corresponding to the implementation of TARP and the beginning of the resolution of the financial crisis. Second, in 2006, SFAS 123R altered reporting of option-based compensation expense and the introduction of the "Compensation Discussion and Analysis" (CD&A) section to the proxy statement expanded disclosure of managerial pay. The CD&A section explicitly requires firms to disclose the design, objectives, and measures of their executive compensation programs. The effect of the CD&A section on researchers' ability to observe executive incentives is difficult to understate. Together, these simultaneous regulatory changes significantly changed the structure of executive incentives (Hayes et al., 2012; Bettis et al., 2018), and the detail with which these incentives are discussed in the proxy statement. Third, in 2010 the SEC further enhanced the requirements of the CD&A to include an explicit discussion of the impact of the company's compensation practices on the company's risk and risk management function.[13] While the financial crisis or changes to compensation disclosure, in isolation, would likely have increased the proportion of banks adopting and disclosing PfP, the combined effect of these changes resulted in the proportion of banks disclosing *Detailed PfP* (*Concrete PfP*) doubling from 10% in 2005 to 20% in 2010 (from 8% in 2005 to 18% in 2010).

In contrast to the trends we document for *Detailed PfP* and *Concrete PfP*, *Vague PfP* follows a very different pattern that we plot in Panel C of Fig. 1. While it is difficult for us to interpret whether or not these vague statements correspond to meaningful use of prudent targets, we believe that comparison of the trends in the three forms of PfP are instructive. In 2001, 65% of banks make vague reference to the use of prudence-based compensation targets in their proxy statements, and this proportion slightly increases to a maximum of 67% in 2004. The subsequent decline in *Vague PfP* to 38% by 2017 mirrors the simultaneous rise in *Concrete* and *Detailed PfP*. Panel D of Fig. 1 plots *Any PfP* which aggregates of Panels B and C. The decline in PfP plotted in Panel D is explained, almost entirely, by the decline in *Vague PfP*.

These plots suggests that as changes in the banking industry occur and as changes in compensation regulation are implemented, banks either provide more information about their prudence-based targets or cease to discuss them. While this trend away from ambiguity is the overarching theme during this period, we also note that PfP use is generally sticky within banks. Table 2 which presents transition matrices over one and two-year windows.

Taken together, the trends from this section reject H1. Consistent with the conjecture of Core and Guay (2010a,b), banks do incorporate PfP terms into their performance compensation contracts, though adoption of these provisions is far from universal. Our next series of analyses examine how PfP relates to measures of equity compensation and shareholder alignment.

[11] These terms are "regulatory capital", "tier 1", "capital adequacy", "well capitalized", "coverage ratio", "asset quality", "delinquent loans", "charge offs", "risk weighted assets", "loan quality", "reserves", "alll", "the allowance", "loan loss allowance", "lease loss allowance", and "liquidity". Please refer to Appendix B for a detailed discussion of the construction of this dictionary.

[12] The thresholds used to create indicator variables are based on the distribution of PfP terms within our hand collected sample and classification of 500 compensation discussions. Please refer to Appendix B for greater details.

[13] It is tempting to attribute changes in this period to the passage of Dodd-Frank, which became law in 2010; however, the law's compensation provisions, though legislated, have not been implemented.

Fig. 1. PfP use from 2001 to 2017.

4. Summary statistics and results

4.1. Summary statistics

Table 3 reports descriptive statistics for our panel dataset. Over the entire sample period, approximately 16.2% (17.9%) of bank-year observations include *Concrete PfP* (*Detailed PfP*). Additionally, 67% of the banks in our sample report some equity

Table 2

Panel A - PfP Persistence from t to $t+1$.			
	Detailed PfP	Vague PfP	No PfP
Detailed PfP	0.76	0.20	0.03
Vague PfP	0.07	0.88	0.05
No PfP	0.00	0.00	1.00
Panel B - PfP Persistence from t to $t+2$.			
	Detailed PfP	Vague PfP	No PfP
Detailed PfP	0.68	0.26	0.06
Vague PfP	0.10	0.82	0.08
No PfP	0.00	0.00	1.00

Table 3
Descriptive statistics, main estimation sample.

	N	μ	σ	25th%ile	50th%ile	75th%ile
Collected from Edgar:						
Concrete PfP Use	5470	0.162	0.368	0.000	0.000	0.000
Detailed PfP Use	5470	0.179	0.383	0.000	0.000	0.000
Vague PfP Use	5470	0.619	0.486	0.000	1.000	1.000
Compustat Variables:						
Report Equity Comp. Expense	5470	0.671	0.470	0.000	1.000	1.000
Equity Compensation Expense	5470	17.602	170.532	0.000	0.232	1.475
Y9−C Variables:						
Deposits/Liabilities	5470	0.849	0.097	0.797	0.868	0.919
Loans/Assets	5470	0.675	0.125	0.615	0.691	0.758
Tier 1 Ratio	5470	0.128	0.037	0.105	0.121	0.141
Book to Market	5470	0.860	0.750	0.526	0.704	0.947
ln(Entities)	5470	1.423	0.949	0.693	1.386	1.946
Total Assets (Billions)	5470	25.211	165.643	0.840	1.837	5.746
ROE	5470	0.070	0.183	0.057	0.091	0.125
Bad Loans/Assets	5470	1.607	1.624	0.629	1.101	1.977
Loan Portfolio Diversification	5470	−0.603	0.180	−0.734	−0.611	−0.481
Real Estate Loans/Assets	5470	0.503	0.147	0.411	0.510	0.605
CRSP Variables:						
Annual Return	5470	0.099	0.335	−0.077	0.087	0.279
Return Variance	5470	7.226	16.920	2.145	3.319	6.427
Tail Risk	5470	0.049	0.029	0.031	0.039	0.056

compensation expense, though the average amount is quite low. On average, banks in our sample are funded with deposits comprising 85 percent of total liabilities. Moreover, loans comprise nearly 68 percent of all assets on banks' balance sheets. Regulatory capital is one of the most important measures of bank stability (Gopalan et al., 2021). In our sample, banks' average tier 1 leverage ratio is nearly 13 percent, well above statutory minimum guidelines set by the Federal Deposit Insurance Corporation Improvement Act (FDICIA). Banks in our sample are large and profitable, with average total assets of USD 25 billion and profitability (*ROE*) of 7%.

4.2. PfP and equity incentives

Our second hypothesis examines the association between the use of PfP goals and equity-based incentives. Ex-ante the association between PfP goals and equity-based incentives is unclear. On the one hand, if banks use PfP to provide management with guard rails to complement equity-based compensation, then we expect a positive relation between PfP and equity-based compensation. On the other hand, PfP may be negatively associated with equity-based compensation if it is used by banks that wish to be cautious and emphasize prudential behavior. We test these contrasting predictions with the following empirical model:

$$pr(PfP_{i,t+1} = 1) = \phi_f + \lambda_t + \beta \textit{High Equity Compensation}_{i,t} + \mathbf{X}_{i,t}\gamma + \varepsilon_{i,t} \quad (1)$$

where *PfP* is either *Detailed PfP* or *Concrete PfP*, and *High Equity Compensation*$_{i,t}$ is an indicator equal to 1 if the bank i reports equity compensation expense above the median in year t. **H2a** (**H2b**) predicts a positive (negative) association between *High Equity Compensation*$_{i,t}$ and PfP.

We include two sets of fixed effects to control for unobserved heterogeneity. First, we include Federal Reserve District fixed effects (ϕ_f). This fixed effect isolates the variation in our sample to banks within a given regulatory district, and helps control for regional differences in the macroeconomic and regulatory environment. We also control for time-specific shocks by

Table 4
Determinants of pay-for-prudence.

	(1)	(2)	(3)	(4)
	Detailed PfP$_{t+1}$	*Concrete PfP*$_{t+1}$	*Detailed PfP*$_{t+1}$	*Concrete PfP*$_{t+1}$
High Equity Comp.	0.064***	0.060***	0.039**	0.040**
	(3.47)	(3.39)	(2.18)	(2.32)
Return Variance			−0.001*	−0.001*
			(-1.86)	(-1.87)
Annual Return			0.026	0.028
			(1.36)	(1.55)
Book to Market			−0.026*	−0.024*
			(-1.78)	(-1.73)
Tier 1 Ratio			−0.105	−0.106
			(-0.46)	(-0.49)
Loans/Assets			0.081	0.072
			(0.88)	(0.85)
Dep/Liab.s			0.132	0.157*
			(1.33)	(1.71)
ln*(Entities)*			0.002	−0.001
			(0.11)	(-0.07)
ln*(Assets)*			0.058	0.091
			(0.88)	(1.37)
ln*(Assets)*^{2}			−0.001	−0.002
			(-0.51)	(-1.07)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5470	5470	5470	5470
Adj. R^2	0.06	0.06	0.07	0.07

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Column (1): *Detailed PfP*−An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes more than three references to pay-for-prudence terms. Column (2): *Concrete PfP*−An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes both more than three references to pay-for-prudence terms and two or more references to ratios. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier 1 Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

including year fixed effects (λ_t). Year fixed-effects are particularly important as SFAS 123R and the SEC's simultaneous introduction of the CD&A in 2006 have well-documented impacts on use of and accounting for equity compensation.

We include a vector of time-varying control variables ($\mathbf{X}_{i,t}$) to control for bank characteristics and attributes. Specifically, to control for the bank's growth opportunities we include the book to market ratio (*Book to Market*). To control for performance we include the bank's annual return (*Annual Return*), and to control for the bank's current level of risk we include the volatility of daily returns over the year (*Return Variance*). To capture the bank's business model and leverage we control for the portion of the bank's liabilities that result from taking deposits (*Dep/Liab.s*), and the portion of assets that the banks lends (*Loans/Assets*), and the bank's tier 1 capital ratio (*Tier 1 Ratio*). We include the natural log of total assets (ln(*Assets*)), its square (ln(*Assets*)^2), and the natural log of number of entities controlled by the bank holding company (ln(*Entities*)) to control for size and complexity. We estimate these models using ordinary least squares with bank-level cluster robust standard errors.[14]

Table 4 reports the results of estimating model 1 without controls (Columns (1) and (2)) and with controls (Columns (3) and (4)). Given that our set of control variables help control for time-varying bank characteristics, we focus our multivariate result discussion on empirical results with control variables. The coefficients produced by this model can be interpreted as differences in the probability of adopting detailed or concrete PfP due to a one unit change in the regressor. Thus, the results in columns (3) and (4) suggest that banks that report equity compensation expense scaled by total assets above the median (*High Equity Compensation* = 1) in year *t* are 3.9 percentage points more likely to report *Detailed PfP* and 4.0 percentage points more likely to report *Concrete PfP* than their peers that report equity compensation expense scaled by total assets

[14] OLS yields estimates of the linear probability model (LPM), which we prefer to logit and probit as it avoids the incidental parameters problem when including fixed effects; see Greene (2003) and Wooldridge (2010, pp. 562−564) for a detailed discussion of the incidental parameters problem and the LPM.

below the median (*High Equity Compensation* = 0). The evidence presented in Table 4 supports **H2a** rather than **H2b**, suggesting that *Detailed PfP* and *Concrete PfP* are used to complement equity incentives by providing incentives for prudent risk-taking.[15]

4.3. Bank characteristics, PfP, and equity compensation

Our previous results suggest that equity compensation and PfP usage are complements. Therefore, when managers are more aligned with shareholder preferences, we expect that the board will use PfP to guard against imprudent risk-taking as managers pursue investment opportunities. This prediction has important implications for the relationships between certain bank fundamentals and PfP. Because shareholder-regulator agency problems are most pronounced as the bank nears insolvency, we anticipate measures associated with the probability of insolvency should be most positively related to PfP at banks where managers interests are most aligned with shareholders (i.e. when *High Equity Compensation* = 1).

We test these relationships by interacting *High Equity Compensation* with the vector of regressors ($\mathbf{X}_{i,t}$) in equation (1). Table 5 reports these results. When equity compensation expense is high we expect an incrementally positive association between *Return Variance* and PfP and an incrementally negative association between *Tier 1 Ratio* and PfP, as volatile performance and the level of capitalization are important predictors of insolvency. We find that the association between *Return Variance* and PfP is significantly positive at banks with *High Equity Compensation*. We also find that the relationship between *Tier 1 Ratio* and PfP is significantly negative at banks with *High Equity Compensation*. Therefore, the results are consistent with our conjecture that indicators of bank insolvency are positively associated with PfP when equity compensation is high.

4.4. PfP and performance

Building on our evidence that documents the prevalence and determinants of PfP, we next test our third hypothesis, which examines the consequences of PfP. As we discuss in section 2, if PfP curtails banks' risk-taking activities, we then expect a negative association between PfP and observable measures of bank risk. Alternatively, if PfP is merely window dressing, we expect to observe either an insignificant or *positive* association between PfP and bank risk.

We focus on three performance measures that help summarize bank conditions: *Tail Risk*, *Bad Loans*, and *ROE*. We define *Tail Risk* as the average of the worst five percent of daily returns over the year multiplied by negative one. *Bad Loans/Assets* is the ratio of the sum of loans past due 90 days or more and non-accrual loans to total assets. *ROE* is the ratio of net income to total equity.

For this series of tests, we regress performance measures in year t and $t+1$ on PfP indicator variables using the following empirical model:

$$Performance\ Measure_{i,\tau} = \phi_f + \lambda_t + \beta PfP_{i,t} + \mathbf{X}_{i,t}\gamma + \varepsilon_{i,t} \quad (2)$$

where *Performance Measure* is one of *Tail Risk*, *Bad Loans*, and *ROE*; τ is the time period in which we measure the outcome (t or $t+1$); and all other estimation, controls, and fixed effects are all similar to those described in our estimation of equation (1).

Table 6 reports the results of estimating Equation (2) with each of our performance measures measured in t and $t+1$ using both *Detailed PfP* and *Concrete PfP*. In Panel A of Table 6, we report the results of estimating Equation (2) using *Tail Risk* as the dependent variable. We find a negative association between PfP and *Tail Risk* for both in years t and $t+1$.[16] This result provides the first clear evidence that PfP is associated with lower risk.

Next, we examine whether PfP is associated with fewer bad loans (i.e., non-performing loans). Prior research has noted that bad loans are associated with banks less effectively monitoring their loan portfolio (Bhat and Desai, 2020). In other words, as banks' loan monitoring portfolio increases, the amount of bad loans should decrease. The results reported in Table 6 Panel B shows that PfP is inversely associated with bad loans, suggesting that PfP is associated with loan monitoring. Together the results in panels A and B of Table 6 support **H3a**, that if PfP is used to guide or reduce risk-taking, then we expect PfP use to be associated with more prudent outcomes.

Our last performance measure is return on equity (ROE). Ex-ante, the association between PfP and profitability is unclear. On one hand, because PfP is associated with fewer bad loans and thus lower loan losses, PfP may be positively associated with ROE. On the other hand, because PfP influences managers to avoid excessive risk, PfP may influence managers to forgo certain positive NPV projects and therefore PfP may be negatively associated with ROE. The results from Table 6 Panel C suggests that the profitability of PfP banks is not significantly different from non-PfP banks. This suggests that the banks that implement PfP are not less profitable on average. We interpret this null result with caution, as the banks that adopt PfP do so voluntarily. This result does not imply that all banks could costlessly adopt PfP, as it is only adopted by banks for which the benefits outweigh

[15] We acknowledge that *High Equity Compensation* is unlikely to capture the full extent of equity compensation use before adoption of SFAS 123R. In untabulated analysis, we re-estimate Table 4 in the post-SFAS 123R period and find similar results. We also revisit these analyses within the Execucomp sample in Table 12.

[16] When *Tail Risk* is the dependent variable, we remove *Return Variance* and *Annual Return* as control variables from the model because they are directly correlated with the dependent variable. Our results are not sensitive to this choice. If we include these market-based controls in the model, we continue to find a significantly negative association between both measures of PfP and tail risk.

Table 5
Cross-sectional variation in the determinants of Pay-for-Prudence.

	(1)	(2)
	Detailed PfP$_{t+1}$	*Concrete PfP*$_{t+1}$
Return Variance	−0.003***	−0.003***
	(-3.06)	(-3.03)
Return Variance × *High Equity Comp.*	0.002**	0.002**
	(2.17)	(2.21)
Annual Return	0.023	0.024
	(1.05)	(1.12)
Annual Return × *High Equity Comp.*	−0.012	−0.008
	(-0.28)	(-0.20)
Book to Market	−0.013	−0.014
	(-1.32)	(-1.45)
Book to Market × *High Equity Comp.*	−0.025	−0.017
	(-1.19)	(-0.87)
Tier 1 Ratio	0.144	0.215
	(0.49)	(0.80)
Tier 1 Ratio × *High Equity Comp.*	−0.551	−0.672**
	(-1.59)	(-2.00)
Loans/Assets	0.235**	0.242**
	(2.17)	(2.42)
Loans/Assets × *High Equity Comp.*	−0.329**	−0.352**
	(-2.19)	(-2.32)
Dep/Liab.s	0.127	0.139
	(1.25)	(1.54)
Dep/Liab.s × *High Equity Comp.*	−0.091	−0.062
	(-0.52)	(-0.37)
ln*(Entities)*	0.017	0.012
	(1.04)	(0.89)
ln*(Entities)* × *High Equity Comp.*	−0.030	−0.026
	(-1.34)	(-1.26)
ln*(Assets)*	0.037	0.118
	(0.25)	(0.94)
ln*(Assets)*^{2}	−0.001	−0.003
	(-0.11)	(-0.81)
ln*(Assets)* × *High Equity Comp.*	0.029	−0.016
	(0.16)	(-0.10)
ln*(Assets)*^{2} × *High Equity Comp.*	−0.001	0.001
	(-0.16)	(0.13)
Year FE × High Equity Comp.	Yes	Yes
Fed Dist FE × High Equity Comp.	Yes	Yes
N	5470	5470
Adj. R^2	0.08	0.08

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Column (1): *Detailed PfP*−An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes more than three references to pay-for-prudence terms. Column (2): *Concrete PfP*−An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes both more than three references to pay-for-prudence terms and two or more references to ratios. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier 1 Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

the costs. This evidence simply suggests that, among the sample of firms that self-select into using it, PfP is not associated with shareholder value *via* lower profitability on average. In other words, while PfP is associated with lower downside risk, the actions taken to achieve these goals consistent with regulators' preferences do not come at the expense of lower profitability on average.[17] We explore several mechanisms by which this may occur in sections 4.5 and section 4.7.

[17] In untabulated analysis, we find similar results using alternative measures of performance, such as *ROA*.

Table 6
Consequences of PfP.

Panel A - PFP Use and *Tail Risk*

	Tail Risk		Tail Risk	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.300***	−0.195**		
	(-3.43)	(-2.15)		
Concrete PfP			−0.301***	−0.221**
			(-3.31)	(-2.42)
High Equity Comp.	−0.128	−0.072	−0.128	−0.071
	(-1.42)	(-0.74)	(-1.41)	(-0.74)
Book to Market	0.763***	0.896***	0.763***	0.896***
	(3.95)	(2.73)	(3.95)	(2.74)
Tier 1 Ratio	−12.319***	−9.659***	−12.309***	−9.652***
	(-6.76)	(-5.52)	(-6.76)	(-5.53)
Loans/Assets	−1.315***	−0.568	−1.313***	−0.565
	(-3.34)	(-1.56)	(-3.33)	(-1.55)
Dep/Liab.s	−0.276	−0.575	−0.269	−0.566
	(-0.53)	(-1.10)	(-0.51)	(-1.08)
ln*(Entities)*	0.151**	0.122**	0.150**	0.122**
	(2.55)	(2.00)	(2.52)	(1.98)
ln*(Assets)*	−0.763**	−0.382	−0.752**	−0.372
	(-2.58)	(-1.18)	(-2.57)	(-1.15)
ln*(Assets)*^{2}	0.016*	0.006	0.015*	0.005
	(1.71)	(0.58)	(1.69)	(0.55)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.69	0.69	0.69	0.69

Panel B - PFP Use and Bad Loans/Assets

	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.119*	−0.084		
	(-1.72)	(-1.14)		
Concrete PfP			−0.147**	−0.139**
			(-2.08)	(-1.98)
High Equity Comp.	−0.307***	−0.260***	−0.307***	−0.258***
	(-3.83)	(-2.92)	(-3.82)	(-2.90)
Return Variance	0.020*	0.009	0.020*	0.009
	(1.76)	(1.34)	(1.76)	(1.34)
Annual Return	−1.011***	−0.948***	−1.012***	−0.949***
	(-7.58)	(-6.23)	(-7.58)	(-6.24)
Book to Market	0.321**	0.430***	0.321**	0.430***
	(2.52)	(2.78)	(2.52)	(2.79)
Tier 1 Ratio	−1.401	0.915	−1.398	0.911
	(-1.00)	(0.73)	(-1.00)	(0.73)
Loans/Assets	1.751***	2.355***	1.753***	2.358***
	(5.22)	(6.84)	(5.21)	(6.83)
Dep/Liab.s	−0.340	−0.551	−0.333	−0.541
	(-0.81)	(-1.13)	(-0.79)	(-1.11)
ln*(Entities)*	0.032	0.029	0.032	0.028
	(0.69)	(0.57)	(0.68)	(0.56)
ln*(Assets)*	−0.461	−0.331	−0.454	−0.323
	(-1.59)	(-1.07)	(-1.57)	(-1.05)
ln*(Assets)*^{2}	0.015*	0.012	0.015*	0.012
	(1.71)	(1.28)	(1.69)	(1.25)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.49	0.45	0.49	0.46

Panel C - PFP Use and *ROE*				
	ROE		ROE	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.007	0.004		
	(1.07)	(0.32)		
Concrete PfP			0.012*	0.007
			(1.68)	(0.59)
High Equity Comp.	−0.014	−0.009	−0.014	−0.009
	(-1.52)	(-0.84)	(-1.53)	(-0.86)
Return Variance	−0.003	−0.001	−0.003	−0.001
	(-1.49)	(-1.09)	(-1.49)	(-1.09)
Annual Return	0.099***	0.100***	0.099***	0.100***
	(3.66)	(3.76)	(3.66)	(3.75)
Book to Market	−0.095***	−0.067*	−0.095***	−0.067*
	(-3.05)	(-1.79)	(-3.05)	(-1.79)
Tier 1 Ratio	0.594**	0.131	0.594**	0.131
	(2.29)	(0.94)	(2.29)	(0.94)
Loans/Assets	0.047	−0.042	0.047	−0.042
	(1.33)	(-1.56)	(1.32)	(-1.57)
Dep/Liab.s	−0.045	−0.024	−0.046	−0.025
	(-1.30)	(-0.67)	(-1.33)	(-0.69)
ln*(Entities)*	−0.002	−0.003	−0.002	−0.003
	(-0.34)	(-0.51)	(-0.33)	(-0.51)
ln*(Assets)*	−0.025	−0.032	−0.026	−0.032
	(-0.88)	(-0.94)	(-0.90)	(-0.96)
ln$(Assets)^2$	0.001	0.001	0.001	0.001
	(1.29)	(1.16)	(1.31)	(1.18)-
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.28	0.17	0.28	0.17

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Panel A−*Tail Risk* the mean of the lowest 5% of returns for the year multiplied by negative 1 so that the measure is increasing in bad outcomes; Panel B−*Bad Loans/Assets* The ratio of the sum of loans past dues 90 days or more and non-accrual loans to assets; Panel C−*ROE* ratio of income before extraordinary items to equity. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier* 1 *Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln$(Assets)^2$−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: $*p < .1$, $**p < .05$, $***p < .01$.

4.5. Cross-sectional variation in the benefits of PfP

While we cannot observe the effect of PfP on banks that find it prohibitively costly to implement PfP goals, cross-sectional variation in the estimated relation between PfP and performance may provide insight into the costs and benefits of its implementation.

We begin this analysis by analyzing whether the association between PfP use and performance varies with size. Examining variation in the effects of PfP by bank size is important because historical evidence suggests that smaller banks are likelier to fail or be taken over by peers (Granja et al., 2017). Additionally, Hirtle et al. (2020) provide empirical evidence that large banks receive more supervisory attention than smaller banks. This attention may affect the role of PfP in two ways. First, large banks already receive significant regulatory attention regardless of their insolvency risk, so PfP may be less costly and/or less beneficial to implement for such banks. Second, supervisory attention provides an opportunity for larger banks to receive more frequent feedback regarding their insolvency risk. In the absence of such feedback, PfP may be more important for smaller banks to reduce insolvency risk.

We define *Small* as an indicator variable equal to 1 if the bank's total assets is below the 90th percentile of banks in that year. This definition reflects the high level of concentration in the U.S. banking industry. In the US, most bank holding companies are “small” relative to the members of the top size decile, while size differences are minor over the subsequent deciles. Table 7 re-estimates results from Table 6 after interacting PfP measures with *Small*. The interaction between *Small* and each PfP measure captures the difference in the association between PfP and performance at large and small banks. In Table 7 Panel A we test whether the association between PfP and *Tail Risk* is different among large and small banks. Consistent with

Table 7
Cross-sectional tests based on bank size.

Panel A - PFP Use and *Tail Risk*

	Tail Risk		Tail Risk	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.096	0.190		
	(0.39)	(0.86)		
Concrete PfP			0.135	0.100
			(0.47)	(0.37)
Detailed PfP × Small	−0.501*	−0.471**		
	(-1.91)	(-1.97)		
Concrete PfP × Small			−0.545*	−0.396
			(-1.81)	(-1.39)
Small	0.772***	0.630***	0.772***	0.603***
	(5.80)	(4.36)	(5.88)	(4.13)
High Equity Comp.	−0.214**	−0.128	−0.216**	−0.129
	(-2.24)	(-1.22)	(-2.25)	(-1.22)
Book to Market	0.796***	0.927***	0.797***	0.928***
	(4.05)	(2.83)	(4.05)	(2.83)
Tier 1 Ratio	−11.485***	−9.120***	−11.501***	−9.127***
	(-6.78)	(-5.81)	(-6.79)	(-5.81)
Loans/Assets	−1.069***	−0.395	−1.078***	−0.400
	(-2.83)	(-1.10)	(-2.85)	(-1.12)
Dep/Liab.s	0.297	−0.174	0.303	−0.167
	(0.61)	(-0.36)	(0.62)	(-0.35)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.68	0.69	0.68	0.69
pr($\beta_1 + \beta_2 = 0$)	0.00	0.00	0.00	0.00
pr($\beta_2 + \beta_3 = 0$)	0.32	0.52	0.47	0.47

Panel B - PFP Use and *Bad Loans/Assets*

	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.017	−0.027		
	(0.10)	(-0.16)		
Concrete PfP			−0.013	−0.102
			(-0.06)	(-0.58)
Detailed PfP × Small	−0.153	−0.057		
	(-0.81)	(-0.32)		
Concrete PfP × Small			−0.149	−0.036
			(-0.70)	(-0.19)
Small	−0.145	−0.240	−0.149	−0.245
	(-0.98)	(-1.45)	(-1.01)	(-1.46)
High Equity Comp.	−0.296***	−0.240***	−0.296***	−0.238***
	(-3.70)	(-2.70)	(-3.69)	(-2.67)
Return Variance	0.020*	0.009	0.020*	0.009
	(1.76)	(1.35)	(1.76)	(1.35)
Annual Return	−1.006***	−0.949***	−1.007***	−0.950***
	(-7.74)	(-6.51)	(-7.75)	(-6.53)
Book to Market	0.323**	0.428***	0.323**	0.427***
	(2.56)	(2.88)	(2.56)	(2.88)
Tier 1 Ratio	−1.588	0.573	−1.595	0.562
	(-1.22)	(0.50)	(-1.22)	(0.49)
Loans/Assets	1.655***	2.226***	1.654***	2.228***
	(5.13)	(6.60)	(5.13)	(6.61)
Dep/Liab.s	−0.425	−0.701	−0.419	−0.694
	(-1.03)	(-1.48)	(-1.02)	(-1.47)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.49	0.45	0.49	0.45
pr($\beta_1 + \beta_2 = 0$)	0.07	0.30	0.03	0.07
pr($\beta_2 + \beta_3 = 0$)	0.27	0.25	0.31	0.29

Panel C - PFP Use and *ROE*				
	ROE		ROE	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.013	−0.012		
	(-1.51)	(-1.26)		
Concrete PfP			−0.017*	−0.008
			(-1.92)	(-0.82)
Detailed PfP × *Small*	0.024*	0.018		
	(1.78)	(1.07)		
Concrete PfP × *Small*			0.033**	0.018
			(2.39)	(1.00)
Small	−0.048***	−0.033***	−0.048***	−0.032***
	(-3.41)	(-3.32)	(-3.51)	(-3.24)
High Equity Comp.	−0.013	−0.009	−0.013	−0.009
	(-1.35)	(-0.80)	(-1.36)	(-0.80)
Return Variance	−0.003	−0.001	−0.003	−0.001
	(-1.49)	(-1.09)	(-1.48)	(-1.09)
Annual Return	0.099***	0.101***	0.099***	0.101***
	(3.82)	(3.98)	(3.83)	(3.98)
Book to Market	−0.096***	−0.067*	−0.096***	−0.067*
	(-3.14)	(-1.84)	(-3.14)	(-1.84)
Tier 1 Ratio	0.599**	0.152	0.602**	0.154
	(2.46)	(1.13)	(2.47)	(1.15)
Loans/Assets	0.044	−0.042	0.044	−0.042
	(1.37)	(-1.58)	(1.39)	(-1.57)
Dep/Liab.s	−0.051*	−0.024	−0.051*	−0.024
	(-1.65)	(-0.71)	(-1.67)	(-0.71)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.28	0.17	0.28	0.17
pr($\beta_1 + \beta_2 = 0$)	0.21	0.66	0.06	0.51
pr($\beta_2 + \beta_3 = 0$)	0.01	0.26	0.10	0.27

Sample: All BHC-years for which a proxt statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Panel A−*Tail Risk* the mean of the lowest 5% of returns for the year multiplied by negative 1 so that the measure is increasing in bad outcomes; Panel B−*Bad Loans/Assets* The ratio of the sum of loans past dues 90 days or more and non-accrual loans to assets; Panel C−*ROE* ratio of income before extraordinary items to equity. **Interaction Variable**: *Small*−an indicator variable equal to 1 for banks that fall outside of the top decile of size. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier 1 Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). ***pr*($\beta_1 + \beta_2 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_1 + \beta_2 = 0$, where β_1 is the estimated coefficient on *Detailed PfP* or *Concrete PfP* and β_2 is the estimated coefficient on the interaction with *Small*. ***pr*($\beta_2 + \beta_3 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_2 + \beta_3 = 0$, where β_2 is the estimated coefficient on the interaction with *Small* and $\beta 3$ is the estimated coefficient on *Detailed PfP* or *Concrete PfP*. *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

the notion that small banks are more prone to bad outcomes than large banks we find a positive association between *Small* and *Tail Risk* in all periods. Furthermore, the coefficient on *Detailed PfP* × *Small* is negative and statistically significant. This result suggests that the negative association between PfP and risk is amplified among small relative to large banks.

In Panel B of Table 7, we examine whether the association between *PfP* and *Bad Loans* varies with bank size. While the estimates are directionally consistent with the results that we tabulate in Panel A of Table 7, the coefficients are not significant at traditional thresholds. In Panel C of Table 7, we examine whether the association between *PfP* and *ROE* varies by bank size, and find an interesting pattern. In column 3, we find some evidence that PfP is *negatively* associated with profitability (*ROE*) in period *t* among large banks, as suggested by the negative coefficient on the main effect of *Concrete PfP*. Furthermore, in columns 1 and 3 we find that PfP is associated with incrementally higher ROE for smaller banks, relative to larger ones in period *t*, as suggested by the significantly positive coefficient on the interaction of *PfP* x *Small*. Collectively, these results suggest PfP magnifies the results that we tabulate in Table 6 for small banks, relative to larger banks.

We next explore whether the relationship between PfP use and performance varies with bank leverage. Leverage as measured by regulatory capital is an indicator of bank solvency and a leading indicator of failure (Gopalan et al., 2021). Thus, banks with less regulatory capital may face different consequences than banks that have higher capital, all else equal. To study these differential effects, we create a variable, *Poor Cap*, that equals 1 if the bank's tier 1 capital ratio is below the 10th

percentile of banks in a given year, which reflects that the banks below the first decile are most likely to face heightened regulatory scrutiny.

Table 8 tabulates these results. In Panel A, we first examine whether the association between *PfP* and *Tail Risk* varies by bank leverage. We find that the negative association between PfP and Tail Risk is magnified for poorly capitalized banks in year *t*. This result suggests that, in year *t*, PfP is more effective in mitigating tail risk for banks that have weak capital positions.

In Table 8 Panel B, we examine whether the association between *PfP* and *Bad Loans* varies with bank leverage. As expected, banks with high leverage have more bad loans, on average. We estimate a negative association between *PfP* × *Poor Cap* and *Bad Loans* in time period *t*. This result suggests that implementing PfP for poorly capitalized banks is associated with significantly fewer non-performing loans in the year that these performance goals are implemented. Finally, in Table 8 Panel C, we examine whether the association between *PfP* and *ROE* varies with bank capitalization. While our coefficient estimates are directionally consistent with PfP incrementally aiding poorly capitalized banks through increased profitability, these estimates are not significant at traditional thresholds. Furthermore, it suggests a tangible benefit for poorly capitalized banks that may stave off regulatory intervention. Overall, the evidence in Table 8 is consistent with our economic framework, and suggests that the negative association between PfP and bank risk is concentrated among poorly capitalized banks that are more likely to face insolvency.

While PfP involves monetary rewards for managers, the results in Tables 7 and 8 are likely explained by PfP's use as a signal, as well as a direct monetary incentive. To explore the use of PfP as a signal, we examine how PfP can serve as a communication tool to bank creditors. Specifically, prior research suggests that bank depositors respond to negative signals about bank health (Iyer et al., 2016; Beck et al., 2022). This literature suggests that as performance deteriorates, non-core depositors may withdraw, or threaten to withdraw, their funding (Sheehan, 2013). This threat may strengthen the need for bankers to communicate their commitment to limit excessive risk-taking through the implementation of PfP. In other words, as non-core deposits increase as a funding source, banks may find it more beneficial to communicate with these depositors through PfP.

In Table 9, we examine cross-sectional variation in the association between PfP and performance based on the presence of greater non-core deposits. We interact the PfP indicator variables with the indicator variable *Low Core Deposits*. This variable equals 1 if, in year *t*, bank *i* is in the lowest decile of the ratio core deposits to total deposits. Core deposits include sources of stable deposit funding, such as checking and savings accounts. While these funds could be withdrawn at any time, prior research suggests that they are relatively sticky and are less prone to withdrawals (Sheehan, 2013). As such, core deposits are generally viewed as a more stable source of bank funding. For the purposes of our analyses, we follow Ellul and Yerramilli (2013) and define core deposits as all deposits held by BHCs' domestic subsidiaries, less time deposits greater than $100,000 and brokered deposits.[18] As reliance on *non-core deposits* increases, banks may need to increase the need to signal their commitment to prudence with these creditors. In Table 9, we find that the negative association between PfP and both *Tail Risk* (Panel A) and *Bad Loans* (Panel B) is amplified among banks with *Low Core Deposits*. Furthermore, in Panel C we find no difference in the association between PfP and profitability across banks with and without *Low Core Deposits*.

4.6. PfP and regulatory intervention

A key tenet of the economic framework that we discuss in section 2 is that PfP may help banks mitigate the likelihood of costly regulatory interference. This may occur for two reasons. First, PfP goals make executives' wealth more sensitive to actions that decrease the likelihood of failure. When the weight on these goals is large enough relative to executives' wealth, this direct incentive effect may be sufficient to avoid regulatory intervention. Second, as we note in section 2, prior research suggests that, beyond the direct monetary incentive, bonuses can serve as a mechanism to reveal managers' commitment to stakeholders, such as to regulators (Bushman, 2021; Guay et al., 2019).

Although the results from section 4.5 suggest that banks change their operations in a manner that is consistent with regulatory objectives, we directly test whether PfP is associated with actual changes in regulatory assessments by examining the association between PfP and regulatory downgrades. To do so, we create an indicator variable, *Downgrades*, which equals one if bank regulators downgrade the bank holding company's confidential composite rating in year t and equals zero otherwise.

We examine the association between *PfP* and *Downgrades* in Table 10 Panel A. The results indicate that, on average, PfP is associated with fewer downgrades in years *t* and *t+1*. In other words, PfP is negatively associated with the likelihood of being downgraded by the regulator, which reduces the possibility of costly regulatory interference.

We next explore whether the association between *PfP* and *Downgrades* varies with bank size and bank capitalization. In Table 10 Panel B, we find that the association between PfP and *Downgrades* is significantly more negative for small banks in year *t+1*. This result suggests that small banks that implement PfP are associated with fewer regulatory downgrades than their peers. Bank capitalization is an important determinant of regulators' allocation of time and attention (Beatty and Liao,

[18] Because bank regulatory financial reports do not explicitly break out deposits by insured status, prior research, such as Ellul and Yerramilli (2013), adjust total deposits in order to approximate insured status. Time deposits above $100,000 is a coarse proxy for uninsured deposit status. Furthermore, brokered deposits represent deposits arranged through third parties. These depositors do not have direct relationships with banks and may withdraw their deposits more quickly than others.

Table 8
Cross-sectional tests based on capitalization.

Panel A - PFP Use and *Tail Risk*

	Tail Risk		Tail Risk	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.249***	−0.242***		
	(-2.76)	(-2.68)		
Concrete PfP			−0.251***	−0.265***
			(-2.68)	(-2.90)
Detailed PfP × Poor Cap.	−0.530*	0.350		
	(-1.95)	(1.22)		
Concrete PfP × Poor Cap.			−0.482*	0.414
			(-1.85)	(1.41)
Poor Cap.	1.265***	0.820***	1.234***	0.817***
	(5.83)	(3.71)	(5.84)	(3.82)
High Equity Comp.	−0.149	−0.087	−0.148	−0.087
	(-1.63)	(-0.89)	(-1.63)	(-0.89)
Book to Market	0.741***	0.879***	0.742***	0.880***
	(3.80)	(2.62)	(3.80)	(2.63)
Loans/Assets	−0.341	0.203	−0.328	0.200
	(-0.96)	(0.58)	(-0.92)	(0.57)
Dep/Liab.s	0.051	−0.298	0.053	−0.288
	(0.11)	(-0.64)	(0.12)	(-0.62)
ln*(Entities)*	0.201***	0.159***	0.197***	0.160***
	(3.38)	(2.62)	(3.32)	(2.63)
ln*(Assets)*	−0.587**	−0.243	−0.569**	−0.240
	(-1.99)	(-0.78)	(-1.98)	(-0.77)
ln*(Assets)*^{2}	0.011	0.002	0.010	0.002
	(1.17)	(0.19)	(1.13)	(0.18)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.68	0.68	0.68	0.68
pr($\beta_1 + \beta_2 = 0$)	0.00	0.71	0.00	0.61
pr($\beta_2 + \beta_3 = 0$)	0.00	0.00	0.00	0.00

Panel B - PFP Use and *Bad Loans/Assets*

	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.074	−0.069		
	(-1.07)	(-0.90)		
Concrete PfP			−0.104	−0.133*
			(-1.46)	(-1.80)
Detailed PfP × Poor Cap.	−0.450**	−0.187		
	(-2.03)	(-1.02)		
Concrete PfP × Poor Cap.			−0.419**	−0.086
			(-2.00)	(-0.46)
Poor Cap.	0.590***	0.232*	0.567***	0.206
	(3.77)	(1.69)	(3.70)	(1.53)
High Equity Comp.	−0.301***	−0.254***	−0.300***	−0.252***
	(-3.76)	(-2.84)	(-3.74)	(-2.82)
Return Variance	0.019*	0.009	0.019*	0.009
	(1.77)	(1.35)	(1.77)	(1.35)
Annual Return	−0.980***	−0.939***	−0.979***	−0.939***
	(-7.74)	(-6.44)	(-7.71)	(-6.44)
Book to Market	0.314**	0.425***	0.314**	0.425***
	(2.52)	(2.82)	(2.52)	(2.82)
Loans/Assets	1.680***	2.150***	1.691***	2.159***
	(5.69)	(6.64)	(5.69)	(6.64)
Dep/Liab.s	−0.256	−0.541	−0.251	−0.532
	(-0.62)	(-1.08)	(-0.60)	(-1.06)
ln*(Entities)*	0.035	0.022	0.032	0.021
	(0.74)	(0.44)	(0.69)	(0.42)
ln*(Assets)*	−0.412	−0.326	−0.397	−0.315
	(-1.45)	(-1.07)	(-1.40)	(-1.03)
ln*(Assets)*^{2}	0.013	0.011	0.013	0.011
	(1.51)	(1.21)	(1.46)	(1.18)

Table 8 (*continued*)

Panel B - PFP Use and *Bad Loans/Assets*				
	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.50	0.46	0.50	0.46
pr($\beta_1 + \beta_2 = 0$)	0.02	0.16	0.01	0.22
pr($\beta_2 + \beta_3 = 0$)	0.49	0.81	0.45	0.55
Panel C - PFP Use and *ROE*				
	ROE		ROE	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.004	0.003		
	(0.85)	(0.42)		
Concrete PfP			0.007	0.007
			(1.58)	(0.95)
Detailed PfP × Poor Cap.	0.043	0.007		
	(1.11)	(0.11)		
Concrete PfP × Poor Cap.			0.045	0.003
			(1.15)	(0.04)
Poor Cap.	−0.131***	−0.018	−0.129***	−0.017
	(-4.13)	(-0.58)	(-4.24)	(-0.56)
High Equity Comp.	−0.014	−0.009	−0.014	−0.009
	(-1.58)	(-0.83)	(-1.59)	(-0.84)
Return Variance	−0.002	−0.001	−0.002	−0.001
	(-1.48)	(-1.09)	(-1.48)	(-1.09)
Annual Return	0.093***	0.100***	0.093***	0.100***
	(3.49)	(3.76)	(3.49)	(3.80)
Book to Market	−0.094***	−0.067*	−0.094***	−0.067*
	(-3.00)	(-1.78)	(-3.00)	(-1.78)
Loans/Assets	0.031	−0.050*	0.030	−0.051*
	(1.36)	(-1.80)	(1.32)	(-1.81)
Dep/Liab.s	−0.070**	−0.029	−0.070**	−0.029
	(-2.13)	(-0.77)	(-2.14)	(-0.79)
ln*(Entities)*	−0.003	−0.003	−0.003	−0.003
	(-0.64)	(-0.58)	(-0.60)	(-0.57)
ln*(Assets)*	−0.040	−0.034	−0.041	−0.034
	(-1.39)	(-0.97)	(-1.45)	(-1.02)
ln*(Assets)*^{2}	0.002*	0.001	0.002*	0.001
	(1.90)	(1.18)	(1.96)	(1.23)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.29	0.17	0.29	0.17
pr($\beta_1 + \beta_2 = 0$)	0.24	0.88	0.20	0.90
pr($\beta_2 + \beta_3 = 0$)	0.00	0.82	0.01	0.80

Sample: All BHC-years for which a proxt statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Panel A−*Tail Risk* the mean of the lowest 5% of returns for the year multiplied by negative 1 so that the measure is increasing in bad outcomes; Panel B−*Bad Loans/Assets* The ratio of the sum of loans past dues 90 days or more and non-accrual loans to assets; Panel C−*ROE* ratio of income before extraordinary items to equity. **Interaction Variable**: *Poor Cap.*−an indicator variable equal to 1 for banks that fall within the bottom decile of Tier 1 Capital Ratio. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). ***pr*($\beta_1 + \beta_2 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_1 + \beta_2 = 0$, where β_1 is the estimated coefficient on *Detailed PfP* or *Concrete PfP* and β_2 is the estimated coefficient on the interaction with *Poor*. ***pr*($\beta_2 + \beta_3 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_2 + \beta_3 = 0$, where β_2 is the estimated coefficient on the interaction with *Poor* and $\beta 3$ is the estimated coefficient on *Detailed PfP* or *Concrete PfP*. *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

Table 9
Cross-sectional tests based on core deposits.

Panel A - PFP Use and *Tail Risk*

	Tail Risk		Tail Risk	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.229**	−0.147		
	(-2.54)	(-1.60)		
Concrete PfP			−0.236**	−0.163*
			(-2.54)	(-1.75)
Detailed PfP × Low Core Dep.	−0.751***	−0.485*		
	(-3.23)	(-1.93)		
Concrete PfP × Low Core Dep.			−0.684***	−0.605**
			(-2.60)	(-2.27)
Low Core Dep.	0.701***	0.673***	0.658***	0.662***
	(4.83)	(4.13)	(4.57)	(4.08)
High Equity Comp.	−0.126	−0.075	−0.126	−0.075
	(-1.41)	(-0.79)	(-1.41)	(-0.78)
Book to Market	0.747***	0.883***	0.749***	0.885***
	(3.88)	(2.72)	(3.89)	(2.72)
Tier 1 Ratio	−12.109***	−9.413***	−12.083***	−9.393***
	(-6.82)	(-5.50)	(-6.79)	(-5.50)
Loans/Assets	−1.299***	−0.568	−1.286***	−0.558
	(-3.38)	(-1.63)	(-3.32)	(-1.60)
ln*(Entities)*	0.155***	0.126**	0.153***	0.124**
	(2.64)	(2.09)	(2.60)	(2.07)
ln*(Assets)*	−0.756**	−0.369	−0.737**	−0.357
	(-2.53)	(-1.13)	(-2.51)	(-1.11)
$\ln(Assets)^2$	0.015*	0.005	0.015	0.005
	(1.65)	(0.54)	(1.62)	(0.51)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.69	0.69	0.69	0.69
pr$(\beta_1 + \beta_2 = 0)$	0.00	0.01	0.00	0.00
pr$(\beta_2 + \beta_3 = 0)$	0.81	0.41	0.91	0.81

Panel B - PFP Use and *Bad Loans/Assets*

	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.075	−0.058		
	(-1.06)	(-0.78)		
Concrete PfP			−0.102	−0.111
			(-1.43)	(-1.59)
Detailed PfP × Low Core Dep.	−0.515**	−0.267		
	(-2.34)	(-0.92)		
Concrete PfP × Low Core Dep.			−0.574**	−0.245
			(-2.28)	(-0.85)
Low Core Dep.	0.351**	0.466***	0.334**	0.449***
	(2.48)	(3.07)	(2.15)	(2.61)
High Equity Comp.	−0.309***	−0.265***	−0.308***	−0.263***
	(-3.83)	(-2.98)	(-3.83)	(-2.96)
Return Variance	0.020*	0.009	0.020*	0.009
	(1.76)	(1.35)	(1.76)	(1.35)
Annual Return	−1.008***	−0.951***	−1.009***	−0.952***
	(-7.58)	(-6.29)	(-7.58)	(-6.30)
Book to Market	0.316**	0.423***	0.316**	0.423***
	(2.49)	(2.77)	(2.50)	(2.77)
Tier 1 Ratio	−1.304	1.122	−1.289	1.127
	(-0.94)	(0.89)	(-0.93)	(0.89)
Loans/Assets	1.736***	2.356***	1.746***	2.364***
	(5.13)	(6.68)	(5.14)	(6.68)
ln*(Entities)*	0.033	0.030	0.032	0.030
	(0.73)	(0.62)	(0.71)	(0.61)
ln*(Assets)*	−0.462	−0.321	−0.451	−0.312
	(-1.56)	(-1.01)	(-1.53)	(-0.99)
$\ln(Assets)^2$	0.016*	0.012	0.015*	0.012
	(1.68)	(1.23)	(1.65)	(1.20)

Table 9 (*continued*)

Panel B - PFP Use and *Bad Loans/Assets*				
	Bad Loans/Assets		Bad Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.49	0.46	0.49	0.46
pr($\beta_1 + \beta_2 = 0$)	0.01	0.27	0.01	0.21
pr($\beta_2 + \beta_3 = 0$)	0.52	0.55	0.29	0.44
Panel C - PFP Use and ROE				
	ROE		ROE	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.005	0.002		
	(0.71)	(0.16)		
Concrete PfP			0.010	0.005
			(1.41)	(0.43)
Detailed PfP × Low Core Dep.	0.026	0.015		
	(1.41)	(0.54)		
Concrete PfP × Low Core Dep.			0.021	0.010
			(1.12)	(0.34)
Low Core Dep.	0.003	−0.024	0.005	−0.023
	(0.27)	(-1.52)	(0.44)	(-1.49)
High Equity Comp.	−0.014	−0.009	−0.014	−0.009
	(-1.56)	(-0.86)	(-1.57)	(-0.87)
Return Variance	−0.003	−0.001	−0.003	−0.001
	(-1.49)	(-1.09)	(-1.48)	(-1.09)
Annual Return	0.099***	0.101***	0.099***	0.101***
	(3.65)	(3.78)	(3.66)	(3.78)
Book to Market	−0.095***	−0.066*	−0.095***	−0.066*
	(-3.06)	(-1.77)	(-3.06)	(-1.77)
Tier 1 Ratio	0.601**	0.126	0.601**	0.126
	(2.32)	(0.91)	(2.32)	(0.91)
Loans/Assets	0.045	−0.046*	0.044	−0.047*
	(1.26)	(-1.74)	(1.24)	(-1.76)
ln*(Entities)*	−0.002	−0.003	−0.002	−0.003
	(-0.35)	(-0.56)	(-0.34)	(-0.56)
ln*(Assets)*	−0.025	−0.032	−0.026	−0.033
	(-0.86)	(-0.98)	(-0.89)	(-1.00)
ln*(Assets)*^{2}	0.001	0.001	0.001	0.001
	(1.30)	(1.23)	(1.34)	(1.25)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.28	0.17	0.28	0.17
pr($\beta_1 + \beta_2 = 0$)	0.09	0.51	0.10	0.56
pr($\beta_2 + \beta_3 = 0$)	0.02	0.68	0.05	0.64

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9—C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Panel A—*Tail Risk* the mean of the lowest 5% of returns for the year multiplied by negative 1 so that the measure is increasing in bad outcomes; Panel B—*Bad Loans/Assets* The ratio of the sum of loans past dues 90 days or more and non-accrual loans to assets; Panel C—*ROE* ratio of income before extraordinary items to equity. **Interaction Variable**: *Low Core Dep.*—an indicator variable equal to 1 for banks that fall within the bottom decile of annual Core Deposits to Total Deposits Ratio. **Control Variables**: *High Equity Comp*— An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep/Liab.s*—Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*—Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Book to Market*—The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*—Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*—Volatility of daily returns over the fiscal year. ln(*Assets*)—Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)—Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2—Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9—C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). ***pr*($\beta_1 + \beta_2 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_1 + \beta_2 = 0$, where β_1 is the estimated coefficient on *Detailed PfP* or *Concrete PfP* and β_2 is the estimated coefficient on the interaction with *Poor*. ***pr*($\beta_2 + \beta_3 = 0$)**: Reports the p-value produced by an F-test of the hypothesis that $\beta_2 + \beta_3 = 0$, where β_2 is the estimated coefficient on the interaction with *Poor* and $\beta 3$ is the estimated coefficient on *Detailed PfP* or *Concrete PfP*. *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

Table 10
PfP and changes in regulatory rating.

Panel A - Relation between PFP Use and *Downgrades*

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.017*	−0.017*		
	(-1.81)	(-1.92)		
Concrete PfP			−0.016*	−0.019**
			(-1.67)	(-2.01)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.12	0.11	0.12	0.11

Panel B - Bank size and the relation between PFP Use and *Downgrades*

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.014	0.039		
	(-0.66)	(1.41)		
Concrete PfP			−0.019	0.043
			(-0.73)	(1.36)
Detailed PfP × Small	−0.005	−0.065**		
	(-0.22)	(-2.23)		
Concrete PfP × Small			0.001	−0.070**
			(0.04)	(-2.12)
Small	0.001	0.013	0.000	0.012
	(0.05)	(0.82)	(0.00)	(0.78)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.12	0.11	0.12	0.11

Panel C - Bank capitalization and the relation between PFP Use and *Downgrades*

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.009	−0.021**		
	(-0.87)	(-2.33)		
Concrete PfP			−0.008	−0.022**
			(-0.86)	(-2.50)
Detailed PfP × Poor Cap.	−0.074***	0.030		
	(-2.93)	(1.06)		
Concrete PfP × Poor Cap.			−0.073***	0.038
			(-2.68)	(1.24)
Poor Cap.	0.059***	0.013	0.056***	0.013
	(2.93)	(0.86)	(3.20)	(0.82)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.12	0.11	0.12	0.11

Panel D - Core deposits and the relation between PFP Use and *Downgrades*

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.016*	−0.017*		
	(-1.70)	(-1.82)		
Concrete PfP			−0.015	−0.018*
			(-1.48)	(-1.80)
Detailed PfP × Low Core Dep.	−0.002	0.007		
	(-0.04)	(0.19)		
Concrete PfP × Low Core Dep.			−0.001	0.007

Table 10 (*continued*)

Panel D - Core deposits and the relation between PFP Use and *Downgrades*

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
			(-0.02)	(0.18)
Low Core Dep.	0.047***	0.042***	0.048***	0.042***
	(3.01)	(2.70)	(2.95)	(2.63)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.13	0.11	0.13	0.11

Panel E – The Financial Crisis and the relation between PFP Use and Downgrades

	Downgrades		Downgrades	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.015	−0.003		
	(-1.54)	(-0.38)		
Detailed PfP × CRISIS	−0.005	−0.087***		
	(-0.14)	(-2.58)		
Concrete PfP			−0.016*	−0.002
			(-1.69)	(-0.17)
Concrete PfP × CRISIS			−0.003	−0.088***
			(-0.11)	(-2.68)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5470	5839	5470
Adj. R^2	0.12	0.11	0.12	0.11

t statistics in parentheses.
*$p < .1$, **$p < .05$, ***$p < .01$.

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** All panels −*Downgrade* an indicator variable equal to 1 in years where examiners downgrade the BHC's regulatory rating and zero otherwise. In each table the dependant variable is measured in *t* in columns (1) and (3) and *t* + 1 in columns (2) and (4). **Interaction Variable**: Panel B−*Small*−an indicator equal to one for all banks that fall outside of the top decile of size; Panel C−*Poor Cap.*−an indicator variable equal to 1 for banks that fall within the bottom decile of Tier 1 Capital Ratio; Panel D−*Low Core Deposits*, which equals 1 if in year *t*, bank *i* has a core deposits to total deposits ratio in the lowest decile. Panel E−*CRISIS*−an indicator equal to 1 for years 2007−2009 inclusive. **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Dep*/*Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans*/*Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier* 1 *Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

2014; Gopalan et al., 2021). Thus, the signalling and incentive mechanisms of PfP may be more salient for poorly capitalized banks. In Panel C of Table 10, we find that the association between *PfP* and *Downgrades* is amplified for poorly capitalized banks in year *t*. In Panel D of Table 10, we examine the association between *PfP* and *Downgrades* for banks with low core deposits but do not find any significant differences across banks with and without low core deposits.

Lastly, in panel E of Table 10, we examine the role that PfP may have had during the financial crisis of 2007−2009. Given how severely the crisis impacted bank performance, PfP may have had a particularly important role during this period of acutely weak performance in the banking industry. We measure an indicator variable, *CRISIS*, equals to 1 for the years during the financial crisis (2007−2009), and zero otherwise. We interact PfP with *CRISIS* and find evidence that, relative to their peers, banks with PfP are associated with a lower likelihood of being downgraded by regulators during the financial crisis.

4.7. PfP and loan portfolio allocation

We explore a potential mechanism through which PfP and is associated with bank risk by examining the association between PfP and loan portfolio decisions. Although changes in performance and regulatory downgrades likely reflect shifts in

Table 11
PfP loan portfolio allocation.

Panel A - Relation between PFP Use and *Portfolio Diversification*				
	Portfolio Diversification		Portfolio Diversification	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	0.026**	0.023**		
	(2.51)	(2.19)		
Concrete PfP			0.026**	0.023**
			(2.43)	(2.08)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.38	0.39	0.38	0.39
Panel B - Relation between PFP Use and *Real Estate Loans/Assets*				
	Real Estate Loans/Assets		Real Estate Loans/Assets	
	(1)	(2)	(3)	(4)
	t	t+1	t	t+1
Detailed PfP	−0.012**	−0.013**		
	(-2.08)	(-2.15)		
Concrete PfP			−0.012**	−0.012*
			(-1.97)	(-1.93)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	5839	5309	5839	5309
Adj. R^2	0.69	0.66	0.69	0.66

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and equity compensation expense is reported in Compustat. **Dependent Variables:** Panel A−*Portfolio Diversification* The HHI of the banks loan portfolio multiplied by negative 1 so that the measure is decreasing in concentration; Panel B−*Real Estate Loans/Assets* Loans backed by real estate divided by total assets; **Control Variables**: *High Equity Comp*− An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Deps/Liab.s*−Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*−Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier* 1 *Ratio*−Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*−The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*−Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVolatility*−Volatility of daily returns over the fiscal year. ln(*Assets*)−Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)−Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2−Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: *$p < .1$, **$p < .05$, ***$p < .01$.

capital allocation, these are indirect measures of banks' operational choices. If PfP does indeed motivate or signal prudent choices, then we expect this to manifest in structure of the bank's loan portfolio.

To explore changes in loan portfolio allocation, we use the following empirical model:

$$Strategy\ Measure_{i,\tau} = \phi_f + \lambda_t + \beta PfP_{i,t} + \mathbf{X}_{i,t}\gamma + \varepsilon_{i,t} \quad (3)$$

where τ is the time period in which we measure the outcome (t or $t+1$), and all other estimation, controls, and fixed effects are all similar to those described in our estimation of equation (1). We first examine the association between PfP and loan portfolio diversification. *Portfolio Diversification* is equal to negative one multiplied by the Herfindahl-Hirschman Index of the bank's capital allocation across commercial loans, real estate loans, consumer loans, governmental loans, and agricultural loans.[19] Panel A of Table 11 tabulates the results of estimating Equation (3) with *Portfolio Diversification* measured in t and $t+1$ using both *Detailed PfP* and *Concrete PfP*. We find that PfP is associated with more diversified loan portfolios in both t and $t+1$. Furthermore, in untabulated analysis, we estimate a small and statistically insignificant association between PfP and the allocation of capital to commercial loans, consumer loans, governmental loans, and agricultural loans. However, we do find evidence that PfP banks reduce their exposure to real estate loans, which we report in Panel B of Table 11. This evidence suggests that the positive relation between PfP and *Portfolio Diversification* is, on average, due to banks reducing exposure to the real estate market and spreading their exposure across other markets.

[19] We multiply by negative one so greater values of *Portfolio Diversification* reflect greater loan portfolio diversification, as opposed to more concentrated loan portfolios.

Diversification may have different consequences for shareholders and regulators. On one hand, regulatory manuals instruct bank boards of directors and management to establish processes for reporting and managing concentrations of credit, as these concentrations may contribute to financial deterioration and failure. Regulators recommend that bank boards of directors analyze and monitor the potential effect of loan concentrations on the bank's asset quality, earnings, capital, and liquidity.

On the other hand, concentrations of credit may be viewed favorably by shareholders. Stomper (2006) suggests that specialization in a given sector may enable banks to extract more rents. Consistent with this theory, empirical evidence from a wide variety of settings suggest that concentrations of credit (or specialization) increases profitability (Stomper, 2006; Rossi et al., 2009; Berger et al., 2010; Tabak et al., 2011). These results suggest that, on average, PfP-induced diversification may increase costs to bank shareholders.

Although our results suggest that PfP is associated with changes in loan portfolio allocation, it is not without caveats. First, in the absence of a mandatory adoption regime, examining the costs and benefits of PfP adoption is challenging. The variation in PfP that we observe is driven by banks which, ex-ante, find it positive NPV to implement these changes. Indeed, while we find that PfP-adopting banks diversify their loan portfolios, they are no less profitable than their (presumably less diversified) counterparts.[20] Given that PfP adoption is voluntary, we can only highlight situations where the incremental benefits of PfP adoption are magnified.

4.8. Alternate measures of equity incentives

In section 4.2 we present results using the equity compensation expense that banks report in Compustat. We believe that this is a reasonable proxy for banks use of equity compensation, and that it is important to provide insight based on the broadest possible sample of banks. However, we recognize that equity compensation expense reported in Compustat has a number of shortcomings. First, until SFAS 123R adoption in 2006 this number likely understates the extent to which banks use options to give equity exposure to their executives. Second, this is an aggregate number for the entire firm rather than a measure of the management team's actual portfolio of equity-based incentives. Finally, lumping equity compensation together does not differentiate between incentives to increase the firm's stock price and incentives to increase the volatility of the firm's stock price. While shareholder alignment in any form may exacerbate the agency problem that arises between shareholders and other stakeholders (e.g., regulators and creditors), we believe that option grants are likely to be much stronger in this regard as they reward stock price increases but do not penalize decreases, and effectively make the value of managers' wealth a function of the volatility of the firm's stock price, which creates incentives for banks managers to increase risk.

To mitigate concerns that using Compustat to measure equity-based incentives creates too noisy a proxy for incentives to increase risk, we use data from Execucomp between 1994 and 2017 to measure the sensitivity of bank executives' wealth to changes in stock price and volatility. The major limitation of Execucomp is that data are only available for a limited subsample of banks that are either current or former S&P 1500 components. To differentiate incentives to increase risk from sensitivity of compensation to stock price, we use Vega and Delta to estimate the change in the value of the executive's portfolio due to a one percent change in the volatility and the price of the stock and equity held by bank executives, respectively. Delta and Vega are calculated following Coles et al. (2006) and Core and Guay (2002). The levels of Delta and Vega that we observe are low relative to those of industrial firms, but high relative to those in studies of banks that focus on the first portion of our sample period when equity compensation was less common. Our calculations of Delta and Vega match the data published by Coles et al. (2006) for the period where our samples overlap.

In Table 12 we repeat the analysis from Table 4 replacing *High Equity Compensation* with ln(*Vega*) and ln(*Delta*), where these are the natural logs of the Delta and Vega discussed above, aggregated at the top management team level (i.e. one observation per bank-year in Execucomp). Consistent with our interpretation of the results in Table 4, and our conjecture that it is risk-taking incentives from Vega that PfP is being employed to address, we find a positive and significant association between ln(*Vega*) and PfP in all four columns of Table 12.

4.9. Sensitivity of compensation flows to performance measures

In our final analysis we attempt to shed some light on the extent to which PfP operates as a direct monetary incentive or a potential signal to outside stakeholders. If the predominant role of PfP is to explicitly tie bankers' pay to measures of prudence, then PfP should be associated with a higher sensitivity of compensation to measures that are aligned with regulators' stated objectives. However, public disclosure of PfP targets makes it challenging to separate the incentive role of PfP from the signalling role. To illustrate, we return to the example of United Financial Bankcorp. In 2011 United Financial Bancorp reported that they had awarded one quarter of the Chief Lending Officer's (CLO) cash bonus based on credit quality. This bonus can signal to regulators and other stakeholders that the bank is committed to credit quality while simultaneously providing a twofold incentive for the CLO to maintain credit quality. First, the cash value of the bonus, a modest $10,380 of the total

[20] In untabulated analysis, we find that while overall profitability is not different from non-adopting banks, PfP-adopting banks make less real estate income as a percentage of their loan portfolio.

Table 12
Determinants of Pay-for-Prudence, Execucomp subsample.

	(1)	(2)	(3)	(4)
	Detailed PfP_{t+1}	*Concrete* PfP_{t+1}	*Detailed* PfP_{t+1}	*Concrete* PfP_{t+1}
ln(*Vega*)	0.158*	0.104*	0.199**	0.145**
	(1.94)	(1.69)	(2.10)	(2.25)
ln(*Delta*)	−0.041	−0.042	−0.043	−0.039
	(-1.16)	(-1.35)	(-1.14)	(-1.19)
Return Variance			−0.002	−0.003
			(-1.14)	(-1.47)
Annual Return			0.075**	0.053
			(1.99)	(1.56)
Book to Market			0.040	0.042
			(0.83)	(0.89)
Tier 1 Ratio			−0.873	−0.538
			(-1.57)	(-1.07)
Loans/Assets			−0.147	−0.115
			(-1.21)	(-1.03)
Dep/Liab.s			0.373**	0.270**
			(2.36)	(2.06)
ln(*Entities*)			−0.004	−0.011
			(-0.19)	(-0.50)
ln(*Assets*)			0.125	0.095
			(0.91)	(0.72)
$\ln(Assets)^2$			−0.004	−0.003
			(-0.92)	(-0.74)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
N	2022	2022	2022	2022
Adj. R^2	0.07	0.08	0.08	0.08

Sample: All BHC-years for which a proxy statement is available on EDGAR, Y9−C data is available from WRDS, and information needed to calculate Delta and Vega are available in Execucomp. **Dependent Variables:** Columns (1) & (3): *Detailed PfP*—An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes more than three references to pay-for-prudence terms. Columns (2) & (4): *Concrete PfP*—An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes both more than three references to pay-for-prudence terms and two or more references to ratios. **Control Variables**: ln(*Vega*) The natural logarithm of one U.S. dollar plus *Vega*. Where *Vega* is the sum across all NEOs of the sensitivity of each NEO's wealth to a 1% change in volatility of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). ln(*Delta*) The natural logarithm of one U.S. dollar plus *Delta*. Where *Delta* is the sum across all NEOs of the sensitivity of the NEO's wealth to a 1% change in value of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). *Deps/Liab.s*—Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*—Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Tier 1 Ratio*—Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *Book to Market*—The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*—Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*—Volatility of daily returns over the fiscal year. ln(*Assets*)—Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)—Natural logarithm of the number of entities held by the bank holding company. $\ln(Assets)^2$—Square of logged book value of total assets (BHCK2170). All bank variables are calculated from Y9−C data provided by WRDS, except for the market-based measures from CRSP and Compustat. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). *t* statistics are reported in parentheses. Statistical significance is indicated as follows: $*p < .1$, $**p < .05$, $***p < .01$.

$39,694 bonus,[21] provides a monetary incentive for the CLO to maintain credit quality. Second, and perhaps more importantly, United Financial Bancorp is providing a clear report of the CLO's performance to the labor market, thereby providing strong reputational incentives for the CLO to maintain credit quality.

We test whether PfP is associated with differences in the sensitivity of pay to performance using two proxies for bank compensation flows. Because our primary sample consists of all publicly traded BHCs on Compustat, we use Compustat data to measure the first proxy: total compensation expense (ln(*Comp. Expense/Assets*)). Compustat-based compensation measures are observable for our entire sample, but reflect compensation for all bank employees, including many that may not have direct influence on prudential actions. Thus, Compustat-based measures provide noisy proxies for executive compensation. To mitigate this concern, our second measure isolates executive compensation flows using the sub-sample of banks that are covered by Execucomp. When using Execucomp we measure the value of total compensation (ln(*Total Compensation/Assets*)).

Using these measures of compensation flows, we estimate the association between compensation and the interactions of PfP (*Detailed PfP* and *Concrete PfP*) and two flow measures that reflect bank prudence: Δ*Tier 1 Ratio* and *NPL/Assets*. These estimates capture the differential pay for prudence between banks that disclose concrete PfP measures and those that do not. If PfP serves predominantly as a direct monetary incentive to bank executives, we should observe a higher sensitivity of compensation to these measures of prudence among PfP banks. Specifically, because positive changes in *Tier 1 Ratio* and lower *NPL/Assets* both reflect greater prudence, PfP banks' compensation should be increasing in Δ *Tier 1 Ratio*, and decreasing in

[21] The credit quality contingent bonus amounted to 5% of the CLO's $196,669 salary in that year.

Table 13
PfP and pay-performance sensitivity.

Panel A - Sensitivity of ln*(Comp. Expense/Assets)*$_{t+1}$ to performance

	ln*(Comp. Expense/Assets)*$_{t+1}$			
	(1)	(2)	(3)	(4)
Detailed PfP	−0.040	−0.025		
	(-1.33)	(-0.80)		
Δ*Tier 1 Ratio* × *Detailed PfP*	−0.856	−0.728		
	(-1.35)	(-1.11)		
NPL/Assets × *Detailed PfP*	0.681	0.691		
	(0.61)	(0.61)		
ROE × *Detailed PfP*	0.057	0.016		
	(1.12)	(0.28)		
Concrete PfP			−0.051*	−0.046
			(-1.76)	(-1.55)
Δ*Tier 1 Ratio* × *Concrete PfP*			−0.691	−0.819
			(-1.01)	(-1.22)
NPL/Assets × *Concrete PfP*			1.693	1.965
			(1.34)	(1.50)
ROE × *Concrete PfP*			0.048	0.008
			(0.88)	(0.13)
Δ*Tier 1 Ratio*	0.369	0.463*	0.336	0.478**
	(1.28)	(1.86)	(1.12)	(1.97)
NPL/Assets	−0.680	−0.030	−0.871	−0.290
	(-0.57)	(-0.03)	(-0.75)	(-0.33)
ROE	−0.146***	−0.090***	−0.145***	−0.089***
	(-3.15)	(-2.77)	(-3.21)	(-2.80)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
N	3134	3134	3134	3134
Adj. R^2	0.09	0.29	0.09	0.29

Panel B - Sensitivity of ln*(Total Compensation/Assets)*$_{t+1}$ to performance

	ln*(Total Compensation/Assets)*$_{t+1}$			
	(1)	(2)	(3)	(4)
Detailed PfP	0.031	0.056		
	(0.28)	(1.19)		
Δ*Tier 1 Ratio* × *Detailed PfP*	3.453	1.491		
	(1.07)	(0.91)		
NPL/Assets × *Detailed PfP*	−4.821	−0.949		
	(-0.97)	(-0.40)		
ROE × *Detailed PfP*	0.001	0.080		
	(0.01)	(0.74)		
Concrete PfP			0.119	0.020
			(0.96)	(0.40)
Δ*Tier 1 Ratio* × *Concrete PfP*			5.929**	2.254
			(2.00)	(1.44)
NPL/Assets × *Concrete PfP*			−6.930	1.232
			(-0.97)	(0.43)
ROE × *Concrete PfP*			−0.033	0.072
			(-0.18)	(0.58)
Δ*Tier 1 Ratio*	−2.654**	−1.039	−2.998**	−1.126
	(-2.17)	(-1.38)	(-2.41)	(-1.51)
NPL/Assets	−6.840	−2.249	−6.827	−2.715
	(-1.23)	(-1.30)	(-1.30)	(-1.61)
ROE	−0.083	0.122	−0.077	0.127
	(-0.53)	(1.63)	(-0.49)	(1.63)
Year FE	Yes	Yes	Yes	Yes
Fed Dist FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
N	1679	1679	1679	1679
Adj. R^2	0.08	0.73	0.08	0.73

Sample: Panel (A)—All BHC-years for which a proxy statement is available on EDGAR, Y9—C data is available from WRDS, and equity compensation expense is reported in Compustat. Panel (B)—All BHC-years for which a proxy statement is available on EDGAR, Y9—C data is available from WRDS, and equity compensation information is reported in Execucomp. **Dependent Variables:** ln*(Comp. Expense/Assets)* is the natural log of compensation expense (Compustat mnemonic xstfws) plus one dollar scaled by total assets (Compustat mnemonic at). *ln(Stock Comp. Expense/Assets)* is the natural log of compensation expense (Compustat mnemonic stkco) plus one dollar scaled by total assets (Compustat mnemonic at). **Variables of Interest:** Columns (1) & (3): *Detailed PfP*—An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes more than three references to pay-for-prudence terms. Columns (2) & (4): *Concrete PfP*—An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a

includes both more than three references to pay-for-prudence terms and two or more references to ratios. Columns (1)–(4): Δ*Tier 1 Ratio* is the change from $t-1$ to t in *Tier* 1 *Ratio*—the ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *NPL/Assets* the ratio of non-performing loans (BHCK5525 and BHCK5526) to total assets (BHCK2170), and *ROE* is income (BHCK4300) over equity (BHCK3210). **Control Variables**: In both panels we control for the following variables: *Dep/Liab.s*—Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *Loans/Assets*—Ratio of total loans (BHCK2122) to total assets (BHCK2170). *Book to Market*—The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *AnnualReturn*—Annual return, ratio of this year's price (prcc_f) to last year's price minus 1, adjusted for stock splits and issues (ajex). *ReturnVariance*—Volatility of daily returns over the fiscal year. ln(*Assets*)—Natural logarithm of the book value of total assets (BHCK2170). ln(*Entities*)—Natural logarithm of the number of entities held by the bank holding company. ln(*Assets*)^2—Square of logged book value of total assets (BHCK2170). In panel B we also include controls for the following variables: ln(*Vega*) The natural logarithm of one U.S. dollar plus *Vega*. Where *Vega* is the sum across all NEOs of the sensitivity of each NEO's wealth to a 1% change in volatility of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). ln(*Delta*) The natural logarithm of one U.S. dollar plus *Delta*. Where *Delta* is the sum across all NEOs of the sensitivity of the NEO's wealth to a 1% change in value of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). All bank variables are calculated from Y9—C data provided by WRDS, except for the market-based measures from CRSP and Compustat and compensation information from Execucomp. **Fixed Effects**: All models include controls for fiscal year and Federal Reserve District, as indicated below the tabulated estimates (Correia, 2017). **Estimation**: All results are calculated using ordinary least squares (OLS), with standard errors clustered by bank. We handle singletons according to Correia (2017). t statistics are reported in parentheses. Statistical significance is indicated as follows: $*p < .1$, $**p < .05$, $***p < .01$.

NPL/Assets. We also examine whether the sensitivity of banks' compensation to profitability (*ROE*) varies based on PfP. On one hand prudent banks may place less weight on *ROE* to encourage long term focus in decision making, while on the other hand banks may use PfP to fine-tune the short-term profit seeking motives of *ROE* based compensation schemes. Therefore, we do not have ex-ante predictions with respect to the interaction of *ROE* and PfP.

In panel A of Table 13 we use compensation measures from Compustat, and do not find significant evidence of differential sensitivity of ln*(Comp. Expense/Assets)* to any of our performance measures across banks with and without PfP. Since clear patterns do not emerge in the Compustat sample, we turn to analysis of the Execucomp subsample. In panel B we repeat the analysis using ln*(Total Compensation/Assets)*. We find some modest evidence of a direct monetary incentive, as demonstrated by the positive coefficient on the interaction of Δ *Tier 1 Ratio* and *Concrete PfP* in column (3) of Table 13. This result suggests that, among banks with PfP, the sensitivity of executives' compensation is higher when banks exhibit prudence by increasing their Tier 1 Capital Ratio. However, we note that this result is no longer statistically significant after controlling for other bank fundamentals in column (4) of Table 13.

Overall, we interpret the results in Table 13 examining the direct incentive mechanism of PfP with caution for several reasons. First, while we find some modest evidence that banks' sensitivity of compensation to changes in capital ratios is increasing among banks with concrete PfP, this result is concentrated among only the subsample of large banks and does not hold in our more comprehensive sample of all publicly traded BHCs. Second, even among the sample of the largest banks available on Execucomp, we do not find evidence that the sensitivity of compensation to other PfP proxies (e.g., non-performing loans) is higher among PfP banks. Third, in additional untabulated analysis, rather than examining compensation flows, we examine the sensitivity of *changes* in banks' compensation to changes in PfP proxies (Δ*Tier 1 Ratio* and *NPL/Assets*) similar to Leone et al. (2006). We do not find any statistically significant evidence that the sensitivity of changes in compensation to changes in capital ratios or changes in non-performing loans is greater for PfP banks. Thus, these results leave open the possibility that PfP may serve complementary roles as an incentive, as well as a signal to stakeholders.

5. Conclusion

In this study, we provide the first evidence that prudential principles shape executive compensation contracts in the banking industry. We show that PfP has grown over time and its usage predates the financial crisis. We find that PfP is positively associated with equity-based incentives for risk-taking, suggesting that it serves as a guard rail against imprudent risk-taking as manager-shareholder alignment increases.

PfP is also associated with fewer bad loans, lower tail risk, and fewer regulatory downgrades. We find that these benefits largely accrue to smaller banks as well as banks with high leverage. Lastly, we find that PfP adoption is associated with greater loan portfolio diversification. While diversification may be costly to bank shareholders, we cannot precisely tease out costs and benefits, due to the voluntary nature of PfP adoption. Taken together, we find that PfP is associated with differences in the way banks' boards balance value maximization and the risk of insolvency.

Future research can further explore the labor market effects of PfP, both in terms of how prudential success and failure impact executive careers, and how PfP adoption impacts banks' ability to attract and retain top talent. Recent bank failures following increases in interest rates also highlight the opportunity for researchers to take a broader view of safety and soundness beyond regulators' traditional measures of credit quality.

A. Appendix. Variable definitions.

Pay-for-Prudence Measures:	
Detailed PfP	An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes more than three references to pay-for-prudence terms. *SEC EDGAR*
Concrete PfP	An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes both more than three references to pay-for-prudence terms and two or more references to ratios. *SEC EDGAR*

Vague PfP	An indicator variable equal to one if we detect that the compensation discussion in the bank's Def 14a includes three or fewer references to pay-for-prudence terms. *SEC EDGAR*
Any PfP	An indicator equal to one if the bank holding company includes any of the prudential terms from Section 2 in their proxy-statement discussions of compensation. *SEC EDGAR*
Equity Incentive Measures	
High Equity Compensation	An indicator variable equal to one if the firm reports equity compensation expense (stkco) scaled by total assets above the sample median. *Compustat via WRDS*
Vega	Sum across all NEOs of the sensitivity of each NEO's wealth to a 1% change in volatility of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). *Execucomp via WRDS*
Delta	Sum across all NEOs of the sensitivity of the NEO's wealth to a 1% change in value of the bank's stock in thousands of US Dollars. Calculated following Coles et al. (2006). *Execucomp via WRDS*
ln*(Comp. Expense/Assets)*	The natural log of compensation expense (Compustat mnemonic xstfws) scaled by total assets (Compustat mnemonic at). *Compustat via WRDS*
ln*(Stock Comp. Expense/Assets)*	The natural log of compensation expense (Compustat mnemonic stkco) scaled by total assets (Compustat mnemonic at). *Compustat via WRDS*
ln*(Bonuses/Assets)*	The natural log of bonus compensation (Execucomp (AnnComp) mnemonic bonus) scaled by total assets (Compustat mnemonic at). *Compustat via WRDS*
ln*(Equity Grant Value/Assets)*	The value of options and shares granted calculated following Coles et al. (2006) divided by total assets (Compustat mnemonic at). *Compustat via WRDS*
Controls and Bank Performance:	
Tail Risk	The mean of the lowest 5% of the firm's daily returns for the year multiplied by negative 1 so that the measure is increasing in bad outcomes. *CRSP via WRDS*
ROA	Ratio of income before extraordinary items (BHCK4300) to total assets (BHCK2170) *BHC Call Reports via WRDS*
ROE	Ratio of income before extraordinary items (BHCK4300) to equity (BHCK3210) *BHC Call Reports via WRDS*
AnnualReturn	Ratio of this year's price (prcc_f) to last years price minus 1, adjusted for stock splits and issues (ajex). *Compustat via WRDS*
ReturnVolatility	Volatility of daily returns over the fiscal year*CRSP via WRDS*
Deps/Liab.s	Ratio of total deposits (the sum of BHDM6631, BHDM6636, BHFN6631, BHFN6636) to total liabilities (BHCK2948). *BHC Call Reports via WRDS*
Tier − 1 Ratio	Ratio of Tier-1 capital (BHCK8274 until 2014, BHCA8274 thereafter) to total assets (BHCK2170). *BHC Call Reports via WRDS*
Loans/Assets	Ratio of total loans (BHCK2122) to total assets (BHCK2170). *BHC Call Reports via WRDS*
Bad Loans/Assets	Percentage of bad loans. Ratio of the sum of loans past due 90 days or more (BHCK5525) and non-accrual loans (BHCK5526) to assets (BHCK2170) multiplied by 100. *BHC Call Reports via WRDS*
Book to Market	The ratio of the bank's book value (ceq) to market value (csho × prcc_f). *Compustat Bank via WRDS*
ln(*Entities*)	Natural logarithm of the number of entities held by the bank holding company. *BHC Call Reports via WRDS*
ln(*Assets*)	Natural logarithm of the book value of total assets (BHCK2170). *BHC Call Reports via WRDS*
ln(*Assets*)^2	Square of logged book value of total assets (BHCK2170) *BHC Call Reports via WRDS*
Loan Portfolio Diversification	The sum of the squared shares of the bank's portfolio of loans across the components reported in the Y9−C (Real Estate, Commercial, Consumer, Government, and Agricultural) multiplied by negative 1 so that more concentrated portfolios have lower diversification.
Downgrade	An indicator variable equal to 1 in years where regulators downgrade the confidential regulatory rating for a bank and zero otherwise. Based on confidential examination data.
Real Estate Loans/Assets	The amount of loans that are backed by real estate (BHCK4011) divided by total assets (BHCK2170).
Real Estate Interest Income/Assets	The sum of real estate interest incomes reported in the call reports of the individual commercial banks held by each of the bank holding companies in our sample. While the call report data is public, we use the Federal Reserve's proprietary data on the bank holding company structure to assign commercial banks to bank holding companies. Assets are BHCK2170.
Small	an indicator equal to one for all banks that fall outside of the top decile of size.
Poor	an indicator variable equal to 1 for banks that fall within the bottom decile of Tier 1 Capital Ratio.
CRISIS	an indicator equal to 1 for years 2007 to 2009inclusive.
Low Core Deposits	an indicator equal to 1 if in year *t*, bank *i* has a core deposits to total deposits ratio in the lowest decile. Core deposits are the sum of all deposits held by the bank holding company's subsidiaries in domestic offices less brokered deposits (deposits facilitated by third parties) and time deposits (deposits with prearranged maturities).

B. Appendix. Measure construction and validation.

B.1. Measure construction.

To measure pay-for-prudence, we first obtain all of the Definitive 14a (Proxy Statements) filings by public bank holding companies from EDGAR. We then use a series of regular expressions to remove formatting information and identify compensation discussions. We define compensation discussions as paragraphs (groups of 1000 characters) that contain key compensation terms. The key compensation terms we search for are “award”, “bonus”, “compensation”, and “incentive” with their common variants.[22] We then remove all compensation discussions that include references to shareholder votes and proposals. We use compensation-related paragraphs, rather than the Compensation Discussion and Analysis (CD&A) section

[22] We do not search for the term “pay” as the term is not unique to compensation discussions.

to focus our search, because the CD&A does not appear in proxy statements until 2006. As a result, the CD&A can only provide information about the incentive structures that were in place from 2006 onward, and we are interested in detecting pay-for-prudence consistently from the start of EDGAR.

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 CAMELS ratings, the private supervisory ratings that Federal Reserve examiners assign to banks after examinations. The primary quantitative output from periodic examinations, CAMELS ratings summarize banks' safety and soundness with an integer from 1 to 5. These ratings combine analyses of capital adequacy (C), asset quality (A), management (M), earnings (E), liquidity (L), and sensitivity to market risk (S) (Agarwal et al., 2014; Gopalan, 2022).

Our set of terms focuses specifically on unique aspects of bank supervision. For that reason, 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" (Board of Governors of the Federal Reserve System, Division of Supervision and Regulation, 2016, p. 5). 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 do not include it in our definition of PfP.

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", "alll", "the allowance", "loan loss allowance", "lease loss allowance", and "liquidity".

Relying on the CBEM and UFIRS for the list of terms allows us to avoid the lengthy and subjective model-development process that researchers rely on for more nuanced natural language processing tasks. For example, Gow et al. (2021) admirably expend considerable effort to assemble several constructs that allow them to identify non-answers in conference calls. Compared to their task, ours is quite straightforward. The Federal Reserve manuals provide us with a basic corpus of these terms; thus, our fundamental task is to determine whether or not these terms occur in banks' compensation contracts.

B.2. Measure validation.

We use the occurrence of PfP terms within compensation discussions to define our main variables of interest. As a initial step, we define $PfP\ Use_{i,t}$ as an indicator variable equal to 1 if, for fiscal year t, proxy statements for BHC i feature any form of these terms within one paragraph of a compensation term. We similarly define $PfP\ Count_{i,t}$ as the number of times that PfP terms are used within compensation discussions. This simple automated approach is flexible and performs similarly both when applied to the plain-text filings early in the EDGAR database, and when applied to the later HTML-formatted filings. However, like most automated text analysis, 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 evaluate the efficacy of the automated portion of the data collection process, and to refine our measures of pay-for-prudence, we randomly select 500 Def 14a filings where our algorithm indicated the presence of a compensation discussion containing at least one PfP term (i.e., $Any\ PfP = 1$). We then read these 500 filings and evaluate the specificity of the PfP language. We determine that 46 of these 500 putative PfP discussions are false positives, a 9.2% false positive rate. In these 46 cases, the algorithm correctly identifies the use of a PfP term near compensation-related language, but it misinterprets the meaning of the discussion. These false positives occur almost exclusively when a discussion related to compensation abuts a discussion of prudential performance or policy not directly related to compensation. The most common false positive is caused by a one-paragraph discussion of the Compensation Committee's responsibilities followed immediately by a one-paragraph discussion of the Asset Quality Committee. Therefore, our more restrictive PfP measures (detailed and concrete PfP) prioritize the elimination of these false positives and focus on identifying substantive discussions of PfP targets.

In addition to concerns related to false positives, we are also concerned that firms may discuss prudential performance metrics using vague and general language without actually committing to compensate executives for achieving prudential objectives. To further eliminate false positives and to better identify substantive discussions of pay-for-prudence, we take the following two steps to directly assess the compensation discussions. First, since most concrete PfP targets are expressed as ratios, we count the number of references to ratios within the compensation discussions. In the spirit of Blankenspoor (2019) and Campbell et al. (2021), we interpret these counts as indicating the extent to which the PfP discussion is quantitative and focused on ratios. Second, when examining the random sample of 500 observations noted above, we also assess the level of detail provided in the PfP discussions. In particular, we record whether or not the compensation discussion includes clear quantitative targets. We use this information to help us systematically differentiate vague discussions of PfP from detailed commitments to compensate executives based on concrete prudential objectives.

Of the 500 randomly selected discussions, we observe that 138 (28%) specify a concrete quantitative PfP target performance metric. By definition these concrete-quantitative targets are never false positives, so we use their attributes to develop

measures that differentiate detailed PfP goals that include concrete targets from vague discussions that do not. Closer inspection reveals that these concrete quantitative targets often include multiple PfP terms and ratios. We use this observation to develop two more restrictive measures of PfP.

First, we define *Detailed PfP*, an indicator variable equal to one if *PfP Count* is above three − the median of the 138 discussions that disclose concrete targets. *Detailed PfP* generates only three of the false positives from *PfP Use*. As only a few of the remaining false positives have counts in the upper tercile of *PfP Count*, further restriction along this dimension is unproductive. Thus, we turn to the number of ratios to eliminate the false positives remaining in *Detailed PfP*, none of which include two or more ratios. We use this restriction to define *Concrete PfP*, an indicator variable equal to one if the compensation discussion has both more than three references to pay-for-prudence terms and two or more references to ratios. While this approach eliminates false positives, it begins to introduce false negatives, as 20 of the 138 disclose a target but all discuss fewer than two ratios. These 20 usually refer to concrete historical benchmarks with terms like 'maintain', 'increase', or 'decrease'. We rely on *Detailed PfP* and *Concrete PfP* for out hypothesis tests in this study.

Having settled on measures that produce an acceptably low level of false positives, we next compare the frequency of PfP goal use across the datasets commonly used by compensation researchers. This comparison is reported in Table B1. This comparison begins with the 7635 bank-years at the intersection of the datasets from which we draw our dependant and independent variables. Then we restrict to the variables we need to estimate our main analyses we are left with 5,839, and only 2022 of these bank-years are available in Execucomp because Execucomp coverage is limited to past and present members of the S&P 1500 index from 1992 to present. Execucomp also tracks the realization of bankers' pay, rather than contract features such as performance targets that form the basis of incentive compensation. Therefore, it is not possible to measure PfP use directly from Execucomp data. However, within the sub-sample of banks available in Execucomp, the rate of PfP use is similar to that of the overall sample of banks on EDGAR. Specifically, 20% of banks in Execucomp have *Detailed PfP*, and 18% of these banks have *Concrete PfP*.

Recently, researchers have begun to use Incentive Lab data, which identifies the specific performance targets used in compensation contracting. However, Incentive Lab generally focuses on compensation contract features that are common among large industrial firms. This limits Incentive Lab in two important ways. First, only 653 bank-years are available in Incentive Lab. Second, due to its focus on industrial firms, Incentive Lab primarily measures compensation contract targets associated with shareholder value, such as returns on assets, returns on equity, and stock returns (Bennett et al., 2017). However, because Incentive Lab does provide some unstructured information about specific performance metrics associated with incentive awards, we can benchmark our measures of PfP (*Detailed PfP* and *Specific PfP*) to this small subsample to further validate our proxies.

Incentive Lab reports performance targets in two variables, *metric* and *metricother*. *metric* reports standard metric names, while *metricother* reports text associated with non-standard performance measures.[23] To determine whether Incentive Lab captures PfP, we search the text in *metricother* for our PfP lexicon. As in the construction of our proxies, 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 the bottom row of Table B1 Panel B, Incentive Lab identifies PfP use in approximately 23% of bank-years. This percentage is consistent with the rate of *Concrete PfP* use that we identify based on EDGAR data among the subsample of bank-years available on Incentive Lab. That *Concrete PfP*, extracted from EDGAR, produces similar results to our analysis of the data from Incentive Lab suggests that our methods performs about as well at identifying the extensive margin of PfP as a comparable measure from Incentive Lab would, but without the limitations imposed by Incentive Lab on the sample size.

We assert that our measures *Detailed PfP* and *Concrete PfP* correspond to true use of PfP while *Vague PfP*, on average, does not. This assertion is, to some extent, empirically testable as it implies that patterns associated with *Detailed PfP* and *Concrete PfP* may not hold when using *Vague PfP*. To test this we repeat the analyses reported in the paper using *Any PfP* and find weaker results, and when using *Vague PfP* the results are generally no longer statistically significant (untabulated). Taken together this suggests that our *Detailed PfP* and *Concrete PfP* capture a unique pattern not captured by *Vague PfP*.

Table B1
Comparison of PfP Coverage across Datasets

	N	%
Bank-Years available in EDGAR	7635	
Bank-Years in EDGAR with any discussion of PfP	5633	73.78
Vague PfP Bank-Years in EDGAR	4522	59.23
Detailed PfP Bank-Years in EDGAR	1111	14.55
Concrete PfP Bank-Years in EDGAR	991	12.98
Bank-Years with Equity Comp. data in Compustat	5839	
Bank-Years with Equity Comp. data and any discussion of PfP	4454	76.28
Vague PfP Bank-Years with Equity Comp. data	3455	59.17

(*continued on next page*)

[23] Use of this variable in Incentive Lab is uncommon. Of the 171 "Incentive Lab" Google search results we examined, only 23 studies mention this variable. While three of these examine the banking industry, none of these three used the information in this variable.

Table B1 (*continued*)

	N	%
Detailed PfP Bank-Years with Equity Comp. data	999	17.11
Concrete PfP Bank-Years with Equity Comp. data	905	15.50
Bank-Years available in Execucomp	2022	
Bank-Years in Execucomp with any discussion of PfP	1761	87.09
Vague PfP Bank-Years in Execucomp	1344	66.47
Detailed PfP Bank-Years in Execucomp	417	20.62
Concrete PfP Bank-Years in Execucomp	367	18.15
Bank-Years available in Incentive Lab	653	
Bank-Years in Incentive Lab with any discussion of PfP	531	81.32
Vague PfP Bank-Years in Incentive Lab	361	55.28
Detailed PfP Bank-Years in Incentive Lab	170	26.03
Concrete PfP Bank-Years in Incentive Lab	151	23.12
Bank-Years with PfP Incentive Lab's metricother field	151	23.12

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