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Do risky banks pay their employees more?

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Abstract

This study investigates the relationship between bank risk and employee wage compensation using a comprehensive dataset of U.S. commercial banks spanning 1990 to 2022. Our key finding is that higher bank risk is associated with increased wage compensation. We interpret this pattern such that higher risk necessitates higher compensation to mitigate bankruptcy risk for employees. We additionally find that this positive relationship between bank risk and wage compensation is only observed for small banks, in favorable economic conditions and when bank concentration is low. These findings suggest that greater bargaining power of employees relative to banks increases the possibility for employees to demand higher wages in the presence of high bank risk. We also find that the positive relationship between bank risk and wage compensation only occurs when banks operate in states with higher past bank default risk, in line with the view that experience affects economic beliefs and behavior.

Keywords: bank, risk, wage determination.

JEL Codes: G21, J31.

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1. Introduction

A bank's risk level is crucial for its stakeholders, especially as excess risk-taking could potentially result in financial distress or lead to bankruptcy. Shareholders can suffer losses as stock prices decline during periods of financial turmoil. Creditors, including depositors, face the risk of not having their loans repaid in the event of bank insolvency. Borrowers can face reduced access to credit and lose the benefits of long-standing credit relationships with the bank. Employees can also be significantly affected, enduring job losses in the event of restructuring or bankruptcy.

Extensive research has examined the effects of bank risk on the behavior of shareholders (e.g., Berger, Imbierowicz and Rauch, 2016), depositors (e.g., Martinez-Peria and Schmuckler, 2001; Demirgüç-Kunt and Huizinga, 2004), other creditors (e.g., Gropp, Vesala and Vulpes, 2006), and borrowers (e.g., Ashcraft, 2005). Overall, they find evidence that bank risk affects bank stakeholders' behavior, conditioned by corporate governance mechanisms and the institutional framework (e.g., the presence of deposit insurance).

Notably, however, the impact of bank risk on bank employees has been largely overlooked, which is surprising considering that bank employees are likely to be well-informed stakeholders due to their positions. Bank employees have a unique vantage point for assessing the bank's financial situation and the associated level of risk-taking, offering insights that may differ from the perspectives of shareholders or creditors.

Our objective in this paper is to examine the effect of bank risk on wage compensation for bank employees. We test the hypothesis that higher bank risk leads to higher wages for bank employees. This hypothesis is based on the theoretical argument that bankruptcy costs for bank employees can be substantial (Titman, 1984; Maksimovic and Titman, 1991). If the bank is at risk of failure, employees may face job losses due to restructuring or bankruptcy. Consequently, higher risk for the bank should be compensated by higher wages for employees.

Examining the relationship between bank risk and wage compensation is of broad interest due to its far-reaching implications. Evidence of a positive effect of bank risk on the wage compensation of bank employees can reveal the existence of a mechanism that amplifies a bank's risk of failure. Namely, if higher bank risk leads to higher employee compensation, it might increase a bank's default probability by raising labor costs. Another substantial implication is that an elevated level of employee compensation could serve as a signal to the bank's external stakeholders regarding the level of risk undertaken by the bank.

We test this hypothesis of a positive relationship between bank risk and wage compensation on a sample of 11,806 U.S. commercial banks. The study spans the extended period from 1990 to 2022, encompassing multiple periods of unfavorable economic conditions. We primarily use a measure of default risk to conduct our analysis, the Z-score, following the existing literature (Laeven and Levine, 2009; Beltratti and Stultz, 2012). We additionally consider two alternative measures of risk: the standard deviation of return on assets, which captures risk across various business activities, and a credit risk measure represented by the ratio of non-performing loans to net loans. Establishing causality between bank risk and wage compensation is particularly challenging due to the endogenous nature of risk. To address this, we use a fixed-effect two-stage least squares panel-data estimator, using the Lewbel (2012) method to generate instruments. We test and confirm the validity of our instruments using the F-test of excluded instruments and the Sargan-Hansen test of the validity of overidentifying restrictions.

Several papers examining the effect of leverage on wages can be related to our analysis. Akyol and Verwijmeren (2013) examine leverage's effect on employee wages for a sample of U.S. non-financial listed companies. They find evidence that leverage has a positive effect on average employee compensation. Chemmanur, Cheng and Zhang (2013) focus on CEOs to investigate the effect of leverage on CEO compensation for U.S. non-financial listed companies. They find that leverage has a positive effect on CEO compensation. In addition, they also conclude that leverage increases average employee compensation. The closest paper to ours is by Bertay and Uras (2020), which extends the question to the banking industry. Using an international sample of listed banks, they investigate whether leverage affects employee compensation. They test two opposing hypotheses. On the one hand, they test the positive impact of leverage on wages, consistent with the hypothesis that higher risk for the bank must be compensated with higher wages. On the other hand, they develop an alternative hypothesis according to which higher leverage would reduce wages. This hypothesis is based on the argument that well-capitalized banks have more incentives to devote resources to monitoring borrowers since shareholders of these banks care more about the risk of default. More monitoring means more work for bank employees, which should be associated with higher wages. They find evidence that well-capitalized banks pay higher wages, supporting the alternative hypothesis.

Compared to the work of Bertay and Uras (2020), our paper has two key differences. First, we provide the first investigation of the effect of bank risk on bank employee compensation. Bertay and Uras (2020) consider the effect of leverage on wages in the banking industry. However, while leverage is a measure of capitalization, it is not a relevant measure of risk for several reasons. It ignores the underlying riskiness of the assets held by the bank. In addition, it does not consider the

differences in risk between debt instruments, such as maturity. Leverage considers only the financial risk associated with using debt financing and thus ignores business risk. However, a positive relationship exists between leverage and the probability of bankruptcy, suggesting that leverage affects risk. Second, we use a comprehensive sample of U.S. banks of all sizes. In contrast, Bertay and Uras (2020) focus on listed banks, namely large banks where employees may perceive protection from bankruptcy due to their "too big to fail" nature. Conversely, our sample encompasses both large and smaller banks, including banks with a higher probability of bankruptcy, making the perception of bankruptcy costs more relevant for bank employees.

Our primary estimations show a positive relationship between bank risk and wage compensation. We find that higher bank risk increases wage compensation. We interpret this result by the fact that higher risk must be compensated with higher pay for bank employees, as assumed in the hypothesis tested.

We also examine whether the relationship varies with bank size. We find that the positive relationship between bank risk and wage compensation is only observed for small banks, while there is no significant relationship for large banks. These findings corroborate our interpretation, as small banks are most exposed to the risk of failure. We further investigate whether the relationship between bank risk and wage compensation is conditional on economic conditions. We find evidence that the positive relationship is only observed in favorable economic conditions. These results are consistent with our interpretation since bank employees have more bargaining power to negotiate higher wages when working in a risky bank during periods of economic expansion. We further find evidence that the positive relationship between bank risk and wage compensation occurs only when bank concentration is low. This again supports our interpretation in the sense that weaker bargaining power of banks increases the possibility for employees to demand higher wages in the presence of high bank risk. Finally, we examine whether the level of past aggregate bank default risk (at the state level) influences the relationship between bank risk and wage compensation. We find that the positive relationship is only observed in states with high past default risk. This is consistent with the view that experience affects economic beliefs and behavior: employees working in a state with higher past aggregate default risk may expect to encounter higher bank risk in the future, strengthening the relationship between bank risk and wage compensation.

Our paper contributes to three strands of the literature. First, we augment the literature on the effects of bank risk on stakeholders' behavior. Various consequences of bank risk have been studied in the literature, in particular, the effects of bank risk on bank failures (Wheelock and Wilson, 2000; Cole and White, 2012) or on various bank stakeholders (Demirgüç-Kunt and Huizinga, 2004; Berger,

Imbierowicz and Rauch, 2016). We provide the first empirical analysis of the effect of bank risk on the compensation of bank employees.

Second, we contribute to the literature on the relationship between risk and compensation in the banking industry. A large number of papers have examined whether compensation impacts bank risk, but our paper differs in two important ways. Firstly, unlike other studies examining how compensation influences banks' risk-taking behavior, we focus on the reverse relationship, examining the effect of bank risk on the compensation of bank employees. Additionally, while most existing papers focus on CEO compensation (Fahlenbrach and Stulz, 2011; Hagendorff and Valsalas, 2011; DeYoung, Peng, and Yan, 2013), our paper broadens this scope by considering the effect of bank risk on the compensation of all employees within a bank.

Third, our paper also contributes to the literature that analyzes what information investors can use to assess and price the level of risk in a bank within a context of significant information asymmetry (Morgan, 2002; Curry, Fissel and Hanweck, 2008; Bennett, Hwa and Kwast, 2015). The involvement of employees in the day-to-day management of the bank arguably makes them potentially the most well-informed stakeholders. We contribute to this literature by examining whether the salaries of bank employees adjust to the level of risk in the bank. If so, it is important to determine under what conditions external stakeholders, financial analysts, and regulators can use this information in their decision-making processes.

The remainder of the paper is organized as follows. Section 2 presents the data and methodology employed in our analysis. Section 3 presents the results. Section 4 reports the robustness checks performed to validate our findings. Finally, Section 5 concludes the paper.

2. Sample and methodology

2.1. Data sample

Our analysis focuses on U.S. commercial banks, utilizing annual data from 1990 to 2022. Financial statement data are sourced from the SNL Financial Institutions Regulatory database, which compiles raw data from the Reports of Condition and Income by the Federal Financial Institutions Examination Council (FFIEC). We follow Berger and Bouwman (2013) in ensuring that the sample is restricted to commercial banks by excluding observations with no outstanding loans or deposits. We further exclude observations with growth in deflated total assets exceeding the 95th percentile of the sample, approximately equivalent to a total asset growth of 35%. We retain only observations

where data on total assets is available for at least five consecutive years. After applying these criteria, our final dataset comprises 204,543 bank-year observations, encompassing 11,806 commercial banks throughout the sample period.

2.2. Econometric specification

The general econometric specification we use to examine whether the level of bank risk has an impact on bank employees' compensation is as follows:

$$Wage_{it} = \alpha_i + \beta Risk_{it} + \sum_m \theta_m BankControls_{it} + \sum_n \gamma_n StateControls_{jt} + \varepsilon_{it} \quad (1)$$

where the subscript i denotes bank, j is for state, t for time period, and ε_{it} is the idiosyncratic error term. The dependent variable $Wage_{it}$ measures the salary per employee, calculated as a bank's salary expenses divided by total employees.

Our main explanatory variable is the level of risk, for which we alternatively consider three standard measures of bank risk. First, we use the logarithm of the traditional time-varying Z-score measure ($Z-score_{it}$) to measure insolvency risk. The Z-score is defined as $(\mu_{ROA,t} + car_t)/\sigma_{ROA,t}$, where $\mu_{ROA,t}$ and $\sigma_{ROA,t}$ are the 3-year rolling window mean and standard deviation of the return on assets, respectively, and car_t is the equity to total assets ratio at date t . Due to the high skewness of the Z-score risk measure, we apply its natural logarithm (Lepetit and Strobel, 2015). Note that the higher the Z-score, the lower the default risk. As an additional bank risk measure, we consider the standard deviation of the return on assets ($SDROA_{it}$), calculated using three-year rolling windows. Lastly, we use the ratio of non-performing loans to net loans (NPL_{it}), which is recognized as a reliable predictor of future performance issues (Berger and DeYoung, 1997).

We include diverse control variables at both the bank level ($BankControls_{it}$) and the state level ($StateControls_{jt}$). At the bank level, we control for bank size ($Size_{it}$), a dummy variable that takes the value of one for banks listed on the stock market ($Listed_{it}$), the degree of income diversification defined as the ratio of total non-interest income to total revenue ($Non-interest\ income_{it}$), and the level of productivity represented by the total revenue per employee ($Employee\ productivity_{it}$). We expect, in particular, that larger banks and those with higher levels of diversification or productivity might offer higher salaries. At the state level, we control for the level of economic activity with the Coincident Economic Activity Index (CEA_{jt}), for economic policy uncertainty with the (composite) Economic Policy Uncertainty index (EPU_{jt}), for bank concentration with the 5-bank asset concentration measure ($Bank\ concentration_{jt}$), and for union membership with

the percentage of employed workers who are union members (*Unionization rate*). We might expect, in particular, that greater economic uncertainty and higher bank concentration levels in a state might be associated with banks offering higher salaries.

The variables used in the empirical analysis are defined in Table 1; all bank-level variables were trimmed at the 0.5% and 99.5% levels. Table 2 shows the correlation coefficients between our main variables of interest.

2.3. Endogeneity issues and estimation methodology

To identify the causal effect of bank risk on employees' compensation with standard regression methods, we would have to assume (implausibly) that our variable of interest (*Risk*) is exogenous and uncorrelated with the error term. We use an extensive set of bank-level and state-level control variables to address potential endogeneity issues caused by omitted variable bias. In addition, we address the potential endogeneity issue between bank employees' compensation and the variables measuring bank risk by estimating an instrumental variable (IV) model, using the fixed-effect two-stage least squares (FE-2SLS) panel-data estimator, with standard errors clustered at the bank level. As finding valid (external) instruments proved challenging, we adopted the Lewbel (2012) method that generates (internal) instruments by exploiting heteroscedasticity in the error structure of the first stage IV regression. Given the resulting overidentification, and as highlighted by Baum and Lewbel (2019), this approach can allow further specification tests, such as the Sargan-Hansen test, to test the validity of the constructed (internal) instruments. These additional specification tests (reported as Hansen J statistic) confirm the validity of the instruments used (based on the set of state-level variables in our study) throughout.

3. Results and discussion

3.1 Main estimations

In Table 3, we report the main estimations by alternatively considering each of the three risk measures as the dependent variable. We reiterate that higher levels of *Z-score* are associated with lower bank risk, while lower levels of *SDROA* and *NPL* denote lower bank risk.

The results provide support for a positive impact of risk on wage compensation. We observe a significantly negative coefficient associated with *Z-score* and a significantly positive coefficient associated with *SDROA* and *NPL*. Thus, these estimations support the view that higher bank risk leads

to higher wage compensation. This result supports the hypothesis that higher risk leads to higher wage compensation because employees want higher wages to compensate for the greater risk of job losses associated with bank failure.

To evaluate the economic significance of these results, we consider the impact of a one standard deviation increase in the *Z-score* (i.e., 1.0266). This results in a decrease in wage compensation by $1.0266 \times (-2.134) = -2.1908$, representing a 4.4% change from its mean value. Similarly, a one standard deviation increase in *SDROA* leads to an increase in wage compensation by 0.6469, or 1.3% from the mean. Additionally, a one standard deviation rise in *NPL* results in a 0.3421 increase in wage compensation, equating to a 0.7% change from the mean. Therefore, we conclude that the effect of bank risk on wage compensation is economically meaningful.

Examining the control variables, we find that the bank-specific control variables largely exhibit the expected signs. Larger banks and those with higher levels of diversification and productivity are associated with higher wage compensation; however, we do not observe any relationship between listed status and the level of wage compensation. In line with expectations, most state-level control variables show the anticipated signs. Higher salaries are associated with greater economic activity, increased economic uncertainty, and higher bank concentration. However, we note a counterintuitive finding regarding the negative relationship between the degree of union membership and wage compensation. This result may be attributed to the fact that the state-level union membership does not accurately reflect the union membership of bank employees, which is crucial for explaining wage compensation in the banking sector.

3.2 The role of bank size

The relationship between bank risk and employee compensation could depend on bank size. We might anticipate smaller banks exhibiting a stronger association between bank risk and employee compensation. This expectation arises from the higher perceived risk of failure associated with smaller banks, which cannot potentially benefit from "too big to fail" protection.

To examine this, we rerun Equation (1) on two distinct subsamples representing smaller and larger banks. We use a threshold of 500 million USD in total assets to differentiate them, corresponding approximately to the 88.5th percentile.¹ The results, provided in Table 4, show that bank size matters in the relationship between the level of risk and wage compensation. None of the coefficients associated with our three bank risk measures are significant for large banks. Conversely, for smaller banks, the coefficients are significantly negative for *Z-score* and significantly positive for

¹ The highly unbalanced nature of our panel dataset prevents the use of proper threshold regression techniques in this context.

SDROA and *NPL*.

Thus, these results highlight that only employees of smaller banks seek a salary increase as the level of risk rises. In contrast, wage compensation in larger banks is not contingent on fluctuations in bank risk, indicating that employees are not sensitive to bank risk in their compensation demands. This outcome can be attributed to the fact that they can benefit from the 'too big to fail' status of large banks, significantly reducing or eliminating the probability of their employer's bankruptcy.

3.3 The role of economic conditions

The prevailing economic conditions are another important factor that may influence the relationship between bank risk and wage compensation. According to our central hypothesis, bank employees may require higher wages when facing higher risk. We anticipate that the impact of increasing bank risk on wage compensation will be more pronounced during periods of economic expansion. In times of economic prosperity, bank employees have more job opportunities, bolstering their bargaining power to demand higher wages when working for a risky bank. Conversely, during economic downturns, bank employees face fewer external options and may face more constraints when negotiating wage compensation with the bank. Similarly, we expect that the influence of bank risk on wage compensation will be amplified in the presence of higher economic uncertainty. In more uncertain economic environments, bank employees have reduced bargaining power as they encounter greater difficulties securing alternative employment.

To investigate these assumptions, we rerun Equation (1) on two subsamples based on economic conditions, using two different indices to assess these conditions. First, we utilize the Coincident Economic Activity Index (*CEA*) to differentiate between higher and lower periods of economic activity. State-year observations are classified as those with lower (higher) economic activity if the *CEA* level is below (above) the 25th percentile of the distribution, giving a more restrictive definition of states with lower economic activity. Alternatively, we use the Economic Policy Uncertainty Index (*EPU*) to assess the degree of economic uncertainty. State-year observations are classified as those with lower (higher) economic uncertainty if the *EPU* level is below (above) the 75th percentile of the distribution, similarly giving a more restrictive definition of states characterized by higher economic uncertainty.

Tables 5 and 6 report the estimations using the *CEA* and the *EPU* index to assess the role of economic conditions, respectively. The findings show that economic conditions are a channel influencing the relationship between bank risk and wage compensation. Firstly, the results show that higher risk is significantly associated with an increase in wage compensation during periods of favorable economic conditions, as measured by either higher economic activity (higher *CEA*) or lower

economic uncertainty (lower *EPU*). This relationship holds when considering insolvency risk, the standard deviation of ROA, and the non-performing loans ratio under lower economic uncertainty or higher economic activity. Secondly, the results show that bank risk has no significant impact on wage compensation during periods of either lower economic activity or higher economic uncertainty.

In summary, we find evidence that economic conditions exert an influence on the relationship between bank risk and wage compensation. During periods of favorable economic conditions, our findings provide evidence that higher bank risk leads to higher wage compensation. This aligns with the view that higher economic activity brings higher bargaining power to bank employees, enabling them to negotiate higher wage compensation when working in a riskier bank. In contrast, during periods of adverse economic conditions, we observe that wage compensation is not significantly dependent on the level of bank risk. These findings align with the argument that workers experience reduced bargaining power under unfavorable economic conditions.

3.4 The role of bank concentration

We next explore the potential role played by the level of bank concentration on the relationship between bank risk and wage compensation. A higher level of bank concentration could be expected to enhance banks' bargaining power, potentially weakening the relationship between bank risk and employee compensation. While bank employees are not confined to pursuing careers solely within the banking industry, their specific human capital may make them more attuned to employment opportunities in this sector.

To examine this potential channel of impact, we differentiate banks operating in environments with varying levels of banking industry concentration using the 5-bank asset concentration at the state level. We classify state-year observations as having lower (higher) bank concentration based on whether the level of bank concentration is below (above) the 75th percentile of the distribution, giving a more stringent definition of states with higher bank concentration.

We rerun Equation (1) on these two subsamples; the results are presented in Table 7. We find evidence of a significant increase in wage compensation for higher levels of risk, specifically within the subsample of banks operating in an environment of lower concentration across the three risk measures. In contrast, none of the coefficients of the risk variables are significant for the subsamples of banks operating in a more concentrated environment.

Consequently, we observe that bank risk exerts an influence on wage compensation only when bank concentration is low, where banks' bargaining power is reduced compared to environments with higher concentration. This finding supports our hypothesis that lower bank concentration offers employees more favorable conditions to negotiate higher compensation when employed by riskier

banks.

3.5 The role of past aggregate default risk

Lastly, we examine whether the historical aggregate level of insolvency risk in the state where a bank operates influences the relationship between bank risk and wage compensation. A recent strand of literature has shown the influence of experiences on economic beliefs and behavior. For instance, Malmendier and Nagel (2011) show that macroeconomic shocks experienced during an individual's lifetime influence their risk-taking behavior. Similarly, Malmendier and Nagel (2016) find that individuals who have lived through a period of high inflation tend to expect higher future inflation. Building on this literature, we can hypothesize that employees working in a state with higher past bank risk may expect to encounter higher bank risk in the future. Consequently, these experiences may strengthen the demands of bank employees for higher wages to compensate for the perceived risk associated with their bank.

We use bank-level Z-scores to build an aggregate measure of bank insolvency risk at the state level. First, we compute the Z-score over 3-year moving windows (as above) and convert them into corresponding default probability measures using Cantelli's inequality, in line with Lepetit and Strobel (2015). Second, we average the resulting bank-level default probabilities per state to construct state-level aggregate default probabilities. Third, our measure of past aggregate default risk at the state level (*Past aggregate risk*) is computed as the 3-year moving average of these state-level aggregate default probabilities; a higher value for this variable means higher aggregate risk. Using the variable *Past aggregate risk*, we classify banks as operating in an environment with lower (higher) past aggregate default risk if the level of past aggregate risk falls below (above) the 25th percentile of the distribution.

Table 8 displays the estimations after running Equation (1) for these two subsamples of banks. We find evidence that past aggregate risk affects the relationship between bank risk and wage compensation, but only for banks operating in an environment with higher past aggregate default risk. For this subsample, we again find significant coefficients that are negative for *Z-score* and positive for *SDROA* and *NPL*, indicating an increasing impact of higher risk on wage compensation. Conversely, we find that wage compensation is not impacted by the level of risk when banks operate in a state with lower past aggregate default risk.

Our findings support the hypothesis that higher past aggregate default risk strengthens the relationship between bank risk and wage compensation, aligning with the view that life experiences affect economic beliefs and behavior. Specifically, in states characterized by higher past aggregate default risk, bank employees exhibit higher sensitivity to their employer's increased risk-taking,

prompting them to request higher wages.

4. Robustness checks

This section examines the sensitivity of the results from several perspectives.

Alternative estimation methods

We address the potential endogeneity issue between bank risk and wage compensation by estimating an instrumental variable model, using the fixed-effects two-stage least squares estimator in the main estimations. We test the robustness of our results by using two alternative estimation methods. First, we rerun our core estimations using an IV-GMM approach, again using the Lewbel (2012) method to generate the (internal) instruments. Second, we alternatively run panel regressions with simple fixed effects to ascertain whether our findings hold when adopting a more straightforward methodology that does not explicitly address endogeneity. The results are reported in Table 9, specifically in columns (1) to (3) for the IV-GMM estimations and columns (4) to (6) for fixed effects estimations.

Our results remain globally unchanged when using these two alternative methods. We find that *Z-score* is significantly negative and *SDROA* and *NPL* are significantly positive for both IV-GMM and fixed effects estimations. Therefore, these results align with our main estimations and thus provide additional support for our key findings.

Alternative data construction

Next, we construct an alternative sample with a different treatment for outliers. The main sample used for the estimations has been constructed by trimming all bank-level variables at the 0.5% and 99.5% levels. While our main results were checked to be robust to alternative trimming levels, one might argue that winsorizing could be a plausible alternative method to allow for potential outliers. To address this issue, we constructed an alternative sample where all bank-level variables were instead winsorized at the 1% and 99% levels.

Table 10 reports the estimations. We find that the results are fully in line with our main estimations. We obtain the same results for all risk variables. These results strengthen our finding of the positive relationship between bank risk and wage compensation.

Alternative specifications

We first investigate the sensitivity of our results to different risk measures. First, we compute the probability of default (*PD*) by converting Z-scores calculated over 3-year moving windows into corresponding default probability measures using Cantelli's inequality, in line with Lepetit and Strobel (2015). Next, we explore three additional measures for bank risk by computing the time-varying probability of default, Z-score and standard deviation of ROA (*PD_exp*, *Z-score_exp* and *SDROA_exp*) using exponentially weighted moments. This approach replaces the traditional 3-year rolling windows and is based on the methodology developed in Bouvatier et al. (2023a).² Exponentially weighted moments offer the advantage of utilizing the full data history, with greater weighting on more recent observations. Finally, we consider the more comprehensive ratio of non-performing assets to assets (*NPA*) and the ratio of loan loss provisions to net loans as alternative measures of credit risk. The results in Table 11 show that our main conclusions are unchanged. We identify a significant and increasing impact of bank risk on wage compensation across all six alternative risk measures.

Finally, we verify that our results remain consistent when considering alternative state-level control variables. Specifically, we replace the composite version of the Economic Policy Uncertainty Index with its state-centric alternative version (*EPU_s*). Additionally, we measure bank concentration using the 3-bank asset concentration measure (*Bank concentration3*) rather than the 5-bank asset concentration measure. Lastly, we measure union membership by the percentage of employed workers covered by a collective bargaining agreement (*CollBargCov*), instead of the percentage of employed workers who are union members. Table 12 shows that our results are unchanged. We continue to observe a positive relationship between bank risk and wage compensation. Furthermore, we observe the same findings for the state-level control variables. Economic uncertainty and bank concentration have a significant and positive relationship with wage compensation, while the degree of union membership has a significantly negative impact. In summary, our use of alternative state-level controls confirms the robustness of our findings. Perhaps even more importantly, as the (internal) instruments generated by the Lewbel (2012) method in the IV approach adopted for our analysis are based on the set of state-level variables, this equates to our results also being robust to an alternative instrument set.

² We used the associated Stata code provided in Bouvatier et al. (2023b).

Alternative period

One could question whether the Global Financial Crisis (GFC) affects our results. Since our period of study includes this crisis, the impact of bank risk on wage compensation may be influenced by this particular period characterized by high bank risk. To this end, we rerun our estimations by removing the period 2007-2008, with Table 13 reporting the results.

We still find that *Z-score* is significantly negative and *SDROA* and *NPL* are significantly positive. This again indicates the existence of a positive relationship between bank risk and wage compensation. Thus, our results are not driven by the GFC period.

Non-linear relationship

We test the possible nonlinearity in the relationship between bank risk and wage compensation by including the squared term for the risk variables in the estimations. We again consider *SDROA* and *NPL* in the estimations; however, we replace *Z-score* with the probability of default (*PD*) to provide a clearer interpretation of the results. *PD* measures insolvency risk like *Z-score* but has the advantage of being interpreted similarly to other risk measures with higher values being associated with higher risk. Furthermore, using a quadratic form to check for non-linearity in a log-transformed variable such as the *Z-score* can be conceptually problematic, which explains our preference for the probability of default in this context. Table 14 displays the results.

We overall reject the existence of a non-linear relationship between bank risk and wage compensation. First, we do not observe such a relationship with *NPL*, as *NPL* is significantly positive while *NPL*² is not significant. Second, we find that *PD* is significantly positive, while *PD*² is significantly negative. At first glance, these results seem to support evidence of a non-linear relationship between bank risk and wage compensation. However the U-shape test by Lind and Mehlum (2010), which tests whether the slope of the curve is positive at the start and negative at the end of the interval, rejects the inverse U-shape form of the relationship. Third, we find that *SDROA* is significantly positive, while *SDROA*² is significantly negative. Here, the U-shape test by Lind and Mehlum (2010) confirms the inverse U-shape form of the relationship between bank risk and wage compensation, albeit only at a low level significance. However, the extreme point is reached when *SDROA* equals 1.593, representing the 98.488th percentile of this variable. In other words, the maximum is such that the decreasing part of the curve is observed for very few observations. Overall, we therefore conclude that non-linearity is not a key feature in the relationship between bank risk and wage compensation.

5. Conclusion

In this paper, we examine the impact of bank risk on the wage compensation of bank employees. For this, we use a large sample of U.S. commercial banks over the period 1990-2022. Our key finding is that bank risk exerts a positive effect on wage compensation, i.e. that risky banks pay more. Our interpretation of the results is that higher risk must be accompanied by higher salaries for bank employees to compensate for bankruptcy costs.

We additionally find that the positive relationship between bank risk and wage compensation is only observed for small banks, which is consistent with the fact that they are most exposed to the risk of failure. We further show that the positive relationship is only observed in favorable economic conditions and when bank concentration is low. These findings accord with our interpretation of the results in the sense that greater bargaining power of employees relative to banks increases the possibility for employees to demand higher wages in the presence of high bank risk. Finally, we also find a positive relationship between bank risk and wage compensation only when banks operate in states with higher past bank default risk, in line with the view that experience affects economic beliefs and behavior.

Overall, our results provide empirical evidence that bank employees are sensitive to risk when negotiating their salary. They demand higher compensation in the presence of higher bank risk for small banks, when they are in a position to negotiate higher salaries, and also when they operate in a riskier financial environment.

The principal implication of our results is that bank risk impacts on the wage compensation of bank employees. Consequently, external stakeholders could interpret employee compensation levels as a signal of banks' risk-taking behavior. Furthermore, the evidence that higher bank risk positively influences employee compensation reveals a mechanism that could exacerbate a bank's risk of insolvency. When elevated risk leads to increased compensation, it has the potential to escalate labor costs and increase the likelihood of bank default. Bank supervisors should allow for this behavior, especially for smaller banks which are particularly vulnerable to risk and therefore necessitate higher employee compensation to mitigate potential losses. Implementing tailored policies for regions with a history of higher bank default risks could further help address the economic beliefs and behaviors shaped by past experiences, thereby fostering a more resilient banking sector.

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Table 1. Definitions of variables and descriptive statistics

This table presents the definitions and the descriptive statistics for the variables used in the estimations.

	Definition	Source	Obs.	Mean	Std. Dev.	Min	Max
Dependent variable							
Wage	Salary Expenses per Employee (\$000)	SNL	197,177	50.23	21.62	18	149
Risk measures							
Z-score	Log of Z-score (3-year moving windows)	SNL & own calculations	178,420	4.1838	1.0266	0.3449	7.0836
SDROA	Std. Dev. of ROA (3-year moving windows, %)	SNL & own calculations	178,420	0.2727	0.3512	0.0100	3.1782
NPL	Ratio of Non-Performing Loans to Loans (%)	SNL	200,822	1.3282	1.9663	0	15.1
Control variables							
Size	Log of Total Assets (\$000)	SNL	204,543	11.6362	1.37	0.69	21.92
Listed	Dummy = 1 if publicly listed	Own construction using CRSP-FRB Link	204,543	0.0033	0.0571	0	1
Non-interest income	Ratio of Total Non-interest Income to Total Revenue (%)	SNL	201,506	15.54	8.76	-2.74	69.57
Employee productivity	Total Revenue per Employee (\$000)	SNL	196,927	145.0717	67.1619	48.28571	632.8839
CEA	Coincident Economic Activity index, by state	FRED	202,644	93.28	19.80	48.63	168.71
EPU	Economic Policy Uncertainty index (composite), by state	Policyuncertainty.com	189,147	154.63	73.37	26.95	887.66
Bank concentration	Assets of five largest banks as share of total commercial banking assets, by state (%)	SNL & own calculations	202,514	0.3870	4.3123	0	100
Unionization rate	Percent of employed workers who are union members, by state	Unionstats.com	202,799	11.6988	5.4928	1.6268	29.2570
Additional variables							
Z-score_exp	Log of Z-score (exponentially weighted)	SNL & own calculations	189,986	4.64	1.02	0.58	7.09

SDROA_exp	Std. Dev. of ROA (exponentially weighted, %)	SNL & own calculations	189,985	0.1716	0.2261	0.0101	2.0776
PD	Probability of default based on bank-level Z-scores (3-year moving windows)	SNL & own calculations	178,420	0.003	0.017	0.000	0.334
PD_exp	Probability of default based on bank-level Z-scores (exponentially weighted)	SNL & own calculations	189,986	0.001	0.010	0.000	0.239
NPA	Ratio of Non-Performing Assets to Assets (%)	SNL	202,558	1.0878	1.6564	0	13.9
LLP	Ratio of Loan Loss Provisions to Assets (%)	SNL	201,556	0.244	0.418	-0.462	3.812
EPU_s	Economic Policy Uncertainty index (state), by state	Policyuncertainty.com	189,147	70.95	46.30	6.65	628.48
Bank concentration3	Assets of three largest banks as share of total commercial banking assets, by state (%)	SNL & own calculations	200,545	0.1864	2.7623	0	100
CollBargCov	Percent of employed workers who are covered by a collective bargaining agreement, by state	Unionstats.com	202,799	13.2304	5.5149	1.9365	31.9810
Past aggregate risk	Aggregate probability of default by state (3-year moving average; based on bank-level Z-scores using 3-year moving windows)	SNL & own calculations	170,560	0.0083	0.0166	0.0001	0.2270

Table 2. Correlation matrix

This table presents the correlation matrix for the variables used in the main estimations.

	Wage	Z-score	SDROA	NPL	Size	Listed	Non-interest income	Employee productivity	CEA	EPU	Bank concentration
Z-score	-0.024										
SDROA	0.080	-0.786									
NPL	0.091	-0.306	0.372								
Size	0.413	0.023	-0.013	0.062							
Listed	0.017	-0.019	0.019	0.011	0.057						
Non-interest income	0.023	-0.128	0.097	0.044	0.276	-0.000					
Employee productivity	0.779	0.019	0.024	0.020	0.496	0.027	0.008				
CEA	0.727	0.063	-0.021	0.022	0.350	-0.016	-0.013	0.563			
EPU	0.131	-0.092	0.079	0.102	0.060	0.011	0.025	0.106	0.041		
Bank concentration	0.053	0.001	0.001	0.034	0.078	-0.003	0.024	0.042	0.057	0.025	
Unionization rate	-0.175	0.044	-0.040	-0.028	-0.011	0.029	-0.111	-0.105	-0.240	-0.020	0.019

Table 3. Bank risk and wage compensation

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
Z-score	-2.134*** (0.380)		
SDROA		1.842*** (0.374)	
NPL			0.174*** (0.048)
Size	3.872*** (0.109)	3.982*** (0.104)	3.313*** (0.099)
Listed	-0.622 (1.005)	-0.524 (0.962)	-0.701 (0.924)
Non-interest income	0.092*** (0.007)	0.111*** (0.006)	0.109*** (0.005)
Employee productivity	0.139*** (0.001)	0.139*** (0.001)	0.137*** (0.001)
CEA	0.365*** (0.003)	0.356*** (0.003)	0.365*** (0.003)
EPU	0.012*** (0.001)	0.014*** (0.000)	0.016*** (0.000)
Bank concentration	0.110*** (0.014)	0.111*** (0.013)	0.116*** (0.013)
Unionization rate	-0.775*** (0.019)	-0.816*** (0.016)	-0.829*** (0.016)
Observations	159,780	159,814	178,369
R-squared	0.792	0.805	0.809
F-test of excl. instruments	68.765	157.054	471.025
Hansen J test, P-value	0.217	0.570	0.165

Table 4. Bank risk and wage compensation: the role of bank size

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation for subsamples based on bank size. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Total Assets below 500 million			Total Assets above 500 million		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	-2.392*** (0.403)			-0.784 (0.999)		
SDROA		2.333*** (0.379)			-1.176 (1.498)	
NPL			0.301*** (0.062)			0.046 (0.121)
Size	3.513*** (0.112)	3.631*** (0.108)	2.891*** (0.103)	3.435*** (0.413)	3.647*** (0.359)	2.713*** (0.341)
Listed	0.638 (1.098)	0.303 (1.109)	0.470 (1.106)	-1.720 (1.541)	-1.232 (1.500)	-2.449* (1.379)
Non-interest income	0.072*** (0.008)	0.092*** (0.006)	0.091*** (0.006)	0.169*** (0.019)	0.183*** (0.017)	0.164*** (0.017)
Employee productivity	0.145*** (0.002)	0.143*** (0.001)	0.143*** (0.001)	0.103*** (0.003)	0.105*** (0.003)	0.102*** (0.003)
CEA	0.349*** (0.003)	0.340*** (0.003)	0.350*** (0.003)	0.556*** (0.014)	0.541*** (0.011)	0.562*** (0.011)
EPU	0.011*** (0.001)	0.014*** (0.000)	0.015*** (0.000)	0.019*** (0.002)	0.020*** (0.001)	0.022*** (0.001)
Bank concentration	0.100*** (0.018)	0.099*** (0.017)	0.092*** (0.017)	0.086*** (0.020)	0.084*** (0.019)	0.096*** (0.019)
Unionization rate	-0.803*** (0.020)	-0.849*** (0.016)	-0.849*** (0.017)	-0.989*** (0.059)	-0.988*** (0.060)	-1.048*** (0.057)
Observations	144,376	144,462	160,843	15,404	15,352	17,526
R-squared	0.786	0.803	0.809	0.829	0.828	0.831
F-test of excl. instruments	58.968	146.816	410.211	11.328	14.531	102.683
Hansen J test, P-value	0.142	0.191	0.925	0.956	0.797	0.353

Table 5. Bank risk and wage compensation: the role of economic activity

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation for subsamples based on (state-level) economic activity. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	CEA below 25 th percentile			CEA above 25 th percentile		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	2.135 (2.093)			-1.974*** (0.434)		
SDROA		-0.323 (0.827)			1.737*** (0.424)	
NPL			0.028 (0.175)			0.216*** (0.055)
Size	2.319*** (0.276)	2.239*** (0.258)	1.345*** (0.232)	3.477*** (0.127)	3.583*** (0.121)	2.956*** (0.114)
Listed	6.511* (3.773)	5.943 (3.728)	4.696 (3.213)	-0.794 (0.990)	-0.783 (0.961)	-0.533 (0.949)
Non-interest income	0.063*** (0.023)	0.054*** (0.013)	0.045*** (0.011)	0.090*** (0.008)	0.106*** (0.007)	0.108*** (0.006)
Employee productivity	0.136*** (0.004)	0.138*** (0.004)	0.132*** (0.003)	0.138*** (0.002)	0.137*** (0.001)	0.136*** (0.001)
CEA	0.366*** (0.028)	0.391*** (0.008)	0.416*** (0.010)	0.393*** (0.004)	0.384*** (0.003)	0.393*** (0.003)
EPU	0.021*** (0.004)	0.017*** (0.001)	0.018*** (0.001)	0.010*** (0.001)	0.012*** (0.000)	0.014*** (0.000)
Bank concentration	0.033 (0.031)	0.037 (0.027)	0.051* (0.028)	0.079*** (0.018)	0.084*** (0.017)	0.087*** (0.017)
Unionization rate	-0.360*** (0.061)	-0.321*** (0.044)	-0.344*** (0.044)	-0.664*** (0.021)	-0.696*** (0.018)	-0.687*** (0.018)
Observations	34,581	34,603	39,940	125,199	125,211	138,429
R-squared	0.640	0.684	0.690	0.792	0.804	0.807
F-test of excl. instruments	1.749	24.538	20.418	43.877	114.010	334.319
Hansen J test, P-value	0.603	0.411	0.241	0.131	0.916	0.796

Table 6. Bank risk and wage compensation: the role of economic uncertainty

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation for subsamples based on (state-level) economic uncertainty. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	EPU index below 75 th percentile			EPU index above 75 th percentile		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	-2.983*** (0.533)			-0.744 (0.532)		
SDROA		2.435*** (0.503)			2.253 (2.008)	
NPL			0.322*** (0.075)			0.042 (0.099)
Size	3.848*** (0.133)	3.963*** (0.125)	3.230*** (0.122)	3.014*** (0.267)	3.088*** (0.274)	2.441*** (0.237)
Listed	-0.120 (1.114)	-0.148 (1.112)	-0.306 (1.136)	-2.221 (2.344)	-1.895 (2.398)	-2.322 (2.028)
Non-interest income	0.097*** (0.009)	0.121*** (0.007)	0.120*** (0.006)	0.063*** (0.015)	0.062*** (0.016)	0.075*** (0.012)
Employee productivity	0.139*** (0.002)	0.138*** (0.002)	0.137*** (0.001)	0.140*** (0.003)	0.141*** (0.003)	0.139*** (0.003)
CEA	0.372*** (0.004)	0.359*** (0.003)	0.369*** (0.003)	0.391*** (0.009)	0.387*** (0.008)	0.398*** (0.008)
EPU	0.012*** (0.001)	0.015*** (0.000)	0.017*** (0.000)	0.013*** (0.001)	0.014*** (0.002)	0.016*** (0.001)
Bank concentration	0.075*** (0.020)	0.081*** (0.019)	0.081*** (0.019)	0.104*** (0.021)	0.104*** (0.021)	0.109*** (0.020)
Unionization rate	-0.757*** (0.026)	-0.826*** (0.020)	-0.821*** (0.020)	-0.661*** (0.038)	-0.645*** (0.042)	-0.739*** (0.037)
Observations	120,053	120,045	132,006	39,727	39,769	46,363
R-squared	0.778	0.805	0.808	0.759	0.760	0.774
F-test of excl. instruments	41.424	93.618	335.625	25.531	4.964	102.862
Hansen J test, P-value	0.616	0.114	0.674	0.143	0.889	0.237

Table 7. Bank risk and wage compensation: the role of bank concentration

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation for subsamples based on (state-level) bank concentration. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	5-bank asset concentration below 75 th percentile			5-bank asset concentration above 75 th percentile		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	-2.041*** (0.381)			-1.892 (1.861)		
SDROA		1.825*** (0.375)			-2.768 (3.157)	
NPL			0.180*** (0.048)			0.142 (0.259)
Size	3.825*** (0.109)	3.917*** (0.104)	3.254*** (0.099)	6.305*** (1.499)	6.267*** (1.381)	5.901*** (1.416)
Listed	-0.608 (1.004)	-0.526 (0.964)	-0.684 (0.928)			
Non-interest income	0.091*** (0.007)	0.109*** (0.006)	0.106*** (0.005)	0.256*** (0.054)	0.263*** (0.050)	0.278*** (0.048)
Employee productivity	0.139*** (0.001)	0.139*** (0.001)	0.137*** (0.001)	0.145*** (0.013)	0.145*** (0.012)	0.144*** (0.012)
CEA	0.364*** (0.003)	0.355*** (0.003)	0.365*** (0.003)	0.324*** (0.030)	0.310*** (0.024)	0.317*** (0.026)
EPU	0.012*** (0.001)	0.014*** (0.000)	0.016*** (0.000)	0.014*** (0.002)	0.015*** (0.002)	0.015*** (0.002)
Bank concentration	1.899*** (0.306)	2.344*** (0.282)	2.036*** (0.291)	0.073*** (0.017)	0.076*** (0.015)	0.084*** (0.015)
Unionization rate	-0.765*** (0.019)	-0.803*** (0.016)	-0.818*** (0.016)	-1.358*** (0.172)	-1.304*** (0.148)	-1.180*** (0.150)
Observations	157,637	157,670	176,109	2,143	2,144	2,260
R-squared	0.794	0.806	0.810	0.779	0.789	0.792
F-test of excl. instruments	67.764	155.491	492.840	2.460	3.222	25.834
Hansen J test, P-value	0.164	0.646	0.143	0.527	0.300	0.216

Table 8. Bank risk and wage compensation: the role of past aggregate default risk

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation for subsamples based on (state-level) past aggregate bank default risk. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Past aggregate risk below 25 th percentile			Past aggregate risk above 25 th percentile		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	0.556 (1.969)			-3.365*** (0.631)		
SDROA		1.206 (1.457)			3.124*** (0.635)	
NPL			0.131 (0.293)			2.721** (1.203)
Size	4.116*** (0.542)	4.001*** (0.334)	3.834*** (0.372)	4.058*** (0.160)	4.445*** (0.128)	2.346*** (0.895)
Listed	-7.885*** (2.241)	-7.493*** (1.753)	-7.555*** (1.798)	-0.169 (1.138)	0.008 (1.067)	1.378 (1.467)
Non-interest income	0.137*** (0.034)	0.124*** (0.017)	0.133*** (0.016)	0.084*** (0.009)	0.109*** (0.007)	0.121*** (0.009)
Employee productivity	0.139*** (0.004)	0.140*** (0.004)	0.139*** (0.004)	0.139*** (0.002)	0.137*** (0.001)	0.142*** (0.005)
CEA	0.466*** (0.010)	0.468*** (0.009)	0.471*** (0.009)	0.357*** (0.004)	0.343*** (0.003)	0.389*** (0.019)
EPU	0.013*** (0.002)	0.013*** (0.001)	0.013*** (0.001)	0.011*** (0.001)	0.014*** (0.000)	0.011*** (0.002)
Bank concentration	0.077*** (0.017)	0.079*** (0.016)	0.083*** (0.016)	0.099*** (0.030)	0.107*** (0.027)	0.129*** (0.028)
Unionization rate	-0.382*** (0.048)	-0.382*** (0.046)	-0.398*** (0.046)	-0.790*** (0.032)	-0.876*** (0.021)	-0.476** (0.210)
Observations	29,113	29,114	30,083	118,078	118,109	123,123
R-squared	0.822	0.823	0.824	0.751	0.787	0.693
F-test of excl. instruments	2.439	11.504	20.407	38.864	75.224	3.521
Hansen J test, P-value	0.766	0.589	0.134	0.115	0.495	0.235

Table 9. Robustness checks: Alternative estimation methods

This table presents the results with alternative estimation methods for the relation between bank risk and wage compensation. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	IV-GMM approach			Fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Z-score	-2.155*** (0.379)			-0.260*** (0.033)		
SDROA		1.828*** (0.374)			1.292*** (0.115)	
NPL			0.173*** (0.048)			0.245*** (0.019)
Size	3.858*** (0.109)	3.987*** (0.104)	3.309*** (0.098)	3.960*** (0.238)	3.972*** (0.236)	3.275*** (0.216)
Listed	-0.638 (1.005)	-0.534 (0.962)	-0.719 (0.924)	-0.270 (2.425)	-0.465 (2.339)	-0.654 (2.330)
Non-interest income	0.093*** (0.007)	0.111*** (0.006)	0.109*** (0.005)	0.112*** (0.012)	0.113*** (0.012)	0.109*** (0.011)
Employee productivity	0.139*** (0.001)	0.139*** (0.001)	0.137*** (0.001)	0.138*** (0.003)	0.138*** (0.003)	0.137*** (0.003)
CEA	0.366*** (0.003)	0.356*** (0.003)	0.365*** (0.003)	0.356*** (0.006)	0.355*** (0.006)	0.367*** (0.006)
EPU	0.012*** (0.001)	0.014*** (0.000)	0.016*** (0.000)	0.015*** (0.000)	0.014*** (0.000)	0.016*** (0.000)
Bank concentration	0.110*** (0.013)	0.110*** (0.013)	0.114*** (0.013)	0.109*** (0.025)	0.110*** (0.025)	0.117*** (0.025)
Unionization rate	-0.774*** (0.019)	-0.818*** (0.016)	-0.828*** (0.016)	-0.832*** (0.036)	-0.824*** (0.036)	-0.819*** (0.035)
Observations	159,780	159,814	178,369	159,780	159,814	178,369
R-squared	0.792	0.805	0.809	0.805	0.805	0.809
F-test of excl. instruments	68.765	157.054	471.025			
Hansen J test, P-value	0.217	0.570	0.165			

Table 10. Robustness check: Alternative sample (winsorized at 1/99 percent level)

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation, with an alternative treatment of potential outliers. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
Z-score	-2.527*** (0.380)		
SDROA		2.511*** (0.423)	
NPL			0.227*** (0.048)
Size	3.452*** (0.117)	3.681*** (0.109)	3.029*** (0.105)
Listed	-1.168 (0.964)	-1.035 (0.914)	-1.675* (0.881)
Non-interest income	0.085*** (0.007)	0.100*** (0.006)	0.101*** (0.005)
Employee productivity	0.143*** (0.001)	0.140*** (0.001)	0.138*** (0.001)
CEA	0.366*** (0.003)	0.357*** (0.003)	0.366*** (0.003)
EPU	0.011*** (0.001)	0.014*** (0.000)	0.016*** (0.000)
Bank concentration	0.098*** (0.012)	0.100*** (0.011)	0.107*** (0.011)
Unionization rate	-0.793*** (0.020)	-0.837*** (0.016)	-0.857*** (0.016)
Observations	164,729	164,729	183,181
R-squared	0.779	0.797	0.801
F-test of excl. instruments	76.853	219.139	596.123
Hansen J test, P-value	0.174	0.257	0.131

Table 11. Robustness check: Alternative risk variables

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation, for alternative risk variables. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
PD	22.221*** (4.981)					
PD_exp		41.522*** (6.707)				
Z-score_exp			-1.539*** (0.263)			
SDROA_exp				2.404*** (0.519)		
NPA					0.206*** (0.051)	
LLP						1.468*** (0.181)
Size	3.969*** (0.105)	3.696*** (0.099)	3.763*** (0.100)	3.753*** (0.099)	3.285*** (0.098)	3.178*** (0.100)
Listed	-0.332 (0.968)	-0.487 (0.932)	-0.597 (0.952)	-0.714 (0.954)	-0.593 (0.921)	-0.944 (0.921)
Non-interest income	0.113*** (0.006)	0.110*** (0.006)	0.096*** (0.006)	0.110*** (0.006)	0.111*** (0.005)	0.112*** (0.005)
Employee productivity	0.138*** (0.001)	0.137*** (0.001)	0.138*** (0.001)	0.137*** (0.001)	0.137*** (0.001)	0.136*** (0.001)
CEA	0.355*** (0.003)	0.360*** (0.003)	0.367*** (0.003)	0.360*** (0.003)	0.366*** (0.003)	0.373*** (0.003)
EPU	0.015*** (0.000)	0.015*** (0.000)	0.013*** (0.001)	0.015*** (0.000)	0.016*** (0.000)	0.016*** (0.000)
Bank concentration	0.109*** (0.013)	0.113*** (0.013)	0.114*** (0.013)	0.115*** (0.013)	0.116*** (0.013)	0.119*** (0.013)
Unionization rate	-0.832*** (0.015)	-0.832*** (0.015)	-0.798*** (0.016)	-0.822*** (0.015)	-0.825*** (0.016)	-0.838*** (0.014)
Observations	159,780	168,864	168,864	168,901	178,526	177,740
R-squared	0.805	0.807	0.803	0.808	0.810	0.808
F-test of excl. instruments	52.597	89.941	180.629	198.264	573.995	386.387
Hansen J test, P-value	0.469	0.782	0.202	0.467	0.491	0.271

Table 12. Robustness check: Alternative state-level variables

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation, with alternative state-level variables. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
Z-score	-3.378*** (0.575)		
SDROA		2.576*** (0.440)	
NPL			0.444*** (0.088)
Size	3.727*** (0.119)	3.969*** (0.105)	3.092*** (0.108)
Listed	-0.983 (1.056)	-0.747 (0.971)	-0.675 (0.949)
Non-interest income	0.078*** (0.009)	0.107*** (0.006)	0.107*** (0.005)
Employee productivity	0.140*** (0.001)	0.139*** (0.001)	0.138*** (0.001)
CEA	0.372*** (0.004)	0.356*** (0.003)	0.366*** (0.003)
EPU_s	0.018*** (0.001)	0.022*** (0.001)	0.025*** (0.001)
Bank concentration3	0.350*** (0.039)	0.339*** (0.037)	0.341*** (0.036)
CollBargCov	-0.659*** (0.021)	-0.714*** (0.015)	-0.700*** (0.017)
Observations	157,929	157,962	176,496
R-squared	0.767	0.802	0.806
F-test of excl. instruments	59.431	116.520	275.046
Hansen J test, P-value	0.177	0.183	0.493

Table 13. Robustness check: Excluding the GFC period (2007-2008)

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the relation between bank risk and wage compensation, excluding the GFC period (2007-2008). Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
Z-score	-2.184*** (0.420)		
SDROA		1.518*** (0.404)	
NPL			0.153*** (0.050)
Size	3.918*** (0.112)	3.964*** (0.108)	3.273*** (0.102)
Listed	-0.251 (0.990)	-0.018 (0.940)	-0.368 (0.935)
Non-interest income	0.093*** (0.008)	0.113*** (0.006)	0.110*** (0.006)
Employee productivity	0.140*** (0.001)	0.140*** (0.001)	0.139*** (0.001)
CEA	0.364*** (0.003)	0.355*** (0.003)	0.364*** (0.003)
EPU	0.012*** (0.001)	0.014*** (0.000)	0.016*** (0.000)
Bank concentration	0.107*** (0.014)	0.108*** (0.014)	0.113*** (0.014)
Unionization rate	-0.759*** (0.020)	-0.807*** (0.016)	-0.814*** (0.017)
Observations	148,730	148,798	166,729
R-squared	0.799	0.812	0.817
F-test of excl. instruments	53.026	133.460	404.340
Hansen J test, P-value	0.243	0.438	0.256

Table 14. Robustness check: Non-linear impact of risk

This table presents the results of two-stage least squares estimations (Lewbel 2012 method) examining the (non-linear) relation between bank risk and wage compensation. Definitions of variables are provided in Table 1. H_0 (Hansen J test): valid instruments; H_0 (Lind/Mehlum U-test): no U-shape. Standard errors (in parentheses) are clustered at the bank level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
PD	42.375*** (12.032)		
PD ²	-94.718* (53.589)		
SDROA		5.163** (2.097)	
SDROA ²		-1.620** (0.814)	
NPL			0.308* (0.169)
NPL ²			-0.012 (0.014)
Size	3.967*** (0.105)	3.987*** (0.105)	3.284*** (0.106)
Listed	-0.393 (0.966)	-0.497 (0.975)	-0.657 (0.926)
Non-interest income	0.112*** (0.006)	0.108*** (0.007)	0.108*** (0.005)
Employee productivity	0.138*** (0.001)	0.138*** (0.001)	0.137*** (0.001)
CEA	0.356*** (0.003)	0.358*** (0.003)	0.366*** (0.003)
EPU	0.015*** (0.000)	0.014*** (0.000)	0.016*** (0.000)
Bank concentration	0.109*** (0.013)	0.111*** (0.013)	0.116*** (0.013)
Unionization rate	-0.828*** (0.015)	-0.804*** (0.019)	-0.822*** (0.018)
Observations	159,780	159,814	178,369
R-squared	0.805	0.804	0.809
F-test of excl. instruments	44.752	39.649	301.150
Hansen J test, P-value	0.758	0.227	0.237
Extreme point (U)	0.224	1.593	12.569
Extreme point (percentile)	99.854	98.488	99.709
Lind/Mehlum U-test, P-value	0.206	0.054	0.412