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How post-crisis regulation has affected bank CEO compensation*

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Abstract

This paper assesses whether compensation practices for bank Chief Executive Officers (CEOs) changed after the Financial Stability Board (FSB) issued post-crisis guidelines on sound compensation. Banks in jurisdictions which implemented the FSB's Principles and Standards of Sound Compensation in national legislation changed their compensation policies more than other banks. Compensation in those jurisdictions is less linked to short-term profits and more linked to risks, with CEOs at riskier banks receiving less, by way of variable compensation, than those at less-risky peers. This was particularly true of investment banks and of banks which previously had weaker risk management, for example those that previously lacked a Chief Risk Officer.

JEL classification: G21, G28, G32.

Keywords: Banks; Managerial compensation; Prudential regulation; Risk-taking.

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1 Introduction

Banks' risk-taking incentives are shaped, among other factors, by the compensation of their top managers. Yet, top managers, and in particular CEOs, are remunerated with compensation packages that are highly complex, especially in their variable elements, and vary greatly between banks and across countries. If these packages influence top managers' appetite for risk, a sound understanding of their determinants and how these might affect banks' risk-taking incentives becomes highly important for successful regulation.

Given that bank CEOs are held accountable for their incentive to seek risk, has bank regulation affected the way CEOs are paid since the global financial crisis? Do we see a change in the structure of CEO compensation? If the answer is positive, have all banks been affected in the same way? These are the questions we try to address in this paper. More in detail, we analyze the structure of CEO compensation within a sample of international banks from 2006 to 2014 and exploit a regulatory change, namely the adoption of the Principles and Standards for Sound Compensation under the supervision of the Financial Stability Board in 2011, to analyze variations in CEO compensation.

The novelty of our paper is to analyze in a comprehensive way cross-country aspects and sensitivity of CEO compensation to risk and performance. We focus directly on the variable part of compensation and study how it has been affected by the introduction of the new policy regulating executive compensation in banks. In particular, our paper uses the introduction of this new regulation as an experimental setting to design a specific test for such a change in behavior.

A consensus seems to exist among researchers and policy-makers that, at the onset of the crisis, financial institutions took on excessive risk, notwithstanding the risk management and prudential policies that were already in place (Hellwig (2009); Admati and Hellwig (2014)). In particular, distortionary compensation practices at large financial institutions have been identified as one of the possible elements for the failure of governance in the banking industry (Fahlenbrach and Stulz (2011) or Bebchuk and Spamann (2010)).

In the aftermath of the financial crisis, former US Treasury Secretary Tim Geithner, testifying in front of a Senate Appropriations subcommittee in June 2009, argued that "although many things caused this crisis, what happened to compensation and the incentives in creative risk-taking did contribute in some institutions to the vulnerability that we saw."

A similar concern was at the origin of a new policy on executive compensation in the banking industry as the Financial Stability Forum (2009) argued that:

"[c]ompensation practices at large financial institutions are one factor among many that contributed to the financial crisis that began in 2007. High short-term profits led to generous bonus payments to employees without adequate regard to the longer-term risks they imposed on their firms. These perverse incentives amplified the excessive risk-taking that severely threatened the global financial system and left firms with fewer resources to absorb losses as risks materialized. The lack of attention to risk also contributed to the large, in some cases extreme absolute level of compensation in the industry."

In 2011 the Financial Stability Board's (FSB) promoted a new regulation, called Principles for Sound Compensation Practices and their Implementation Standards (Principles and Standards, P&S). The new regulation was developed to align compensation with prudent risk-taking, particularly at systemically relevant financial institutions. The P&S require compensation practices in the financial industry to align all employees' incentives with the long-term profitability of the firm. Moreover, the P&S call for effective governance of compensation, and for compensation to be adjusted for all types of risks, to be symmetrical with risk outcomes, and to be sensitive to the time horizon of risks. As the P&S are intended to apply to all significant financial institutions headquartered in FSB and EU jurisdictions (through the adoption of the CRD IV), we can consider these banks as the "affected" (or "treated") group and compare their behavior with financial intermediaries in other jurisdictions that are "unaffected" ("control group"). The P&S policy was transposed into national regulation in 2011 for all banks within FSB jurisdictions and EU countries included in our sample; this allows us to neatly test the differing effects in affected and unaffected banks.

To perform our analysis, we use a detailed database from S&P Capital IQ that reports the different elements of banks' CEO compensation, which we integrate with information on bank balance sheet data and information on the macroeconomic and institutional setting. In particular, we study the sensitivity of CEO compensation to measures of profitability and risk after the recent changes in the regulation of bankers' pay to control for the presence of a structural break.

The main results are as follows. First, we find that the affected banks have changed CEO compensation policies more than the banks in the control group have. Second, the analysis shows that the affected banks have made the variable elements of CEO compensation less responsive to measures of short-term performance, while more negatively correlated to measures of risk. Third, we find that CEO compensation in investment banks has become much more sensitive to risk measures than in the case of commercial banks. Finally, our analysis indicates that the policy had a greater impact on banks where risk management governance was weaker (i.e. at those that lacked a chief risk officer (CRO) before the implementation of the policy), in line with the results in Ellul and Yerramilli (2013).

Our paper is not the first one to empirically analyze bank CEO compensation after the financial crisis. Many papers have already used information from the US and other advanced economies to study the evolution of the different elements of CEO compensation (see, for example, Gregg *et al.* (2012); Cheng *et al.* (2015); DeYoung *et al.* (2013); Bhagat and Bolton (2014)).

Several papers have focused on the relationship between CEO compensation and risk, such as Fahlenbrach and Stulz (2011), Gregg *et al.* (2012), Chesney *et al.* (2012) and Cheng *et al.* (2015); these papers are centered mainly on the financial crisis in the US and UK. Few papers control also for country heterogeneity and regulation, exploiting information on international banks, such as Huttenbrink *et al.* (2014) and Cerasi and Oliviero (2015). Cerasi and Oliviero (2015) show, after controlling for regulatory and institutional factors, that a combination

of lax regulation and greater variable pay for CEOs (namely stock options and/or bonus related to performance) was associated with an inferior financial performance at some banks during the 2007-08 financial crisis. This accords with more recent evidence on the relevance of several other aspects of corporate governance for explaining the ex-post performance of banks (Laeven and Levine (2009); Beltratti and Stulz (2012); Ellul and Yerramilli (2013)).¹ Exploiting a detailed dataset on payroll in Austrian, German and Swiss banks, Eling *et al.* (2015) have studied the relation between incentive pay and risk. They show that the financial crisis has indeed reduced the response of employees' compensation to measures of risk.

Finally, there are several papers showing the importance of corporate governance for bank risk, such as Laeven and Levine (2009), Gropp and Kohler (2010); Beltratti and Stulz (2012), and Ellul and Yerramilli (2013); however CEO compensation is not part of their analysis, with the exception of that of Ellul and Yerramilli (2013) where the CRO's importance in the hierarchy is the principal focus.

A few papers have analyzed how the introduction of the regulation has affected CEO compensation (Ferrarini and Ungureanu (2011) and Murphy (2013) for a review). However, these papers focus mainly on one specific aspect of the new regulation, namely the introduction of a bonus cap, without exploiting the cross-country heterogeneity in the regulation's application. Kleymenova and Tuna (2016) have conducted an event studies approach to study how financial markets responded to the news of the introduction of a bonus cap on executive compensation in the UK and in the EU. They show that the impact of the new UK regulation was larger than that of the subsequent bonus cap in the EU, which may have reflected the un-anticipated feature of the second policy measure. Colonnello *et al.* (2018) have analyzed the impact of the bonus cap regulation on EU banks by collecting information directly from official statements. They provide evidence that the bonus cap regulation, by increasing the fixed part of executive compensation to retain executives, has reduced the risk-adjusted performance in banks, as predicted by a rise in moral hazard. Our paper complements this analysis, by exploiting the cross-sectional information between the jurisdictions that did and those that did not apply the P&S policy. We show that the change in the structure of executive compensation is mainly due to the P&S, while for our sample period, the bonus cap regulation had a marginal impact.

Finally, other papers analyze the impact of regulating CEO compensation in the banking industry, from a theoretical perspective. Chaigneau (2013) calls for regulation of bank CEOs compensation. The reason is that partial public guarantee of deposits, leave shareholders free to align CEOs remuneration to the equity value of the bank: this induces risk-shifting. To mitigate this incentive the regulator has to intervene on the structure of CEO compensation. Kolm *et al.* (2016) show that regulating CEO compensation alone is not sufficient with active shareholders: any choice of risk must be approved by the board, thus shaping CEO compensation alone without intervening on capital requirements is insufficient. A passive board instead will reach the objective. Therefore the impact of a regulation intervening on CEO

¹A different view is provided by Cheng *et al.* (2015)), who claim that higher CEO compensation before the crisis merely reflected the greater risk involved in their function and did not cause greater risk, suggesting a reverse causality.

compensation may be affected by the type of corporate governance of the bank. Thanassoulis (2012) develops a model where banks compete for hiring the best talents among CEOs. Greater bank competition introduces an externality since competition increases the level of bonuses and thus reduces the ability of bankers to repay their debt with the remaining share of the balance sheet. A cap on the share of the balance sheet to pay the management team restores the efficient outcome. Our paper provides evidence that the policy aimed at changing the risk-taking incentives within banks succeeded in reducing the pay-for-performance and increased the sensitivity of CEO compensation to risk.

The remainder of the paper is organized as follows. The next section discusses the changes in the regulation of bankers' pay and the expected evolution of CEO variable compensation. Section 3 describes the data and the main variables relevant for the empirical analysis. Section 4 presents our empirical analysis of the impact of the P&S policy, while Section 5 is devoted to several robustness checks. The last section summarizes the main conclusions of the paper.

2 The change in regulation of bankers' pay

After the 2007-08 financial crisis, the Financial Stability Forum and its successor, the Financial Stability Board (FSB) were mandated by various stakeholders, including central banks, treasury ministers, and financial markets authorities, to provide new guidelines for executive compensation at banks. Although the FSB does not have real regulatory power, it acted as a coordination and monitoring device to help countries to adopt the best regulatory practices in order to foster financial stability.²

The FSB's "Principles and Standards of Sound Compensation" (P&S) mainly concern the design of executive compensation, and in general the remuneration of all Material Risk Takers (MRTs) in banks, including CEOs. Furthermore, the FSB called for executive compensation to be increasingly tied to the risks assumed in the banking core business. This is achieved, on the one hand, by designing the variable part of the compensation of executives in relation to (ex-ante) risk measures; and, on the other hand, by introducing some form of deferrals in the compensation, through claw-back clauses, to ensure there is enough time to observe the actual achievement of (ex-post) lower tail risk. After the publication of the Principles, the Standards were implemented in 2011.

2.1 Principles of Sound Compensation (P&S)

This section discusses the content of the nine Principles that are at the heart of the P&S policy and their implications. The Principles explicitly underline the relationship between managerial compensation and risk appetite within the bank organization (see Financial Stability Forum (2009)). Before the financial crisis, this relationship was not well recognized. While managerial compensation was set with the aim of motivating or retaining hard-working and talented managers, the risk appetite of the bank was monitored by the risk management

²More detailed information about its mandate can be found on the site <http://www.fsb.org/about/>.

committee, which had no say on managerial compensation. After the crisis it was clear that the structure of managerial compensation indeed affected the risk appetite of the bank. Rewarding managers with equity grants, for instance, increased their focus on short-term objectives, while it increased their incentive to avoid outcomes in the lower tail of the performance distribution. The nine Principles are divided under three main headings: corporate governance (Principle P1 to P3), compensation (Principle P4 to P7) and supervision (Principle P8 to P9).

Corporate governance. These three principles discipline the way banks must set the managerial compensation. Although the FSB clearly states that there is no single system of compensation (i.e. that “one size does not fit all”), the chosen system must still comply with the features listed below.

- P1: Independence of the compensation system. Insiders (CEO and management team) must be restricted from influencing their own remuneration.
- P2: Accountability of compensation system. Performance and risk measures must be observable and easy to evaluate, so that achievements to which compensation is related can be easily assessed by all parties.
- P3: Integrity of risk measures. Risk managers must be independent, and avoid setting risk targets in the interests of insiders and allowing them to game their compensation.

Compensation. These four principles, which are more relevant for our analysis, state the main rules to follow when setting the structure of managerial compensation.

- P4: Heterogeneity of managerial compensations. Within the same organization, each MRT must be compensated according to his own marginal contribution to bank risk.
- P5: Symmetry in the elasticity of compensation to risk outcomes. Compensation must vary in a symmetrical way, either up or down, conditional on performance and risk outcomes.
- P6: Deferrals. Compensation must take into account the length of the time required for risk to materialize and allow for the compensation to vary as a function of a specific risk outcome.
- P7: Optimal mix of cash and equity. Stock options, equity grants and cash bonuses should be set in an optimal combination in order to moderate excessive risk-taking.

The document states clearly that each bank must be able to freely decide its optimal compensation structure, provided that the chosen structure complies with these principles. Each bank must find its own way to apply sound compensation practices. Some banks may prefer to rely on quantitative measures, while others on discretion when relating the performance of their own employees to the share of risk undertaken.

Supervision. These two principles define the tasks of supervisors and disclosure of information outside and inside the bank.

- P8: Supervisors must ensure implementation of compensation principles. National supervisors must monitor the application of compensation practices either at bank level within the same country and among countries to ensure an even application of the principles to avoid regulatory arbitrage.
- P9: Disclosure of compensation. Enough disclosure must be assured at the bank level both for the interests of all stake-holders and for the supervisors' needs.

The P&S are not international standards that, once implemented in domestic jurisdictions, become supervisory or regulatory norms to which each bank must comply. The question therefore arises as to how to ensure that the Principles will be adopted by all the banks that authorities consider significant for this purpose. Each national supervisor is responsible for the implementation of the relevant national regulation or supervisory guidance, whereas the FSB has identified compensation as one of the priority areas for implementation monitoring, with a dedicated monitoring framework to review and support implementation by all member jurisdictions. At the national level, there are different degrees of intervention in case a bank fails to comply. The national supervisor i) can exercise moral suasion to convince the bank to comply; then it can escalate using ii) firmer interventions within the range of supervisory actions that are applied, including, where available, increasing the bank's specific prudential requirements, such as capital requirements. At the supranational level, coordination among supervisors has the objective to prevent regulatory arbitrage by multi-national institutions.

To understand whether and how quickly the principles have been translated into national laws, we computed an index of the intensity of regulation. Figure 1 shows that the full set of P&S were immediately implemented in the countries belonging to the FSB in our data sample (solid line), while for other countries not represented in our sample the implementation was a bit slower (dashed line). The behavior of the index displays a step-wise convergence of regulatory intensity from 2011 to the final year in our sample.

2.2 Testable implications

Following the discussion of the principles, we provide here the list of the hypotheses to be tested. The set of principles from P4 to P8 has the purpose of changing the structure of CEO compensation in banks.

- **Hypothesis 1:** *Has the structure of CEO compensation changed as a consequence of the implementation of the P&S?*

The aim of the new regulation is to influence CEO compensation with a view to dampening banks' risk incentives. As a first step, we aim to see whether there has been a change in the structure of CEO compensation. The complex structure of CEOs' remuneration can be more easily captured by looking at the share of variable compensation. For instance Chaigneau (2013) claims that the regulator must reduce pay-for-performance in order to mitigate the incentive to shift risks. If the norms contained in the P&S have been effective, we should detect a change in the balance of variable and total compensation.

However the P&S was not the only change in regulation on executive compensation in banks to be implemented in our sample period: a bonus cap has been introduced in UK and in the European countries through the new Capital Requirement Directive 575/2013, also known as CRD IV³. Hence we must control for these concurrent changes.

- **Hypothesis 2:** *Do we observe heterogeneity in the impact of the P&S on our sample of banks?*

The regulator states that “one size does not fit all”, as banks are free to find their optimal compensation structure in line with the norms in the P&S. Kolm *et al.* (2016) provide reasons why a change in regulation of CEO compensation cannot be analyzed separately from aspects of corporate governance of the bank. In addition Cerasi and Oliviero (2015) provide evidence that the differences in resilience of banks during the global financial crisis are related to bank characteristics, to the quality of corporate governance and supervision.

Hence we expect to observe a heterogeneous impact of the principles across banks in our sample. In general we control for unobservable (to the econometrician) characteristics of the individual banks that could alter the response to the implementation of the P&S by adding bank fixed effects. However, it could be that banks with different business models or corporate governance quality, responded differently to the application of the principles.

First of all, we see whether commercial or investment banks have made greater changes to their compensation policy after the implementation of the P&S. Investment banks tend to pay their CEOs with a greater share of variable compensation in order to attract the most talented individuals. However, given their core business and the lighter regulatory framework in which they operate, their performance is more volatile. Then, if the main goal of the P&S policy is to mitigate risk incentives, we expect CEOs' compensation in investment banks to be more affected by the introduction of this policy compared to commercial banks.

As for the quality of the corporate governance that matters for risk incentives, following the results in Ellul and Yerramilli (2013), we control for the importance of the risk management function within the bank hierarchy. If the risk officer sits on the board, this signals the importance attached by the bank's shareholders to risk management. So we control for the presence of a chief risk officer (CRO) before the introduction of the P&S policy, to distinguish between banks that were at the time relatively more aware of the importance of the risk management and those with weaker governance on this respect. We expect the policy to be less effective, other things being equal, for banks with a higher governance quality: this would imply that banks with a stronger risk management were those less in need of reforming their compensation structure.

³The new Capital Requirements Regulation 575/2013 is an EU law that aims to decrease the likelihood that banks go insolvent. This law applies to all EU banks since 1st January 2014

- **Hypothesis 3:** *Has the sensitivity of the variable compensation with respect to short-term performance changed after the implementation of the P&S policy?*

Principle P5 requires CEO compensation to become more responsive to bad outcomes, i.e. it should be reduced whenever measures of performance fall. In the meantime, P6 requires compensation to respond only after the observation of the performance outcome. This means that we should control whether the response of the variable part of the compensation, by definition more sensitive to short-term performance, has diminished after the implementation of the principles. According to Chaigneau (2013) reducing the degree of pay-for-performance of CEO compensation is the objective of a regulator who needs to mitigate risk-taking incentives within banks.

- **Hypothesis 4:** *Has the sensitivity of the variable compensation with respect to risk measures increased after the P&S?*

Principle P6 requires executives to be penalized after bad outcomes occur, by extending the time elapsed between their actions and their monetary reward, so that there is enough time to observe the outcome of the risks undertaken. For the P&S to bite on risk-taking incentives, we must be able to observe a change in the response of variable compensation to measures of risk. The relationship between bank risk and executives' variable compensation could well be positive if banks want to encourage risk-taking by setting an aggressive compensation. This would imply a positive correlation between variable compensation and risk. However the P&S policy has the objective to mitigate risk-taking. Thus, even though the coefficient could be still positive after the adoption of the P&S, it should be smaller in size. This should lead to a reduction in the difference between the (positive) correlation pre-P&S policy and after-P&S policy.

- **Hypothesis 5:** *Do we observe a greater CEOs' turnover after the P&S?*

The introduction of the principles may have also contributed to changes in the composition of the board and in the executive leadership. If this is the case, we expect to see a rise in CEO turnover after the implementation of the P&S once we control for other factors that may explain CEO turnover.

3 The Data

Information on CEO compensation was sourced from S&P Capital IQ - People Intelligence and Capital Structure - between 2006 and 2014 for 173 banks located in 36 countries. In particular, we selected the ten⁴ largest financial institutions (among the commercial, savings and

⁴Following Laeven and Levine (2009) we focus on the top ten banks in each country. There are two reasons for selecting the top ten banks: i) being the largest banks in each country they typically apply international accounting standards and disclosure on executive remuneration; ii) if we were to select in each country all banks for which information about CEO compensation was available, we could encounter the problem of an highly unbalanced sample with an over-representation of many banks in fewer large countries, as for instance the US.

investment banks) in each country for which we found information on CEO compensation.⁵ Disclosure on executive compensation is quite common among the largest and listed banks, although not everywhere mandatory; this explains why this information is not available even for all the largest banks. We have also collected accounting records and weekly stock returns at individual bank level (only for listed banks). At a more detailed level, we can identify the CEO at any time for each specific bank together with their compensation. The remuneration of CEOs combines several elements (fixed salary, cash bonus, equity shares and stock option awards, long term benefits, etc.). Total annual compensation of a bank CEO is the sum of all cash and non-cash rewards in a specific year t (including equity shares and stock options awarded in year t): it does not include stock options awarded in year $(t - 1)$ or before, even when liquidated in year t . Since the variable part of CEO compensation can be very complex and differs considerably between CEOs, we choose to focus on this component as our main variable of interest. The variable part of total compensation is computed by subtracting the fixed salary from the total annual compensation. We are aware that many other elements in addition to the variable part characterize the structure of CEOs' compensation: however a higher level of granularity would mean reducing further the sample of international banks as not all information about the various elements is available across all countries and banks.

In order to control for the effect of the P&S policy on the structure of CEOs' variable compensation, we adopt an approach that compares affected ("treated") with those unaffected ("control group"). To this end we drew up a list of affected banks from two sources: (i) those headquartered in the countries⁶ affiliated to the FSB and (ii) those operating in EU countries (within the CRD IV these countries have adopted a mandatory amendment with the P&S guidelines). Both groups (i) and (ii) were under the scrutiny of national bank supervisors that exerted moral suasion to adopt the new principles soon after implementation. Given the national and international supervisory pressure on the affected banks, these have changed their executive remuneration policy in 2011. As shown in the previous section, by referring to the behavior of the regulatory index, this policy became effective in 2011 for all the banks included in our sample. It is worth stressing that all the banks in EU countries adopted the P&S through the implementation of the CRD IV. Hence, we include among the affected banks all the financial institutions headquartered in EU countries, even if they did not belong to an FSB country. As a result, the percentage of affected banks in our sample is 74 percent, and about 22 percent of the affected are investment banks. The policy came into effect in 2011, while the CRD IV took effect only in January 2014: we still consider 2011 as the beginning of the treatment under the presumption that the implementation of regulation was de facto anticipated as anecdotal evidence suggests. As a robustness check, however, we will allow for a different initial treatment year for banks located in EU countries.

⁵From the list of banks in our sample in the *Online Annex* one can see that for some countries the number of banks is larger or smaller than ten. This depends on the effects of banking industry reorganization. For example, in the case of Poland, the top banks changed over the years and we had to include additional ones that were among the top ten in the sample period; elsewhere, fewer than ten banks were observed, as in the case of Italy, because of mergers and acquisitions and a lack of information on CEO's remuneration at the smaller banks.

⁶Notice that the P&S policy is applied at country level except for Australia where the investment banks are outside the scope of application of the policy: we therefore include these banks in the control group.

3.1 Descriptive statistics

Table 1 reports descriptive statistics of our sample, both for the main bank characteristics and their CEO's compensation. In particular, the first part of the table reports the composition of our sample according to bank models (investment vs. commercial banks) and geographic area (North America and Australia; Asia and Africa and Europe). Interestingly, European banks account for 44 percent of the sample, while 21 percent are North American and Australian banks and around 36 percent are Asian banks, with only few banks from two African countries. In our sample, 19 percent of the banks are investment banks. All banks are listed on the stock market. The average bank in the sample has \$1.5 billion in total assets and a Tier 1 ratio of 11.8 percent.

CEO compensation statistics are detailed in the second part of the table. Annual total compensation per individual bank CEO is on average \$3.8 million, while the fixed salary is around \$1 million. Variable compensation represents on average 51 percent of a CEO's total compensation. About 37 percent of variable compensation is given by short-term cash rewards, while around 63 percent is via non-cash compensation (e.g., stock options, restricted stock awards, equity shares, etc.). Banks that award stock options to their CEOs account for 37 percent of our sample.

In Table 2, we report the descriptive statistics for a selected number of variables by dividing the sample between two periods: before and after the policy intervention. While average fixed salary has remained stable over time, total annual compensation has significantly decreased after 2011. The ratio between variable and total compensation drops from a level of 0.54 to a level of 0.47 showing that the observed reduction is attributable to the variable component. In particular the cash bonus, which represents the compensation component mostly related to short-run performance, dropped significantly. Over time we also observe stable banks' performance as measured by return on equity (ROE) and return on assets (ROA), although an increase in non-performing loans (NPL).

In Figure 2, we plot the evolution of CEOs' compensation levels and composition, distinguishing between commercial and investment banks. Total compensation dropped from an average of \$6 million in 2007 to \$3 million in 2008 because of the global financial crisis. This drop has been more pronounced for investment banks than for commercial banks. The composition of the compensation, as captured by the share of variable over total compensation, follows a similar pattern as we can see in the panel on the right. In particular, it falls from about 60 percent in 2007 to 45 percent in the post-crisis years for commercial banks. For investment banks the drop is larger, although rising again in the recent years. As a matter of fact, commercial and investment banks have different business models and different incentive structures for management. The difference is evident prior to the crisis, although total compensation is more homogeneous afterwards. It would be interesting to ascertain if a different catch-up process was in place after the introduction of the post-crisis regulatory changes. This could at least in part explain the convergence process for total compensation, although the composition differs between bank business models.

In Figure 3, we plot banks' performance, profitability (measured as ROE) and risk (mea-

sured as standard deviation on stock prices), distinguishing the two different bank business models. In the panel on the left, we see that investment banks' profits are more volatile than those of commercial banks and that this is also reflected in a higher level of risk in the panel on the right. Profits for commercial banks during the global financial crisis were more stable, probably due to their greater degree of revenue diversification. During the financial crisis, risk increased for both investment and commercial banks, declining after the crisis for both types of bank.

The graphical analysis is suggestive of changes in the economic conditions that may have affected the variable part of CEO compensation. Clearly, after the crisis, banks have performed worse and this explains why their CEOs received a lower share of variable compensation, which is typically tied to performance. Also the volatility in performance may have affected the variable compensation for CEOs. However, the crisis has obliged countries to adopt changes in their prudential policy, and this may have affected CEO compensation.

It would be interesting to ask whether the correlation with respect to short-term profitability and risk has changed in response to country-specific shocks or to regulatory changes. In any case, we need to control for these factors and we will devote particular attention to check the robustness of our results with respect to specific country characteristics.

4 Impact of the policy

As a first pass analysis, in this section we examine how the correlations of CEO compensation with respect to measures of bank performance and risk have changed over time. This preliminary analysis is also useful because it helps us to verify if, before the adoption of the policy, the sensitivity of the variable compensation with respect to performance and risk in the two groups of banks were following similar trends.

In particular, in each year we measure the difference in response of CEO compensation to performance and risk compared to 2011, i.e. the year of the treatment. To this aim we divide our sample around 2011 as the benchmark year and estimate the following equation:

$$Y_{it} = \alpha_i + \lambda_t + \sum_{\tau=2006}^{2010} \gamma_{\tau} W_{it} \mathbf{1}(t = \tau) + \sum_{\tau=2012}^{2014} \gamma_{\tau} W_{it} \mathbf{1}(t = \tau) + \epsilon_{it} \quad (1)$$

where Y_{it} indicates the share of variable compensation in period t of bank i . The time-varying coefficients γ_t measure the difference in the effect of a specific explanatory variable in W_{it} on the dependent variable Y_{it} at time τ relatively to the benchmark year 2011. Furthermore, we add bank time-invariant fixed effects (α_i) and time fixed effects (λ_t) to absorb all common variation due to time, shared by all banks.

The vector W_{it} contains the factors affecting executive remuneration, that is the return on equity (ROE_t), its lagged value (ROE_{t-1}) and contemporaneous stock return volatility (SRV_t).⁷ We prefer to measure profitability with ROE rather than ROA, because the latter

⁷The lagged value of SRV is never significant and has been excluded from the analysis. Notice that using SRV as measure of risk affects our sample size, which is restricted by the actual number of listed banks. Since the

measure tends to overestimate bank profitability for banks that have a large portion of non-interest sources of income (trading income, fees and commissions for services) as these revenues are not reflected in (and therefore cannot be scaled by) total assets. However, as a robustness check not reported here, for the sake of brevity, we have performed the analysis with ROA and the percentage of non-performing on total loans (NPL) as alternative measures of profitability and risk: in both cases we obtain similar results.

In Figure 4, we plot the estimated coefficients at each point in time (the reference year is normalized to zero). In other words, each bullet represents the sum of the coefficients τ_t attached to the dependent variable W_{it} , summing up the contemporaneous and, where available, the lagged value, in a specific year τ . The aim is to illustrate the changes in correlation between compensation and measures of performance and risk in order to detect the presence of a possible structural change after 2011.

In the absence of regulation, the share of variable compensation should be positively correlated with short term profits, while the correlation with risk is uncertain a priori. One reason why variable compensation may be positively correlated to risk, is because CEOs might take on more risk to boost their variable compensation. However we cannot exclude that risk measures were used prior to the introduction of the P&S to mitigate such incentives. We summarize below the signs of the expected correlations before and after the introduction of the policy. However, as described in *Hypothesis 3* and *4*, the introduction of the P&S should reduce both correlations: variable compensation should be less (positively) correlated with short term performance and risk. In the last case the correlation could even turn out to be negative when variable compensation is linked to risk adjusted measures of profitability.

Correlation between VC/TC	Expected sign	Effect of P&S
ROE	+	↓
SRV	+/-	↓ (switch from + to -)

First of all, comparing the behavior of treated banks with the control group (not-treated banks), we see that prior to 2011 the trends are similar both in terms of ROE and SRV. After 2011 the trends between the two groups tend to diverge. This provides some preliminary evidence that the policy had some effect (*Hypothesis 1*): as a matter of fact those two groups before the treatment don't show a statistically different behavior. We can notice that actually before 2011 the coefficients for SRV were indeed increasing for the treated banks and switched to a decreasing trend after 2011, while the control group does not show this feature.

After 2011 the sum of the coefficients for the contemporaneous and lagged measure of ROE tend to lie below the zero line and the correlations are estimated with greater precision (the smaller brackets indicate smaller standard errors) compared to previous years: this means that the share of variable compensation responds less to short-term performance after 2011 for the treated banks (*Hypothesis 3*). At the same time, the coefficients for risk have a larger (negative) impact on the share of variable compensation after 2011, but only for treated banks

objective of the P&S policy is to increase variable compensation only in case of stable returns through time, we have included in the analysis one lag in ROE.

(*Hypothesis 4*): this implies that the greater the risk, measured by SRV, the smaller the variable compensation to CEOs. This is not true for the control group. These results indicate that changes in the regulation occurred in 2011, could have determined a change in the way bankers' compensations are designed.

Although this analysis is suggestive of some changes occurred in the structure of CEO compensation, it could be confounded with the fall in measures of performance to which the variable part of the compensation is tied. As alternative explanation, it could be that the change in regulation have had an impact on the way banks pay their CEOs. To disentangle macroeconomic factors from the regulatory ones, we study how the share of variable compensation is affected by changes in performance and risk within an econometric analysis to control for possible confounding factors at bank and country level.

4.1 Are affected banks different? Test for sorting bias

This preliminary evidence is suggestive of a role played by the policy in affecting CEOs' compensation. But this evidence may simply reflect a sorting bias. It could be that either the affected banks, or their CEOs, have some special characteristics that explain the behavior of the response of the share of variable compensation to bank performance and risk, although independently of the introduction of the P&S. For instance, affected banks may be more risk-averse and therefore tend to design flatter managerial compensation schemes for their CEOs. To shed some light on the importance of this possible bias, we perform a dynamic test for sorting, similar to that in Foá *et al.* (2015), for the selection of banks in the P&S policy. Specifically, we collect information on the age and the gender of the CEO, both factors which might influence risk-taking.⁸ Moreover, we control for bank-specific characteristics before the adoption of the policy, such as measures of profitability (ROE and ROA), as well as measures of risk, diversification and leverage ratios. The dependent variable is the treatment dummy, which takes value 1 if a bank is affected and 0 otherwise. The sample is limited to observations up to 2011, i.e. before the implementation of the P&S policy took place.

This test is not conceived to verify which are the characteristics of banks headquartered in FSB countries. Instead our aim is to rule out the possibility that banks in FSB countries have certain balance sheet characteristics that could systematically explain differences in the evolution over time of compensation practices.

The estimation procedure consists in a logit model, here applied to different specifications, as displayed in Table 3. Regardless of whether CEO- or bank-specific characteristics are considered separately or jointly, none of the variables has a significant impact on the probability that an intermediary is considered part of the group of treated banks. These results seem to rule out the presence of sorting for the banks in the treatment policy.

⁸Other variables at the level of CEOs such as education could affect the risk-taking attitude by the bank CEO (see for instance King *et al.* (2016)). Unfortunately we lack this information: we add instead bank characteristics to control for heterogeneity across banks.

4.2 Effect of the P&S policy on CEO compensation: A diff-in-diff approach

In this section, we test for changes in the impact of profitability and risk on the share of variable compensation before and after the introduction of the P&S controlling for changes in common and bank idiosyncratic factors. For each bank i and year t , we run the following regression:

$$Y_{it} = \alpha_i + \lambda_t + \beta X_{it} + \gamma_s W_{it} + \sum_{h=1}^H \delta_h D_h + \sum_{h=1}^H \phi_h (D_h * W_{it}) + \varepsilon_{it} \quad (2)$$

where the dependent variable Y_{it} is the share of variable compensation for bank i at time t , X_{it} is a vector of bank and country explanatory variables, W_{it} includes measures of profitability and risk. Similarly to the analysis presented in Section 4, the vector W_{it} contains the return on equity (ROE_t), its lagged value (ROE_{t-1}) and the contemporaneous stock return volatility (SRV_t). D_h denotes a vector $[d_1, d_2, \dots, d_h]$ containing dummy variables, while $D_h * W_{it}$ represents interactions among dummies and continuous variables. Finally, α_i and λ_t denote bank and time fixed effects, respectively. Among the dummy variables we include:

- “Post” which takes value 1 if year > 2011 to capture the change in regulation;
- “Inv”, which takes value 1 when the bank is an investment bank;
- “Treated” which takes value 1 if the bank is under the scope of application of the P&S policy or headquartered in one of the EU countries.

Table 4 reports the results of the baseline regression. The profitability measure includes the contemporaneous and the one-period lagged value to account for profitability in the short run. The estimated coefficients of the lagged and current explanatory variable are summed up for the sake of brevity (with the associated standard errors being provided in parentheses). We measure bank profitability by its return on equity (ROE) or return on assets (ROA). We consider both measures in a simplified model (Specifications (1) and (3) and with interactions of the main variables with a specific dummy for investment banks in Specifications (2) and (4)). Investment banks have a different business model and, as indicated also in the descriptive analysis in Section 3, CEO compensation structure could be different. For both profitability measures, the main results are the following: We observe a positive correlation between the share of variable compensation and bank profitability before 2011, as indicated by the coefficient of Profit. In the case of ROE, this correlation significantly decreased for all banks after the introduction of the policy (as shown by the difference in the coefficients of Profit and Post×Profit). These results provide evidence that the P&S has changed the way CEOs are compensated (*Hypothesis 1*) and they are in line with our expectations both in terms of the response to short-term performance (*Hypothesis 3*) and on measures of risk (*Hypothesis 4*).

When we control for the bank’s business model (*Hypothesis 2*), CEO’s variable components are even more responsive before 2011 for commercial banks (0.628***). For investment banks, on the other hand, the coefficient is substantially smaller (as shown by the difference in

coefficients between Profit and $\text{Inv} \times \text{Profit}$, i.e. $0.628 - 0.517 = 0.111$ in Specification (2) and $4.999 - 4.884 = 0.115$ in Specification (4)). Moreover, while we still observe a significant reduction after 2011 for commercial banks, variable compensation in the case of investment banks did not change its response to short-term profits. By contrast, the impact of risk on CEOs' variable compensation is fairly stable across the different specifications. Disregarding banks' business models, we observe a negative impact of risk before 2011, given by the coefficient of Risk. This negative coefficient increases significantly after the change in regulation. For investment banks, in particular, the (negative) sensitivity intensifies substantially (-4.22 in Specification (2) and -3.03 in Specification (4)).

Interestingly, if a new CEO is appointed (CEOentry), the share of variable compensation is lower on average. This can be explained by the fact that for a new CEO the bank does not have past performance indicators related to his actions in order to award a bonus.⁹

Among the macroeconomic controls we test for GDP growth of the country where the bank is located and we find that it has no significant impact on the share of variable compensation.

Table 5 shows the estimation results of the complete version of equation (2), in which we added the dummy for treatment and its interactions with the bank-specific variables. As before, the coefficients are computed as the sum of the current and lagged coefficient values (with associated standard errors in brackets). We report the results for the benchmark regression using ROE as the profitability measure in the first column, while ROA in the second column. The regression with the treatment shows a better fit to the data (higher within R^2).¹⁰

Results from Table 5 are not immediately interpretable due to the presence of a large number of interaction terms. In order to understand the effects for commercial and investment banks we need to sum different coefficients. Moreover, we need to distinguish the effects for treated and not treated banks, before and after the implementation of the P&S policy. This complicates the analysis further. Tables 6 and 7 help in making a more direct comparison by simply summing the regression coefficients in the first column of Table 5 in the appropriate way. For example, the third cell in the first row of Table 6 indicates that the sensitivity of variable over total compensation to profitability in the pre-P&S period is 0.341 (standard errors 0.407). This is exactly the first cell in Table 5. However, if we want to evaluate the same sensitivity for treated banks in the pre-P&S period we need to sum $0.341 + 0.326 = 0.667$ and calculate the associated standard error by means of the delta method (0.122). In a similar way, starting from the results in Table 5 we consider all possible cases for the sensitivity of variable compensation over total compensation to profitability (Table 6) and risk (Table 7).

The difference between pre- and post-treatment, namely the impact of the treatment, is provided in column (Δ). As can be seen from Tables 6 and 7, there is a significant decline in

⁹Notice that the variable compensation may in principle also increase when there is a change in CEO. On the one hand, incoming CEOs may be given a "golden handshake" when taking their new job (since they may have foregone bonuses at their old bank); on the other hand, outgoing CEOs pocket the "golden parachute" even when they have contributed to the increased outcome of risks in the bank they are leaving.

¹⁰In order to assess how much of the regulatory differences could explain the heterogeneity in variable compensation, we have regressed equation (2) excluding the dummies Post and Treated and the interactions of the other regressors with these two dummies. As a result of this exercise, the within R^2 drops from 19% to 16%. This indicates that around one quarter of the variability in variable compensation is explained by a regression model that incorporates variables that capture the variation due to the introduction of the P&S after 2011.

the response of variable compensation vis-à-vis a bank's short-term profitability for the whole sample of banks (*Hypothesis 3*). However, a more detailed analysis reveals differences across business models. Specifically, we find a significant decline for both treated (-0.297^{**}) and not-treated (-0.806^{*}) commercial banks. The latter is statistically marginally significant and might be explained by spillover effects among banks. In other words, regulation that draws on the corporate governance of a set of banks, here the treated banks, also affects other banks operating in the same business as an “implied obligation”. On the contrary, no significant change can be observed for all investment banks.

As we suggested in the previous section, CEOs' variable compensation is also related to bank market risk, here measured as banks' stock return volatility. As Table 4 shows, ignoring the treatment status, higher market risk leads on average to a lower share of variable compensation. As Table 7 shows, after the implementation of the P&S policy, we observe a significant increase in the (negative) correlation of CEO variable compensation for all treated banks regardless of their business model (*Hypothesis 4*). The effect is particularly significant for investment banks. Contrary to the case of profitability, we do not observe spillovers on the elasticity to risk from treated to not-treated banks: as a matter of fact the change in the elasticity of the share of variable compensation with respect to market risk is not statistically significant for the control group.

Overall the results indicate that:

- the pay-for-performance, measured as the sensitivity of CEOs compensation to return-on-equity (ROE), has shrunk for banks exposed to the policy. Before the introduction of the P&S, a 1 percentage point (pp) increase in ROE was associated with an increase in the proportion of variable to total compensation of about 0.5 pp; after the introduction of the policy, this sensitivity has dropped by half.
- the sensitivity of CEOs compensation to risk has increased for banks exposed to the P&S. Before the introduction of the policy, CEOs compensation was virtually insensitive to an increase in SRV; after the adoption of the policy, a 1 pp increase in the SRV is associated with a decrease in the proportion of variable to total compensation of 2.5 pp.

4.3 The role of the risk management function

The regulator has taken a “one size does not fit all” approach. Hence we must control for bank-specific characteristics that might explain the different impact of the policy such as the quality of corporate governance (*Hypothesis 2*).

In particular, we can test for the importance of the risk management function in the governance of the bank. We replicate the results of the previous analysis by replacing the dummy for the business model with a dummy indicating the presence of the CRO (Chief Risk Officer) in the board of the bank. The results in Tables 8, 9 and 10 indicate that our main results on the response of the variable compensation to changes in short-term profitability are driven by the group of banks that do not have a CRO in the board. Specifically, we find no significant

impact of short-term profitability on CEOs' variable compensation for banks where a CRO is present. For banks without a CRO, on the other hand, we detect a significant positive influence of profitability on CEOs' variable compensation before the P&S were implemented, which drops significantly and becomes insignificant afterwards. For treated banks with (without) a CRO, the effect of risk on CEOs' variable compensation is negative (positive) before the regulation took place. In both cases, the response decreased significantly in the subsequent period. For not-treated banks without a CRO, variable compensation heavily depends on bank risk before the P&S came into force. This effect becomes insignificant in the subsequent period. For not-treated banks with a CRO, on the other hand, no significant effect from risk is detected, regardless of the time period. The results indicate that the P&S policy has been more effective in changing the compensation structure for the banks that have a weaker internal risk governance. This is in line with Ellul and Yerramilli (2013).

Another question of interest concerns the change of the banks' CEO after the P&S were implemented (*Hypothesis 5*). Table 11 reports the results of a logit model with the appointment of a new CEO as the binary dependent variable taking the value of 1 if a new CEO enters the bank in year t and 0 otherwise. Interestingly, the likelihood of a CEO change decreased after the implementation of the P&S, whether bank fixed effects are included (Specification (1)) or not (Specification (4)). As soon as the treatment status as well as bank-specific characteristics and CEO compensation growth are considered (Specifications (2,3,5,6)), no significant clustering in pre and post P&S periods can be observed. The same is true for the bank- and CEO-specific variables themselves with the exception of bank size proxied by its total assets when bank fixed effects are not included.

4.4 Summary of results

Our analysis finds that the P&S policy had an impact on the share of CEOs' variable compensation (*Hypothesis 1*). In particular, the share of variable compensation is negatively correlated with risk for the treated banks (*Hypothesis 4*). Similar, but less pronounced, is the effect of banks' profitability on the variable part of compensation (*Hypothesis 3*). An interesting finding is that the impact of the policy has been heterogeneous across banks with different business models and with different governance quality with respect to risk management (*Hypothesis 2*), lending support to the idea that the P&S are not a "one size fits all" policy. In particular, the response of variable compensation with respect to profitability has fallen for both treated and, to some extent, also for not-treated commercial banks, while we find no effect for investment banks. Instead, the response of the variable part of the compensation on risk has become significantly negative for both types of business models. In line with the existing literature, we find that the varying governance quality across banks with respect to risk management matters for the impact of the policy. In particular, for those banks that had a CRO before the introduction of the policy, the impact of the P&S policy has been lower. Finally, we do not find the P&S policy to have any particular effect on CEO turnover (*Hypothesis 5*).

5 Robustness checks

In this section we perform several robustness checks. First, we examine if the sensitivity of the results really depends on differences in bank's business model. Second, we control for a set of concurrent events occurred around the years when the P&S was adopted in 2011, such as the global financial crisis or the sovereign debt crisis. Finally, we control for the clustering of other regulatory changes in those years that may have affected the structure of CEO compensation around the date of the implementation of the principles.

5.1 Ignoring bank business models

To control for the differential effect according to the business model, we take a simplified version of the benchmark model, as presented in the previous section, where we do not split the sample according to the different bank business models (commercial vs investment banks).¹¹ The results replicate the benchmark regression, without the interactions with the dummy for the investment banks (see Tables from B.1 to B.3 in the *Online annex*). While we observe that our previous findings hold in this simplified version of the benchmark model, the tests are weaker (even if still significant) compared to the benchmark specification: this tells us that investment banks do indeed behave differently from commercial banks. This evidence provides support for the notion that the policy's impact differed between those two business models.

5.2 Global financial crisis and sovereign debt crisis

While the P&S policy was adopted in 2011, several other important economic events occurred around that year. These concurrent factors may partly explain the changes we observe in the structure of CEOs' compensation. From an econometric point of view it could be difficult to disentangle between the effect of these factors and those of the P&S policy. However, we check the robustness of our results for at least some of these concurrent factors by exploiting the fact that these factors did not affect countries at the same way and with the same timing.

First of all, the global financial crisis that erupted in 2007-08 caused several banking crises around the world. However only a subset of countries in our sample experienced a banking crisis. We run the baseline specifications by adding the interaction between a dummy variable that indicates if the country had a banking crisis in 2007 or 2008 (the dummy is taken from Laeven and Valencia (2012)) and the dummy variable "Post" capturing the year of implementation of the P&S policy. Our main results are robust to this control (see Tables from B.4 to B.6 in the *Online annex*).

Finally, as a consequence of the banking crisis, several countries had to inject public money to bail out their banks. In those countries that had already accumulated a large public debt, this caused an indirect shock to the banking system¹², which we abbreviate into "sovereign debt crisis". The countries involved were the so-called PIIGS (Portugal, Ireland, Italy, Greece,

¹¹In order to identify a bank according to its business model, investment vs. commercial, we used the SIC codes.

¹²See for instance Altavilla *et al.* (2017)

Spain). We therefore add, to the baseline specification, a dummy to control if CEO variable compensation has responded differently in these countries. Our main results are robust to this control (see Tables from B.7 to B.9 in the *Online annex*).¹³

5.3 Supervisory intensity and timing of the regulatory change

Supervisory intensity could alter compensation practices for bank CEO. As an additional robustness test, we include in the baseline regression an indicator taken from Barth *et al.* (2013) that controls for the stringency of bank capital regulation. This index measures the amount of capital banks must hold and the stringency of supervision on the nature and sources of regulatory capital. Larger values of this index indicate more stringent capital regulation. The results obtained including this index are very similar to our baseline results (see Tables from B.16 to B.18 in the *Online annex*).

In a further robustness check we control for differences in the time of adoption of the policy, since the EU countries have adopted the P&S policy as part of the CRD IV in 2014, that is, later than the rest of the FSB countries.¹⁴ In the meantime, we also control for the UK reform that set a cap on bankers' compensations in 2009 (see Kleymenova and Tuna (2016)). To this aim we have eliminated all observations in 2014 and all UK banks from our sample. (see Tables from B.10 to B.12 in the *Online annex*) Our results are robust to the different timing of adoption across EU countries.

Finally we checked whether the changes in the variable compensation are due to introduction of the bonus cap on CEO compensation through the EU regulation in 2014 rather than to the P&S policy. We have conducted several controls: first, we have confronted the EU banks to the non-EU banks belonging to the FSB to measure the additional effect of the introduction of the EU bonus cap on top of the P&S policy; then, we have excluded the non-EU banks from the treated group and compared the EU-banks to non-EU non-FSB banks to see if changes in EU regulation may explain the impact we find. Our results (the tables are not in the paper, for the sake of brevity, but available upon request) are not significantly changed.

5.4 Placebo test

The introduction of FSB guidelines could have been anticipated by banks. Post-crisis industry climate and regulatory discussions largely indicated that pay levels will come under much regulatory scrutiny. The P&S report was published in 2009 and directed regulatory attention to pay levels and structure at major banks. It could be likely that a large number of banks had downward-adjusted their pay levels in response to the bailouts and extreme negative performance during crises. In order to provide further evidence on the identification design,

¹³As an additional robustness test, along the same line, we have included directly into the main regression the variable Public Debt over GDP (source: World Bank). The results are robust to this inclusion (see Tables from B.13 to B.15 in the *Online annex*).

¹⁴In addition to the other principles within the P&S, the EU countries have imposed, within the CRD IV, a cap on the amount of variable over total compensation at 100 percent; this cap can be augmented only with the approval of a qualified majority of shareholders. This new cap on bankers' bonuses may alter the initial impact of the P&S policy on the variable part of executive compensation.

we run a placebo test (see Jiang *et al.* (2016); Krishnan *et al.* (2014)). In particular, we replicate the results in Table 5 by replacing the Post Dummy 2011 with a Post Dummy 2008 and dropping the observations for all the years from 2011 onwards. Results, reported in Tables from B.19 to B.21 in the *Online annex*, do not indicate significant changes in compensation practices for bank CEO after Lehman's default and before the introduction of the P&S. This confirms that CEOs compensation practices have changed as a result of the application of the P&S policy in 2011, not as a bank individual reaction to the global financial crisis.

5.5 Propensity score matching

To rule out the possibility that a selection in the treatment of different banks may influence our results, we construct a sample of more directly comparable banks by using a propensity score matching combined with a diff-in-diff type of analysis. In particular, we proceed in two steps: first, we run a propensity score matching that restricts our analysis to a sample of more homogenous treated and control banks; second, we use this subsample of banks in our baseline empirical specification.

We first average selected banks' characteristics in the period before the implementation of the P&S policy (pre-treatment period). We then select the same financial variables used in Table 3 (ROE, Risk, Diversification Ratio and Leverage) as key variables to be included in the propensity score matching estimator to predict the probability of being treated. For every bank in the control group, we finally match them with one or more banks in the treatment group that has the closest score, that is the same probability of being treated.

We take into account these differences as we estimate the following Logit regression:

$$T_i = \alpha + \beta_1 ROE_i + \beta_2 Risk_i + \beta_3 DiversificationRatio_i + \beta_4 Leverage_i + \epsilon_i \quad (3)$$

where T_i is a dummy that equals 1 if bank i is in the treatment group and 0 otherwise. Matching is then done using a Nearest Neighbour approach with a conservative Caliper equal to 0.01. The caliper sets boundaries of the distance between the score of banks in treated and control equal to 0.01, meaning that the propensity score of two banks in the treatment and control group cannot exceed 0.01. Finally, the matching is done with replacement, so that there is more than one match between a bank in the treatment with a bank in the control group.

Table B.22 shows the post-matching summary statistics of the treated and control group in the years before 2011. Notice that the sample under scrutiny is significantly smaller as the number of banks in the treatment group shrinks to 69, while the banks in the control group shrinks to 31. The two groups do not show significant differences performance (measured by the ROE) and Diversification and Leverage. The matched control sample shows a 1 p.p. difference in SRV although the difference is weakly significant.

After the satisfactory matching, we replicate our baseline analysis on this matched sample. Results in Tables B.23 to B.25 show that our baseline results are confirmed and our coefficients are even stronger in magnitudes. The results on profitability are less precisely estimated in this version due to higher estimated standard errors; this naturally comes as a consequence

of the significantly reduced sample size that shrinks by more than half with respect to our baseline estimation.

6 Conclusions

This paper studies how the structure of bank CEO compensation has changed after the introduction of the Principles and Standards of Sound Compensation Practices in 2011. To run the test, we exploit the fact that the new regulation was not applied to all banks and therefore we could split intermediaries between two groups, “affected” intermediaries and an “unaffected” control group. As CEO compensation is influenced by many factors, we constructed a detailed database sourced from S&P Capital IQ that reports information on the different elements of banks’ CEO compensation and we integrated it with bank balance sheet information and other information on the macroeconomic and institutional setting.

The introduction of the P&S could have been, at least in part, anticipated by banks. Therefore, in a preliminary analysis, we have shown by means of year-by-year regressions that the behavior of affected banks and the control group were similar before 2010 and different afterwards. Another concern is that affected banks and their CEOs could have some special characteristics, independent of the introduction of the P&S, that could make them different from the control group (for example, by being more risk-averse). A specific test for dynamic sorting has dissipated this doubt, indicating that the characteristics of CEOs are similar between the two groups. We finally checked by means of an econometric model that tests for the presence of a structural break in variable compensation, as a share of total compensation, has been less correlated with short-term profit and more correlated with risk after 2011, as regulators would intend.

We find that bankers’ pay regulation had a significant impact on the structure of CEO compensation of the banks under the scope of the application of the policy. For the affected commercial banks we find that, after the introduction of the P&S, the share of variable compensation has been less (positively) correlated with short-term profit and more (negatively) correlated with bank risk. For the group of affected investment banks, on the one hand, we detect clearly the effect on risk, indicating that banks’ risk-taking has been affected by the introduction of the P&S. The correlation with short-term bank profits for investment banks, on the other hand, remains similar (weak) before and after the introduction of P&S. Furthermore, within the control group, we find some “spillover effects” of the introduction of the P&S only for commercial banks and for short-term profits (even if the effect is statistically only marginally significant). In all the remaining tests, we do not detect any significant effect of the introduction of the P&S on CEO variable compensation for the control group (unaffected banks). Finally, our results are more pronounced for investment banks and for the banks without a CRO in place. This result is in line with Ellul and Yerramilli (2013) and suggests that the policy has been most effective at banks with a weaker governance of risk management.

References

- ADMATI, A. and HELLWIG, M. (2014). *The bankers' new clothes: What's wrong with banking and what to do about it*. Princeton University Press.
- ALTAVILLA, C., PAGANO, M. and SIMONELLI, S. (2017). Bank Exposures and Sovereign Stress Transmission. *Review of Finance*, **21** (6), 2103–2139.
- BARTH, J., CAPRIO, G. JR and LEVINE, R., (2013). Bank Regulation and Supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy*, Emerald Group Publishing, **5** (2), 111–219.
- BEBCHUK, L. and SPAMANN, H. (2010). Regulating Bankers' Pay. *Georgetown Law Journal*, **98** (2), 247–287.
- BELTRATTI, A. and STULZ, R. (2012). The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics*, **105** (1), 1–17.
- BHAGAT, S. and BOLTON, B. (2014). Financial crisis and bank executive incentive compensation. *Journal of Corporate Finance*, **25**, 313–341.
- CERASI, V. and OLIVIERO, T. (2015). CEO compensation, regulation, and risk in banks: Theory and evidence from the financial crisis. *International Journal of Central Banking*, **11** (3), 241–297.
- CHAIGNEAU, P. (2013). Risk-shifting and the regulation of bank CEOs? compensation. *Journal of Financial Stability*, **9** (4), 778–789.
- CHENG, I.H., HONG, H. and SCHEINKMAN, J. A. (2015). Yesterday's heroes: Compensation and creative risk-taking. *Journal of Finance*, **70** (2), 839–879.
- CHESNEY, M., STROMBERG, J., WAGNER, A. (2012). Risk-taking Incentives and Losses in the Financial Crisis. Research Paper.
- COLONNELLO, S., KOETTER, M., AND WAGNER, K. (2018). Effectiveness and (In)efficiencies of Compensation Regulation: Evidence from the EU Banker Bonus Cap. IWH Discussion Papers 7/2018, Halle Institute for Economic Research.
- DEYOUNG, R., PENG, E. Y. and YAN, M. (2013). Executive compensation and business policy choices at US commercial banks. *Journal of Financial and Quantitative Analysis*, **48** (01), 165–196.
- EFING, M., HARALD, H., KAMPKÖTTER, P. AND STEINBRECHER, J. (2015). Incentive pay and bank risk-taking: Evidence from Austrian, German, and Swiss banks. *Journal of International Economics*, **96**, 123–140.
- ELLUL, A. and YERRAMILI, V. (2013). Stronger risk controls, lower risk: Evidence from US bank holding companies. *Journal of Finance*, **68** (5), 1757–1803.

- FAHLENBRACH, R. and STULZ, R. M. (2011). Bank CEO incentives and the credit crisis. *Journal of Financial Economics*, **99** (1), 11–26.
- FERRARINI, G. and UNGUREANU, M.C. (2011). Bankers' Pay after the 2008 Crisis: Regulatory Reforms in the US and the EU. *Zeitschrift für Bankrecht und Bankwirtschaft*, **23** (6), 11–26.
- FINANCIAL STABILITY FORUM (2009). Principles for Sound Compensation.
- FINANCIAL STABILITY BOARD. Implementing the FSB Principles for Sound Compensation Practices and their Implementation Standards. 2012–2015.
- FOÁ, G., GAMBACORTA, L., GUISO, L. and MISTRULLI, P. E. (2015). The supply side of household finance. BIS Working Papers No. 531.
- GREGG, P., JEWELL, S. and TONKS, I. (2012). Executive pay and performance: did bankers' bonuses cause the crisis? *International Review of Finance*, **12** (1), 89–122.
- GROPP, R. and KOHLER, M. (2010). Bank owners or bank managers: Who is keen on risk? Evidence from the financial crisis. ZEW Centre for European Economic Research Discussion Paper No.10-013.
- HELLWIG, M. (2009). Systemic risk in the financial sector: An analysis of the subprime-mortgage financial crisis. *De Economist*, **157** (2), 129–207.
- HUTTENBRINK, A., KASERER, C. and RAPP, M.S. (2014). Regulation, Compensation and Risk Taking in Banks: Evidence from the Credit Crises. Mimeo, EFMA, 2014.
- JIANG, L., LEVINE, R. and LIN, C. (2016). Competition and bank opacity. *The Review of Financial Studies*, **29** (7), 1911–1919.
- KING, T., SRIVASTAV, A. and WILLIAMS, J. (2016). What's in an education? Implications of CEO education for bank performance. *Journal of Corporate Finance*, **37**, 287–308.
- KLEYMENOVA, A. and TUNA, I. (2016). Regulation of Compensation. Chicago Booth School Working Paper No.16-07.
- KOLM, J., LAUX, C. and LÓRÁNT, G. (2016). Bank Regulation, CEO Compensation, and Boards. *Review of Finance*, **5** (1), 1901–1932
- KRISHNAN, K., NANDY, D. K., and PURI, M. (2014). Does financing spur small business productivity? Evidence from a natural experiment. *The Review of Financial Studies*, **28** (6), 1768–1809.
- LAEVEN, L. and LEVINE, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, **93** (2), 259–275.
- LAEVEN, L. and VALENCIA, F. (2012). Systemic Banking Crisis Database: An Update. IMF working paper 12/163.

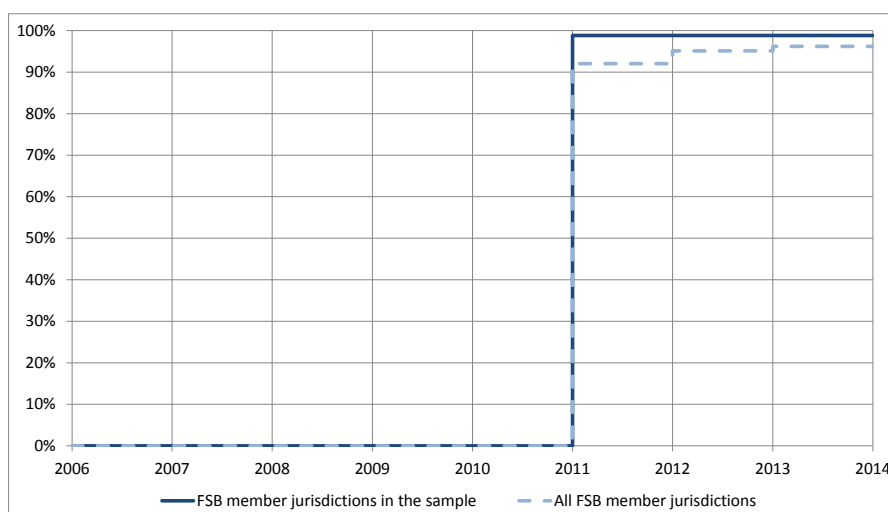
MURPHY, K.J.(2013). Regulating Banking Bonuses in the European Union: A Case Study in Unintended Consequences. Center in Law, Economics and Organization Research Papers Series No. C13-8

THANASSOULIS, J. (2012). The case for intervening in bankers' pay. *The Journal of Finance*, **67** (3), 849–895.

A Main figures and tables

Regulatory Intensity Index

Figure 1

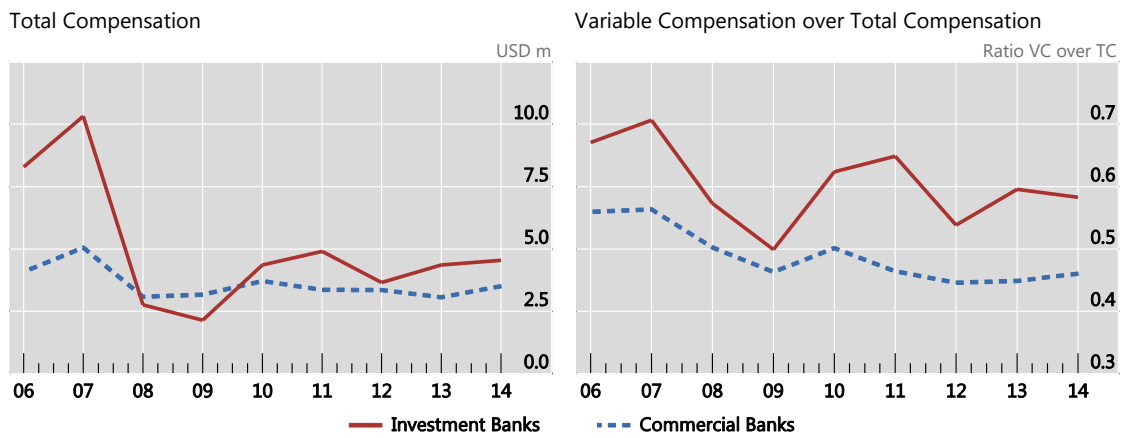


The figure shows the index for the total group of FSB member jurisdictions (dashed) and the FSB member jurisdictions in our sample (solid line). FSB member jurisdictions not in the sample are Argentina, Brazil, Indonesia, Korea, Mexico, Russia, Saudi Arabia and Turkey. If a principle or standard was translated into national law, the index takes the value of 1, otherwise it takes the value of 0. If initiatives are under consideration/preparation, the value of 0.5 was assigned to the index. The index was calculated using public information.

Source: Own calculations based on the Financial Stability Board (annual reports, several years)

Compensation level and composition

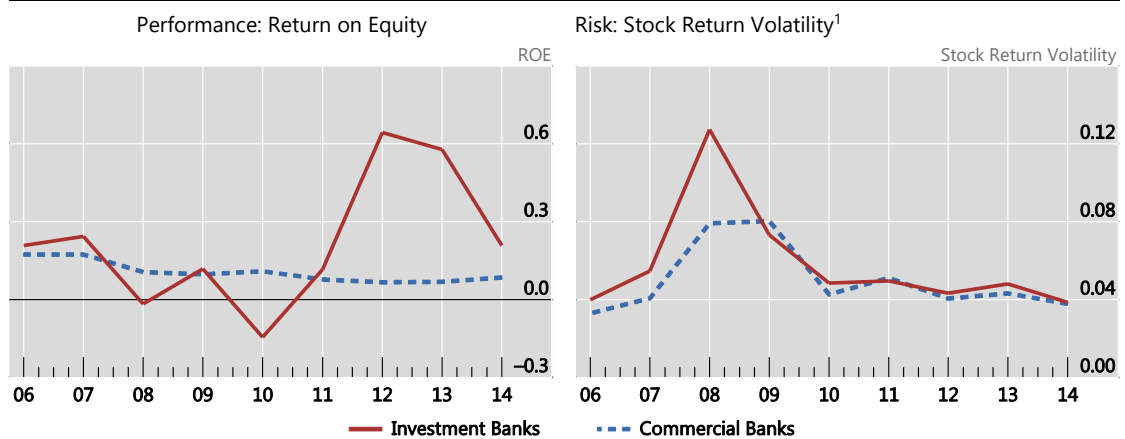
Figure 2



Source: S&P Capital IQ.

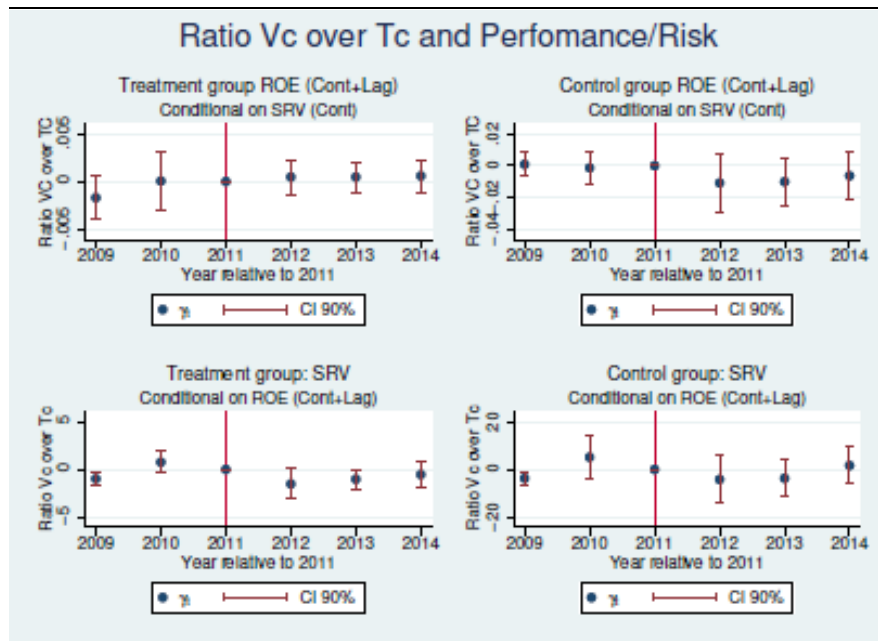
Banks' performance: profitability and risk

Figure 3



¹ One standard deviation of stock prices on a weekly basis.

Source: S&P Capital IQ.



Each bullet refers to the estimated coefficient of equation (1) in a specific year. The confidence interval is represented by the vertical brackets around each bullet. Precision in the estimation is inversely measured by the height of the brackets: for the coefficient to be significant, the brackets should not contain the zero line. The top panels represent the sensitivity of the share of variable compensation to performance measured by ROE and its lagged value, respectively for treated and not-treated banks. The bottom panels refer to the sensitivity of the share of variable compensation to risk, measured by contemporaneous SRV. Standard errors clustered at bank level.

Table 1: Summary Statistics: 2006-2014

	Mean	Standard deviation	Observations
Bank variables			
Total Assets	1.52	9.05	1191
Tier1 Capital Ratio	11.80	4.65	854
ROE	0.13	0.58	1174
ROA	0.01	0.03	1181
Non-performing loan ratio	3.72	5.99	861
SRV (Stock Return Volatility)	0.05	0.04	1168
Listed Banks	1.00	0.00	1193
Investment Banks	0.19	0.40	1193
North America & Australia	0.21	0.41	1193
Asia & Africa	0.36	0.48	1193
Europe	0.44	0.50	1193
CEO compensation			
Fixed Salary	1.11	2.19	1193
Total Annual Compensation	3.84	5.63	1193
Variable Compensation over Total Compensation	0.51	0.29	1193
Cash Bonus over Variable Compensation	0.37	0.38	1145
Stock Option Awarding	0.37	0.48	1193

Notes: All variables are expressed in US dollars. Fixed Salary and Total Compensation are annual and measured in millions. Variable compensation is calculated as Total Compensation minus Fixed salary. Total Assets are measured in billions.

Table 2: Summary Statistics: Pre and Post FSB intervention

	Pre (2006-2010)		Post (2012-14)	
	Mean	Standard deviation	Mean	Standard deviation
CEO compensation				
Fixed Salary	1.11	2.48	1.11	1.88
Total Annual Compensation	4.15	6.54	3.48	4.51
Variable Compensation over Total Compensation	0.54	0.29	0.47	0.30
Cash Bonus over Variable Compensation	0.40	0.39	0.33	0.36
Stock Option Awarding	0.39	0.49	0.36	0.48
Bank performance and risk				
ROE	0.12	0.37	0.15	0.83
ROA	0.02	0.04	0.01	0.02
Non-performing loan ratio	2.97	3.98	4.66	8.18
SRV (Stock Return Volatility)	0.06	0.04	0.04	0.03
Observations	609		443	

Notes: All variables are expressed in US dollars. Fixed salary and total compensation are annual and measured in millions. Variable compensation is calculated as total compensation minus fixed salary.

Table 3: Selection into the treatment policy

Dependent variable:	Treated _t (0/1)				
	(1)	(2)	(3)	(4)	(5)
<i>CEO-specific characteristics</i>					
Age of the CEO _t	-0.0700 (0.0904)			0.0263 (0.106)	0.0348 (0.119)
Sex of the CEO _t	-1.686 (2.576)			-1.850 (2.751)	-1.430 (2.207)
<i>Bank-specific characteristics</i>					
ROE _t		1.770 (7.459)		-0.0559 (7.337)	
ROA _t			0.897 (31.08)		0.709 (55.68)
SRV _t		16.20 (33.75)	10.61 (22.33)	15.85 (42.11)	18.61 (39.68)
Diversification Ratio _t		-0.0872 (1.593)	0.000990 (1.563)	-0.115 (2.555)	-0.294 (1.567)
Leverage Ratio _t (E/A)		2.644 (5.280)	2.789 (9.593)	2.475 (8.648)	1.713 (10.63)
Observations	1199	956	956	864	864

Notes: The table shows the results of a test for dynamic sorting using different specifications. The test framework is a binary logit model using the treatment status of a bank (treated=1, not treated=0) as the dependent variable. The sample is restricted to observations before the treatment took place in 2011. The significance of a parameter indicates that banks are not randomly treated. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 4: Regressions without treatment (baseline model)

Dependent variable:	Variable over Total Compensation			
Profitability measure:	ROE		ROA	
	(1)	(2)	(3)	(4)
Profit	0.254*** (0.0759)	0.628*** (0.118)	0.561* (0.321)	4.999*** (0.864)
Post×Profit	-0.264*** (0.0770)	-0.259* (0.148)	0.386 (0.571)	0.575 (1.312)
Risk	-0.959*** (0.249)	-0.627** (0.263)	-0.879*** (0.190)	-0.995*** (0.238)
Post×Risk	-2.332*** (0.431)	-1.221** (0.574)	-2.061*** (0.353)	-0.712 (0.468)
Inv×Post		0.160** (0.0653)		0.116** (0.0462)
Inv×Profit		-0.517*** (0.152)		-4.884*** (0.919)
Inv×Post×Profit		0.171 (0.175)		0.066 (1.454)
Inv×Risk		0.713 (0.735)		0.334 (0.324)
Inv×Post×Risk		-4.220*** (1.341)		-3.030*** (0.762)
CEOentry	-0.0344** (0.0145)	-0.0318** (0.0145)	-0.0403*** (0.0145)	-0.0413*** (0.0144)
GDPgrowth	0.00383 (0.00333)	0.00426 (0.00330)	0.00334 (0.00341)	0.00312 (0.00337)
Time FE	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Within R^2	0.1549	0.1792	0.1313	0.1693
Observations	1197	1197	1212	1212

Notes: Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional control included but not presented in the Table is $Post_t \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 5: Regressions with the treatment

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.341 (0.407)	6.453 (4.543)
Post×Profit	-0.806* (0.437)	-8.931** (4.459)
Treated×Profit	0.326 (0.416)	-1.486 (4.593)
Inv×Profit	-0.133 (0.587)	-6.101 (8.064)
Post×Treated×Profit	0.509 (0.427)	9.738** (4.448)
Post×Inv×Profit	-0.387 (2.633)	10.75 (8.662)
Treated×Inv×Profit	-0.409 (0.606)	1.315 (8.118)
Post×Treated×Inv×Profit	0.584 (2.636)	-10.96 (8.693)
Risk	1.893** (0.919)	1.522* (0.897)
Post×Risk	-0.649 (1.845)	1.339 (1.685)
Treated×Risk	-2.501*** (0.908)	-2.551*** (0.889)
Inv×Risk	-1.642 (1.796)	-1.693 (1.658)
Post×Treated×Risk	-0.849 (1.756)	-2.253 (1.610)
Post×Inv×Risk	-1.931 (11.54)	-1.859 (9.623)
Treated×Inv×Risk	2.521 (1.976)	2.083 (1.685)
Post×Treated×Inv×Risk	-2.371 (11.59)	-1.112 (9.631)
CEOentry	-0.0288** (0.0146)	-0.0398*** (0.0145)
GDPgrowth	0.00421 (0.00339)	0.00205 (0.00345)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1816	0.1860
Observations	1197	1212

Notes: Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 6: Computed sensitivity of Variable over Total Compensation to profitability (from the model with the treatment)

		pre	post	Δ
Commercial Banks	Not treated	0.341 (0.407)	-0.465 (0.606)	-0.806* (0.437)
	Treated	0.667*** (0.122)	0.370*** (0.125)	-0.297** (0.150)
Investment Banks	Not treated	0.208 (0.428)	-0.985 (2.553)	-1.193 (2.605)
	Treated	0.126 (0.107)	0.0252 (0.0243)	-0.100 (0.106)
All (\$)	Not treated	0.310 (0.330)	-0.584 (0.753)	-0.895 (0.692)
	Treated	0.543*** (0.0983)	0.291*** (0.0965)	-0.252** (0.119)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table 5 by summing the coefficients of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 7: Computed sensitivity of Variable over Total Compensation to risk (from the model with the treatment)

		pre	post	Δ
Commercial Banks	Not treated	1.893** (0.919)	1.243 (2.091)	-0.649 (1.845)
	Treated	-0.609** (0.267)	-2.107*** (0.589)	-1.498*** (0.579)
Investment Banks	Not treated	0.251 (1.590)	-2.330 (11.28)	-2.580 (11.40)
	Treated	0.270 (0.850)	-5.530*** (1.044)	-5.801*** (1.280)
All (\$)	Not treated	1.516* (0.812)	0.423 (3.048)	-1.093 (2.979)
	Treated	-0.407 (0.309)	-2.893*** (0.515)	-2.486*** (0.540)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table 5 by considering the coefficient of SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 8: Regressions controlling for the presence of CRO

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.560 (0.745)	11.72 (7.691)
Post×Profit	0.0776 (0.662)	4.688 (8.340)
Treated×Profit	-0.152 (0.755)	-10.65 (7.695)
CRO×Profit	-0.299 (0.792)	-4.475 (8.979)
Post×Treated×Profit	-0.385 (0.656)	-4.477 (8.303)
Post×CRO×Profit	-0.694 (0.903)	-18.39* (10.34)
Treated×CRO×Profit	0.0221 (0.807)	3.513 (8.997)
Post×Treated×CRO×Profit	0.870 (0.904)	20.08* (10.42)
Risk	6.499*** (2.319)	7.335*** (2.399)
Post×Risk	-6.618* (3.388)	-6.659* (3.523)
Treated×Risk	-5.575** (2.333)	-6.310*** (2.416)
CRO×Risk	-6.380*** (2.404)	-6.599*** (2.488)
Post×Treated×Risk	3.520 (3.334)	3.994 (3.460)
Post×CRO×Risk	7.766* (4.546)	7.012 (4.637)
Treated×CRO×Risk	3.739 (2.443)	4.340* (2.522)
Post×Treated×CRO×Risk	-6.879 (4.536)	-6.458 (4.606)
CEOentry	-0.0332** (0.0143)	-0.0360** (0.0144)
GDPgrowth	0.00119 (0.00341)	0.000250 (0.00350)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1847	0.1577
Observations	1197	1212

Notes: Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$, $Post_t \times Treated_{ij} \times Inv_{ij}$ and $Post_t \times CRO_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 9: Computed sensitivity of Variable over Total Compensation to profitability (from the model with presence of CRO)

		pre	post	Δ
No CRO	Not treated	0.560 (0.745)	0.638 (1.038)	0.0776 (0.662)
	Treated	0.408*** (0.126)	0.101 (0.108)	-0.308** (0.136)
CRO exists	Not treated	0.261 (0.273)	-0.355 (0.638)	-0.616 (0.620)
	Treated	0.132 (0.0993)	-0.000136 (0.0166)	-0.132 (0.100)
All (\$)	Not treated	0.411 (0.399)	0.144 (0.613)	-0.267 (0.456)
	Treated	0.271*** (0.0827)	0.0505 (0.0548)	-0.220** (0.0863)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table 8 by summing the coefficients of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for banks with a CRO and banks without a CRO. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 10: Computed sensitivity of Variable over Total Compensation to risk (from the model with presence of CRO)

		pre	post	Δ
No CRO	Not treated	6.499*** (2.319)	-0.119 (3.980)	-6.618* (3.388)
	Treated	0.923** (0.406)	-2.174** (0.892)	-3.097*** (0.879)
CRO exists	Not treated	0.119 (0.815)	1.267 (2.993)	1.148 (3.040)
	Treated	-1.718*** (0.285)	-3.929*** (0.503)	-2.211*** (0.535)
All (\$)	Not treated	3.326*** (1.261)	0.570 (2.500)	-2.756 (2.280)
	Treated	-0.390 (0.268)	-3.047*** (0.517)	-2.657*** (0.517)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table 8 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for banks with a CRO and banks without a CRO. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 11: Determinants of CEO entry

Dependent variable:	CEOentry _t (0/1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.335** (0.148)	-0.163 (0.361)	0.674 (0.555)	-0.383** (0.167)	-0.225 (0.406)	0.519 (0.570)
Treated		0.294 (0.211)	0.272 (0.399)			
Post × Treated		-0.204 (0.396)	-0.897 (0.602)		-0.189 (0.445)	-0.991 (0.622)
ΔTotal compensation _{t-1}			0.0527 (0.0860)			0.0686 (0.0796)
ROE _{t-1}			-0.333 (0.656)			-0.279 (0.419)
SRV _{t-1}			4.225 (3.380)			-1.299 (3.968)
Log total assets _{t-1}			0.127** (0.0567)			0.564 (0.348)
Constant	-1.761*** (0.0758)	-2.006*** (0.194)	-4.086*** (0.778)			
Bank FE	No	No	No	Yes	Yes	Yes
Observations	2021	2021	989	1361	1361	685

Notes: The table shows the result of a logit model with CEO entry (Value of 1 if a new CEO enters the bank in year t , 0 otherwise) as the dependent variable. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

B Online Annex

Table B.1: Regressions without controls for bank business models

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.360 (0.266)	3.339 (3.632)
Post×Profit	-0.795* (0.407)	-6.512* (3.683)
Treated×Profit	0.116 (0.269)	0.0137 (3.639)
Post×Treated×Profit	0.591 (0.403)	7.252** (3.693)
Risk	1.941* (1.001)	1.508 (0.969)
Post×Risk	-0.915 (1.621)	-0.520 (1.500)
Treated×Risk	-2.310*** (0.795)	-2.113*** (0.764)
Post×Treated×Risk	-0.884 (1.576)	-1.325 (1.447)
CEOentry	-0.0300** (0.0146)	-0.0375*** (0.0144)
GDPgrowth	0.00296 (0.00335)	0.00178 (0.00342)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1821	0.1653
Observations	1197	1212

Notes: Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.2: Computed sensitivity of Variable over Total Compensation to profitability (without bank business models)

		pre	post	Δ
All	Not treated	0.360	-0.435	-0.795*
		(0.266)	(0.489)	(0.407)
	Treated	0.476***	0.273***	-0.203**
		(0.0923)	(0.0758)	(0.0851)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.1 by summing the coefficients of contemporaneous and lagged ROE. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.3: Computed sensitivity of Variable over Total Compensation to risk (without bank business models)

		pre	post	Δ
All	Not treated	1.405*	0.491	-0.915
		(0.797)	(1.868)	(1.621)
	Treated	-0.904***	-2.704***	-1.799***
		(0.274)	(0.490)	(0.482)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.1 by considering the coefficient for SRV. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.4: Regressions controlling for countries with a banking crisis

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.338 (0.406)	6.281 (4.533)
Post×Profit	-0.933** (0.439)	-9.847** (4.465)
Treated×Profit	0.345 (0.415)	-1.356 (4.583)
Inv×Profit	-0.125 (0.586)	-5.716 (8.047)
Post×Treated×Profit	0.515 (0.426)	9.395** (4.440)
Post×Inv×Profit	-0.255 (2.627)	11.68 (8.650)
Treated×Inv×Profit	-0.414 (0.604)	1.007 (8.100)
Post×Treated×Inv×Profit	0.549 (2.629)	-10.92 (8.672)
Risk	1.919** (0.917)	1.519* (0.895)
Post×Risk	-1.168 (1.853)	0.802 (1.696)
Treated×Risk	-2.530*** (0.906)	-2.582*** (0.887)
Inv×Risk	-1.695 (1.792)	-1.752 (1.654)
Post×Treated×Risk	-0.137 (1.776)	-1.452 (1.641)
Post×Inv×Risk	-1.297 (11.52)	-1.115 (9.605)
Treated×Inv×Risk	2.715 (1.973)	2.175 (1.681)
Post×Treated×Inv×Risk	-2.964 (11.57)	-1.918 (9.614)
CEOentry	-0.0309** (0.0146)	-0.0412*** (0.0144)
GDPgrowth	0.00585* (0.00345)	0.00359 (0.00351)
Post×FinancialCrisis	-0.0598** (0.0246)	-0.0605** (0.0253)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1951	0.1860
Observations	1197	1212

Notes: The dataset in Laeven and Valencia (2012) does not contain information for Malta, Cyprus and Oman. In this regression we have included the three countries by classifying the last one as a country without a banking crisis. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.5: Computed sensitivity of Variable over Total Compensation to profitability (controlling for banking crisis)

		pre	post	Δ
Commercial Banks	Not treated	0.338 (0.406)	-0.595 (0.607)	0.933** (0.439)
	Treated	0.683*** (0.122)	0.265** (0.132)	-0.419** (0.158)
Investment Banks	Not treated	0.213 (0.427)	-0.975 (2.547)	-1.188 (2.598)
	Treated	0.144 (0.107)	0.0202 (0.0243)	-0.124 (0.106)
All (\$)	Not treated	0.310 (0.329)	-0.682 (0.752)	-0.992 (0.691)
	Treated	0.560*** (0.0983)	0.208** (0.102)	-0.351*** (0.125)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.4 by summing the coefficients of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.6: Computed sensitivity of Variable over Total Compensation to risk (controlling for banking crisis)

		pre	post	Δ
Commercial Banks	Not treated	1.919** (0.917)	0.751 (2.096)	-1.168 (1.853)
	Treated	-0.611** (0.267)	-1.916*** (0.593)	-1.305** (0.583)
Investment Banks	Not treated	0.224 (1.586)	-2.240 (11.25)	-2.464 (11.37)
	Treated	0.409 (0.850)	-5.156*** (1.053)	-5.565*** (1.281)
All (\$)	Not treated	1.530* (0.810)	0.0644 (3.044)	-1.465 (2.975)
	Treated	-0.377 (0.308)	-2.660*** (0.522)	-2.283*** (0.545)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.4 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.7: Regressions controlling for countries with a sovereign debt crisis

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.348 (0.407)	6.328 (4.526)
Post×Profit	-0.839* (0.438)	-9.151** (4.459)
Treated×Profit	0.297 (0.417)	-1.876 (4.582)
Inv×Profit	-0.146 (0.586)	-5.957 (8.034)
Post×Treated×Profit	0.434 (0.428)	8.805** (4.448)
Post×Inv×Profit	-0.376 (2.630)	11.00 (8.631)
Treated×Inv×Profit	-0.421 (0.606)	1.638 (8.091)
Post×Treated×Inv×Profit	0.730 (2.634)	-7.186 (8.756)
Risk	1.929** (0.919)	1.519* (0.896)
Post×Risk	-0.801 (1.854)	1.139 (1.682)
Treated×Risk	-2.548*** (0.908)	-2.573*** (0.887)
Inv×Risk	-1.682 (1.793)	-1.712 (1.652)
Post×Treated×Risk	-0.380 (1.770)	-1.786 (1.615)
Post×Inv×Risk	-1.672 (11.53)	-1.630 (9.586)
Treated×Inv×Risk	2.565 (1.975)	2.123 (1.679)
Post×Treated×Inv×Risk	-3.009 (11.60)	-1.660 (9.596)
CEOentry	-0.0288** (0.0147)	-0.0405*** (0.0145)
GDPgrowth	0.00389 (0.00345)	0.00261 (0.00351)
PIIGS×Post2011	-0.105** (0.0431)	-0.106** (0.0419)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1970	0.1916
Observations	1176	1191

Notes: In this regression we have included a dummy that identifies PIIGS countries (Portugal, Ireland, Italy, Greece and Spain) interacted with a dummy variable that takes value equal to one in the years subsequent to 2011. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.8: Computed sensitivity of Variable over Total Compensation to profitability (controlling for sovereign debt crisis)

		pre	post	Δ
Commercial Banks	Not treated	0.348 (0.407)	-0.491 (0.606)	-0.839* (0.438)
	Treated	0.645*** (0.129)	0.240 (0.148)	-0.405** (0.165)
Investment Banks	Not treated	0.202 (0.427)	-1.013 (2.550)	-1.215 (2.602)
	Treated	0.0770 (0.110)	0.0265 (0.0287)	-0.0505 (0.109)
All (\$)	Not treated	0.315 (0.329)	-0.611 (0.753)	-0.925 (0.692)
	Treated	0.514*** (0.103)	0.191* (0.115)	-0.323** (0.130)
Observations		1176	1176	1176

Notes: The sensitivity is derived from the regression in Table B.7 by summing the values of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.9: Computed sensitivity of Variable over Total Compensation to risk (controlling for sovereign debt crisis)

		pre	post	Δ
Commercial Banks	Not treated	1.929** (0.919)	1.129 (2.098)	-0.801 (1.854)
	Treated	-0.619** (0.271)	-1.799*** (0.665)	-1.180* (0.647)
Investment Banks	Not treated	0.247 (1.588)	-2.225 (11.26)	-2.473 (11.38)
	Treated	0.264 (0.856)	-5.597*** (1.239)	-5.862*** (1.435)
All (\$)	Not treated	1.543* (0.813)	0.359 (3.046)	-1.184 (2.977)
	Treated	-0.416 (0.312)	-2.671*** (0.587)	-2.255*** (0.600)
Observations		1176	1176	1176

Notes: The sensitivity is derived from the regression in Table B.7 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.10: Regressions excluding 2014 and UK from the analysis

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.318 (0.406)	7.612* (4.533)
Post \times Profit	-0.869* (0.503)	-7.712 (5.521)
Treated \times Profit	0.445 (0.418)	-2.395 (4.587)
Inv \times Profit	-0.182 (0.625)	-6.053 (8.241)
Post \times Treated \times Profit	0.521 (0.488)	8.685 (5.472)
Post \times Inv \times Profit	0.203 (2.827)	7.749 (10.13)
Treated \times Inv \times Profit	-0.463 (0.646)	1.590 (8.308)
Post \times Treated \times Inv \times Profit	-0.00836 (2.831)	-6.805 (10.20)
Risk	1.916** (0.942)	1.550* (0.921)
Post \times Risk	-1.681 (1.961)	0.276 (1.810)
Treated \times Risk	-2.207** (0.938)	-2.421*** (0.916)
Inv \times Risk	-1.703 (1.779)	-1.652 (1.664)
Post \times Treated \times Risk	-0.211 (1.836)	-1.441 (1.724)
Post \times Inv \times Risk	4.245 (21.98)	4.024 (14.60)
Treated \times Inv \times Risk	2.836 (1.970)	1.861 (1.694)
Post \times Treated \times Inv \times Risk	-6.705 (22.01)	-6.030 (14.60)
CEOentry	-0.0159 (0.0160)	-0.0320** (0.0158)
GDPgrowth	0.00404 (0.00362)	0.000482 (0.00369)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1865	0.1911
Observations	999	1012

Notes: In this regression we have repeated the baseline analysis after excluding from the sample all observations in the year 2014 and all the financial institutions operating in the UK. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.11: Computed sensitivity of Variable over Total Compensation to profitability (excluding 2014 and UK from the analysis)

		pre	post	Δ
Commercial Banks	Not treated	0.318 (0.406)	-0.551 (0.652)	-0.869* (0.503)
	Treated	0.763*** (0.131)	0.415*** (0.154)	-0.348** (0.176)
Investment Banks	Not treated	0.135 (0.481)	-0.531 (2.724)	-0.666 (2.796)
	Treated	0.118 (0.116)	-0.0359 (0.0318)	-0.154 (0.114)
All	Not treated	0.276 (0.333)	-0.547 (0.808)	-0.822 (0.759)
	Treated	0.615*** (0.106)	0.311*** (0.119)	-0.303** (0.139)
Observations		999	999	999

Notes: The sensitivity is derived from the regression in Table B.10 by summing the coefficients of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted between the values for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.12: Computed sensitivity of Variable over Total Compensation to risk (excluding 2014 and UK from the analysis)

		pre	post	Δ
Commercial Banks	Not treated	1.916** (0.942)	0.236 (2.203)	-1.681 (1.961)
	Treated	-0.291 (0.288)	-2.183*** (0.722)	-1.892*** (0.699)
Investment Banks	Not treated	0.213 (1.560)	2.777 (21.81)	2.564 (21.89)
	Treated	0.841 (0.864)	-3.511*** (1.236)	-4.352*** (1.428)
All	Not treated	1.526* (0.826)	0.819 (5.283)	-0.707 (5.245)
	Treated	-0.0311 (0.323)	-2.488*** (0.626)	-2.457*** (0.634)
Observations		999	999	999

Notes: The sensitivity is derived from the regression in Table B.10 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the values for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.13: Regressions controlling for countries with a large public debt

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.434 (0.406)	6.506 (4.509)
Post×Profit	-0.862** (0.435)	-8.898** (4.425)
Treated×Profit	0.140 (0.419)	-2.173 (4.561)
Inv×Profit	-0.239 (0.586)	-6.569 (8.003)
Post×Treated×Profit	0.546 (0.425)	8.406* (4.426)
Post×Inv×Profit	-0.245 (2.621)	10.84 (8.596)
Treated×Inv×Profit	-0.223 (0.606)	2.264 (8.059)
Post×Treated×Inv×Profit	0.468 (2.624)	-10.10 (8.629)
Risk	2.043** (0.916)	1.737* (0.892)
Post×Risk	-1.396 (1.852)	-0.415 (1.726)
Treated×Risk	-2.530*** (0.904)	-2.559*** (0.882)
Inv×Risk	-1.760 (1.788)	-1.848 (1.646)
Post×Treated×Risk	0.0787 (1.772)	-0.364 (1.664)
Post×Inv×Risk	-1.303 (11.49)	-0.504 (9.555)
Treated×Inv×Risk	2.874 (1.970)	2.107 (1.672)
Post×Treated×Inv×Risk	-2.977 (11.54)	-2.366 (9.562)
CEOentry	-0.0301** (0.0146)	-0.0405*** (0.0143)
GDPgrowth	0.00568* (0.00341)	0.00394 (0.00346)
Public Debt over GDP	-0.00175*** (0.000557)	-0.00222*** (0.000546)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.2032	0.1993
Observations	1197	1212

Notes: In this regression we have included the ratio of Public Debt over GDP to control for countries' large public debt exposure. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.14: Computed sensitivity of Variable over Total Compensation to profitability (controlling for countries with a large public debt)

		pre	post	Δ
Commercial Banks	Not treated	0.434 (0.406)	-0.429 (0.604)	-0.862** (0.435)
	Treated	0.574*** (0.125)	0.257** (0.130)	-0.317** (0.149)
Investment Banks	Not treated	0.195 (0.426)	-0.912 (2.542)	-1.107 (2.593)
	Treated	0.112 (0.107)	0.0179 (0.0243)	-0.0939 (0.105)
All (\$)	Not treated	0.379 (0.329)	-0.540 (0.750)	-0.919 (0.689)
	Treated	0.467*** (0.101)	0.202** (0.100)	-0.266** (0.118)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.13 by summing the values of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.15: Computed sensitivity of Variable over Total Compensation to risk (controlling for countries with large public debt)

		pre	post	Δ
Commercial Banks	Not treated	2.043** (0.916)	0.648 (2.091)	-1.396 (1.852)
	Treated	-0.487* (0.269)	-1.804*** (0.595)	-1.317** (0.580)
Investment Banks	Not treated	0.283 (1.583)	-2.416 (11.23)	-2.699 (11.34)
	Treated	0.409 (0.850)	-5.156*** (1.053)	-5.565*** (1.281)
All (\$)	Not treated	1.639** (0.810)	-0.0558 (3.038)	-1.695 (2.972)
	Treated	0.627 (0.854)	-4.970*** (1.055)	-5.597*** (1.276)
Observations		1197	1197	1197

Notes: The sensitivity is derived from the regression in Table B.13 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.16: Regressions controlling for intensity of supervision

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.318 (0.408)	6.364 (4.554)
Post×Profit	-0.771* (0.437)	-8.658* (4.468)
Treated×Profit	0.367 (0.417)	-1.416 (4.600)
Inv×Profit	-0.0944 (0.588)	-5.977 (8.089)
Post×Treated×Profit	0.461 (0.427)	9.671** (4.455)
Post×Inv×Profit	-0.413 (2.630)	10.60 (8.667)
Treated×Inv×Profit	-0.479 (0.606)	1.176 (8.135)
Post×Treated×Inv×Profit	0.637 (2.634)	-10.97 (8.697)
Risk	1.991** (0.922)	1.536* (0.902)
Post×Risk	-0.702 (1.845)	1.445 (1.688)
Treated×Risk	-2.574*** (0.912)	-2.554*** (0.895)
Inv×Risk	-1.703 (1.799)	-1.638 (1.666)
Post×Treated×Risk	-0.810 (1.755)	-2.330 (1.612)
Post×Inv×Risk	-1.797 (11.53)	-1.918 (9.628)
Treated×Inv×Risk	2.608 (1.980)	2.022 (1.693)
Post×Treated×Inv×Risk	-2.553 (11.58)	-1.058 (9.635)
CEOentry	-0.0342** (0.0149)	-0.0452*** (0.0147)
GDPgrowth	0.00380 (0.00351)	0.00171 (0.00358)
Capital Regulatory Index	0.00384 (0.00356)	0.000853 (0.00368)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.2009	0.1889
Observations	1168	1183

Notes: In this regression we have included a variable, ranging from 1 to 14, that measures the intensity of supervision (Source: Barth *et al.* (2013)). Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.17: Computed sensitivity of Variable over Total Compensation to profitability (controlling for intensity of supervision)

		pre	post	Δ
Commercial Banks	Not treated	0.318 (0.408)	-0.453 (0.606)	-0.771* (0.437)
	Treated	0.685*** (0.124)	0.375*** (0.126)	-0.310** (0.151)
Investment Banks	Not treated	0.224 (0.427)	-0.961 (2.551)	-1.184 (2.602)
	Treated	0.112 (0.107)	0.0258 (0.0245)	-0.0859 (0.106)
All (\$)	Not treated	0.296 (0.330)	-0.569 (0.753)	-0.866 (0.692)
	Treated	0.554*** (0.0999)	0.295*** (0.0969)	-0.259** (0.120)
Observations		1168	1168	1168

Notes: The sensitivity is derived from the regression in Table B.16 by summing the values of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.18: Computed sensitivity of Variable over Total Compensation for risk (controlling to intensity of supervision)

		pre	post	Δ
Commercial Banks	Not treated	1.991** (0.922)	1.290 (2.091)	-0.702 (1.845)
	Treated	-0.583** (0.269)	-2.094*** (0.591)	-1.511*** (0.580)
Investment Banks	Not treated	0.288 (1.590)	-2.210 (11.26)	-2.499 (11.38)
	Treated	0.322 (0.851)	-5.539*** (1.055)	-5.861*** (1.289)
All (\$)	Not treated	1.600** (0.814)	0.486 (3.046)	-1.114 (2.976)
	Treated	-0.375 (0.309)	-2.885*** (0.517)	-2.510*** (0.542)
Observations		1168	1168	1168

Notes: The sensitivity is derived from the regression in Table B.16 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.19: Regressions - Placebo test

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.208 (0.566)	14.08** (6.038)
Post×Profit	0.495 (0.450)	-2.750 (5.821)
Treated×Profit	0.278 (0.583)	-9.790 (6.157)
Inv×Profit	-0.0206 (1.118)	-2.817 (14.83)
Post×Treated×Profit	-0.417 (0.450)	6.493 (5.928)
Post×Inv×Profit	-0.614 (1.024)	3.831 (11.74)
Treated×Inv×Profit	-0.334 (1.177)	-1.247 (14.90)
Post×Treated×Inv×Profit	0.679 (1.073)	-6.156 (11.82)
Risk	3.033** (1.478)	1.014 (1.660)
Post×Risk	-2.109 (1.568)	0.529 (1.612)
Treated×Risk	-2.091 (1.769)	0.403 (1.952)
Inv×Risk	-1.518 (11.82)	-0.443 (11.49)
Post×Treated×Risk	0.161 (1.731)	-3.113* (1.728)
Post×Inv×Risk	0.811 (11.85)	-2.185 (11.51)
Treated×Inv×Risk	-0.315 (12.16)	-3.017 (11.86)
Post×Treated×Inv×Risk	2.398 (12.20)	6.225 (11.86)
CEOentry	-0.0340* (0.0189)	-0.0379** (0.0186)
GDPgrowth	0.00852** (0.00426)	0.00651 (0.00431)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.1951	0.2093
Observations	794	805

Notes: In this regression the variable *Post* takes value equal to 1 for years after 2007 and 0 otherwise. The sample used in this regression excludes the years from 2011 onwards. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.20: Computed sensitivity of Variable over Total Compensation to profitability (Placebo test)

		pre	post	Δ
Commercial Banks	Not treated	0.208 (0.566)	0.704 (0.551)	0.495 (0.450)
	Treated	0.487* (0.251)	0.565*** (0.174)	0.0783 (0.249)
Investment Banks	Not treated	0.188 (0.970)	0.0695 (0.696)	-0.118 (0.924)
	Treated	0.132 (0.332)	0.276* (0.152)	0.144 (0.312)
All (\$)	Not treated	0.203 (0.492)	0.554 (0.452)	0.350 (0.409)
	Treated	0.403* (0.211)	0.497*** (0.139)	0.0938 (0.208)
Observations		794	794	794

Notes: The sensitivity is derived from the regression in Table B.19 by summing the values of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.21: Computed sensitivity of Variable over Total Compensation to risk (Placebo test)

		pre	post	Δ
Commercial Banks	Not treated	3.033** (1.478)	0.924 (1.185)	-2.109 (1.568)
	Treated	0.942 (1.313)	-1.007*** (0.320)	-1.949 (1.306)
Investment Banks	Not treated	1.515 (11.73)	0.216 (2.043)	-1.299 (11.76)
	Treated	0.409 (0.850)	-5.156*** (1.053)	-5.565*** (1.281)
All (\$)	Not treated	2.674 (2.998)	0.756 (1.053)	-1.918 (3.033)
	Treated	-0.891 (2.628)	0.369 (1.152)	1.260 (2.730)
Observations		794	794	794

Notes: The sensitivity is derived from the regression in Table B.19 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.22: Post-Matching Summary Statistics

	(1)		(2)		
	Treatment		Control		
	Mean	Standard deviation	Mean	Standard deviation	Difference
ROE	0.12	0.07	0.12	0.09	-0.00
SRV	0.05	0.05	0.04	0.02	-0.01*
Diversification Ratio	0.58	0.27	0.55	0.21	-0.03
Leverage Ratio	0.10	0.17	0.09	0.11	-0.00
Observations	432		159		

Notes: Summary Statistics refer to the pre-2011 period when the matching procedure has been implemented. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.23: Regressions: Matching

Dependent variable:	Variable over Total Compensation	
Profitability measure:	ROE	ROA
	(1)	(2)
Profit	0.679 (0.527)	9.794* (5.466)
Post×Profit	-1.690** (0.705)	-14.50** (6.216)
Treated×Profit	0.120 (0.569)	-1.070 (5.711)
Inv×Profit	-0.178 (0.789)	-0.685 (14.22)
Post×Treated×Profit	1.079 (0.673)	17.09*** (6.201)
Post×Inv×Profit	0.758 (5.923)	-0.811 (30.38)
Treated×Inv×Profit	-0.350 (0.897)	-7.971 (14.37)
Post×Treated×Inv×Profit	-0.342 (5.937)	3.160 (30.44)
Risk	1.957* (1.123)	1.621 (1.098)
Post×Risk	1.946 (2.734)	2.764 (2.208)
Treated×Risk	-2.780** (1.134)	-2.666** (1.097)
Inv×Risk	-2.274 (2.422)	-1.047 (2.602)
Post×Treated×Risk	-2.898 (2.558)	-3.370* (2.028)
Post×Inv×Risk	-3.022 (21.95)	-6.846 (14.01)
Treated×Inv×Risk	4.388 (2.851)	1.283 (2.671)
Post×Treated×Inv×Risk	-5.334 (22.05)	3.865 (14.00)
CEOentry	-0.0376 (0.0233)	-0.0478** (0.0227)
GDPgrowth	0.00651 (0.00628)	0.00123 (0.00655)
Time FE	Yes	Yes
Individual FE	Yes	Yes
Within R^2	0.2738	0.2703
Observations	488	500

Notes: In this regression we have repeated the baseline analysis after implementing a matching strategy. Among the explanatory variables we consider the contemporaneous values for risk and profitability and include one-period lagged value for the latter. The contemporaneous and lagged coefficients for profit (and its interactions) are summed up. Additional controls included but not presented in the Table are $Post_t \times Inv_{ij}$ and $Post_t \times Treated_{ij} \times Inv_{ij}$. Standard errors clustered at the bank level in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.24: Computed sensitivity of Variable over Total Compensation to profitability (matching)

		pre	post	Δ
Commercial Banks	Not treated	0.679 (0.527)	-1.011 (0.864)	-1.690** (0.705)
	Treated	0.798*** (0.287)	0.187 (0.339)	-0.611 (0.383)
Investment Banks	Not treated	0.501 (0.606)	-0.431 (6.017)	-0.932 (5.890)
	Treated	0.271 (0.329)	0.0755** (0.0354)	-0.195 (0.325)
All	Not treated	0.636 (0.432)	-0.873 (1.584)	-1.510 (1.509)
	Treated	0.673*** (0.236)	0.160 (0.259)	-0.512* (0.307)
Observations		488	488	488

Notes: The sensitivity is derived from the regression in Table B.23 by summing the values of contemporaneous and lagged ROE. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.25: Computed sensitivity of Variable over Total Compensation to risk (matching)

		pre	post	Δ
Commercial Banks	Not treated	1.929** (0.919)	1.129 (2.098)	-0.801 (1.854)
	Treated	-0.619** (0.271)	-1.799*** (0.665)	-1.180* (0.647)
Investment Banks	Not treated	0.247 (1.588)	-2.225 (11.26)	-2.473 (11.38)
	Treated	0.264 (0.856)	-5.597*** (1.239)	-5.862*** (1.435)
All (\$)	Not treated	1.543* (0.813)	0.359 (3.046)	-1.184 (2.977)
	Treated	-0.416 (0.312)	-2.671*** (0.587)	-2.255*** (0.600)
Observations		1176	1176	1176

Notes: The sensitivity is derived from the regression in Table B.23 by considering the coefficient for SRV. (\$) The value for "All" is a weighted average between the value for commercial and investment banks. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table B.26: Variable definition and source

Variable	Definition	Source
CEO level variables		
Total compensation (TC)	All cash and non-cash compensation paid to a bank CEO in the year	Capital IQ-People Intelligence
Variable compensation (VC)	Total Compensation less the Fixed Salary	Id.
VC over TC	The percentage of Variable Compensation over Total Compensation	Id.
CEO entry	Dummy variable taking value of 1 if a new CEO was appointed during the year	Id.
CEO age, sex	Age and sex of the CEO	Id.
Bank level variables		
SRV	Standard deviation of weekly stock returns (only listed banks)	Eikon (Thomson Reuters)
NPL	Non-performing loans	Capital IQ-People Intelligence
ROE	Return on Equity	Id.
ROA	Return on Assets	Id.
Tier 1	Tier 1 Capital ratio	Id.
TA	Total Assets	Id.
Retail Ratio	Ratio between net loans + total deposits and TA	Id.
Inv	Dummy variable taking value of 1 if the bank is an investment bank (SIC code above 6099)	Id.
CRO	Dummy variable taking value of 1 if a CRO exists in the bank	Own calculation based on Capital IQ-People Intelligence
Country level variables		
GDP Growth	GDP of the country where the bank is located	IFS from IMF
Public debt over GDP	Central government debt, total (% of GDP)	IFS from IMF
Capital Regulatory Index	Overall Capital Stringency plus Initial Capital Stringency	World Bank
Financial crisis	Dummy taking value of 1 in the years 2008 and 2009	Our own def.
Treatment variables		
Treated	Dummy variable taking value of 1 if the bank belongs to a type of bank and country within the scope of the P&S	FSB reports I-IV
G-SIBs	Dummy variable taking value of 1 if the bank is classified as G-SIBs (global systemically important banks)	FSB list

Table B.27: List of banks

<i>Country</i>	<i>Company Name</i>	<i>Treatment (FSB)</i>	<i>EU not FSB member</i>	<i>G-SIBs</i>
Australia	AMP Limited	1	0	0
Australia	Australia & New Zealand Banking Group Limited	1	0	0
Australia	Bank of Queensland Ltd.	1	0	0
Australia	Bendigo and Adelaide Bank Limited	1	0	0
Australia	Challenger Limited	1	0	0
Australia	Commonwealth Bank of Australia	1	0	0
Australia	Macquarie Group Limited	1	0	0
Australia	National Australia Bank Limited	1	0	0
Australia	Westpac Banking Corporation	1	0	0
Austria	Erste Group Bank AG	0	1	0
Austria	Raiffeisen Bank International AG	0	1	0
Bangladesh	Eastern Bank Limited	0	0	0
Belgium	BHF Kleinwort Benson Group SA	0	1	0
Belgium	Dexia SA	0	1	0
Belgium	KBC Group NV	0	1	0
Botswana	Barclays Bank of Botswana Limited	0	0	0
Canada	Bank of Montreal	1	0	0
Canada	Canadian Imperial Bank of Commerce	1	0	0
Canada	Canadian Western Bank	1	0	0
Canada	First National Financial Corporation	1	0	0
Canada	Home Capital Group Inc.	1	0	0
Canada	Laurentian Bank of Canada	1	0	0
Canada	National Bank of Canada	1	0	0
Canada	Royal Bank of Canada	1	0	0
Canada	The Bank of Nova Scotia	1	0	0
Canada	The Toronto-Dominion Bank	1	0	0
China	Agricultural Bank of China Limited	1	0	1
China	Bank of China Limited	1	0	1
China	Bank of Communications Co., Ltd.	1	0	0
China	China CITIC Bank Corporation Ltd.	1	0	0
China	China Construction Bank Corporation	1	0	1
China	China Everbright Bank Co., Ltd.	1	0	0
China	China Merchants Bank Co., Ltd.	1	0	0
China	Industrial and Commercial Bank of China Limited	1	0	1
Cyprus	Bank of Cyprus Public Company Limited	0	1	0
Cyprus	Hellenic Bank Public Company Limited	0	1	0
Cyprus	SFS Group Public Company Limited	0	1	0
Czech Republic	Komerční Banka AS	0	1	0
Denmark	Danske Bank A/S	0	1	0
Denmark	Spar Nord Bank A/S	0	1	0
Denmark	Sydbank A/S	0	1	0
Finland	Aktia Bank PLC	0	1	0
France	BNP Paribas SA	1	0	1
France	Credit Agricole S.A.	1	0	1
France	Crédit Industriel et Commercial	1	0	0
France	Natixis	1	0	0
France	Société Générale Group	1	0	1
Germany	Commerzbank AG	1	0	0
Germany	Deutsche Bank AG	1	0	1
Germany	Deutsche Boerse AG	1	0	0
Greece	Hellenic Exchanges - Athens Stock Exchange S.A. Holding	0	1	0
Greece	National Bank of Greece S.A.	0	1	0
Hong Kong	Allied Group Limited	1	0	0
Hong Kong	Allied Properties (H.K.) Limited	1	0	0
Hong Kong	China Everbright Ltd.	1	0	0
Hong Kong	Chong Hing Bank Limited	1	0	0
Hong Kong	Dah Sing Banking Group Limited	1	0	0
Hong Kong	Dah Sing Financial Holdings Limited	1	0	0
Hong Kong	Hang Seng Bank Limited	1	0	0
Hong Kong	Hong Kong Exchanges & Clearing Limited	1	0	0
Hong Kong	Public Financial Holdings Limited	1	0	0
Hong Kong	The Bank of East Asia, Limited	1	0	0
India	AXIS Bank Limited	1	0	0
India	Bank of Baroda	1	0	0
India	Canara Bank Limited	1	0	0
India	HDFC Bank Ltd.	1	0	0
India	Housing Development Finance Corporation Limited	1	0	0
India	ICICI Bank Ltd.	1	0	0
Ireland	Allied Irish Banks, p.l.c.	0	1	0
Ireland	The Governor and Company of the Bank of Ireland	0	1	0
Ireland	permanent tsb Group Holdings p.l.c.	0	1	0
Israel	Bank Hapoalim B.M.	0	0	0
Israel	Bank Leumi Le-Israel BM	0	0	0
Israel	Bank of Jerusalem Ltd.	0	0	0
Israel	Dexia Israel Bank Ltd.	0	0	0
Israel	First International Bank of Israel Ltd.	0	0	0
Israel	Israel Discount Bank Limited	0	0	0

Continuation of the list of banks

<i>Country</i>	<i>Company Name</i>	<i>Treatment (FSB)</i>	<i>EU not FSB member</i>	<i>G-SIBs</i>
Israel	Mizrahi Tefahot Bank, Ltd.	0	0	0
Israel	Union Bank of Israel Limited	0	0	0
Italy	Banca Carige S.p.A.	1	0	0
Italy	Banca Monte dei Paschi di Siena S.p.A.	1	0	0
Italy	Banca popolare dell'Emilia Romagna, Società cooperativa.	1	0	0
Italy	Banco Popolare Società Cooperativa Scarl	1	0	0
Italy	Intesa Sanpaolo S.p.A.	1	0	0
Italy	Mediobanca Banca di Credito Finanziario S.p.A.	1	0	0
Italy	UniCredit S.p.A.	1	0	1
Italy	Unione di Banche Italiane S.p.A.	1	0	0
Japan	Nomura Holdings, Inc.	1	0	0
Japan	Sumitomo Mitsui Financial Group, Inc.	1	0	1
Jordan	Arab Bank Plc	0	0	0
Jordan	Arab Banking Corporation (Jordan)	0	0	0
Jordan	Bank of Jordan	0	0	0
Jordan	Cairo Amman Bank	0	0	0
Jordan	Capital Bank of Jordan	0	0	0
Jordan	InvestBank	0	0	0
Malaysia	Hong Leong Bank Berhad	0	0	0
Malaysia	Hong Leong Financial Group Berhad	0	0	0
Malaysia	Malayan Banking Berhad	0	0	0
Malaysia	Public Bank Berhad	0	0	0
Malta	Brait S.E.	0	1	0
Mauritius	MCB Group Limited	0	0	0
Norway	DNB ASA	0	0	0
Norway	SpareBank 1 Nord-Norge	0	0	0
Norway	SpareBank 1 SMN	0	0	0
Norway	SpareBank 1 SR-Bank	0	0	0
Norway	Sparebanken MÅre	0	0	0
Norway	Sparebanken SÅr	0	0	0
Norway	Sparebanken Vest	0	0	0
Oman	National Securities Co. SAOG	0	0	0
Pakistan	Bank AL Habib Limited	0	0	0
Pakistan	Meezan Bank Limited	0	0	0
Poland	Alior Bank SA	0	1	0
Poland	Bank BGZ BNP Paribas S.A.	0	1	0
Poland	Bank BPH SA	0	1	0
Poland	Bank Handlowy W Warszawie SA	0	1	0
Poland	Bank Millennium SA	0	1	0
Poland	Bank Ochrony Srodowiska SA	0	1	0
Poland	Bank Polska Kasa Opieki SA	0	1	0
Poland	Bank Zachodni WBK S.A.	0	1	0
Poland	Getin Noble Bank SA	0	1	0
Poland	ING Bank Slaski SA	0	1	0
Poland	Powszechna Kasa Oszczednosci Bank Polski SA	0	1	0
Poland	mBank SA	0	1	0
Portugal	Banco Comercial PortuguÃs S.A.	0	1	0
Portugal	Banco EspÃrito Santo, S.A.	0	1	0
Portugal	Banif - Banco Internacional do Funchal, S.A.	0	1	0
Portugal	Sonae Capital, S.g.p.s., S.a.	0	1	0
Singapore	DBS Group Holdings Ltd	1	0	0
Singapore	Hong Leong Finance Limited	1	0	0
Singapore	Oversea-Chinese Banking Corporation Limited	1	0	0
Singapore	Singapore Exchange Limited	1	0	0
Singapore	UOB-Kay Hian Holdings Limited	1	0	0
Singapore	United Overseas Bank Limited	1	0	0
South Africa	African Bank Investments Limited	1	0	0
South Africa	Barclays Africa Group Limited	1	0	0
South Africa	Capitec Bank Holdings Ltd.	1	0	0
South Africa	Coronation Fund Managers Limited	1	0	0
South Africa	FirstRand Limited	1	0	0
South Africa	Investec Limited	1	0	0
South Africa	JSE Limited	1	0	0
South Africa	Nedbank Group Limited	1	0	0
South Africa	Nedbank Limited	1	0	0
South Africa	Standard Bank Group Limited	1	0	0
Spain	Banco Bilbao Vizcaya Argentaria, S.A.	1	0	0
Spain	Banco Popular Espanol S.A.	1	0	0
Spain	Banco Santander, S.A.	1	0	1
Spain	Bankia, S.A.	1	0	0
Spain	Bankinter, S.A.	1	0	0
Spain	Liberbank, S.A.	1	0	0
Sweden	Nordea Bank AB (publ)	0	1	1
Sweden	Skandinaviska Enskilda Banken AB (publ)	0	1	0
Sweden	Swedbank AB (publ)	0	1	0
Switzerland	Banque Cantonale Vaudoise	1	0	0
Switzerland	Julius Baer Group Ltd.	1	0	0
Switzerland	St.Galler Kantonalbank AG	1	0	0

Continuation of the list of banks

<i>Country</i>	<i>Company Name</i>	<i>Treatment (FSB)</i>	<i>EU not FSB member</i>	<i>G-SIBs</i>
Switzerland	UBS Group AG	1	0	1
United Kingdom	Barclays PLC	1	0	1
United Kingdom	HSBC Holdings plc	1	0	1
United Kingdom	Lloyds Banking Group plc	1	0	0
United Kingdom	London Stock Exchange Group plc	1	0	0
United Kingdom	Nationwide Building Society	1	0	0
United Kingdom	Standard Chartered PLC	1	0	1
United Kingdom	The Royal Bank of Scotland Group plc	1	0	1
United States	Bank of America Corporation	1	0	1
United States	Federal Home Loan Mortgage Corporation	1	0	0
United States	Federal National Mortgage Association	1	0	0
United States	JPMorgan Chase & Co.	1	0	1
United States	Lehman Brothers Holdings, Inc.	1	0	0
United States	Morgan Stanley	1	0	1
United States	The Bank of New York Mellon Corporation	1	0	1
United States	The Goldman Sachs Group, Inc.	1	0	1
United States	U.S. Bancorp	1	0	0
United States	Wells Fargo & Company	1	0	1

Treatment (FSB) takes value equal to 1 if the bank is under the treatment because of the FSB membership

EU not FSB member takes value equal to 1 if the bank does belong to the EU but does not to the FSB

G-SIBs takes value equal to 1 if the bank belongs to the group of systemically important banks