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Stefano Colonnello, Michael Koetter, Konstantin Wagner

Authors

Stefano Colonnello
Corresponding author
Department of Economics, Ca' Foscari University of Venice, and Halle Institute for Economic Research (IWH) – Member of the Leibniz Association
E-mail: stefano.colonnello@unive.it
Tel +39 041 234 9198

Michael Koetter
Halle Institute for Economic Research (IWH) – Member of the Leibniz Association,
Department of Financial Markets, and
Otto von Guericke University Magdeburg
E-mail: michael.koetter@iwh-halle.de
Tel +49 345 7753 727

Konstantin Wagner
Halle Institute for Economic Research (IWH) – Member of the Leibniz Association,
Department of Financial Markets
E-mail: konstantin.wagner@iwh-halle.de
Tel +49 345 7753 755

Editor

Halle Institute for Economic Research (IWH) – Member of the Leibniz Association

Address: Kleine Maerkerstrasse 8
D-06108 Halle (Saale), Germany
Postal Address: P.O. Box 11 03 61
D-06017 Halle (Saale), Germany

Tel +49 345 7753 60
Fax +49 345 7753 820

www.iwh-halle.de

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Effectiveness and (In)Efficiencies of Compensation Regulation: Evidence from the EU Banker Bonus Cap*

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Abstract

We investigate the (unintended) effects of bank executive compensation regulation. Capping the share of variable compensation spurred average turnover rates driven by CEOs at poorly performing banks. Other than that, banks' responses to raise fixed compensation sufficed to retain the vast majority of non-CEO executives and those at well performing banks. We fail to find evidence that banks with executives that are more affected by the bonus cap became less risky. In fact, numerous results indicate an increase of risk, even in its systemic dimension according to selected measures. The return component of bank performance appears to be unaffected by the bonus cap. Risk hikes are consistent with an insurance effect associated with raised the increase in fixed compensation of executives. The ability of the policy to enhance financial stability is therefore doubtful.

Keywords: banks, bonus cap, executive compensation, executive turnover

JEL classification: G21, G32, G34

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1 Introduction

In April 2013, the European Parliament voted to cap the compensation share of bonus payments to banks' executive directors—henceforth executives for short—in the European Union (EU). Many observers interpreted this decision as the dawn of a regime shift that should alter the risk-taking attitudes of bank executives after the Great Financial Crisis of 2007-2008 (The Economist, 2013). Yet, theoretical predictions about the effects of bonus caps are mixed. Some studies show that they can contain excessive risk-taking when banking regulation is weak (Hakenes and Schnabel, 2014) or if the bank is systemically relevant (Freixas and Rochet, 2013). Others caution that less incentive pay reduces bank executives' effort, thereby serving as an undesirable insurance mechanism that increases systemic risk (Carlson and Lazrak, 2010; Albuquerque, Cabral, and Guedes, 2019).

Given this theoretical ambiguity, we assemble a novel sample of all executives of 45 major EU banks to provide comprehensive empirical evidence on the implications of this policy shock in two dimensions. First, we isolate first-order effects in labor markets to learn if this stark regulatory policy intrusion inflicted undesirable collateral damage by driving the most talented human capital out of the banking industry. Second, we test if the policy shock successfully tamed risk-taking by banks or whether changed incentives of top executives possibly jeopardized banking system resilience.

After all, the high levels of pay in the finance industry, which disgruntled the public in the aftermath of the Great Financial Crisis, were necessary to attract and retain the most skilled human capital (Philippon and Reshef, 2012; Murphy, 2013a,b). An erosion of the talent pool may destabilize this inherently complex sector. High fixed compensation insures risk-averse bankers (Carlson and Lazrak, 2010) and causes higher operating leverage (Efing, Hau, Kampkötter, and Rochet, 2020), possibly increasing systemic risk. However, large variable and incentive-based compensation components in the United States (US) banking industry invited risk-shifting behavior after deregulation in 1999 (DeYoung, Peng, and Yan, 2013). Pre-crisis compensation practices also contributed to risk-taking in non-US banking markets (Efing, Hau, Kampkötter, and Steinbrecher, 2015). This mixed evidence highlights that corporate governance in banking is special and conditional on country-specific regulatory conditions (Laeven and Levine, 2009; Anginer, Demirguc-Kunt, Huizinga, and Ma, 2018).

With our novel and granular executive data collected for 14 different EU countries, we demonstrate empirically that the policy did not generate unintended collateral damage to banks' human capital. The concerns voiced by industry representatives that the most

talented managers would leave did not materialize in general. Banks simply indemnified their CEO and non-CEO executives sufficiently when adjusting compensation packages to comply with the new regulation. The increase in turnover rates is driven by CEOs at poorly performing banks, suggesting a tougher governance response towards under-performance by these executives after the bonus cap. In addition, we find no compelling evidence that the bonus caps accomplished the objective to reduce risk-taking and to enhance financial system resilience. The risk profile of the average EU bank did not improve for any of the main stakeholders of banks: shareholders, creditors, and the general public. Most empirical results suggest rather clearly that banks affected by the bonus cap exhibit a hike in risk, even in its systemic dimension according to selected measures. Importantly, these results obtain also under various alternative specifications to account for a plethora of confounding regulatory shocks at the time. These empirical results raise concerns about the usefulness of the EU bonus cap in fostering financial stability.

This paper contributes to a firmer comprehension of the consequences of limiting incentive pay in banking in three distinct ways. First, we test for the adverse attrition of human capital from the banking industry due to the regulatory shock to compensation. The isolation of first-order effects in bank executive labor markets helps to reveal potentially unintended consequences of regulating incentive pay. We collect data on CEOs and all non-CEO executives of 45 EU banks that reside in 14 countries between 2010 and 2016. The EU bonus cap establishes that the maximum variable-to-fixed compensation ratio shall generally not exceed 100% or 200% subject to shareholder approval. The data allows us to precisely identify executives with higher maximum variable-to-fixed compensation ratios who were therefore not compliant with the EU cap as of 2013. These executives constitute the treatment group whereas those with compliant contracts are the control group. By differentiating between plausibly forced and voluntary executive turnover in a difference-in-differences framework, we find no evidence of collateral damage. Voluntary turnover is not significantly more likely for executives with higher treatment intensity. Likewise, better skilled and more experienced executives are not more likely to depart after the regulatory shock, which suggests that executives' dismissals rather than top talents abandoning sinking ships drive executive turnover. This interpretation is consistent with the result that only treated executives at under-performing banks—in particular CEOs, who are commonly more subject to shareholder discipline—leave the industry at a significantly higher rate and are replaced by younger and less experienced successors following the EU cap. Overall, we find no empirical indications of a dramatic impairment

of EU banks' ability to retain their best executives.

Second, we test whether and how banks implemented the regulation. Beyond confirming that banks abide with new rules, we are the first to collect information on fixed compensation and *maximum achievable* rather than *granted* or *realized* variable compensation. This metric for the maximum variable-to-fixed compensation ratio is a truly forward-looking measure of incentives in the contracts of both CEO and non-CEO executives in EU banks. Therefore, it allows us to show that the absence of human capital attrition is attributable to the practice of a timely adjustment of treated executives' compensation structure to comply with the cap. Banks do so through a combination of increased fixed compensation and a decreased maximum variable compensation. We show that expected compensation did not change significantly from the perspective of a risk-neutral treated executive around the EU cap. Thus, banks appear to indemnify their executives and buffer the regulatory shock to their labor income, without substantial differences across non-CEO executives and CEOs. Banks only changed the face value of variable compensation and whereas we observe an increased use of equity and deferred compensation, overall ex post pay-for-performance sensitivity does not change significantly. Against the backdrop that also KPI remained unchanged, the practice to leave pay-performance incentives apparently untouched casts doubt on whether the regulation succeeded to alter managerial risk-taking incentives as planned.

The third contribution is therefore to test if these indemnification responses to the bonus cap did taper observable risk-taking at the bank level. We assess if EU bank performance in terms of risk and return realizations changed after the regulatory shock. Contrary to the common narrative about performance compensation, often perceived to be akin to risk-taking incentives, treated banks do not exhibit any significant risk reduction following the cap. In fact, multiple risk metrics hike even after accounting for unobservable factors at the bank and country-year level by means of fixed effects. The return dimension of bank performance, in turn, does not exhibit statistically significant regulation response. Increased risk-taking manifests itself through different risk dimensions that are of direct relevance to shareholders (beta), creditors (credit risk), and the public and policy-makers (selected systemic risk metrics). These patterns are consistent with the theoretical prediction of Carlson and Lazrak (2010) that risk-averse managers become more tolerant to risk because of the insurance effect provided by higher fixed compensation.

A fundamental problem in the literature on executive compensation is the endogenous nature of pay (Edmans, Gabaix, and Jenter, 2017). Although the EU bonus cap

constitutes a shock to the contracting environment in which banks and their executives operate, its exogenous nature is unclear. In our sample, treated executives exhibit indeed different levels of observable traits compared to untreated executives. But importantly, we demonstrate that the parallel trends assumption is not violated, indicating that differences across the two groups of executives are arguably time invariant. To this end, we saturate our difference-in-differences specifications with fixed effects to account for these level differences. We also ensure that our results are not driven by one of the many confounding events and factors, such as the contemporaneous EU implementation of Basel III, banks' exposure to the European debt crisis, bailouts, and macroeconomic or regulatory shocks that are subsumed by country-by-year fixed effects. Our results also obtain when using an alternative control sample based on top executives at large US banks, who are by definition not affected by the EU bonus cap. The mostly large, internationally active treated EU banks arguably share more hard-to-observe features—such as risk exposures, business models, and below-executive-level compensation practices—with this alternative control group of US peers compared to untreated EU banks. Yet, we cannot exclude the possibility that treated executives self-select into treatment. Overall, we therefore interpret the empirical results as suggestive evidence rather than clear-cut causal effects of a shock to compensation structure. Despite this limitation, these relationships measure relevant observational differences associated with a change in regulatory compensation introduced in the wake of the Great Financial Crisis.

The first strand of literature to which we relate studies the relationship between bank executive compensation and the consequences for risk-taking and financial stability. Against the backdrop of the Great Financial Crisis, several theoretical frameworks emerged that link executive compensation, regulation of compensation, and risk-taking in banks (e.g., Thanassoulis, 2012; Bénabou and Tirole, 2016; Bolton, Meran, and Shapiro, 2015). On the empirical side, Fahlenbrach and Stulz (2011) investigate the role of bank CEOs' incentives before the crisis and show that banks with CEOs whose incentives were more tightly linked to shareholder wealth performed worse during the crisis. Those CEOs did not decrease their equity holdings and subsequently experienced large losses due to poor performance. Boyallian and Ruiz-Verdú (2017) complement this line of research by looking at how pre-crisis incentives and leverage interacted, showing that equity incentives were especially conducive to default risk in highly levered banks. Kolasinski and Yang (2018) illustrate that financial institutions whose CEOs had a higher fraction of short-term incentives before the crisis exhibited higher exposure to subprime mortgages and higher distress. Bhagat and Bolton (2014) find that managerial incentives led to ex-

cessive risk-taking and that poor bank performance was not the result of unforeseen risk. Efing et al. (2015) exploit payroll data from selected European countries to document that incentives in banks before the crisis were too high to be the result of an optimal trade-off between risk and return (see Mukharlyamov, 2016, for a review of bank labor market studies). DeYoung et al. (2013) show that in the US, more risk-taking incentives were provided to CEOs after regulatory constraints on growth opportunities of banks were lifted in the wake of the Financial Services Modernization Act deregulation in and around the year 1999. They report that as a result, both bank risk-taking and average (variable) pay of CEOs increased. Fahlenbrach, Prilmeier, and Stulz (2012) conclude that a bank's performance in the crisis of 1998 had strong predictive power on its performance in the recent crisis, which solidified the rise to persistence of that bank's risk culture. Using data from 2006–2014, Bennett, Gopalan, and Thakor (2020) report that banks link their compensation more to short-term metrics and do not appropriately adjust for leverage, providing a potential explanation for the observation that banks took greater risks before the Great Financial Crisis. We add to these studies by testing whether attempts in the EU banking sector to tame risk-taking due to incentive pay were successful.

A second strand of empirical and experimental literature relates more directly to our exercise and focuses on the consequences of regulation of bankers' compensation on both risk and executive labor markets. In a cross-country setting, Cerasi, Oliviero et al. (2015) show that banks whose CEOs receive more stock and option grants perform worse and take more risk in the presence of explicit deposit insurance schemes. Cerasi, Deininger, Gambacorta, and Oliviero (2020) provide cross-country evidence on how bank CEOs' pay packages and turnover rates changed around the introduction of the Financial Stability Board (FSB) guidelines on compensation. Kleymenova and Tuna (2020) investigate UK banks' reactions in terms of CEO compensation, turnover, and risk-taking to a regulation that mandated the deferral of compensation and subjected it to performance-based vesting. They report that it contributed to a reduction of systemic risk, but possibly impaired banks' ability to retain their CEOs. These results are important evidence on unintended effects of the EU-wide mandatory deferral of bonuses as part of the Capital Regulation Directive (CRD) III of 2010 on CEOs employed in one important financial system, the UK. We complement this insight with an assessment of the approach adopted by regulators as part of the CRD IV in 2013: bonus share instead of clawback rules under CRD III. Empirical evidence on the effect of bonus caps is surprisingly scarce and we are only aware of laboratory-based experimental evidence by Harris, Mercieca, Soane, and

Tanaka (2018).[1] They show that this type of cap is highly effective at limiting risk-taking if and only if the bonus is not conditional on achieving a performance target. Since this condition is rarely met in the banking industry, we study the effects of capping bonus shares of CEOs and non-CEO executives at 45 major banks from 14 EU countries and provide empirical ad-hoc tests showing that bonus caps in fact exacerbate rather than mitigate risk-taking through differential effects on the stakeholders of the banking sector: owners, creditors, and tax payers with a public interest in system resilience.

In sum, we conduct a comprehensive empirical assessment of the (un)intended consequences of a bonus cap on the compensation and career choices of CEO and non-CEO executives in multiple jurisdictions within the EU, before isolating the association of such a regulatory shock with bank performance in terms of risk and return.

2 Institutional background on main changes of compensation regulation

Short termism—especially in the form of excessive risk-taking—induced by high-powered compensation packages in the financial industry is often blamed for the Great Financial Crisis (DeYoung et al., 2013; Efing et al., 2015). This view also explains why, for example, bailouts of stressed US banks under the Troubled Asset Relief Program were conditioned on executive compensation constraints (Bayazitova and Shivdasani, 2012). The longer-term implications were regulatory reforms that aimed to curb risk-taking incentives in bankers' compensation packages for good.

In 2009, the FSB published the Principles for Sound Compensation Practices, which comprise three clusters. The overarching goal is to raise awareness that compensation systems are closely related to risk management and governance. The first cluster guides the governance of compensation and the internal monitoring of compensation systems. The second provides principles aligning compensation to prudent risk-taking goals. Payouts should be risk-adjusted, penalize bad performance on various levels of the institution, and reflect the time horizon of risks in appropriate deferral schemes. The employee's role, position, and responsibility should be reflected by the mix of payouts in equity, equity-linked, and cash components. The third cluster of principles defines standards on the supervision and disclosure of compensation practices. Supervisors should review compensation systems continuously as part of their risk assessment and take supervisory actions when deficiencies are identified. Information on compensation systems should also

[1] Abudy, Amiram, Rozenbaum, and Shust (2020) investigate a cap on *total* compensation in the Israeli finance industry and find that it helped to reduce rent extraction.

be made accessible to stakeholders to allow them to evaluate the compensation policies.

The FSB principles sparked the amendment of existing and the drafting of new national and pan-European compensation regulations, such as the Remuneration Code in the UK or Germany (*Institutsvergütungsverordnung*) that were both enacted in late 2010. Thus, some national regulations were enacted after the first publication of the agreed-upon text of the EU Capital Markets Directive (CRD) III in July 2010, but before the publication of the Directive 2010/76/EU in December 2010 that became effective as of January 2011. This iterative development process of regulation sparked by the FSB principles implied that various national regulations en route towards CRD III had to be adjusted after January 2011 so as to comply with the EU regulation (see, e.g., FSA, 2010).

The main upshot of these various ongoing and interacting legislative processes at national and EU level was, however, that all were sparked by the FSB remuneration principles of 2009. Put differently, national processes to revisit remuneration as one aspect of a larger effort to enhance financial stability applied to all EU banking markets alike, ultimately leading to the enactment of the CRD III. Regarding remuneration aspects, this regulation prescribes minimum levels of deferral and equity grants for identified staff at significant institutions to better link bankers' incentives to long-term bank performance and favor prudent risk-taking. At least 40% of variable compensation must be deferred for at least three years. Not less than half of variable compensation should be granted in a way that incentives are aligned with long-term interests of the credit institution (e.g., by granting share-linked compensation).

The CRD IV was introduced in 2013 and its rules on compensation became binding as of January 2014. The main goal was to limit bank risk-taking.[2] This regulation complements the original rules of the CRD III with the so-called banker bonus cap. It limits the ratio of variable-to-fixed compensation at 100%, or 200% if shareholders agree.[3] Studying this regulatory shock complements the existing evidence on vesting periods and clawbacks with a comprehensive cross-country study of a compensation component that is most directly linked to short-termism: variable bonuses.

According to the European Banking Authority (EBA), compensation items can only

[2]Directive 2013/36/EU (preamble no. 65). National regulators had to ensure compliance with it by the end of 2014: see https://www.eba.europa.eu/-/eba-discloses-probe-into-eu-bankers-allowances.

[3] The cap can be further increased by discounting up to 25% of the variable compensation that is deferred for at least five years. The discount rate is a function of macroeconomic conditions and the specific features of the compensation plan of the executive (see EBA Guidelines, EBA/GL/2014/01, p. 3). Robustness tests using a threshold of 250% (Reuters UK, 2013) confirm the main results.

be classified as fixed if they are "permanent, i.e., maintained over a period tied to the specific role and organisational responsibilities for which they are granted; pre-determined, in terms of conditions and amount; non-discretionary, non-revocable and transparent to staff".[4] The cap applies to senior managers, so-called material risk takers (e.g., traders), and internal supervisors. It is binding for legal entities of EU banking groups, i.e., also for non-EU subsidiaries. Regulating the variable-to-fixed compensation ratio leaves compensation levels as such untouched, but the costs to incentivize employees increase. For example, under a cap of 100%, for each euro a bank offers as a potential variable earning to an executive, the bank must pay at least one euro as fixed pay, irrespective of performance. Therefore, the bonus cap leads banks to internalize to a larger extent the potential costs of incentivization.

3 Compensation regulation in banking: Theoretical priors

First, we provide theoretical guidance on how the particular governance of the banking firm interacts with regulation, which gives rise to different implications for the nexus between compensation and risk-taking. Second, we discuss theoretical implications of compensation regulation regarding the first-order effects in managerial labor markets.

3.1 Governance, regulation, and risk in the banking industry

The governance mechanism of banks differs from that of non-financial firms (Shleifer and Vishny, 1997) for two main reasons: pervasive regulatory oversight and the presence of explicit (e.g., deposit insurance schemes) and implicit government safety nets (e.g., bailouts of *too-big-to-fail* banks), as illustrated by Adams and Mehran (2003) and John, Mehran, and Qian (2010). Both aspects reflect the systemic relevance of bank stress, which can generate negative externalities for non-stressed banks, non-financial firms, and households (Acharya, 2009; Brunnermeier, 2009). Hence, the traditional agency problem between shareholders, creditors, and management is nested in the broader one between shareholders and the public, which has an interest in a stable banking system (The Economist, 2010; Freixas and Rochet, 2013).

This interest was severely violated when poor bank governance arrangements contributed significantly to financial instability, which eventually led to the Great Financial Crisis. Critically weak governance practices prior to 2007 failed to align interests between shareholders and management that fostered excessive risk taking. In addition, the crisis

[4] See https://www.eba.europa.eu/-/eba-discloses-probe-into-eu-bankers-allowances.

also illuminated how the presence of government safety nets and limited liability gave rise to negative externalities in terms of socially suboptimal levels of risk-taking. (see, e.g., Chaigneau, 2013; Eufinger and Gill, 2016; Anginer et al., 2018). Given the limitations of standard governance practices for banks, the scope of bank regulation was extended continuously since the Great Financial Crisis by tightening microprudential requirements and by launching novel macroprudential regulation.

Relevant to our study, ensuring sound management processes and corporate governance received substantial attention besides the regulation of financial quantities (Bank for International Settlements, 2011). Significant attention has been devoted in particular to bankers' pay packages since theoretical studies indicate that compensation regulation fulfills a distinct disciplining role compared to more direct approaches to regulating risk-taking. John, Saunders, and Senbet (2000) show that capital regulation cannot fully curb risk-shifting behavior due to banks' high leverage. Likewise, asset restrictions may lead to substantial inefficiencies in investment policy. They propose to link deposit insurance premia to bankers' compensation structure to induce shareholders to design Pareto optimal managerial contracts. Similarly, Eufinger and Gill (2016) illustrate that capital requirements contingent on bank management incentive schemes could achieve the socially optimal level of risk-taking. Kolm, Laux, and Lóránth (2017) show that the optimal approach to prevent excessive risk-taking comprises both capital and compensation regulation if shareholders are active. Capital regulation limits underinvestment in risk-reducing projects. But only when combined with compensation regulation, it effectively prevents risk-shifting. In sum, theoretical studies point towards an intricate interaction between prudential regulation and existing governance arrangements (see also Laeven and Levine, 2009), which raises the question if alternative policy tools to regulate compensation also have different effects on executive labor markets and risk-taking.

Whereas executive compensation contracts encompasses many dimensions (e.g. level of pay, debt vs. equity incentives, maturity mix, etc.), Section 2 highlighted that most compensation regulation aims to reduce short-term incentives by constraining the structure of bank executives' payment packages. The focus on vesting periods under the 2010 regulation of CRD III, was supplemented with an explicit cap of bonuses in the CRD IV of 2013. Accordingly, we focus on one particular facet of compensation structure: the ratio of incentive pay relative to fixed pay.

It is theoretically unclear if and via which economic mechanisms bonus caps mitigate risk-shifting. Risk-shifting concerns are more severe than effort problems if bank bailout probabilities are high. Against the backdrop of a so far untested Single Resolution

Mechanism (SRM), doubts about bank resolution continue to prevail among market participants (Beck, Da-Rocha-Lopes, and Silva, 2020; Carmassi, Dobkowitz, Evrard, Parisi, Silva, and Wedow, 2020). In such as setting, Hakenes and Schnabel (2014) show that capping bonuses is an effective tool to restore the socially optimal level of risk-taking. Relatedly, Kolm et al. (2017) point out that a bonus cap can contain the bank's maximum default probability. However, it does not mitigate underinvestment in risk-reducing strategies. Thanassoulis and Tanaka (2018) study the case of a *too-big-to-fail* bank, focusing on clawback rules as the main tool to curb excessive risk-taking. Accounting for bank shareholders' endogenous reaction, they predict that these rules are effective if coupled with restrictions on pay-for-performance sensitivity, such as bonus caps. Yet, they caution that shareholders can circumvent a cap structured like the EU one by granting highly convex pay schemes within a concentrated incentive region, thereby undoing the risk-reducing effect of the regulation (see also Jokivuolle, Keppo, and Yuan, 2019). As such, their model suggests that bonus caps effectively reduce risk-taking only under fairly specific conditions. Albuquerque et al. (2019) demonstrate that bonus caps can even increase systemic risk because they reduce managerial effort if executive performance is evaluated relative to peers, which is commonplace among large EU financial institutions (see Appendix Figure A.1 for an example). Systemic risk increases if low-effort bankers invest in correlated projects (Acharya and Yorulmazer, 2007; Farhi and Tirole, 2012).

Overall, theoretical priors how bonus caps influence risk-taking are mixed. Fewer short-term incentives may reduce managerial risk appetite. But compensation packages with large fixed components reduce managers' incentives to exert effort and may induce them to invest more in correlated projects. Since these theories hinge on inherently unobservable quantities, a structural empirical test of each economic mechanism is infeasible. We therefore limit ourselves to provide evidence on the equally important empirical question that is realistic to answer: what was the net change in bank riskiness around the introduction of the EU cap? Before doing so, we articulate our expectations about the first-order effects of capping incentive pay in the labor market for bank executives.

3.2 Implications for managerial labor markets

Compensation structure is especially likely to co-determine executives' career trajectories in the financial industry. Skills can be better scaled in the financial industry compared to other sectors, which results in higher returns to human capital, in particular during times of deregulation (Philippon and Reshef, 2012; Célérier and Vallée, 2019). Skilled

workers in the financial industry also tend to be highly mobile, possibly leading to tax competition across jurisdictions within a banking union to retain them (Gietl and Haufler, 2018). Van Boxtel (2017) discusses anecdotal evidence and provides a model that endogenizes compensation structure and risk-taking. In the presence of highly mobile workers, banks attract skilled workers in this model if they offer high-powered incentives. According to Oyer (2004), variable compensation can be more efficient than fixed pay to ensure that workers' participation constraint is met, even if the former partly rewards "luck". The financial industry provides a setting where variable compensation may indeed primarily serve the function of retaining talent rather than inducing optimal effort. Murphy (2013b) cautions that the most talented executives would suffer the most from a more performance-insensitive compensation structure, hence they might be the first to leave. We formulate testable hypotheses about such first-order effects.

To understand the potential impact of the EU bonus cap for the managerial labor market, consider a stylized performance-based compensation plan resembling those in place at most EU banks. Variable compensation opportunities for executives are usually capped at a maximum level (Murphy, 2001; Bettis, Bizjak, Coles, and Kalpathy, 2018), which applied to major EU banks already before the introduction of the bonus cap. Figure 1 visualizes the terminal payoff M_T of one such plan as a function of a given measure of performance A_T at time T. Within the incentive zone ($X \leq A_T \leq Z$), executives participate in the bank's performance $\Pi = A_T - X$ at the participation rate p. The maximum variable compensation achievable by the executive V_{max} is a fraction of fixed compensation ρF, where ρ represents the level of the cap ratio. At the end of a period, the compensation contract has the value:

$$M_T = F + \underbrace{(\rho F)/(Z - X)}_{p} \left[\max\{\underbrace{A_T - X}_{\Pi}, 0\} - \max\{A_T - Z, 0\} \right]. \tag{1}$$

The EU cap limits the value of the parameter ρ as described in Section 2. To assess the consequences of the regulatory shock for the managerial labor market, we investigate *how* banks complied with it. Figure 2 relates an executive's preferences to the possible adjustments in the compensation plan with the payoff as in (1) in terms of fixed compensation vs. expected variable compensation $E_t\,[Var.\ comp.]$ as of time t around the EU cap. The risk-averse case (the solid red line) and the risk-neutral case (dotted black 45° line) are depicted. Suppose that the maximum variable-to-fixed compensation ratio ρ in place before the EU cap does not comply with the new regulation (point O). If banks

abide by the new regulation, three ways to reduce the ratio to ρ' are:

1. Decrease expected variable and maintain fixed compensation (point A);
2. Increase fixed and maintain expected variable compensation (point B);
3. Rebalance so that risk-averse executives are indifferent (e.g., point C).

These cases highlight empirically testable effects of the EU cap on managerial mobility. If banks comply with the cap as in case 1 (2), we should observe a surge (decrease) in voluntary turnover rates of executives. If banks *indemnify* their executives as in case 3, we expect no significant change in voluntary turnover rates.

Several additional bank executive and bank characteristics are likely to matter. For example, highly skilled managers, who benefit more from performance-based compensation, may be more likely to leave than less skilled ones. A manager with general skills may also be more prone to leave for another bank or sector if his/her human capital is portable, thus reducing personal switching cost (Weinberg, 2001). Banks may decide not to indemnify managers either because they do not want or they cannot afford to retain them. Both scenarios have become increasingly relevant for the banking sector, which became much less attractive as an employer after the Great Financial Crisis.

Therefore, as far as these inherently opaque motives can be approximated, we control below for unobservable and observable bank-level traits when we test empirically if bank executives leave their positions around the introduction of the EU cap more often (voluntarily or due to forced attrition). After establishing these first-order effects in executive labor markets, we proceed to examine the adjustment in executive compensation structure and the implications for bank performance.

4 Empirical approach

We study the January 2014 introduction of the EU bank bonus cap and test empirically its effects on bank executive turnover, their compensation structures, and bank performance in terms of risk and return. We focus on executives serving on the management board, to whom shareholders delegated their control rights to operate the bank.

4.1 Turnover rate

We study the first-order consequences of the EU bonus cap for executives' mobility in managerial labor markets by adopting a difference-in-differences design similar to Guo

and Masulis (2015). To explain executive turnover, we estimate a linear probability model, where the unit of observation is executive i at bank j in year t:

$$y_{ijt} = \beta_0 + \beta_1 Treatment\ intensity_i \times Post_t + \boldsymbol{\gamma x_{it}} + \boldsymbol{\theta z_{jt}} + \mathbf{1}\boldsymbol{\alpha_{jt}} + \epsilon_{ijt}. \quad (2)$$

The dependent variable y_{ijt} is an indicator equal to 1 if an executive leaves. The baseline estimations comprise all turnover events. Given the potentially adverse impact of the cap on EU banks' ability to retain their managers (Murphy, 2013b), we are especially interested in executives who voluntarily left their banks either to take positions at other institutions or to retire early. Intuitively, by revealed preferences, if executives after the cap are worse (better) off, the number of voluntary turnovers should increase (decrease).

Since the bonus cap was imposed on banks across all EU countries at the same time, no obvious counterfactual sample of unaffected banks exists relative to which the consequences of the regulatory shock can be isolated trivially. We thus define bank executives with compensation packages that did not comply with the cap as of 2013 as *treated* in this difference-in-differences approach. Bank executives with compliant compensation packages as of 2013 constitute instead the control group. Appendix Table A.1 illustrates that treated and untreated executives are employed across a diverse set of banks. The absence of any glaringly obvious clustering of treated executives in banks of a certain type, for example in terms of business model, distress, nationality, or ownership, bodes well for the empirical approach. We define treatment in the baseline tests on the basis of the 200% threshold because most of the sampled large banks sought approval for a threshold above 100% (see Figure 1 of European Banking Authority, 2015) and because it minimizes the number of false positives in the treatment group. Rather than using a binary treatment indicator, we exploit variation in compensation structure across treated executives, also within banks. $Treatment\ intensity_i$ equals 0 for the control group whereas it is equal to the distance between ρ and 200% as of 2013 for treated executives. For example, an executive with a maximum variable-to-fixed compensation ρ of 240% as of 2013 has a treatment intensity of 0.4. This approach improves the precision of empirical estimates. In robustness tests, we also use a standard binary treatment indicator as well as a different treatment threshold. $Post_t$ is an indicator variable equal to 1 from 2014 onward.

Executive-level control variables $\boldsymbol{x_{it}}$ comprise age, a CEO indicator, professional experience, a retirement age indicator (1 if the executive is older than 65 years), a female indicator, and tenure. $\boldsymbol{z_{jt}}$ comprises bank-level control variables, namely size (natural logarithm of total assets), risk-adjusted performance as proxied by the lagged Sharpe

ratio, the number of executives serving on the board, and an indicator for CEO turnover. To approximate at least indirectly outside options of executives, we follow Custódio, Ferreira, and Matos (2013) and use principal component analysis of employment history information (see Appendix Table A.2 for computational details).

We estimate increasingly saturated specifications by including year and bank fixed effects, which we denote by $\boldsymbol{\alpha_{jt}}$. Thereby, we control for changes in aggregate conditions and unobservable, time-invariant bank traits. Equation (2) depicts the most saturated specification. For ease of notation, in equation (2) we do not report direct terms of $Treatment\ intensity_i$, and $Post_t$ is absorbed by year fixed effects. We cluster standard errors at the bank level.

Identifying forced and voluntary turnovers through news searches à la Jenter and Kanaan (2015) is infeasible due to the sparse media coverage of non-CEOs in our sample. Observed changes in the overall turnover rate are informative regarding voluntary departures only as long as no differential changes occurred across the treatment and the control group in terms of the forced turnover rate and job-switching costs or preferences. Both conditions are unlikely to hold around the introduction of the EU bonus cap. We follow instead the intuition of Jenter and Lewellen (2020) and analyze the turnover rate at different levels of performance. An executive turnover taking place after a year of good performance is arguably unlikely to be a dismissal. In this way, we refine our estimates of the consequences of the EU bonus cap for banks' ability to retain their executives.

4.2 Compensation structure

In a second step, we analyze how banks adjust their executives' compensation packages to comply with the new regulation. The adjustment of compensation structure is key to understand how attractive an executive's outside option becomes after the introduction of the EU cap and, thus, the strength of his/her incentives to leave the bank. Put differently, we study whether banks indemnify executives for the loss in variable pay opportunities to gain insights into the observed patterns of executive turnover around the cap.

The difference-in-differences design is the same as in equation (2). Dependent variables y_{ijt} include different measures of compensation: the level of fixed and (maximum) variable pay, the ratio of maximum variable compensation to fixed compensation, and expected pay. As before, executive-level controls comprise age, tenure, a female indicator, professional experience, and a CEO indicator. Bank-level controls comprise size, performance as proxied by ROE, and number of executives serving on the board. The most

saturated compensation regression specification also includes executive fixed effects.

4.3 Bank performance and risk-taking

Given the importance of executives' compensation structures to shape managerial incentives, we explore in a third step the evolution of performance in terms of returns and risk-taking around the introduction of the EU cap. Again, we follow a difference-in-differences approach similar to equation (2). The outcome variables y_{jt} comprise the Sharpe ratio and its components (stock return and its volatility), credit default swap (CDS) spreads, and measures of systemic and market risk taking.[5] Most notably, we conduct our analysis at the bank level, because we do not observe individual executives' performance in terms of return of risk-taking.

$Treatment\ intensity_j$ at the bank-level equals the average across executives serving on a bank's board as of the enforcement of the EU cap. Thus, it refers to the same executives that are in the post-treatment sample in executive-level regressions.[6] An important difference of these bank-level analyses vis-á-vis executive-level regressions concerns the potential bias arising from confounding regulatory events. The latter isolate responses in turnover and compensation towards the EU bonus cap by exploiting variation within banks and across executives. Hence, any regulation affecting entire banks identically would not contaminate *executive* responses. But bank-level exposure to other relevant regulation launched around the same time poses a challenge to isolate the EU bonus cap effect on bank return and risk if it correlates with $Treatment\ intensity_j$.

We tackle this challenge with a "brute-force" approach by saturating bank-level specifications with country-by-year instead of year fixed effects, in addition to bank-specific fixed effects. Thereby, we purge all variation in bank performance that is either attributable to confounding national legislation, such as heterogeneous deposit insurance schemes and bailout practices but also the regulation of gender quotas on boards per country (Jourová, 2016), or staggered transposition of EU directives related to the European Banking Union into national legislation (Koetter, Tonzer, and Krause, 2019).[7] We disregard control variables because they are arguably endogenous to bank return and

[5] We argue that banks' CDS spreads gauges idiosyncratic credit risk because we consider the bank's spread in excess of its sovereign's CDS spread and since the beta of debt is conventionally small.

[6] Distinguishing bank-level treatment intensity of non-CEO executives vs. CEOs yields qualitatively similar results.

[7] Consequently, we cannot estimate performance regressions for countries that only host one bank, see Appendix Table A.1. More parsimonious specifications with bank- and year-fixed effects yield qualitatively identical results. Although less of an issue, we also check the sensitivity of confounding regulation in executive-level analyses. Results are unaffected and available upon request.

risk, thus qualifying as "bad controls" (Angrist and Pischke, 2009).

4.4 Identification challenges

The empirical analysis faces three key challenges. The first is selection bias. Highly skilled executives are more likely to receive high-powered incentives and are thus more likely treated. Therefore, we specify covariates to gauge managers' skills and risk appetite as well as banks' abilities to retain human capital and perform standard diagnostic tests. Still, we cannot rule out that treatment assignment is to some extent non-random in the difference-in-differences design. Especially managerial skill is intrinsically elusive.

To address the lack of a clear counterfactual in the context of the EU-wide introduction of a bankers' bonus cap, we scrutinize our results regarding alternative treatment and control group definitions mainly in three ways. First, we build an alternative control group of top executives from the largest US banks to complement the baseline choice of untreated EU bankers, which enriches our analysis for two main reasons. To begin with, US banks' executives are not directly affected by the cap. Furthermore, this alternative control group allows us to compare the EU banks where treated executives are employed to similar US institutions in terms of size and business model. Compensation packages of treated EU executives may simply be more similar to top executives' pay at large US banks rather than resembling pay at untreated EU banks. Indeed, the difference in CEO pay between US and non-US CEOs is moderate when comparing CEO compensation of firms with similar characteristics across countries (Fernandes, Ferreira, Matos, and Murphy, 2013). The US control group also alleviates concerns about executives' self-selection into treatment. Despite these apparent advantages, the US control group suffers from the crucial limitation that executives' payoff schedules cannot be measured in a fully comparable way to the EU case. Therefore, we prefer untreated EU executives as the baseline control group. Second, we use a standard binary treatment indicator $Treated_i$, equal to 1 for treated executives, and 0 otherwise. Third, to compute $Treatment\ intensity_i$, we replace the 200% threshold for the maximum variable-to-fixed compensation ratio with the standard 100% threshold. Although this method suffers from having more false positives, it has the benefit of a larger treatment group that is more akin to the control group.

The second empirical challenge are potentially confounding regulation events after the Great Financial Crisis as discussed in Section 2. Importantly, many of these regulatory changes were introduced before the EU bonus cap, which alleviates some concerns. But the adjustments to these reforms might have clearly taken place over an extended period

of time, thus overlapping and interacting with the EU bonus cap. In addition to such observable differences, unobservable country effects may be at work, for example in terms of non-synchronous business cycles, banking system distress, or diverging government bailout practices across EU-countries after 2014. To account for possible unobserved confounding factors, in the baseline analysis we therefore specify country-year fixed effects as a first line of defense. However, country-by-year fixed effects may not suffice to rule out that we capture spurious effects due to other provisions, specifically those contained in the 2013 Capital Requirements Regulation (CRR).[8] Together with the CRD IV, which contains the EU bonus cap, it implemented Basel III in the EU. Spurious effects may arise if banks' exposures to the cap correlated with changes in capital and liquidity requirements introduced at the same time. As a second line of defense, we therefore test if our main results hold up when controlling for changes in the level and the composition of regulatory capital and liquidity. As a third approach, we conduct falsification tests for selected events. One such event is the European debt crisis that hit banks to different degrees, depending on their exposures to sovereign debt. To rule out that sovereign debt exposures drive our bank-level results, we replace *Treatment intensity* with bank-level exposure to sovereign debt of peripheral countries. Further falsification tests include the exclusion of bailed-out banks as well as the exclusion of UK banks.

Third, we need to isolate the economic mechanism underlying the effects estimated with equation (2). Given the mixed theoretical predictions paired with the inherent limitations of empirical exercise discussed in Section 3, we conduct various ad hoc tests for executive- and bank-level regressions. First, we study differential changes in the turnover rate across executives based on the approximated attractiveness of their outside options. Next, we study the dynamics of plausible drivers of bank risk around the cap, such as insurance effects implied by larger shares of fixed compensation, operating leverage, and the intensity of monitoring over the bank portfolio of assets at the bank-level.

5 Data

Whereas most literature focused on the turnover and performance of CEOs (e.g., Jenter and Kanaan, 2015), we consider the entire board of executive directors with managerial duties, executives for short. This group is more comparable to CEOs than supervisory directors or non-executive managers, which we disregard. For a panel of EU banks with

[8]Regulation (EU) No. 575/2013 was enacted in 2013, but applies from 2014 onward, like the EU bonus cap. The CRR mainly addresses disclosure requirements on remuneration policy (see Art. 450).

available executive compensation data over the 2010–2016 period, we obtain information on executive boards and executives' characteristics from BoardEx. Accounting data are from Bureau van Dijk's Bankscope for 2010–2015 and Orbis Bank Focus for 2016. Stock market and CDS spread data are from Thomson Reuters Datastream. To construct an alternative control group of executives from the largest 25 US banks, we obtain compensation data from Standard and Poor's ExecuComp, and accounting and stock price data from CRSP-Compustat merged (CCM). We use three systemic risk measures. The first two are the raw long-run marginal expected shortfall (LRMES) and the expected shortfall adjusted for the size and the leverage of banks (SRISK%), respectively (Acharya, Pedersen, Philippon, and Richardson, 2016; Brownlees and Engle, 2017). We obtain SRISK% and LRMES from the V-Lab at New York University's Volatility Institute for the EU and the US banking systems, respectively, to gauge the bank's expected capital shortfall conditional on a large drop in equity markets. The third measure is ΔCoVaR (Adrian and Brunnermeier, 2016). The data are provided by the Systemic Risk Lab at the Center for Sustainable Architecture of Finance in Europe for EU and US banks. Sovereign debt exposure data are from the EBA Transparency Exercise of 2011.

We manually collect information on post-evaluation grants and on the structure of compensation at EU banks from publicly available remuneration reports in the years around the introduction of the EU bonus cap. The exact measurement of the quantity that is actually regulated by the EU bonus cap, namely the *maximum* variable-to-fixed compensation ratio, permits much more precise analyses compared to commercial databases, which only report *granted* or *realized* variable compensation. Appendix Table A.1 lists untreated and treated EU and US banks, respectively. Banks with at least one treated executives are considered a treated bank and we show the number of (un)treated executives to illustrate existing within-bank variation in compensation schemes.

The final sample contains 995 bank-executive-year observations from 45 banks. Table 1 summarizes the main executive- and bank-level variables for the treatment group (Panel A) and the control group (Panel B) and for the periods before (2010–2013) and after (2014–2016) the introduction of the EU bonus cap, respectively. The data are winsorized at the 1st and 99th percentiles and variables are defined in Appendix Table A.3. The 24 treated executives (200% threshold) serve on the boards of nine distinct banks. They exhibit higher levels of compensation, receive more performance-based pay, and serve at larger banks. Yet, Panel C shows that changes in executive- and bank-level variables between 2010 and 2013 across the treatment and the control group are not significantly different, in line with no divergence in trends between the two groups before the treatment.

Column (3) in panel D of Table 1 shows univariate difference-in-differences tests between average changes of the main variables in the treatment and the control group around the introduction of the EU bonus cap. The estimates demonstrate that treated executives exhibit a significant increase in their turnover rate. At the same time, the fixed compensation of treated executives significantly increases while the variable component contracts around the introduction of the EU cap. The combined pattern of compensation structure changes thus indicates that banks indemnify their executives for the EU bonus cap. In contrast, bank performance indicators exhibit neither in the return nor in the risk dimension unconditionally significant difference-in-differences. Below, we revisit this prima facie evidence extensively in a regression framework. This approach is necessary to adequately account for observable and unobservable factors that may also explain different turnover rates and the absence of unconditional bank performance differentials.

5.1 Post-turnover career trajectories of bank executives

Before proceeding with the analysis, it is worth exploring where bank executives go after leaving their positions. To this end, we manually collect data on career trajectories after a turnover from news stories and professional networking websites. Focusing on banks for which treatment status is defined, we identify 101 turnover events (57 at listed banks).

Table 2 groups executives by pre-turnover type of appointment (Panel A) and by post-turnover employment category (Panel B). Among leaving executives, 84% (86% at listed banks) are below CEO level. We retrieve information on the career trajectory of 77% of departing executives (67% at listed banks),[9] of which 27% (28% at listed banks) remain executives at another bank or company. Another 20% (14% at listed banks) become senior managers, partners, self-employed, or work as advisors. In this subset, 6% (4% at listed banks) advise the bank which they left as executives. 9% (5% at listed banks) stay active as supervisory board members or as non-executive directors.

Overall, considering that the executive positions that we consider constitute the most prestigious job category, it seems fair to say that most departing executives face inferior employment conditions after turnover. As such, these data suggest that executives in this sample do not voluntarily leave banks to look for better employment opportunities.

[9] We find no explicit information on career endings, e.g., for age reasons, for the other executives.

6 Main results

First, we investigate the effects of the EU bonus cap on bank executive turnover. Second, we analyze commensurate changes in executive compensation structure. Third, we test for return and risk responses including ad-hoc tests on the respective channels.

6.1 Turnover rate

Table 3 shows results from difference-in-differences tests to examine executive turnover rates of CEO and non-CEO executives in EU banking around the introduction of the EU bonus cap. In columns 1 and 2, the dependent variable is an indicator variable equal to 1 for any turnover. Average turnover rates of treated executives are significantly higher in the post-EU bonus cap period.[10] To better understand the drivers of executive labor market dynamics after this regulatory shock, we further dissect this headline results.

A first question that arises is if increased turnovers are more likely to reflect that the most talented managers "abandon ship" and leave the industry or whether altered bank governance practices also implied more forced attrition of bad managers if bank performance is poor. The true nature of turnover is ultimately inherently opaque as we do not observe if turnovers are due to executives' or due to employers' choices. Our first approach to tackle this question in column 3 focuses on turnover events in the presence of below-median bank performance, as measured by the bank's ROE relative to the other banks in a given year.[11] Turnover at well-performing banks is arguably more likely to originate from executives' choices and therefore represent a plausible approximation of voluntary turnovers. Conversely, turnover at poorly performing banks is consistent with executives being forced to leave (see also Jenter and Lewellen, 2020). The frequency of turnover events at below-median performing banks increases significantly for treated

[10] Note that we account for further well-known determinants of executive turnover. Turnovers are more likely at smaller banks, at banks that perform worse, and if the executive is of retirement age and has more professional experience, which arguably correlates positively with executives' outside options. Coefficients confirm economic intuition, but point estimates are unavoidably imprecise in this manually collected executive sample. Note that the lagged Sharpe ratio is only available for listed banks. Therefore, this sample is smaller than for compensation regressions (e.g., Table 6). Overall, executive turnovers among EU banks exhibit similar patterns diagnosed in previous studies for US firms.

[11] Executive performance is often evaluated relative to peers and KPIs are often linked to short-term metrics like ROE (Bennett et al., 2020), which crucially depends on leverage (Engel, Hayes, and Wang, 2003). Defining poor performance based on ROA does not affect our results (analysis available upon request). Furthermore, KPIs may also comprise "soft" metrics, such as employee satisfaction. For example, Barclays considers besides traditional KPIs also "sustanaibility metrics" that are defined in the bank's "Citizenship Agenda" (Barclays PLC, Annual Report 2011, p. 60). Due to the difficulty of measuring soft KPIs, we resort to equity performance in all compensation sensitivity analyses.

executives. This result suggests that the bonus cap led to more stringent governance, but not necessarily to an exodus of the best bankers from the industry.

Table 4 examines this result in more depth by explaining turnover behavior of non-CEO executives (columns 1, 2, and 5) separately from that of CEOs (columns 3, 4, and 6). This approach also helps to compare our evidence to the existing turnover literature where CEOs took center stage. The point estimate of the change in the turnover rate of non-CEO executives is positive, but insignificant. Hence, the significant overall effects for the full sample of executives documented above hinges on departing CEOs. Column 6 suggests that average turnover responses are driven in particular by performance-induced turnover events involving CEOs. This result aligns well with the evidence that non-CEO executive turnover is in comparison less sensitive to performance, possibly suggesting that firm performance is a good measure of productivity only for CEOs (Fee and Hadlock, 2004). We further examine the relationship between turnover and risk-adjusted bank performance for treated and untreated executives more explicitly in Figure 3. Instead of re-classifying the dependent variable for poorly performing banks as done so far, we predict turnover rates from a linear probability model specification of equation (2) conditional on terciles of the Sharpe ratio. The left panel compares predicted turnover by tercile for treated executives before and after the introduction of the bonus cap. The right panel does the same for untreated executives. This comparison shows that turnover rates hike in the treated group only in bank-years characterized by poor performance.

But the increase in the turnover rate during bad treated bank-years does not suffice to conclude that most attrition is forced. Instead, some underperforming banks may have been unable to retain their best executives (especially CEOs) following the introduction of the cap. In fact, if it is the most talented executives that are called for the toughest restructuring cases, this most talented human capital pool has more degrees of freedom to decide to leave in case of unsatisfactory turnaround missions. We therefore augment our empirical strategy with explicit proxies for the quality of executives in Table 5 to tease out differential changes in turnovers that reflect forced versus voluntary departures conditional on observable executive traits. Specifically, we interact proxies for executives' skill that should gauge the attractiveness of their outside option and, thus, the ease of leaving their current position. In column 1, we add a triple interaction with the indicator variable *High experience*, which equals 1 if the professional experience measure à la Custódio et al. (2013) is above its median. In columns 2 and 3, we assume that the best executives are also the highest paid in the bank and measure skills accordingly by compensation in the pre–EU bonus cap period. The indicator variable *Top total pay* in

column 2 equals 1 if the executive is the best paid (or the second best paid) on the board in terms of total compensation (for boards with at least five executives). The indicator variable in column 3 is computed identically using variable compensation (*Top var. pay*). No statistically significant pattern across different degrees of professional experience or compensation levels emerges, reinforcing the idea that executives' voluntary turnovers are not more likely after the introduction of the EU bonus cap.

Three additional explorations lend further support to this interpretation. First, for those executives where we could identify career transitions in more detail, in Appendix Table A.4 we replace the dependent variable with an indicator equal to 1 if a turnover event implied that the executives secured another executive position. The differential effect of the bonus cap introduction is insignificant, which is consistent with the absence of a change in the voluntary turnover rate following the EU cap

Second, provided that the bonus cap produces a shift towards a safer compensation structure, executives' total compensation may become less exposed to poor performance. Thus, banks may use forced turnovers as a substitute to discipline executives for weak performance. Such a change in governance practice would lead to the observed higher turnover rate at treated banks with poor performance. If so, we would expect a positive differential effect on the performance sensitivity of turnover events in the presence of below-median bank performance. Appendix Table A.5 reports triple difference-in-difference regressions that analyze the role of risk-adjusted performance for such turnover events. We find qualitative evidence that turnover sensitivity to risk-adjusted performance increases, but the change is not statistically significant at conventional levels.

Third, we conduct a non-parametric comparison of leaving executives' characteristics with those of newly appointed ones in the post-cap period in Appendix Table A.6. Whereas incoming executives are younger and slightly less experienced than those who leave, no stark differences emerge between treated and untreated institutions.[12]

Overall, we find no evidence that banks fail to retain their executives following the EU bonus cap. Whereas average attrition of all executives increases after the regulatory shock, this surge in the turnover rate is driven by treated CEOs at under-performing banks. These results suggest that the bonus cap prompted tougher governance responses to poor executive performance in general (and for weak bank CEOs in particular), instead of marking the beginning of an uncontrolled exodus of the most talented managers.

[12] We cannot rule out that some unobserved regulation affects also executives within one bank differently. A prime example would be heterogeneous approaches towards regulating the share of female board members across EU countries (Jourová, 2016). Therefore, we also specified country-by-year fixed effects in turnover regressions. Results are qualitatively identical and available upon request.

6.2 Compensation structure

The preceding section documents that only CEOs at poorly performing banks exhibit higher turnover rates under the bonus cap, whereas non-CEO executives at well-performing banks are not more likely to leave. Next, we investigate if the dynamics of compensation structure adjustment around the cap are consistent with such a pattern in turnover.

A visual inspection of compensation structure around the introduction of the EU bonus cap confirms that EU banks complied with the new regulation in a timely manner. Figure 4 depicts the maximum variable-to-fixed compensation ratio for the treated and the control groups. For both, we plot the ratio before the EU cap against the ratio after the EU cap. By definition, the treated group's ratio exceeds 200% in the pre-EU cap period and ranges from just above the threshold up to approximately 700%. After the introduction of the cap, the maximum variable-to-fixed compensation ratio declines to below 200% for virtually all treated executives.[13] Consistently, the regression line in the upper-left quadrant (treated executives) is steeper than the 45° line. By contrast, the regression line in the lower-left quadrant (control group) essentially coincides with the 45° line, corroborating the idea that the control group's compensation structure does not change systematically around the EU cap.

Given this prima facie evidence, we conduct a formal regression analysis. We estimate equation (2), using maximum variable-to-fixed compensation ratio, realized post-evaluation variable compensation, fixed compensation, and maximum variable compensation as dependent variables. For each dependent variable, we consider three progressively more saturated specifications: (1) controlling for bank and executive characteristics and year fixed effects, (2) including bank fixed effects, and (3) including executive fixed effects. Table 6 reports the estimation results. Panel A focuses on the maximum variable-to-fixed compensation ratio (columns 1 – 3), i.e., the quantity directly regulated by the EU bonus cap, and post-evaluation variable compensation (columns 4 – 6). For both measures, in each specification we observe a large and statistically significant decrease for the treated group. The parameter estimates of roughly –1 for maximum variable-to-fixed pay implies that compensation was on average adjusted without overshooting. This is accomplished by a significant and economically substantial reduction of executives' variable compensation grant levels after the reform. The point estimates in columns 4–6 imply that the average executive received 0.5 million euro less in variable compensation after the

[13] Some banks applied for higher thresholds according to the rules detailed in footnote 3. Therefore, a few executives exhibit a maximum variable-to-fixed compensation ratio above 200% after 2013.

introduction of the cap compared to executives that complied already as of 2013.

Many control variables are statistically insignificant once we specify fixed effects for unobservable time, bank, and executive factors in columns 3 and 6. They provide some qualitative indications though that are consistent with economic intuition. Larger banks offer more variable compensation. Interestingly, seniority as such is not rewarded. Age exhibits instead a weakly significant negative effect on the achievable variable compensation. In contrast, professional experience and longer tenure with the bank are rewarded with higher variable compensation levels and incentives, at least in parsimonious specifications. Not too surprisingly, the estimates suggest further that in particular the compensation packages of CEOs contain larger bonus elements compared to non-CEO executives.

Panel B analyzes fixed compensation (columns 1 – 3) and maximum variable compensation (columns 4 – 6). Treated executives received substantially higher fixed compensation following the EU bonus cap. By contrast, maximum variable compensation exhibits a large and statistically significant decrease. This decomposition of the results in Panel A already suggests that banks responded to the regulatory shock by indemnifying their executives, thus resembling case 3 from Section 3.2. Point estimates for control variables are again often insignificant after saturating the model with fixed effects. One upshot of these results is that CEOs receive in general higher levels of pay, both in fixed as well as in variable terms. In addition, better bank performance as measured by ROE increases also both fixed and variable levels of executive compensation, as can be expected given ample evidence of pay-performance sensitivity in prior studies.

To corroborate the validity of our difference-in-differences tests, Figure 5 plots different measures of compensation (fixed and variable compensation, maximum variable-to-fixed compensation ratio, and equity rate) around the introduction of the cap for treated and control groups. The evolution of these measures—with the exception of realized variable compensation—supports the parallel trend assumption, with the divergence between treated and untreated executives taking place only starting in 2014. With regard to realized variable compensation, however, the bottom left-hand graph of Figure 5 does not condition on bank performance, which may blur the interpretation. Also note that the adjustment to the new regulation takes largely place in the first year. Variables for treated and untreated executives do not converge afterwards.

So far, the empirical results highlight two implications. The first is the timely compliance by banks with the EU bonus cap. The second is adherence to the regulation through an increase in fixed compensation and a decrease in maximum variable compensation, resembling a scheme consistent with unchanged executives' utility (point C in Figure 2).

To test the conjecture that banks design post–EU bonus cap contracts that leave executives' utility unchanged around the introduction of the cap more rigorously, we investigate if expected utility changes around the introduction of the cap. To this end, we take the perspective of a risk-neutral executive and approximate the probability to earn variable compensation by the ratio of variable grants over maximum variable grants. We call this measure the goal achievement rate. Expected pay is computed as the sum of fixed compensation and maximum variable times the goal achievement rate.

Table 7 shows the results from estimating equation (2) with expected pay specified as the dependent variable. In columns 1 – 4, the goal achievement rate is computed over the pre-EU bonus cap period. Columns 1 and 2 rely on a measure of expected compensation based on the executive-level goal achievement rate, whereas columns 3 and 4 are based on the board-level achievement rate. To account for possible changes in managerial effort induced by the cap, columns 5 – 8 replicate the same tests, but for a goal achievement rate computed over the post-EU bonus cap period. Treated executives do not exhibit any statistically significant change in expected pay at conventional levels. Thus, at least from the perspective of a risk-neutral manager, banks seem to indeed offer contract adjustments that do not make managers worse off around the introduction of the EU bonus cap. One possible interpretation of this result is that banks adjust contracts in such a way that their ex ante costs of compensation stay at the same level. However, sufficiently risk-averse and undiversified executives may even be better off under the regulation-compliant contracts.[14]

The decline of the maximum variable-to-fixed compensation ratio according to the described mechanism coupled with the lack of evidence of a change in expected compensation points to a substantial change in the specification of the payoff schedule and its intrinsic incentives. Consider the type of performance-based compensation plan visualized in Figure 1. After the EU cap, the lower compensation bound rises for the average executive while the upper bound decreases. Conditional on the resulting changes in the incentive zone and the slope of the payoff schedule associated with it, executives will face different sets of incentives. Measuring the width of the incentive zone consistently across banks is challenging, but there is a natural proxy for the slope of the payoff schedule:

[14]Our measure offers an upper bound of expected utility but a lower bound for the differential change in expected utility linked to a decrease of variable compensation, given that most executives are arguably risk averse. Unreported results obtained under the assumption of risk-averse executives underpin this argument. To compute the expected utility of risk averse managers, we follow Hall and Murphy (2002), who investigate the difference between the cost of compensation to firms and the safety equivalent of compensation plans to risk averse managers and find large differences for plausible parametrizations.

pay-for-performance sensitivity. This approach allows to indirectly draw conclusions on the incentive zone as well.

We analyze *ex post* pay-for-performance sensitivity around the introduction of the EU bonus cap by means of triple difference-in-differences specifications. Appendix Table A.7 focuses on the sensitivity of executives' goal achievement rate to stock return (columns 1 – 3) and the Sharpe ratio (columns 4 – 6). The goal achievement rate allows us to investigate if it is harder for an executive to achieve a percentage of his/her bonus plan rather than an absolute amount. Changes in performance sensitivity and risk-adjusted performance sensitivity of treated executives' compensation are statistically insignificant.[15]

The analysis of ex post pay-for-performance sensitivity is helpful (see, e.g., Jensen and Murphy, 1990), but looking at *ex ante wealth*-performance-sensitivity would be preferable according to Edmans, Gabaix, and Landier (2008). Sadly, this approach is infeasible in our setting because public access to the necessary individual EU executive's firm-related wealth information to compute ex ante sensitivities is hampered by data disclosure practices in the EU. Moreover, EU banks tend to use more long-term accounting-based incentive plans than standard equity incentives. Therefore, the computation of portfolio delta and vega in the spirit of the Core and Guay (2002) framework is challenging.

To gain some further insights about the ex ante riskiness of pay despite these binding data limitations, we consider two empirical proxies of the future payoff schedule of executives. A first, admittedly coarse proxy in comparison to the delta of compensation is the *Equity rate*, which relates all equity-linked grants that are provided to the manager post-performance to total pay. The second proxy is the fraction of deferred compensation, which relates positively to the riskiness of pay. In Table A.8 we estimate difference-in-differences specifications for the equity rate (columns 1 – 3) and the deferral rate (columns 4 – 6). We generally observe an increase in both the equity rate and the deferral rate around the introduction of the cap, pointing to an increase in the riskiness of variable pay. Higher equity compensation and deferrals stem from (1) stronger reliance on long-term compensation plans and (2) fixed allowances that are used to increase fixed compensation. Both link executive compensation to bank performance in the medium- to long-run. Taking the perspective of the average treated executive (*Treatment intensity*$= 4.3 - 2 = 2.3$, based on Panel A of Table 1) and looking at columns 3 and 6, the

[15] In addition to this formal test on pay-for-performance sensitivity, we study changes in KPIs of bonus plans at treated banks by looking at their compensation reports around the introduction of the EU bonus cap. Both the weights and the range of KPIs in these plans remain largely unchanged. This feature suggests that banks complied with the cap by reducing the face value of variable compensation instead of altering KPIs or their weighting underlying compensation plans.

differential increase around the cap is of $4.6\% \times 2.3 = 10.58\%$ for the equity rate and $3.6\% \times 2.3 = 8.28\%$ for the deferral rate. Stronger reliance on long-term compensation plans could also indicate that banks want to exploit the 25% discount rule for variable compensation, which, in turn, allows them to exceed to some extent the 200% threshold (see footnote 3). Whereas the change in the equity and deferral rate is sizable, it is unlikely to have a major impact on the implementation of the regulation.

Finally, recall that only CEOs exhibit a significant increase in (performance-induced) turnover following the EU cap. Therefore, in Table 8 we investigate if this differential effect on turnover behavior of non-CEO executives and CEOs originates from differences in the adjustment of compensation structure. To that end, we specify a triple interaction with a CEO indicator. The estimated differences between the two groups of executives in terms of the impact of the EU cap on realized variable compensation and fixed compensation are not statistically significant. The only significant difference relates to maximum variable compensation. Importantly, this finding does neither translate into a significant differential effect on the maximum variable-to-fixed compensation ratio nor on expected compensation. Hence, these results corroborate again that even for CEOs increased turnover rates are unlikely due to voluntary moves sparked by less attractive pay packages. We consider instead the narrative of altered shareholder discipline by means of turnover in case of disappointing bank performance more plausible.

All in all, the tests on pay-for-performance sensitivity provide a mixed picture. Whereas we do observe an increased use of equity-linked post-performance grants and deferred compensation, overall ex post pay-for-performance sensitivity does not change significantly. Going back to the diagram in Figure 1, we provide evidence suggestive of several effects of the EU cap: (1) an increase of the lower bound of pay (fixed salary), (2) a decrease of the upper bound of pay (fixed salary plus maximum variable compensation), (3) an insignificant change of the slope of the schedule within the incentive zone. Together, these findings point to a compressed incentive region after the EU cap. More managers may therefore reach performance levels that reduce incentives to exert effort more easily.

6.3 Bank performance: returns and risk-taking

Banks are highly interconnected institutions, in which the inherently different objectives of multiple interest groups interact and possibly conflict. The EU bonus cap, by changing the executives' compensation structure, alters the agency relationship between bank management and these interest groups. Traditionally, important interest groups are

shareholders and creditors, who hold direct claims on the asset value of the bank, but have different payoff functions. Shareholders are residual claimants who are more keen on risk-taking relative to creditors who hold senior claims. The seniority differences of claims can generate agency conflicts between owners and creditors especially if the bank is approaching distress. We thus examine the performance of equity and debt claims around the introduction of the EU cap in terms of bank-specific return and risk indicators.

In addition to this conventional agency conflict, explicit and implicit public guarantees on banks' debt imply potentially severe negative externalities beyond the individual banking firm as discussed in Section 3. Therefore, we also consider systemic risk responses to the EU bonus cap to gauge implications for the financial stability of the entire banking system, in which the public has an interest. But whereas the Great Financial Crisis underpinned the first-order importance of financial stability for the welfare of modern economies, systemic risk remains an elusive concept ever since (European Central Bank, 2009; Allen and Carletti, 2013). Yet, most scholars agree on a range of mutually non-exclusive drivers of systemic crises, which are common exposures of banks to overvalued assets that are subject to sudden corrections, subsequent liquidity freezes, and fire sales that cause financial market breakdowns (see, e.g., Acharya, 2009; Tirole, 2011; Wagner, 2011; Brunnermeier, Rother, and Schnabel, 2020). Gridlock in financial markets fuels the contagion of insolvency risk via observable and unobservable financial networks among banks (Glasserman and Young, 2016; Bosma, Koetter, and Wedow, 2019), of which some are considered too big, too connected, too many, or otherwise too important to fail, triggering government intervention (Acharya and Yorulmazer, 2007; Brown and Dinc, 2009; Farhi and Tirole, 2012; Freixas and Rochet, 2013). Given the ongoing debate about the sources of systemic financial crises, we remain agnostic as to the exact mechanisms explaining systemic risk. Instead, we take advantage of three fairly established systemic risk measures. The first two, SRISK% and LRMES (Acharya et al., 2016; Brownlees and Engle, 2017), approximate the vulnerability of individual institutions towards financial crises. The third measure, ΔCoVaR (Adrian and Brunnermeier, 2016), gauges the contribution of an individual bank to the fragility of the entire financial system.

We address the relationships between the EU bonus cap and performance indicators by adapting the specification in equation (2) to the bank instead of the executive level as the unit of analysis, as described in Section 4.3. The pre- and post-treatment unconditional summary statistics reported in Panel C and Panel D of Table 1 bode well for this approach. But those tests compare time-collapsed data around the introduction of the EU cap, which bear little information as to the validity of our approach in terms of meeting the parallel

trends assumption.

Thus, we start to scrutinize our approach by visualizing estimated average marginal effects (AMEs) of the EU cap on selected bank-level performance and risk measures by interacting a binary treatment indicator with year-specific indicators. Plotted AMEs in Figure 6 underpin the non-violation of the parallel trends assumption during the pre-treatment period. Not one performance metric exhibits a significant response in the three pre-treatment years, but each displays a significant and large response in at least one post-treatment year. These responses point to a temporary deterioration of returns and to a persistent increase in risk. Yet, the benefit of an intuitive visualization as in Figure 6 implies some important cost, too. First, obtaining sufficiently precise point estimates of differences across numerous strata in an already small sample is challenging due low statistical power. Second, the binary treatment indicator used to visualize AMEs gauges bank-specific exposure to the regulatory shock less precise compared to the intensity measure specified in executive-level regressions so far. Third, we do not account for unobserved confounding shocks by means of country-by-year fixed effects as in the fully saturated specification discussed in Section 4.3.

Therefore, we further refine this preliminary evidence and conduct a difference-in-differences analysis including country-by-year fixed effects for alternative variables capturing the motives of the various stakeholders involved. Recall that bank-level *Treatment intensity* equals the average treatment intensity of executives within a bank's board when the cap became effective. The results are shown in Table 9.

Panel A considers first the return and risk dimensions of bank performance from a shareholder perspective. The Sharpe ratio of treated banks does not respond significantly to the policy shock as shown in column 1. Also its two components, returns in column 2 and return volatility in column 3, exhibit insignificant differential effects. These results suggests that the reform did not alter shareholders' position in the bank once we augment the bank-level specifications with country-by-year fixed effects. The EU bonus cap appears to exert no additional impact on shareholder performance above and beyond any variation in country-specific business cycles or the regulatory environments like deposit insurance schemes or bank bailout practices.

Implications differ from a creditor perspective. Five-year CDS spreads approximate default risk and we specify banks' excess CDS spreads vis-á-vis their corresponding sovereign CDS spread as the dependent variable in column 4, thus capturing a crucial facet of idiosyncratic risk. The evidence suggests that treated banks' credit risk increased after the regulatory shocks compared to untreated peers. Unreported specifications using

absolute CDS spreads that are not adjusted for sovereign debt spreads as dependent variable corroborate this result. The documented increase in risk-taking is at odds with the original intention of the EU bonus cap. However, it is consistent with theories cautioning that less variable pay imposes inferior incentives for managers to exert (risk-management) effort or by providing insurance to risk-averse managers as in Carlson and Lazrak (2010). Hence, this result provides evidence of unintended consequences of the EU bonus cap.

In Panel B of Table 9, we specify proxies for systemic and market risk to address the potential of banks to generate negative externalities beyond the individual institution. In column 1, SRISK% measures the bank's fraction of the capital shortfall conditional on a large drop of European financial market value adjusted for the size and leverage of the bank. LRMES in column 2 represents the expected equity loss faced by the bank in such a severely adverse market scenario. As such, these two metrics are closely related, but gauge different aspects of systemic risk.[16] ΔCoVaR in column 3 equals the end-of-year difference between the VaRs of the financial system when a bank is distressed versus when it exhibits median performance. Whereas SRISK% and LRMES gauge the consequences of a system meltdown for an individual bank, this measure therefore aims to gauge the contribution of each individual bank to aggregate systemic risk. We approximate market risk using the bank's market beta and correlation (columns 4 and 5).

The results in columns 1 through 3 indicate that both systemic risk indicators gauging the effect of a financial meltdown on financial institutions increased significantly after the policy shock. Given this conservative specification, which accounts for a plethora of regulatory, prudential, governance, and other differences over time and across countries, this marks an important result. Not only did the bonus cap possibly induce more idiosyncratic credit risk, but these two systemic risk metrics even suggest that the policy did even increase systemic risk – the very opposite of its declared objective.

However, column 3 also highlights that any inference depends critically on the choice of systemic risk metrics. Treated banks do not exhibit statistically different ΔCoVaR after the introduction of the EU bonus cap. Taken together, these results indicate that banks' vulnerability in terms of potentially being critically under-capitalized in very adverse market scenarios increased, but that the contribution of the average bank to the entire system's value-at-risk did not change in response to the policy. However, the latter insignificant result may also simply reflect the data-intensive quantile regression approach required to compute ΔCoVaR. Related, Adams, Gropp, and Füss (2014) documented that this approach is sensitive to the chosen time period to specify state-dependent con-

[16] For computation details, see: https://vlab.stern.nyu.edu/help/risk_summary_en.html.php?gmes.

trols, which might pose a challenge given the relatively short and low-frequency data underlying our analysis. Finally, note that treated banks also exhibit a statistically significant increase in their market risk as gauged by beta in column 4. Hence, those banks with management boards that had to be compensated differently to comply with the new rules also faced higher market risk. Simple return correlations do not exhibit significant differential effects in column 5.

Overall, we therefore interpret our findings as indications of possibly severe unintended consequences cast by the introduction of the EU bonus cap for idiosyncratic credit risk, selected metrics of systemic risk, and non-diversifiable market risk. The deterioration of bank performance metrics in the risk dimension, especially the increase of selected, but important systemic risk metrics, paints a bleak picture of the ability of the EU bonus cap to enhance financial stability. Given the potentially high policy relevance of this finding, we devote considerable attention to the robustness of these results towards various competing shocks in Section 7. Beforehand, we aim to shed some light on possible economic channels how the bonus cap may affect bank performance.

6.4 Economic channels

Given that the EU bonus cap's primary goal was to curb risk-taking, these results are remarkable. Table 10 seeks to unveil possible drivers of the increase in risk. We estimate again a difference-in-differences model including bank- and country-by-year fixed effects.

In Panel A, we consider three specific bank policies that may be conducive to a surge in bank (systemic) risk. First, in column 1 we analyze *Deposits*, which capture to what extent banks rely on retail as opposed to wholesale funding. Higher reliance on wholesale short-term funding is associated with higher systemic risk (Huang and Ratnovski, 2011). Treated banks do not significantly modify their reliance on this source of funding following the cap. In column 2, we specify *Interbank assets* as the dependent variable to gauge whether treated banks aim to increase their systemic importance in a "too-many-to-fail" sense (see, e.g., Brown and Dinc, 2009). The (insignificant) decline in this admittedly crude measure of connectivity suggests, however, that the increase in systemic risk was not channeled via higher exposure to other players on the interbank market. Finally, we analyze a more general measure of risk-taking, namely the exposure to *Corporate loans* (column 3) as opposed to safer assets, such as liquid government securities. Consistent with treated banks becoming riskier after the cap, the ratio of corporate loans over total asset increases, but the result is again insignificant at conventional levels.

The absence of statistically significant correlations in these tests suggests that the increase in bank riskiness following the EU cap is not the result of some single, radical shift in banks' business models. Rather than shifting, for example, the entire funding strategy of the bank out of one source like deposits into another one like wholesale funding, more nuanced responses within the more aggregate asset and liability categories visible to us appear to be at work. Hence, future research with access to a more granular dimension of risk-taking using, for example, confidential supervisory data would be warranted.

Structural tests of the specific theories about the effects of bonus caps discussed in Section 3 are beyond the scope of our analysis. But it is still important to disentangle the mechanics of changes in bank riskiness around the introduction of the cap. Therefore, we consider how risk-taking incentives depend on compensation structure in the absence of any regulation restricting it. Recall that the standard argument for a risk-neutral manager is that incentive pay may favor risk-shifting by aligning managers to equity holders (see, e.g., John and John, 1993). Yet, the direction of the effect is ambiguous when other forces are taken into account. Ross (2004) shows that the net impact on risk-taking is only positive under certain assumptions. In the presence of bankers whose task is to manage a bank portfolio, lower incentives may be associated with lower effort exertion and, consequently, lower risk-adjusted returns (Martinez-Miera and Repullo, 2017). At the same time, Carlson and Lazrak (2010) argue that a risk-averse manager may take more risk as the ratio of fixed-to-variable pay increases. An increase in fixed-to-variable pay may also augment bank riskiness by increasing operating leverage (Efing et al., 2020).

In Panel B, we thus turn attention to three theory-founded mechanisms possibly underlying the rise in bank risk. The approach we follow can neither structurally test the diverging predictions from theoretical models nor provide "smoking gun" empirical evidence as most relevant quantities at the executive level (effort, skills, etc.) are inherently unobservable. However, our exercise supplies a set of correlations against which we can assess the plausibility of different channels. In column 1, we examine *Nonperforming loans*, as lower performance pay may induce weakened monitoring effort by bankers and, in turn, higher delinquencies (Martinez-Miera and Repullo, 2017). Increased risk-taking following the introduction of the bonus cap is also consistent with a story about higher fixed labor costs augmenting operating leverage (Murphy, 2013b; Efing et al., 2020). Remember that the cap extends to so-called material risk-takers, who can be well below the executive level. In column 2, we therefore look at *Operating leverage*. Furthermore, Carlson and Lazrak (2010) hypothesize that an increase in safe compensation—i.e., what happened following the cap—might serve as an insurance to risk-averse executives, al-

lowing them to take more risks. To capture this, in column 3 we consider a bank-level measure of *Executive pay safety*. The results in the table support only this last conjecture.

7 Robustness and limitations

7.1 US executives as an alternative control group

So far, we have compared treated to untreated executives at EU banks around the introduction of the cap. Whereas we define *Treatment intensity* at the executive level, it is still possible—and Table 1 shows it is indeed the case—that most treated executives are from large EU banks, while smaller EU institutions in our sample seldom award executives compensation packages with a maximum variable-to-fixed ratio above 200% in the pre-cap period. As a consequence, although the executive-level results appear unlikely to be driven by anything else than the bonus cap, it is still possible that de facto we are comparing large to small institutions and capturing a shock that affected these two groups of institutions differentially.

To address this concern, we form an alternative control group based on top executives from large US banks. Following Boyallian and Ruiz-Verdú (2017), we identify banks in ExecuComp and rank them by asset size as of 2013. We focus on the largest 25 banks. ExecuComp generally reports the five most paid executives for each firm. We include all of them in our control sample and obtain data on their turnover events and compensation packages, as well as on bank-level variables. US banks in the alternative control sample closely resemble the EU ones from which treated executives are drawn in terms of size and business model, thus being arguably exposed to similar risks. Whereas large US banks are affected by the same international regulations, such as the FSB's guidelines on compensation, they are not directly affected by the EU cap, rendering them a suitable control group. An important limitation of this alternative control group is, however, that ExecuComp provides awarded or realized variable compensation, but does not report the maximum variable compensation. Therefore, we prefer to use EU banks' untreated executives in the baseline analysis.

Table 11 shows estimates from difference-in-differences specifications using data from large US banks to form the control sample. In Panel A, we analyze executive turnover rates around the introduction of the cap. As in the baseline analysis, we observe a general increase in the turnover rate of treated executives in the post-EU bonus cap period, driven by turnover events taking place in periods of poor bank performance, which reinforces our finding that the cap did not lead to a surge in voluntary turnovers.

In Panel B, we estimate compensation structure regressions. In line with the results above, we find a positive and significant increase in measures of fixed compensation (columns 1 and 2), coupled with a significant decline in measures of variable compensation (columns 3 – 5). In other words, EU treated executives appear to have been indemnified relative to their peers at US banks around the introduction of the cap.

In Panel C and Panel D we re-estimate difference-in-differences specifications on bank performance in terms of return and risk-taking, using the same dependent variables as before. All key results described in Section 6.3 are confirmed. Idiosyncratic credit risk of treated banks hikes significantly, a result now also supported by a positive differential effect obtained for higher stock return volatility in column (3) of Panel C. More importantly, the pattern for the three systemic risk metrics is confirmed. Both SRISK% and LRMES exhibit statistically significant increases after the policy shock, whereas the differential effect of ΔCoVaR remains not discernible from zero. Market risk responses also remain significantly positive. Only the negative point estimate for correlation as a gauge of market risk is one qualitative change among these robustness tests.

Bearing this exception in mind, we find that coefficients obtained under the baseline tests in Table 9 and those using US banks as the control group in Table 11 are qualitatively strikingly similar and exhibit comparable orders of magnitude.

7.2 Confounding events

It is important to acknowledge that the bank-level results are less direct than those at the executive-level, also because the cap affects not only executives, but all the material risk-takers as well. Therefore, we scrutinize next the sensitivity of these results towards specific confounding events in addition to the brute-force approach of including country-by-year fixed effects. Specifically, we conduct direct tests on four plausible confounders: the EU implementation of Basel III, the European debt crisis, bank bailouts, and the passage of the FSB guidelines on compensation.[17]

First, the EU bonus cap is contained in the CRD IV, which, together with the CRR, implements Basel III in the EU.[18] Both the bonus cap and the CRR became effective in the entire EU as of 2014. Specifically, the CRR reformed capital and liquidity requirements,

[17] In unreported tests, we show that our results are not driven by the introduction of the Single Supervisory Mechanism in 2013-14 or by differences (not absorbed by bank fixed effects) between large—classified as global systematically important by FSB—and small banks.

[18] Note that the CRD IV introduced also systemic risk buffers, which could affect bank riskiness, but have not been activated in those EU economies (Germany, France, UK, Italy, Spain) that host most banks in our sample. See https://www.esrb.europa.eu/national_policy/systemic/html/index.en.html.

whose impact could confound our estimates of the effects of the bonus cap on bank performance and risk. Yet, while effective from 2014, the CRR's capital and liquidity requirements were subject to a phase-in period that ended only in 2019. Concerning capital requirements, for instance, up to 2016 the phase-in focused on increasing the quality of regulatory capital (e.g., higher fraction of Tier I capital), while only after 2016 it increased its level, mainly through the new so-called conservation buffer.[19] In contrast, the EU bonus was fully implemented already in 2014 without a phase-in process.

Because of these discrepancies in the schedule of implementation, it is unlikely that our bank-level results are blurred by the EU implementation of the new Basel III requirements. Nonetheless, in Appendix Table A.9 we formally control for changes in Tier I capital levels, in the composition of regulatory capital, and in liquid assets, which were possibly induced by the CRR.[20] Even after accounting for these changes, our main findings remain qualitatively unchanged.

Second, we assess the sensitivity of the bank-level results to banks' exposure to the European debt crisis. We devise a falsification test in which we replace *Treatment intensity* with *Peripheral exposure*, a measure of bank exposure to the sovereign debt of EU peripheral sovereigns (Greece, Ireland, Italy, Portugal, and Spain). To this end, we use data on bank sovereign debt holdings from the EBA Transparency Exercise of 2011, which was the first time this information was disclosed to the public. If in the baseline analysis we are indeed just capturing the lingering effects of the European debt crisis, we will observe the same patterns in bank performance and risk-taking also in this case.

Appendix Table A.10 reports estimates of the falsification test. In Panel A, neither equity return and risk measures (columns 1 – 3) nor CDS spreads (column 4) exhibit a significant change around the cap introduction for banks highly exposed to peripheral sovereigns. Panel B illustrates that banks exposed to the European debt crisis do not experience any significant change in systemic and market risk after 2013. All in all, no clear pattern emerges from these results, which corroborates the interpretation of the baseline findings in the light of the introduction of the cap.

Third, governments of EU member states provided support to several institutions in the sample (e.g., MPS, Dexia, etc.). It is possible that these interventions bias our analysis of the EU bonus cap, especially because they were extended conditional on tight restrictions on bank managers' compensation. In Appendix Table A.11, we therefore

[19] Minimum total regulatory capital relative to risk-weighted assets stays at 8% as under Basel II up to 2016. See https://www.bis.org/bcbs/basel3/basel3_phase_in_arrangements.pdf.

[20] The CRR regulates liquidity with the so-called liquidity coverage, which is only sparsely reported in Bankscope before 2014. Thus, we use the ratio of liquid assets to short-term funding.

replicate the analysis of Table 9 without all banks that were bailed out since the Great Financial Crisis.[21] Overall, the qualitative findings are robust to this adjustment, especially the evidence on turnover, compensation, and idiosyncratic credit risk. Systemic risk responses lose statistical significance, but remain statistically significant at the 10% level in the case of SRISK%. Besides the mechanistic explanation that already a few degrees of freedom less in an already small sample may make an important difference for the precision of point estimates, the result is also economically intuitive. With the benefit of hindsight, we know and exclude exactly those banks that were bailed out. By definition, these banks are the most risky and simultaneously sufficiently important ones to warrant their rescue. Not too surprisingly, the sample selection then yields less significant systemic risk responses. We interpret this result as tentative support for the view that it is crucial to empower the Single Supervisory Mechanism and to implement an effective Single Resolution Mechanism. The former ensures to monitor and discipline systemically relevant banks closely enough before they become too risky. The latter is helpful to resolve distressed banks swiftly and according to rule-based procedures to prevent mounting systemic risk.

In sum, the bank-level results obtain also under an encompassing specification using country-by-year fixed effects as well as when accounting explicitly for major confounding events.

7.3 Additional tests

Whereas the baseline treatment group comprises banks from many EU countries, UK banks are by some margin the largest group (see Appendix Table A.1). Therefore, bank-level tests—which do not allow for executive-level treatment definition—may capture spurious effects, for instance, a more investment banking-oriented business model or the more prevalent bonus culture at UK banks. In Appendix Table A.12, we therefore exclude UK banks both from the treatment and the control group. The results remain identical with the exception of expected compensation in Panel B. The specification of a goal achievement rate from the pre-reform period yields a positive and significant change in expected compensation (column 5). By contrast, the estimated change is negative and significant if we use a contemporaneous goal achievement rate (column 6). Apart from this last negative estimate—which is smaller than the one in column 5 (-227.63 vs. 457.12)—,

[21] The data are obtained from Table B.I of Carbó-Valverde, Cuadros-Solas, and Rodríguez-Fernández (2020), Table A.3 of Bosma et al. (2019), and the state aid case-search engine of the European Commission (see http://ec.europa.eu/competition/elojade/isef/).

all other results in Panel B are consistent with the indemnification narrative explaining the absence of an executive exodus from the EU banking sector following the bonus cap.

Next, we broaden the treatment definition and include all executives with a maximum variable-to-fixed compensation ratio above 100% as of 2013. This treatment definition is more likely to return false positives because banks have the opportunity to increase the threshold to 200% provided they obtain shareholders' approval (see footnote 3). At the same time, the treatment definition based on the 200% will miss several treated executives at banks that decided not to raise the threshold relative to 100% or raise it to a level below 200%. The broader treatment group comprises 17 banks (vs. 9 in the baseline). As a result, by using the 100% threshold, we also improve the covariate balance between the treated and the control sample. In this case, we rely again on the treatment intensity variable. Appendix Table A.13 shows regression estimates using this treatment definition. Our results generally continue to hold. Moreover, unreported tests confirm the main findings also when using thresholds above 200%.

In Appendix Table A.14, we specify a binary treatment indicator using the 200% threshold instead of the treatment intensity variable. Our findings stay generally robust.

7.4 Limitations

This paper provides a comprehensive analysis of the (un)intended consequences of the EU bonus cap, looking at different dimensions pertaining to the job market of bank executives and bank performance. But despite its richness, both our manually collected data as well as the empirical design are subject to some limitations that warrant readers' attention.

First, both executive and bank-level analyses hinge on relatively small samples, which poses a general challenge to precise point estimations of coefficients. Our approach to saturate models at both levels of analyses with many fixed effects further increases the burden on the data to draw firm inference. Whereas the overall tendencies of effects are surprisingly robust across a wide range of scrutiny checks, we want to caution to put too much emphasis on point estimates.

Second, the approach to use country-by-year fixed effects to isolate responses of bank performance variables to the EU cap implies that already the baseline specification considers only banks from countries with more than one bank. Hence, we report relationships for fewer than the maximum of 14 EU countries used for the analyses conducted at the executive level. Although the qualitative robustness of empirical results obtained after excluding the home to most banks in the sample, the UK in Table A.12, bodes well for

some general association reported here, one needs to acknowledge that the regulatory perimeter of the EU bonus cap is larger than just the seven countries, which host more than one listed bank in this sample.

Third, the collected compensation data comprise top executives in management boards. However, non-board executives and middle management, such as traders (European Banking Authority, 2013), might also be subject to the cap if they qualify as material risk-takers. Since the compensation of non-executive material risk takers is not reported publicly per individual, we cannot gauge the effect of changed incentives on managerial labor markets below the management board level. Future research that collects and analyzes compensation information of all material risk-takers in banking is thus warranted.

Bearing these inevitable limitations in mind, the overarching empirical indications regarding the effects of the EU bonus cap on executive turnover, compensation structure, and bank performance based on our manually collected and novel dataset yield overall robust results and fairly few contradictions.

8 Conclusion

Bankers' compensation has been subject to significant regulatory activity following the Great Financial Crisis, ultimately aiming to enhance financial stability. But the banking sector is characterized by, first, higher returns to skill than other industries and, second, a highly mobile workforce. Hence, any regulation of pay practices in banking may have important unintended consequences on this particular managerial labor market. Specifically, it can adversely affect banks' abilities to retain their most skilled managers. Concurrently, the consequences of compensation regulation for managerial risk-taking behavior are far from obvious and depend on a host of factors, such as managers' risk preferences, their time horizon, and the complex interactions among different pay components.

We examine the interplay between executive compensation structure, managerial career trajectories, and risk-taking in the banking sector by using the introduction of the EU bonus cap in 2013 as a laboratory. The EU cap limits the maximum variable-to-fixed compensation ratio of executives in EU banks. We use a difference-in-differences approach to compare executives whose compensation structure as of 2013 did not comply with the cap to a control group of executives with compensation packages compliant with the cap as of 2013. The evidence does not support the existence of an uncontrolled exodus of the most talented and successful executives from banking. In fact, our results indicate that the average increase in turnover rates was driven by departing CEOs

from poorly performing banks. Hence, the evidence suggests that the governance stance toughened-up in banks most affected by the cap, including a prompter punishment of poor CEO performance. There are few indications that banks lose their ability to retain their most skilled managers after introducing the cap. Instead, the empirical results consistently point to banks complying with the regulation by offering their executives higher fixed compensation and reduced maximum variable compensation. Put differently, banks indemnified their executives for the introduction of the cap.

Bank-level evidence suggests that treated banks exhibit higher risk-taking propensities across a wide range of robustness checks regarding possible confounding policy shocks and alternative control groups. This result is in line with a theory predicting that an increase in the ratio of fixed-to-variable compensation induces risk-averse managers to tolerate more risks. Importantly, the deterioration of risk profiles is not confined to indicators of total and diversifiable risk, but also extends to selected systemic risk metrics. Whereas metrics that gauge banks' vulnerability in case of a system meltdown, such as marginal expected shortfalls, consistently exhibit significant hikes in response to the bonus cap introduction, other measures like ΔCoVaR never exhibit significant reactions.

In sum, whereas it is important to note that our testing framework does not allow for clear causal statements, the results suggest that concerns about the potential adverse impact of the cap on EU banks' ability to attract skilled managers may have been overstated. At the same time, the EU cap's risk-mitigating and system-stabilizing effects in the banking sector appears to be questionable at best. With the caveat in mind that the proper measurement of systemic risk and financial stability remains an ongoing matter of debate, the empirical regularities that emerge from our analyses do not bode well for the bonus cap's ability to tame risk-taking and financial instability in the EU banking system.

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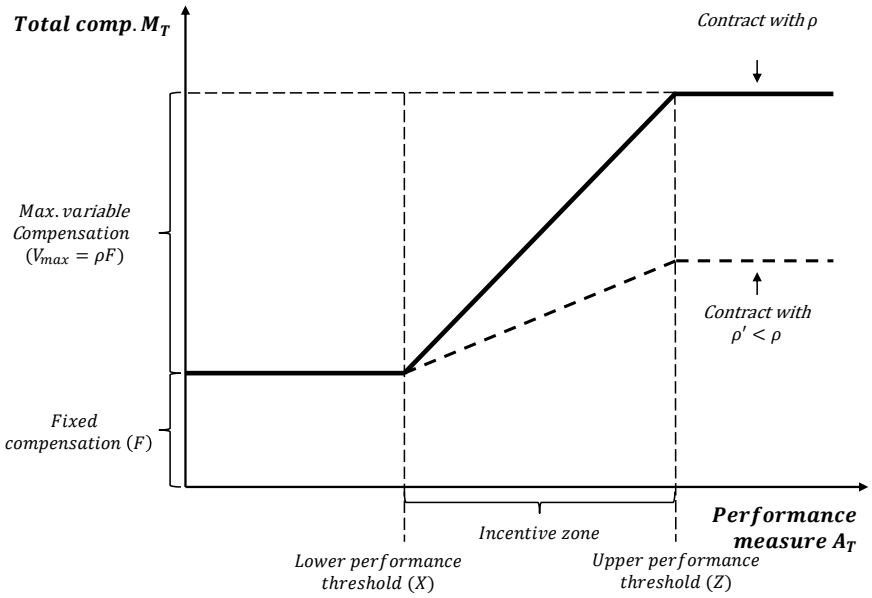


Figure 1: A stylized performance-based compensation plan
This figure shows the terminal payoff M_T of a stylized performance-based compensation plan as a function of a given measure of performance A_T at time T. The executive participates in the bank's performance $\Pi = A_T - X$ at the participation rate p within the incentive zone ($X \leq A_T \leq Z$). ρ is the ratio of the maximum variable compensation achievable by the executive V_{max} and fixed compensation F. Such a ratio is the quantity regulated by the EU bonus cap.

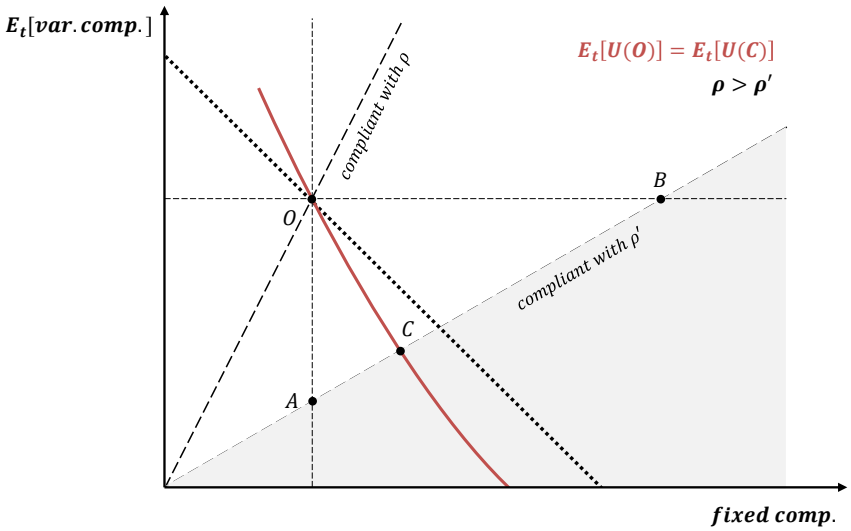


Figure 2: Adjustment schemes of executive compensation structure in reaction to the EU bonus cap
This figure visualizes how the bank can adjust executives' compensation packages to comply with the EU bonus cap. Consider an executive with an initial maximum variable-to-fixed compensation ratio ρ (point O), which is higher than the limit imposed by the EU bonus cap (i.e., ρ'). The solid red (dotted black 45°) line represents the indifference curve of a risk-averse (risk-neutral) executive. The bank can adjust the executive's compensation structure and comply with the regulation by implementing one of the following schemes: (1) decreasing expected variable compensation while keeping fixed compensation unchanged (point A); (2) increasing fixed compensation while keeping expected variable compensation unchanged (point B); or (3) rebalancing both along the indifference curve (red line) such that a risk-averse executive is indifferent between the old and the new contract, i.e. $E_t\,[U(O)] = E_t\,[U(C)]$ (point C).

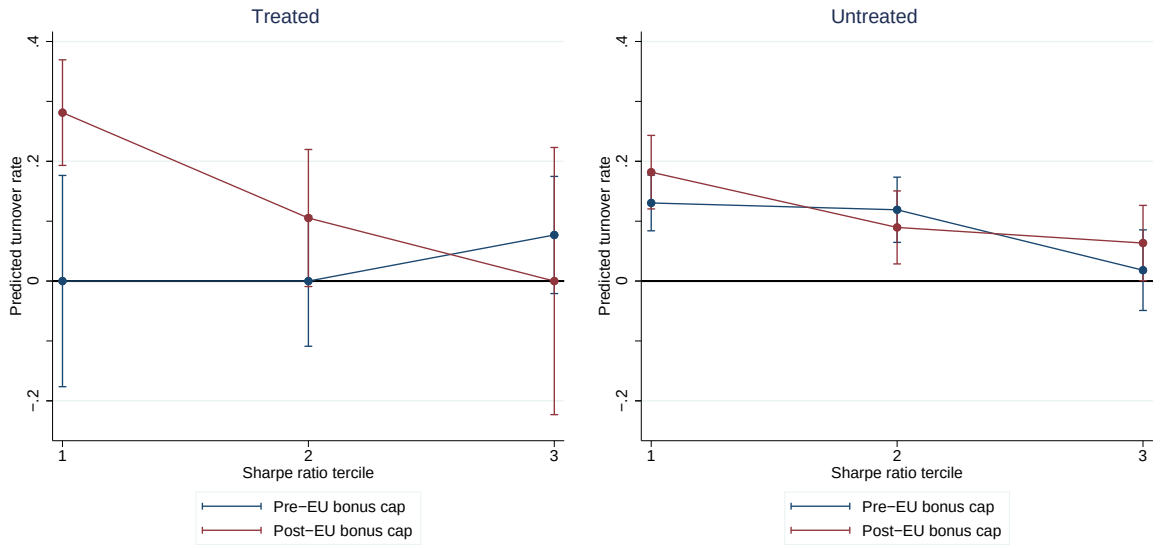


Figure 3: Prediction of turnover rate
This figure shows the predicted turnover rate at different terciles of the Sharpe ratio from linear probability models. The left plot refers to treated executives (those whose compensation structure is non-compliant with the EU bonus cap as of 2013: maximum variable-to-fixed compensation ratio>200%). The right plot refers to untreated executives. Blue lines indicate predicted turnover rates before the introduction of the EU bonus cap (2010-2013), whereas red lines indicate predicted turnover rates after the introduction of the EU bonus cap (2014-2016). Vertical bars indicate 90% confidence intervals.

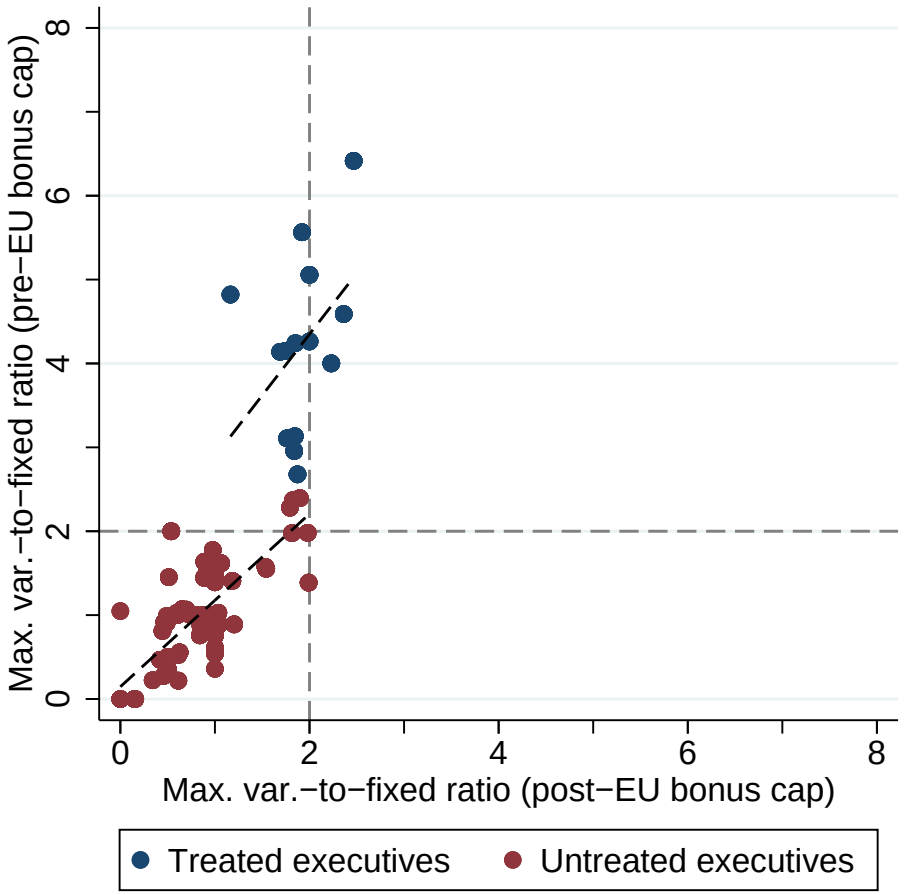


Figure 4: Adjustment of compensation structures to the EU bonus cap
This figure shows the maximum variable-to-fixed compensation ratio for treated and untreated executives at EU banks before (median over 2010–2013) and after (median over 2014–2016) the introduction of the EU bonus cap. Blue dots represent treated executives (i.e., those whose compensation structure was noncompliant with the EU bonus cap as of 2013; maximum variable-to-fixed compensation ratio>200%). Red dots represent untreated executives (i.e., those whose compensation structure is compliant with the EU bonus cap as of 2013). The bold dashed lines are regression lines for treated and untreated executives. The vertical and horizontal dashed lines represent the 200% limit on the maximum variable-to-fixed compensation ratio imposed by the EU bonus cap.

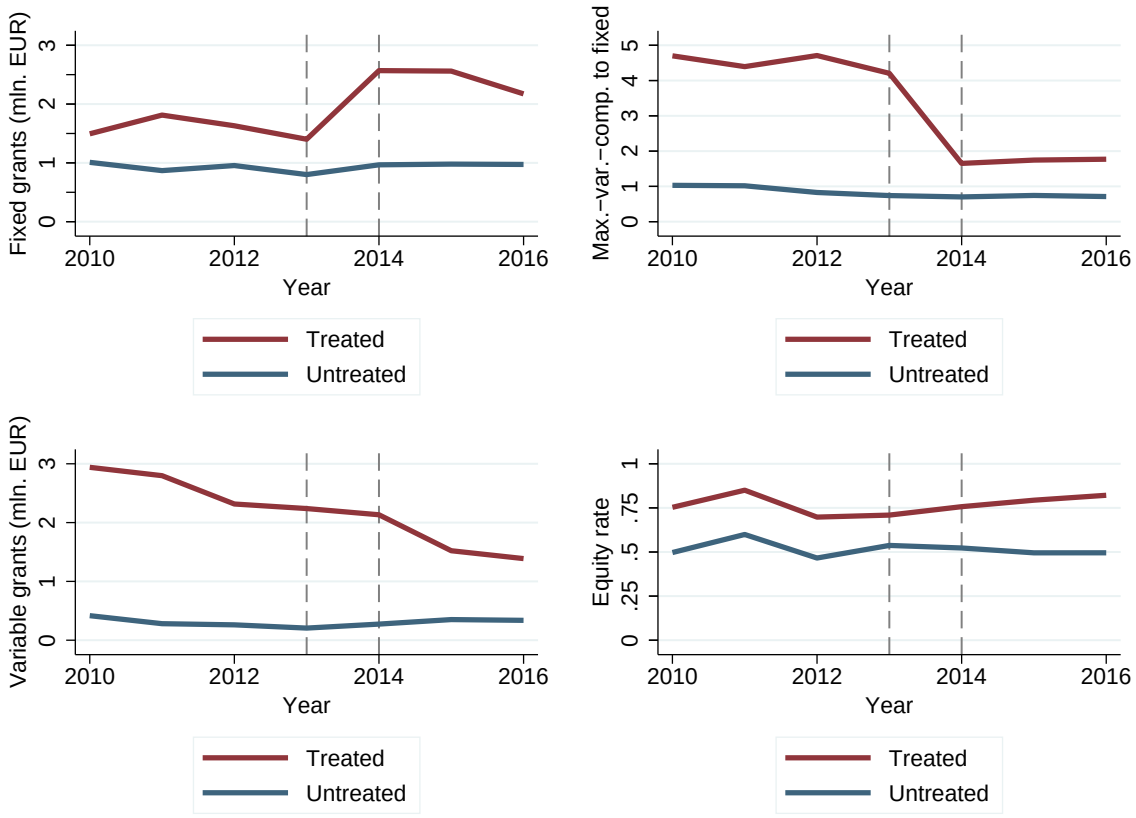


Figure 5: Evolution of compensation structure around the introduction of the EU bonus cap
This figure shows the evolution of executives' fixed compensation, maximum variable compensation-to-fixed compensation ratio, variable compensation, and equity rate around the introduction of the EU bonus cap for a sample of EU banks. The red line represents treated executives (those whose compensation structure is non-compliant with the EU bonus cap as of 2013: maximum variable-to-fixed compensation ratio>200%). The blue line represents untreated executives. The dashed vertical lines denote the points in time at which the EU bonus cap was introduced (2013) and at which it became binding (2014).

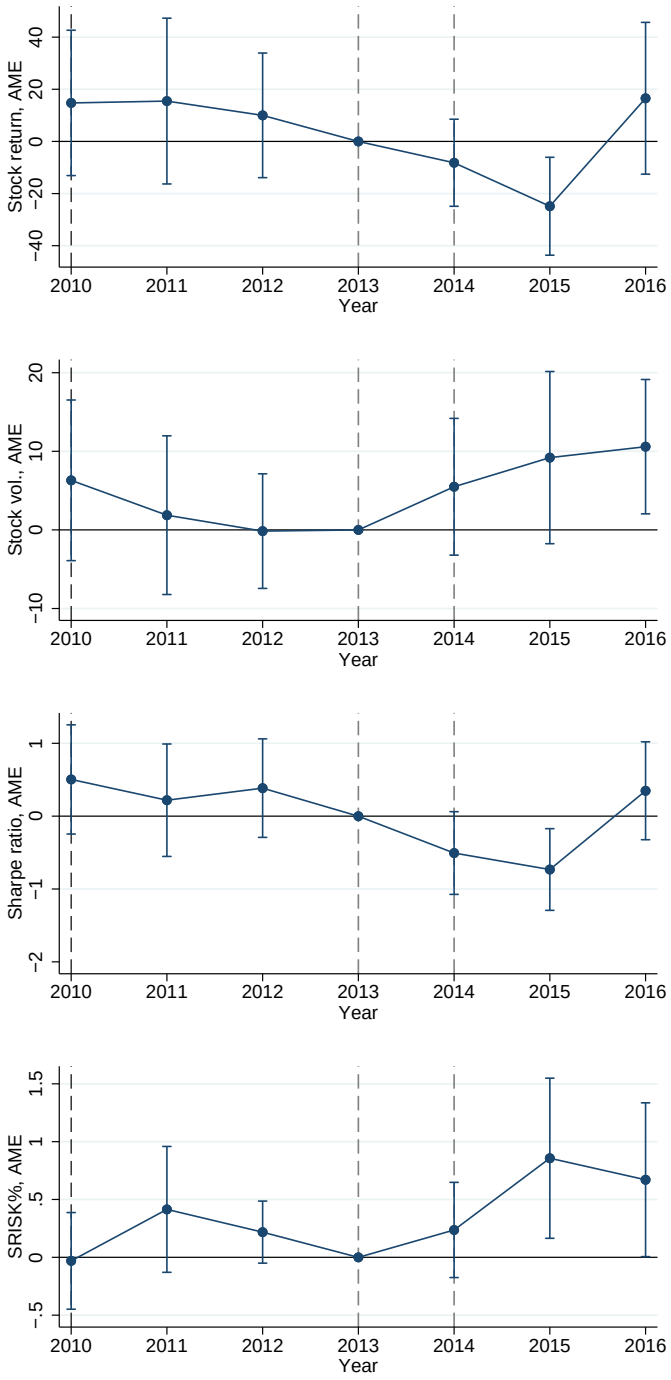


Figure 6: Evolution of bank performance and risk around the introduction of the EU bonus cap
This figure shows the average marginal effect (AME) of the EU bonus cap on bank performance and risk (stock return, stock volatility, Sharpe ratio, and SRISK%) year-by-year. This is obtained by estimating the coefficients β_t from the following specification:

$$y_{jt} = \sum_t \beta_{1t} Treated_j \times \mathbf{1}_{\{Year=t\}} + \alpha_j + \alpha_t + \epsilon_{jt}.$$

$Treated_j$ is equal to 1 if bank j has at least one executive whose compensation structure is noncompliant with the EU bonus cap as of 2013 (maximum variable-to-fixed compensation ratio>200%), and 0 otherwise. The specification includes bank (α_j) and year (α_t) fixed effects. The sample comprises EU banks over 2010–2016, using 2013 as the reference year. The dashed vertical lines denote the points in time at which the EU bonus cap was introduced (2013) and at which it became binding (2014). Vertical bars indicate 90% confidence intervals.

Table 1: Summary statistics
This table shows summary statistics for a sample of EU banks over 2010–2016. Panel A reports summary statistics for treated executives (i.e., those with a maximum variable-to-fixed compensation ratio exceeding 200% as of 2013). Panel B reports summary statistics for untreated executives. Panel C reports differences over the pre-treatment period, i.e., between 2013 and 2010, for treated (column 1) and untreated executives/banks (column 2), as well as the difference between the two in the third column ((1) − (2)). Panel D reports average differences between 2014–2016 and 2010–2013 for treated (column 1) and untreated executives/banks (column 2), as well as the difference between the two in the third column ((1) − (2)). The p-values (in parentheses) are computed from t-tests with standard errors clustered by bank. Refer to Appendix Table A.3 for variable definitions.

Panel A: Treated executives

	2010–2013				2014–2016			
	N	Average	S.E.	Median	*N*	Average	S.E.	Median
Executive characteristics:								
Turnover	67	0.030	0.171	0.000	57	0.193	0.398	0.000
Prof. experience	67	0.618	1.564	0.216	57	0.628	1.706	0.177
Age	67	52.910	5.570	51.000	57	55.368	5.951	54.000
Compensation structure:								
Fixed comp. (thd. EUR)	67	1,559.811	626.448	1,603.252	57	2,439.960	939.986	2,248.520
Var. comp. (thd. EUR)	67	2,493.708	1,798.012	2,003.701	57	1,703.418	1,678.042	1,206.645
Max. var. comp. (thd. EUR)	62	6,765.360	2,846.159	6,816.691	57	4,382.624	2,446.419	4,000.000
Bank-level information:								
Total assets (bln. EUR)	35	1,143.245	682.276	1118.198	27	1,085.196	613.232	954.415
ROA	35	0.181	0.529	0.230	27	0.134	0.456	0.180
ROE	35	2.982	8.340	5.530	27	1.797	7.623	3.360
Stock return	35	0.615	38.863	6.725	27	-8.056	19.995	-8.091
Stock return volatility	35	34.012	10.718	35.507	27	29.301	13.644	23.373
Sharpe ratio	35	0.081	1.117	0.232	27	-0.256	0.701	-0.278
Log 5-year excess CDS spread	27	1.113	0.601	1.241	21	1.373	0.654	1.273
Peripheral exposure	27	0.347	0.298	0.224	21	0.336	0.300	0.224
SRISK%	35	21.959	18.417	20.240	27	22.750	19.427	15.010
LRMES	35	54.821	8.132	56.400	27	49.188	8.017	48.800
Beta	35	1.585	0.341	1.630	27	1.351	0.345	1.310
Corr.	35	0.541	0.077	0.540	27	0.475	0.078	0.460

Panel B: Untreated executives

	2010–2013				2014–2016			
	N	Average	S.E.	Median	*N*	Average	S.E.	Median
Executive characteristics:								
Turnover	519	0.077	0.267	0.000	352	0.111	0.314	0.000
Professional experience	519	-0.035	1.438	-0.340	352	0.010	1.666	-0.462
Age	519	54.620	8.441	53.000	352	56.648	7.999	55.000
Compensation structure:								
Fixed comp. (thd. EUR)	519	890.312	619.718	734.714	352	972.998	666.709	904.571
Var. comp. (thd. EUR)	519	269.369	634.373	0.000	352	317.445	578.629	125.760
Max. var. comp. (thd. EUR)	402	851.435	1,329.753	500.000	352	758.828	1,001.971	425.322
Bank-level information:								
Total assets (bln. EUR)	125	529.226	549.994	280.719	96	466.014	528.571	233.653
ROA	125	-0.090	1.075	0.180	96	0.192	0.602	0.320
ROE	125	-3.672	31.003	4.730	96	2.978	12.530	5.630
Stock return	76	-8.417	53.472	6.464	61	-9.563	42.953	3.307
Stock return volatility	76	43.994	19.744	39.422	61	33.288	19.114	25.375
Sharpe ratio	76	0.054	1.124	0.172	61	0.038	0.927	0.101
Log 5-year excess CDS spread	70	1.220	0.760	1.325	53	1.367	0.856	1.568
Peripheral exposure	93	0.303	0.353	0.162	67	0.354	0.377	0.184
SRISK%	90	30.467	25.971	21.805	66	22.740	24.440	16.585
LRMES	90	53.545	12.027	54.860	66	46.211	9.400	47.265
Beta	90	1.563	0.496	1.555	66	1.243	0.338	1.250
Corr.	90	0.478	0.124	0.480	66	0.407	0.114	0.415

Panel C: Pre-treatment changes (2010 vs. 2013)

	Δ Treated	Δ Untreated	Diff.
	(1)	(2)	(1) - (2)
Executive characteristics:			
Turnover	0.0833	0.2179	-0.1345
	(0.2902)	(0.0000)	(0.2902)
Professional experience	-0.3543	0.0431	-0.3974
	(1.3298)	(0.8362)	(0.4935)
Age	0.6667	5.6964	-5.0297
	(0.1012)	(0.0000)	(0.1012)
Compensation structure:			
Fixed comp. (thd. EUR)	-92.0765	-207.6847	115.6082
	(0.6292)	(0.0128)	(0.6164)
Var. comp. (thd. EUR)	-701.1673	-210.9905	-490.1768
	(0.2150)	(0.0765)	(0.1385)
Max. var. comp (thd. EUR)	-549.5368	-555.3960	5.8592
	(1.0478)	(0.0548)	(0.9929)
Bank-level information:			
Total assets (bln. EUR)	-249.6526	-155.4144	-94.2383
	(1.0583)	(0.2907)	(0.7676)
ROA	-0.4387	-0.4974	0.0587
	(0.9712)	(0.0550)	(0.9161)
ROE	-7.7552	-10.5343	2.7790
	(0.8503)	(0.0449)	(0.8054)
Stock return	30.4951	23.8124	6.6828
	(0.8415)	(0.0699)	(0.7716)
Stock return volatility	-5.3732	4.7373	-10.1104
	(0.8062)	(0.4453)	(0.3610)
Sharpe ratio	0.9700	0.8930	0.0770
	(0.8889)	(0.0041)	(0.8848)
Log 5-year excess CDS spread	0.7098	0.5228	0.1869
	(0.7557)	(0.0551)	(0.7006)
Peripheral exposure	-0.0505	0.0679	-0.1184
	(1.0953)	(0.5099)	(0.5854)
SRISK	-7.9771	0.8355	-8.8126
	(1.4843)	(0.9170)	(0.5673)
LRMES	-3.0778	-5.2389	2.1612
	(0.8516)	(0.1176)	(0.7340)
Beta	-0.1337	-0.2493	0.1156
	(0.7160)	(0.0650)	(0.6511)
Corr.	-0.0413	-0.0743	0.0331
	(0.6263)	(0.0265)	(0.5998)

Panel D: Changes around treatment (2010–2013 vs. 2014–2016)

	Δ Treated	Δ Untreated	Diff.
	(1)	(2)	(1) - (2)
Executive characteristics:			
Turnover	0.1631	0.0337	0.1294
	(0.1109)	(0.0906)	(0.0202)
Professional experience	0.0093	0.0453	-0.0360
	(1.5754)	(0.6715)	(0.9039)
Age	2.4580	2.0273	0.4307
	(0.7805)	(0.0003)	(0.7803)
Compensation structure:			
Fixed comp. (thd. EUR)	880.1487	135.3953	744.7534
	(0.0149)	(0.0149)	(0.0000)
Var. comp. (thd. EUR)	-790.2908	60.3369	-850.6277
	(0.4100)	(0.4100)	(0.0000)
Max. var. comp (thd. EUR)	-2,382.7357	-56.9915	-2,325.7443
	(0.6699)	(0.6699)	(0.0000)
Bank-level information:			
Total assets (bln. EUR)	-191.2683	-34.7213	-156.5470
	(0.9982)	(0.6496)	(0.3486)
ROA	-0.0432	0.2819	-0.3252
	(0.1896)	(0.0111)	(0.1785)
ROE	-1.0083	6.6331	-7.6414
	(0.2601)	(0.0248)	(0.2352)
Stock return	-7.8869	-1.1687	-6.7182
	(1.5021)	(0.8752)	(0.6269)
Stock return volatility	-3.8037	-10.3535	6.5498
	(0.2352)	(0.0006)	(0.2347)
Sharpe ratio	-0.3087	-0.0121	-0.2966
	(1.2960)	(0.9438)	(0.3522)
Log 5-year excess CDS spread	0.2688	0.1518	0.1170
	(0.9093)	(0.2638)	(0.6455)
Peripheral exposure	-0.0112	0.0475	-0.0587
	(1.0041)	(0.3928)	(0.6113)
SRISK	-1.1707	-6.9544	5.7837
	(0.4730)	(0.0586)	(0.4144)
LRMES	-4.9797	-7.3190	2.3393
	(0.4600)	(0.0000)	(0.4600)
Beta	-0.2051	-0.3201	0.1150
	(0.3661)	(0.0000)	(0.3661)
Corr.	-0.0701	-0.0687	-0.0014
	(0.9649)	(0.0000)	(0.9648)

Table 2: Career trajectories of bank executives
This table shows information on the employment paths of bank executives around turnover events. Panel A classifies departing executives based on the whether they were CEOs or not before the turnover. Panel B follows them after the turnover (up to one year after leaving the board). Both panels are structured in the same way. Column 1 and 2 cover all executive turnovers at banks for which treatment status is defined. Columns 3 and 4 focus on the subsample of listed banks. Odd (even) columns report the absolute (relative) number of executives by employment category. For Panel B, we collected data through searches of news stories and professional networking websites. If multiple positions are found, the position is classified according to this hierarchy: (1) executive position, (2) management position, (3) supervisory position, and (4) politics and regulation.

Panel A: Turnover events by position held

	All banks		Listed banks	
	#	%	#	%
	(1)	(2)	(3)	(4)
CEO	16	15.84%	8	14.04%
Non-CEO	85	84.16%	49	85.96%

Panel B: Career trajectories after turnovers

	All banks		Listed banks	
	#	%	#	%
	(1)	(2)	(3)	(4)
Executive position	27	26.73%	16	28.07%
Exec. dir. at a bank	15	14.85%	7	12.28%
Exec. dir. at a non-bank	12	11.88%	9	15.79%
Management position	20	19.80%	8	14.04%
Self-employed	6	5.94%	3	5.26%
Advisor (to the same bank)	6	5.94%	2	3.51%
Advisor (elsewhere)	4	3.96%	2	3.51%
Senior management position	4	3.96%	1	1.75%
Supervisory director or non-exec. director	9	8.91%	3	5.26%
Politics and regulation	1	0.99%	1	1.75%
No information on further employment	30	29.70%	21	36.84%
No information on career path afterwards	23	22.77%	19	33.33%
Explicit information on retirement	7	6.93%	2	3.51%
Others	14	13.86%	8	14.04%
None of the above	13	12.87%	7	12.28%
Died in office	1	0.99%	1	1.75%

Table 3: Executive turnover
This table reports estimates from difference-in-differences regressions (linear probability models) for turnover of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. In columns 1 and 2, the dependent variable is *Turnover*, an indicator variable equal to 1 if the executive leaves the board of the bank in a given year. In column 3, the dependent variable is *Turnover (poor perf.)*, an indicator variable equal to 1 if the executive leaves the board of the bank and the bank's ROE is below the median in a given year. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. All specifications include bank and executive control variables (bank size, lagged Sharpe ratio, number of executives serving on the board, age, a retirement age indicator, tenure, a female indicator, professional experience, and a CEO indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Turnover		Turnover (poor perf.)
	(1)	(2)	(3)
Treat. int.	-0.006	-0.027	-0.012
	(-0.53)	(-0.99)	(-0.68)
Post × Treat. int.	0.044*	0.054**	0.063**
	(1.94)	(2.27)	(2.60)
Sharpe ratio (lag)	-0.036**	-0.020	-0.023
	(-2.63)	(-0.96)	(-1.27)
# Executives	-0.004	-0.066***	-0.069***
	(-0.85)	(-3.89)	(-3.96)
Bank size	-0.012	-0.046	-0.175
	(-0.99)	(-0.34)	(-1.38)
Age	0.000	-0.001	-0.002
	(0.05)	(-0.39)	(-0.65)
Retirement age	0.092	0.105*	0.085*
	(1.67)	(2.03)	(1.93)
Female	-0.100***	-0.081*	-0.019
	(-3.70)	(-1.72)	(-0.37)
Tenure	0.002	0.006	0.007**
	(1.20)	(1.38)	(2.06)
Prof. experience	0.004	0.006	0.007
	(0.43)	(0.71)	(0.86)
CEO	-0.060***	-0.050**	-0.032
	(-2.78)	(-2.19)	(-1.44)
Year fixed effects	X	X	X
Bank fixed effects		X	X
# Executives	130	130	130
# CEOs	36	36	36
# Banks	32	32	32
Mean(y)	0.109	0.109	0.086
S.D.(y)	0.312	0.312	0.280
R^2	0.132	0.221	0.243
N	561	561	561

Table 4: Executive turnover: Non-CEO executives vs. CEOs
This table reports estimates from difference-in-differences regressions (linear probability models) for turnover of executives around the introduction of the EU bonus cap of 2013, analyzing separately non-CEO executives and CEOs. The sample covers executives of EU banks between 2010 and 2016. In columns 1 to 4, the dependent variable is *Turnover*, an indicator variable equal to 1 if the executive leaves the board of the bank in a given year. In columns 5 and 6, the dependent variable is *Turnover (poor perf.)*, an indicator variable equal to 1 if the executive leaves the board of the bank and the bank's ROE is below the median in a given year. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. All specifications include bank and executive control variables (bank size, lagged Sharpe ratio, number of executives serving on the board, age, a retirement age indicator, tenure, a female indicator and professional experience). In columns 1, 2, and 5 we additionally control for CEO turnover. Data in columns 1, 2, and 5 include only non-CEO executives. Data in columns 3, 4, and 6 include only CEOs. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Turnover				Turnover (poor perf.)	
	Ex-CEOs		CEOs only		Ex-CEOs	CEOs only
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int.	0.032	0.034	0.097*	0.116**	0.043	0.122**
	(1.35)	(1.36)	(1.75)	(2.50)	(1.68)	(2.62)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects		X		X	X	X
# Executives	107	106	36	35	106	35
# CEOs	0	0	36	35	0	35
# Banks	28	27	30	29	27	29
Mean(y)	0.127	0.125	0.059	0.060	0.096	0.053
S.D.(y)	0.334	0.331	0.237	0.238	0.294	0.225
R^2	0.145	0.233	0.173	0.438	0.270	0.421
N	409	408	152	151	408	151

Table 5: Executive turnover (the role of managerial skills)
This table reports estimates from triple difference-in-differences regressions (linear probability models) for turnover of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variable is *Turnover*, an indicator variable equal to 1 if the executive leaves the board of the bank in a given year. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. The specification in column 1 includes a triple interaction term with *High exp.*, an indicator variable equal to 1 if *Professional experience* is above its median for a given executive. The specification in column 2 includes a triple interaction term with *Top total pay*, an indicator variable equal to 1 if the executive is the highest paid (or the second highest paid) within the board in terms of total compensation (for boards with at least five executives). The specification in column 3 *Top var. pay*, an indicator variable computed in the same way but based on variable compensation. All specifications include bank and executive control variables (bank size, lagged Sharpe ratio, number of executives serving on the board, age, a retirement age indicator, tenure, a female indicator, professional experience, and a CEO indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Turnover		
	(1)	(2)	(3)
Post × Treat. int. × High exp.	0.050		
	(0.86)		
Post × Treat. int. × Top total pay		-0.050	
		(-1.57)	
Post × Treat. int. × Top var. pay			-0.035
			(-1.04)
Bank and executive controls	X	X	X
Year fixed effects	X	X	X
Bank fixed effects	X	X	X
# Executives	130	122	122
# CEOs	36	34	34
# Banks	32	30	30
Mean(y)	0.109	0.117	0.117
S.D.(y)	0.312	0.322	0.322
R^2	0.231	0.233	0.229
Observations	561	521	521

Table 6: Executive compensation structure
This table reports estimates from difference-in-differences regressions for compensation structure of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks over the years between 2010 and 2016. In Panel A, the dependent variables are *Maximum variable compensation to fixed* (columns 1 – 3) and *Variable compensation* (columns 4 – 6). In Panel B, the dependent variables are *Fixed compensation* (columns 1 – 3) and *Maximum variable compensation-to-fixed* (columns 4 – 6). The two panels follow the same structure. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. All specifications include bank and executive control variables (bank size, ROE, number of executives serving on the board, age, tenure, professional experience, a CEO indicator, and a female indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Compliance with the bonus cap regulation

Dependent variable:	Max.-var.-comp. to fixed			Variable compensation		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. int.	1.223***	0.892***		794.270***	562.689***	
	(7.37)	(5.03)		(10.26)	(4.42)	
Post × Treat. int.	-0.935***	-0.952***	-0.896***	-523.160**	-542.217***	-527.269**
	(-6.93)	(-6.69)	(-6.78)	(-2.25)	(-2.80)	(-2.22)
Bank size	0.122	0.731**	0.700**	149.545*	-61.487	-115.650
	(1.47)	(2.43)	(2.22)	(2.01)	(-0.24)	(-0.36)
ROE	-0.003	0.000	-0.000	2.283	3.341	4.719*
	(-1.32)	(0.33)	(-0.06)	(1.38)	(1.54)	(1.71)
# Executives	-0.024	0.015	0.004	-30.685	6.340	25.007
	(-0.76)	(0.47)	(0.11)	(-1.31)	(0.23)	(0.79)
Age	-0.010*	-0.002	-0.102*	-6.062	-0.082	74.447
	(-1.93)	(-1.23)	(-1.75)	(-1.59)	(-0.03)	(1.37)
Tenure	0.032**	-0.006	-0.005	45.030**	-5.704	-141.572
	(2.35)	(-0.79)	(-0.30)	(2.16)	(-0.59)	(-1.17)
Professional experience	0.025	-0.002	0.294	55.033**	-1.213	-7.432
	(0.85)	(-0.12)	(1.52)	(2.10)	(-0.06)	(-0.06)
CEO	0.046	0.117**	-0.148	211.957*	358.687***	441.345
	(0.51)	(2.45)	(-0.54)	(2.01)	(2.96)	(1.66)
Female	-0.051	-0.016		141.204	34.947	
	(-0.44)	(-0.49)		(1.11)	(0.69)	
Year fixed effects	X	X	X	X	X	X
Bank fixed effects		X	X		X	X
Executive fixed effects			X			X
# Executives	205	204	185	206	206	200
# CEOs	52	52	51	52	52	52
# Banks	45	44	44	45	45	45
Mean(y)	1.113	1.114	1.126	518.308	518.308	521.452
S.D.(y)	1.198	1.198	1.207	1,044.724	1,044.724	1,047.108
R^2	0.657	0.843	0.871	0.468	0.690	0.764
Observations	875	874	855	995	995	989

Panel B: Changes in compensation structure after the bonus cap

Dependent variable:	Fixed compensation			Max. variable compensation		
	(1)	(2)	(3)	(4)	(5)	(6)
Treat. int.	125.279***	-127.482		2247.767***	1636.665***	
	(3.25)	(-0.92)			(6.71)	
Post × Treat. int.	331.962***	326.560***	343.651***	-947.836***	-986.087***	-858.713***
	(3.28)	(3.91)	(3.14)	(-5.90)	(-6.40)	(-4.06)
Bank size	142.285**	-220.098	-259.387	238.085	689.872*	354.250
	(2.24)	(-0.95)	(-0.84)	(1.61)	(1.88)	(0.68)
ROE	2.751*	2.229	3.191**	-0.824	3.043***	4.714***
	(1.84)	(1.66)	(2.21)	(-0.28)	(3.05)	(2.94)
# Executives	-30.623	-7.179	20.398	20.671	8.691	47.943
	(-1.51)	(-0.41)	(0.83)	(0.35)	(0.21)	(0.76)
Age	-17.163***	-7.325***	91.284	-18.933**	-0.837	33.089
	(-4.16)	(-2.82)	(1.33)	(-2.16)	(-0.09)	(0.39)
Tenure	44.537***	10.114	-115.269	95.021***	-11.270	-391.656
	(5.29)	(1.31)	(-1.20)	(2.92)	(-0.55)	(-1.29)
Professional experience	35.949	18.023	-37.130	115.541**	47.192	406.274*
	(1.41)	(0.90)	(-0.23)	(2.23)	(1.20)	(1.80)
CEO	359.573***	483.312***	493.584**	806.382***	1097.127***	1305.946*
	(4.34)	(5.88)	(2.66)	(2.95)	(3.53)	(1.92)
Female	-6.831	35.636		239.831	257.298	
	(-0.06)	(0.29)		(0.71)	(1.07)	
Year fixed effects	X	X	X	X	X	X
Bank fixed effects		X	X		X	X
Executive fixed effects			X			X
# Executives	206	206	200	205	204	185
# CEOs	52	52	52	52	52	51
# Banks	45	45	45	45	44	44
Mean(y)	1,053.420	1,053.420	1,058.330	1,496.334	1,497.832	1,525.059
S.D.(y)	759.372	759.372	758.716	2,411.650	2,412.627	2,431.648
R^2	0.483	0.713	0.822	0.677	0.811	0.893
N	995	995	989	873	872	853

Table 7: Expected utility from executive compensation packages

This table reports estimates from difference-in-differences regressions for expected compensation of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variable is expected utility for a risk-neutral executive (i.e., *Expected pay*) as measured by the sum of fixed compensation and maximum variable compensation times the goal achievement rate. In columns 1 – 4 (5 – 8), the goal achievement rate is computed as the ratio of pre(post)–EU bonus cap realized variable grants over pre(post)–EU bonus cap maximum variable grants. Columns 1, 2, 5, and 6 are based on the executive-level goal achievement rate. Columns 3, 4, 7, and 8 are based on the board-level goal achievement rate. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onwards. All specifications include bank and executive control variables (bank size, ROE, number of executives serving on the board, age, tenure, professional experience, a CEO indicator, and a female indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Expected pay (pre-probabilities)				Expected pay (post-probabilities)			
	Executive-level prob.		Board-level prob.		Executive-level prob.		Board-level prob.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treat. int.	-25.054	-28.458	-31.667	-5.470	-382.441	-394.085	-303.657	-304.492
	(-0.13)	(-0.11)	(-0.20)	(-0.03)	(-1.15)	(-0.97)	(-1.20)	(-0.99)
Bank and executive controls	X	X	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X	X	X
Executive fixed effects		X		X		X		X
# Executives	172	157	173	158	177	161	178	163
# CEOs	42	42	44	44	45	45	46	46
# Banks	36	36	37	37	38	38	39	39
Mean(y)	1,710.522	1,735.223	1,694.311	1,718.688	1,743.693	1,770.892	1,705.812	1,729.927
S.D.(y)	1,783.815	1,791.914	1,726.315	1,733.656	1,741.809	1,749.050	1,684.772	1,691.123
R^2	0.808	0.906	0.816	0.898	0.782	0.868	0.789	0.874
N	730	715	737	722	736	720	752	737

Table 8: Executive compensation structure: Non-CEO executives vs. CEOs
This table reports estimates from triple difference-in-differences regressions for compensation structure of executives around the introduction of the EU bonus cap of 2013, distinguishing between non-CEO executives and CEOs. The sample covers executives of EU banks over the years between 2010 and 2016. The dependent variables are *Maximum variable compensation to fixed* (column 1), *Variable compensation* (2), *Fixed compensation* (columns 3), *Maximum variable compensation-to-fixed* (columns 4), both *Expected pay based on pre-probabilities* (column 5), and *Expected pay based on post-probabilities* (column 6), based on board-level. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *CEO* is an indicator variable equal to one if an executive serves as the CEO. *Post* is an indicator variable equal to 1 from 2014 onward. All specifications include bank and executive control variables (bank size, ROE, number of executives serving on the board, age, tenure, professional experience, a CEO indicator, and a female indicator). Included fixed effects are indicated below. The *t*-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Max. var. to fixed	Var. comp.	Fixed comp.	Max. var. comp.	Expected pay, pre prob.	Expected pay, post prob.
	(1)	(2)	(3)	(4)	(5)	(6)
CEO	0.103	493.233	329.028	961.587	904.476	848.500
	(0.84)	(1.55)	(1.42)	(1.50)	(1.55)	(1.58)
Post × CEO	0.070	57.433	72.579	-75.775	98.007	153.699
	(0.89)	(0.58)	(0.74)	(-0.53)	(0.61)	(0.96)
Post × Treat. int.	-0.834***	-532.968**	340.153**	-674.893*	41.546	-281.372
	(-6.85)	(-2.35)	(2.67)	(-1.90)	(0.15)	(-0.83)
CEO × Treat. int.	-0.657	-240.626	374.653**	1,652.113	975.708	618.187
	(-0.91)	(-0.70)	(2.47)	(1.65)	(1.69)	(1.36)
Post × CEO × Treat. int.	-0.239	40.667	-25.864	-1,061.890**	-342.323	-192.257
	(-1.17)	(0.11)	(-0.19)	(-2.11)	(-1.10)	(-0.72)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X
Executive fixed effects	X	X	X	X	X	X
# Executives	185	200	200	185	158	163
# CEOs	51	52	52	51	44	46
# Banks	44	45	45	44	37	39
Mean(y)	1.126	521.452	1,058.330	1,525.059	1,718.688	1,729.927
S.D.(y)	1.207	1,047.108	758.716	2,431.648	1,733.656	1,691.123
R^2	0.877	0.765	0.824	0.902	0.902	0.875
N	855	989	989	853	722	737

Table 9: Bank performance
This table reports estimates from difference-in-differences regressions for different bank performance metrics around the introduction of the EU bonus cap of 2013. The sample covers EU banks between 2010 and 2016. Panel A considers measures of return and credit risk: *Sharpe ratio* (column 1), *Stock return* (column 2), *Stock return volatility* (column 3), and *Log 5-year excess CDS spreads* (column 4). Panel B considers measures of systemic risk and market risk: *SRISK%* (column 1), *LRMES* (column 2), $\Delta CoVaR$ (column 3), *Beta* (column 4), and *Correlation* (column 5). *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Treat. int.	-0.108	-3.359	5.279	0.310***
	(-0.82)	(-0.59)	(1.43)	(3.84)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	30	30	30	17
Mean(y)	0.025	-7.243	35.859	0.997
S.D.(y)	1.048	44.317	18.717	0.738
R^2	0.788	0.769	0.822	0.974
N	189	189	189	111

Panel B: Systemic and market risk

	Systemic risk			Market risk	
Dependent variable:	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	0.689***	3.723**	-1.435	0.142**	0.015
	(2.79)	(2.45)	(-1.02)	(2.39)	(0.91)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	30	30	23	30	30
Mean(y)	2.321	50.854	23.099	1.433	0.472
S.D.(y)	2.505	10.201	10.025	0.413	0.114
R^2	0.977	0.851	0.901	0.835	0.891
N	189	189	143	189	189

Table 10: Economic channels behind bank-level results
This table reports estimates from difference-in-differences regressions for bank funding structure, loan policy, and possible drivers of asset riskiness around the introduction of the EU bonus cap of 2013. The sample covers EU banks between 2010 and 2016. The dependent variables of Panel A are *Deposits* in columns 1 and 2, *Interbank assets* in column 3 and 4, and *Corporate loans* in columns 5 and 6. The dependent variables of Panel B are *Nonperforming loans* in columns 1 and 2, *Operating leverage* in columns 3 and 4, and *Executive pay safety* in columns 5 and 6. *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Funding structure and loan policy

Dependent variable:	Deposits	Interbank assets	Corporate loans
	(1)	(2)	(3)
Post × Treat. int.	-0.020	-0.015	0.005
	(-1.26)	(-1.17)	(0.65)
Bank fixed effects	X	X	X
Country-year fixed effects	X	X	X
# Banks	30	30	17
Mean(y)	0.408	0.089	0.140
S.D.(y)	0.156	0.056	0.092
R^2	0.964	0.900	0.935
N	189	189	94

Panel B: Risk drivers

Dependent variable:	Nonperf. loans	Operating leverage	Exec. pay safety
	(1)	(2)	(3)
Post × Treat. int.	0.003	-0.000	0.671***
	(0.34)	(-0.49)	(3.47)
Bank fixed effects	X	X	X
Country-year fixed effects	X	X	X
# Banks	30	30	30
Mean(y)	0.043	0.008	-0.587
S.D.(y)	0.049	0.003	0.648
R^2	0.922	0.959	0.796
N	189	189	189

Table 11: US executives/banks as the control group

This table reports estimates from difference-in-differences regressions around the introduction of the EU bonus cap of 2013. The sample period is 2010-2016. The dependent variables are executive turnover (Panel A), measures of executive compensation structure (Panel B), measures of bank-level return and credit risk (Panel C), and measures of systemic risk and market risk (Panel D). The treatment sample covers executives of EU banks fulfilling the conditions laid down below. The control sample covers the top executives from the largest 25 US banks as of 2013. Treated executives are those EU banks' executives whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. In Panel A and Panel B, *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. In Panel C and Panel D, *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. All specifications correspond to the most saturated ones in Table 3, Table 6, and Table 9. Control variables in Panel A are bank size, lagged Sharpe ratio, age, a female indicator, and a CEO indicator. Control variables in Panel B are bank size, ROE, age, a female indicator, and a CEO indicator. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Turnover

Dependent variable:	Turnover		Turnover (poor perf.)
	(1)	(2)	(3)
Post × Treat. int.	0.049**	0.049**	0.055***
	(2.07)	(2.32)	(2.95)
Bank and executive controls	X	X	X
Year fixed effects	X	X	X
Bank fixed effects		X	X
# Executives	276	276	276
# CEOs	41	41	41
# Banks	34	34	34
Mean(y)	0.118	0.118	0.053
S.D.(y)	0.323	0.323	0.224
R^2	0.038	0.069	0.117
N	1,042	1,042	1,042

Panel B: Compensation

Dependent variable:	Measures of fixed comp.		Measures of var. comp.		
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	220.760***	267.955**	-841.659***	-179.773***	-170.577***
	(2.87)	(2.73)	(-6.49)	(-3.43)	(-5.83)
Bank and executive controls	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Bank fixed effects	X	X	X	X	X
Executive fixed effects	X	X	X	X	X
# Executives	231	231	231	231	231
# Banks	33	33	33	33	33
# CEOs	41	41	41	41	41
Mean(y)	1,226.256	767.483	3,525.117	672.055	678.486
S.D.(y)	907.352	504.268	3,327.529	1,273.429	1273.565
R^2	0.756	0.834	0.895	0.879	0.878
N	1,055	1,055	1,055	1,055	1,055

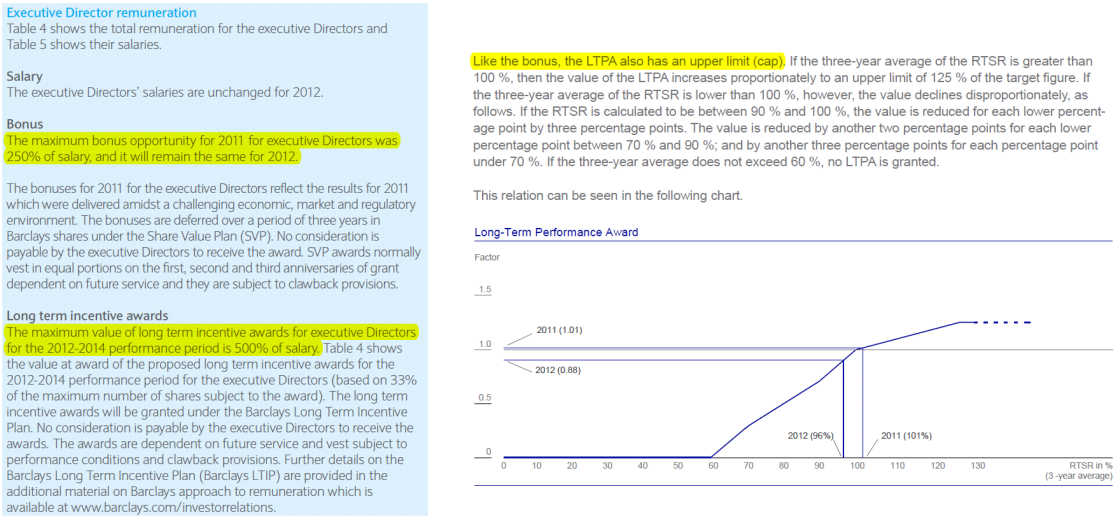
Panel C: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Treat. int.	0.035	-0.538	5.249***	0.169***
	(0.72)	(-0.34)	(8.09)	(7.40)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	32	32	32	16
Mean(y)	0.731	15.337	24.789	3.213
S.D.(y)	1.225	34.919	10.272	1.434
R^2	0.605	0.467	0.756	0.978
N	218	218	218	110

Panel D: Systemic and market risk

Dependent variable:	Systemic risk			Market risk	
	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	0.512***	2.338***	-0.476	0.093***	-0.004**
	(3.91)	(3.78)	(-0.69)	(3.86)	(-2.22)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	32	32	30	32	32
Mean(y)	2.528	43.184	23.703	1.131	0.586
S.D.(y)	4.202	8.779	9.029	0.319	0.106
R^2	0.936	0.880	0.788	0.877	0.913
N	218	218	206	218	218

Appendix for "Compensation Regulation in Banking: Executive Director Behavior and Bank Performance after the EU Bonus Cap"



Executive Director remuneration
Table 4 shows the total remuneration for the executive Directors and Table 5 shows their salaries.

Salary
The executive Directors' salaries are unchanged for 2012.

Bonus
The maximum bonus opportunity for 2011 for executive Directors was 250% of salary, and it will remain the same for 2012.

The bonuses for 2011 for the executive Directors reflect the results for 2011 which were delivered amidst a challenging economic, market and regulatory environment. The bonuses are deferred over a period of three years in Barclays shares under the Share Value Plan (SVP). No consideration is payable by the executive Directors to receive the award. SVP awards normally vest in equal portions on the first, second and third anniversaries of grant dependent on future service and they are subject to clawback provisions.

Long term incentive awards
The maximum value of long term incentive awards for executive Directors for the 2012-2014 performance period is 500% of salary. Table 4 shows the value at award of the proposed long term incentive awards for the 2012-2014 performance period for the executive Directors (based on 33% of the maximum number of shares subject to the award). The long term incentive awards will be granted under the Barclays Long Term Incentive Plan. No consideration is payable by the executive Directors to receive the awards. The awards are dependent on future service and vest subject to performance conditions and clawback provisions. Further details on the Barclays Long Term Incentive Plan (Barclays LTIP) are provided in the additional material on Barclays approach to remuneration which is available at www.barclays.com/investorrelations.

Like the bonus, the LTPA also has an upper limit (cap). If the three-year average of the RTSR is greater than 100 %, then the value of the LTPA increases proportionately to an upper limit of 125 % of the target figure. If the three-year average of the RTSR is lower than 100 %, however, the value declines disproportionately, as follows. If the RTSR is calculated to be between 90 % and 100 %, the value is reduced for each lower percentage point by three percentage points. The value is reduced by another two percentage points for each lower percentage point between 70 % and 90 %; and by another three percentage points for each percentage point under 70 %. If the three-year average does not exceed 60 %, no LTPA is granted.

This relation can be seen in the following chart.

Figure A.1: Examples of performance-based compensation plans
This figure reports examples of performance-compensation plans in place at EU banks before the introduction of the EU bonus cap. The plan on the left was given by Barclays to its executives in 2011 (source: Barclays PLC, Annual Report 2011, p. 58). The plan on the right was given by Deutsche Bank to its executives in 2012 (source: Deutsche Bank AG, Annual Report 2012, p. 211). Yellow highlight is added in both cases.

Table A.1: List of banks
The number of executive-year observations refers to the baseline estimation sample in column 4 of Panel A of Table 6.

	Banks with treated executives	Country	Treat. exec.-years	Untr. exec.-years
1.	AAREAL BANK AG	DE	4	20
2.	BARCLAYS PLC	GB	12	0
3.	BBVA - BANCO BILBAO VIZCAYA ARGENTARIA SA	ES	11	0
4.	DEUTSCHE BANK AG	DE	26	6
5.	HSBC HLDGS PLC	GB	14	7
6.	LLOYDS BANKING GROUP PLC	GB	15	0
7.	ROYAL BANK OF SCOTLAND GROUP PLC	GB	10	0
8.	STANDARD CHARTERED PLC	GB	18	0
9.	UNICREDIT SPA	IT	7	0
	Banks without treated executives	Country	Treat. exec.-years	Untr. exec.-years
1.	ABN AMRO GROUP NV	NL	0	43
2.	BANCA MPS	IT	0	13
3.	BANCA POPOLARE DELL'EMILIA ROMAGNA SCARL	IT	0	34
4.	BANCA POPOLARE DI MILANO SCARL	IT	0	20
5.	BANCO COMERCIAL PORTUGUES SA	PT	0	30
6.	BANCO SABADELL SA	ES	0	17
7.	BANCO SANTANDER SA	ES	0	29
8.	BANK OF CYPRUS GROUP	CY	0	12
9.	BANK OF IRELAND	IE	0	12
10.	BANKIA SA	ES	0	8
11.	BANKINTER SA	ES	0	15
12.	BNP PARIBAS	FR	0	9
13.	BAYERNLB AG	DE	0	36
14.	CAIXABANK SA	ES	0	2
15.	COMMERZBANK AG	DE	0	54
16.	CREDIT AGRICOLE SA	FR	0	6
17.	COOPERATIEVE RABOBANK UA	NL	0	37
18.	DANSKE BANK AS	DK	0	2
19.	DEUTSCHE POSTBANK AG	DE	0	28
20.	DEXIA SA	BE	0	4
21.	DZ BANK AG	DE	0	47
22.	ERSTE GROUP BANK AG	AT	0	31
23.	GRUPPO BANCA CARIGE SPA	IT	0	21
24.	GROUPE BPCE SA	FR	0	22
25.	HELABA LANDESBANK HESSEN THUERINGEN	DE	0	31
26.	ING GROEP NV	NL	0	20
27.	INTESA SANPAOLO SPA	IT	0	51
28.	KBC GROUP NV	BE	0	18
29.	KFW GROUP	DE	0	27
30.	LANDESBANK BERLIN AG	DE	0	30
31.	LANDESBANK BADEN WUERTTEMBERG AG	DE	0	31
32.	MEDIOBANCA SPA	IT	0	24
33.	SKANDINAVISKA ENSKILDA BANKEN AB	SE	0	7
34.	SOCIETE GENERALE SA	FR	0	7
35.	SVENSKA HANDELSBANKEN AB	SE	0	6
36.	UNIONE DI BANCHE ITALIANE SCPA	IT	0	61

	US banks in the alternative control group	Country	Treat. exec.-years	Untr. exec.-years
1.	AMERICAN EXPRESS CO	US	0	37
2.	AMERIPRISE FINANCIAL INC	US	0	34
3.	BANK OF AMERICA CORP	US	0	37
4.	BANK OF NEW YORK MELLON CORP	US	0	38
5.	CAPITAL ONE FINANCIAL CORP	US	0	34
6.	CITIGROUP INC	US	0	36
7.	COMERICA INC	US	0	37
8.	E TRADE FINANCIAL CORP	US	0	39
9.	FIFTH THIRD BANCORP	US	0	42

10.	FIRST NIAGARA FINANCIAL GRP	US	0	32
11.	FIRST REPUBLIC BANK	US	0	29
12.	GOLDMAN SACHS GROUP INC	US	0	36
13.	HUDSON CITY BANCORP INC	US	0	28
14.	HUNTINGTON BANCSHARES	US	0	42
15.	JP MORGAN CHASE & CO	US	0	37
16.	KEYCORP	US	0	35
17.	MORGAN STANLEY	US	0	34
18.	NEW YORK COMMUNITY BANCORP INC	US	0	35
19.	NORTHERN TRUST CORP	US	0	38
20.	PNC FINANCIAL SERVICES GROUP INC	US	0	39
21.	SCHWAB (CHARLES) CORP	US	0	38
22.	STATE STREET CORP	US	0	34
23.	SUNTRUST BANKS INC	US	0	35
24.	US BANCORP	US	0	36
25.	WELLS FARGO & CO	US	0	43

Table A.2: Principal component analysis of executives' employment history
We apply a principal component analysis to proxy for executives' professional experience. We choose five indicators generated from the BoardEx employment history as listed in Panel A. Panel B reports the explanatory ability of the different principal components. Our approach builds on Custódio et al. (2013), who use a principal component analysis to proxy for general managerial skills. We depart from Custódio et al. (2013) by applying principal component analysis for each year separately. The results listed in the table correspond to 2015.

Panel A: Principal components of professional experience

	Component 1	Component 2	Component 3	Component 4	Component 5
# Exec. dir.	0.4266	0.263	-0.6282	0.5893	-0.0831
# Industries	0.3129	0.6454	0.6681	0.1979	0.0021
# Firms	0.4923	0.2466	-0.2643	-0.6946	0.3802
# Positions	0.5306	-0.3317	0.1332	-0.1988	-0.7424
# Superv. dir.	0.4429	-0.586	0.2673	0.3027	0.5453

Panel B: Eigenvalues and proportion explained (by principal components)

	Eigenvalue	Difference	Proportion expl.	Cumulative
Component 1	2.7775	1.8491	0.5555	0.5555
Component 2	0.9284	0.1996	0.1857	0.7412
Component 3	0.7288	0.3212	0.1458	0.8870
Component 4	0.4076	0.2500	0.0815	0.9685
Component 5	0.1576	-	0.0315	1.0000

Table A.3: Definition of variables
For variables used in tests relying on the US control group (see Table 11), additional information on the database and the variable definition is given [in brackets].

Variable	Databases	Definition
Executive characteristics:		
Turnover	BoardEx [ExecuComp]	Dummy variable that is one if an executive leaves the board and zero otherwise. Note that we collected data on 2016 turnovers manually by checking banks' websites and news reports. [Executive turnover is set to one in the year after an executive has last been reported in ExecuComp, and zero otherwise.]
Turnover (poor performance)	BoardEx, Bankscope and Orbis Bankfocus [ExecuComp and CCM]	Dummy variable equal to *Turnover* if ROE of the respective bank is below the 50th percentile in a year in our sample of banks and zero otherwise.
CEO	Manually collected [ExecuComp]	Dummy variable indicating if an executive is the CEO of the bank (1) or not (0). We collected this information manually because BoardEx does not supply a variable indicating the CEO in a board. [ExecuComp provides a CEO indicator.]
Professional experience	BoardEx	Variable derived from BoardEx data on executives' employment history by means of a principle component analysis similar to the one by Custódio et al. (2013). Relevant information includes number of executive directorships, number of industries, number of firms, number of positions, and number of supervisory directorships.
Age	BoardEx [ExecuComp]	Age of the executive.
Retirement age	BoardEx [ExecuComp]	Dummy variable that is one if an executive is older than 65 years.
Tenure	BoardEx [ExecuComp]	Number of years an executivehas served as executive for the bank.
Female	BoardEx [ExecuComp]	Dummy variable that is one if an executive is female.
Turnover to other executive position	Manually collected	Dummy variable equal to *Turnover* if the executive leaves the board of the bank in a given year and moves to another executive position afterwards and zero otherwise.
Compensation structure:		
Fixed compensation	Manually collected [ExecuComp]	Sum of fixed compensation grants in a year (i.e., salary, pensions, other fixed compensation and fixed allowances). If banks do not report these subcategories, we take the aggregate value of fixed compensation. [For tests using the US control group, two different measures of fixed compensation are defined. Measure 1 is defined as (i) the one described above for EU executives, (ii) the sum of salary (`salary`), other components (`othcomp`), and pension contributions (`pension_chg`) for US executives. Measure 2 is defined as (i) the one described above minus pensions and other components for EU executives, (ii) salary for US executives.]
Variable compensation	Manually collected [ExecuComp]	Sum of variable (postevaluation) grants in a year (i.e., grants that relate to bank performance of up to the reporting year). [For tests using the US control group, three different measures of variable compensation are defined. Measure 1 is defined as (i) the one described above for EU executives, (ii) the sum of bonus (`bonus`), option grants (`option_awards_fv`), and stock grants (`stock_awards_fv`) for US executives. Measure 2 is defined as (i) variable compensation granted in cash (both deferred and non-deferred) for EU executives, (ii) bonus for US executives. Measure 3 is defined as (i) variable compensation without long-term deferral (i.e., less than a year until realization of a grant) for EU executives, (ii) bonus for US executives.]
Maximum variable compensation	Manually collected	Maximum value of variable compensation that can be achieved within the reporting year.
Maximum variable compensation to fixed	Manually collected	Ratio of maximum variable compensation to fixed compensation. It is the ratio to which the bonus cap applies.
Deferral rate	Manually collected	Sum of deferred variable grants and deferred parts of fixed allowances over the sum of total variable compensation and total fixed allowances.

(Continued)

Table A.3: – *Continued*

Equity rate	Manually collected	Sum of equity grants or grants that are equity-linked over the sum of total variable compensation and total fixed allowances.
Treatment intensity	Manually collected	This is equal to 0 for executives in the control group and equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013.
Treated	Manually collected	Dummy equal to 1 if an executive has a maximum variable-to-fixed compensation ratio exceeding 200% as of 2013.
Bank-level information:		
Bank size	Bankscope and Orbis Bank Focus [CCM]	Natural logarithm of total assets.
ROA	Bankscope and Orbis Bank Focus [CCM]	Return on average assets.
ROE	Bankscope and Orbis Bank Focus [CCM]	Return on average equity.
Stock return	Datastream [CCM]	Annual return on stock (total investment return).
Stock return volatility	Datastream [CCM]	Standard deviation of monthly returns over the previous 12 months.
Sharpe ratio	Datastream [CCM]	Ratio of stock return over stock volatility.
Log 5-year excess CDS spread	Datastream	Log of 5-year CDS excess spread. The excess spread is the difference of the CDS spread of the bank and the CDS spread of the corresponding sovereign CDS spread (average over the last quarter of the year).
SRISK%	NYU V-Lab	Fraction of the whole financial sector's capital shortfall the bank would incur in the event of a crisis.
LRMES	NYU V-Lab	Expected fractional equity loss the bank would incur in the event of a crisis.
ΔCoVaR	Systemic Risk Lab at SAFE	Following Adrian and Brunnermeier (2016), ΔCoVaR of bank i is defined as the difference of the CoVaR of the financial system with respect to bank i and the Value-at-Risk (VaR_i) of the financial system, whereas the CoVaR of the financial system with respect to bank i is the VaR of the financial system, conditional on bank i being in distress, i.e., bank i being at VaR_i.
Beta	NYU V-Lab	Market beta of the bank based on the MSCI World Index.
Correlation	NYU V-Lab	Correlation of the bank's stock returns with the returns on the MSCI World Index.
# Executives	BoardEx	Number of executives serving on the board. We take the gross number of observations per year on a board and subtract the sum of the turnovers of the respective year.
CEO turnover	BoardEx [ExecuComp]	Dummy variable that indicates if the CEO leaves the board (1) or stays on the board (0). Note that we collected data on 2016 turnovers manually by checking banks' websites and news reports. We also manually collected who the CEO is because BoardEx does not supply a variable indicating the CEO in a board. [ExecuComp provides a CEO indicator.]
Deposits	Bankscope and Orbis Bank Focus	Deposits over total assets.
Interbank assets	Bankscope and Orbis Bank Focus	Interbank assets over total assets.
Corporate loans	Bankscope and Orbis Bank Focus	Corporate loans over total assets.
Nonperforming loans	Bankscope and Orbis Bank Focus	Doubtful loans over total assets.
Operating leverage	Bankscope and Orbis Bank Focus	Payroll over total assets.

(Continued)

Table A.3: – *Continued*

Executive pay safety	Manually collected	Within-bank-year median of variable compensation over fixed compensation times minus one. Note that we use the negative ratio of variable over fixed compensation instead of using fixed over variable compensation to omit having zeros at the denominator.
Tier I	Bankscope and Orbis Bank Focus	Tier 1 capital over risk-weighted assets.
Regulatory capital mix	Bankscope and Orbis Bank Focus	Tier 1 capital over total regulatory capital.
Liquidity	Bankscope and Orbis Bank Focus	Liquid assets over short-term funding.
Peripheral exposure	EBA	Ratio of the sum of a bank's sovereign debt exposure to peripheral countries (Portugal, Ireland, Italy, Portugal, and Spain) over a bank's total sovereign debt exposure. Data are from the 2011 EBA Transparency Exercise.
Treatment intensity	Manually collected	This is equal to 0 for banks in the control group and equal to the average executive-level treatment intensity of executives within a bank as of 2014. We use 2014 as reference year to ensure that only executives' treatment intensities who serve as executives in the post-period are captured by our measure.
Treated	Manually collected	Dummy equal to 1 if at least one executive in the bank has a maximum variable-to-fixed compensation ratio exceeding 200% as of 2013.

Table A.4: Executive turnover and post-turnover career outcomes
This table reports estimates from difference-in-differences regressions (linear probability models) for turnover of executives around the introduction of the EU bonus cap of 2013 conditional on post-turnover outcomes. The sample covers executives of EU banks between 2010 and 2016. The dependent variable is *Turnover to other executive position*, an indicator variable equal to 1 if the executive leaves the board of the bank in a given year and moves to another executive position afterwards. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. Both columns 1 and 2 specifications include bank and executive control variables (bank size, lagged Sharpe ratio, number of executives serving on the board, age, a retirement age indicator, tenure, a female indicator, professional experience, and a CEO indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Turnover to other executive position	
	(1)	(2)
Post × Treat. int.	0.005	0.014
	(0.38)	(1.20)
Bank and executive controls	X	X
Year fixed effects	X	X
Bank fixed effects		X
# Executives	130	130
# CEOs	36	36
# Banks	32	32
Mean(y)	0.030	0.030
S.D.(y)	0.172	0.172
R^2	0.039	0.135
N	561	561

Table A.5: Sensitivity of executive turnover to performance
This table reports estimates from triple difference-in-differences regressions (linear probability models) for turnover of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variable is *Turnover (poor perf.)*, an indicator variable equal to 1 if the executive leaves the board of the bank and the bank's ROE is below the median in a given year. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. *Treatment intensity* and *Post* are interacted with bank risk-adjusted performance as measured by lagged *Sharpe ratio*. Both specifications include bank and executive control variables (bank size, lagged Sharpe ratio, number of executives serving on the board, age, a retirement age indicator, tenure, a female indicator, professional experience, and a CEO indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Turnover (poor perf.)	
	(1)	(2)
Post × Treat. int. × Sharpe ratio (lag)	-0.048	-0.043
	(-1.69)	(-0.95)
Bank and executive controls	X	X
Time fixed effects	X	X
Bank fixed effects		X
# Executives	130	130
# CEOs	36	36
# Banks	32	32
Mean(y)	0.086	0.086
S.D.(y)	0.280	0.280
R^2	0.144	0.248
N	561	561

Table A.6: Characteristics of leaving executives and new executives over the post-EU bonus cap period
This table shows summary statistics for executives leaving their bank (columns 1 to 4) and executives that are newly employed (columns 1 to 4) in the post period, i.e. in the years 2014–2016. Panel A reports summary statistics for executives at treated banks (i.e., those where at least one executive has a maximum variable-to-fixed compensation ratio exceeding 200% as of 2013). Panel B reports summary statistics for executives at untreated banks. Refer to Appendix Table A.3 for variable definitions.

Panel A: Executives at treated banks

	Leaving executives				New executives			
	N	Mean	S.E.	Median	*N*	Average	S.E.	Median
Age	13	55.154	5.080	53.000	12	50.333	3.892	50.500
Professional experience	13	0.082	1.206	0.025	12	-0.061	1.717	-0.54
Female	13	0.000	0.000	0.000	12	0.083	0.289	0.000
# Executive directorships held	13	2.846	1.994	3.000	12	2.333	1.303	2.000
# Supervisory directorships held	13	3.385	3.404	3.000	12	0.833	1.528	0.000
# Previous sectors	13	1.385	0.506	1.000	12	1.333	0.651	1.000
# Previous firms	13	4.615	1.805	4.000	12	6.250	5.396	4.000

Panel B: Executives at untreated banks

	Leaving executives				New executives			
	N	Average	S.E.	Median	*N*	Average	S.E.	Median
Age	48	62.208	10.213	60.500	25	54.640	9.367	52.000
Professional experience	48	0.276	1.841	-0.081	25	0.287	2.111	-0.311
Female	48	0.000	0.000	0.000	25	0.080	0.277	0.000
# Executive directorships held	48	2.438	1.785	2.000	25	2.480	2.044	1.000
# Supervisory directorships held	48	5.313	4.406	4.000	25	3.240	4.456	1.000
# Previous sectors	48	1.208	0.504	1.000	25	1.280	0.542	1.000
# Previous firms	48	5.125	3.071	5.000	25	5.920	3.451	6.000

Table A.7: Sensitivity of compensation to performance
This table reports estimates from triple difference-in-differences regressions for goal achievement of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variable is the realized *Variable compensation-to-maximum variable compensation* ratio. Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. *Post* is an indicator variable equal to 1 from 2014 onward. The estimated specifications include a triple interaction term with *Stock return* (columns 1 – 3) and with *Sharpe ratio* (columns 4 – 6). All specifications include bank and executive control variables (bank size, ROE, number of executives serving on the board, age, tenure, professional experience, a CEO indicator, and a female indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Var. comp.-to-max. var. comp.					
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int. × Stock return	0.001	0.001	0.001			
	(1.05)	(1.06)	(0.80)			
Post × Treat. int. × Sharpe ratio				0.019	-0.001	-0.003
				(0.65)	(-0.02)	(-0.09)
Bank and executive controls	X	X	X	X	X	X
Time fixed effects	X	X	X	X	X	X
Bank fixed effects		X	X		X	X
Executive fixed effects			X			X
# Executives	125	124	103	125	124	103
# CEOs	32	32	31	32	32	31
# Banks	30	29	29	30	29	29
Mean(y)	0.338	0.338	0.350	0.338	0.338	0.350
S.D.(y)	0.314	0.314	0.314	0.314	0.314	0.314
R^2	0.213	0.536	0.590	0.219	0.528	0.583
N	472	471	450	472	471	450

Table A.8: Deferred and equity executive compensation
This table reports estimates from difference-in-differences regressions for compensation structure of executives around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variables are *Equity rate* (columns 1 – 3) and *Deferral rate* (columns 4 – 6). Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. *Treatment intensity* is (1) equal to 0 for executives equal to 1 from 2014 onwards. All specifications include bank and executive control variables (bank size, ROE, number of executives serving on the board, age, tenure, professional experience, a CEO indicator, and a female indicator). Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Dependent variable:	Equity rate			Deferral rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int.	0.040**	0.037***	0.046**	0.039**	0.027	0.036
	(2.14)	(2.94)	(2.28)	(2.39)	(1.64)	(1.51)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects		X	X		X	X
Executive fixed effects			X			X
# Executive	117	115	101	117	115	101
# CEOs	38	38	34	38	38	34
# Banks	33	31	29	33	31	29
Mean(y)	0.565	0.565	0.565	0.685	0.686	0.686
S.D.(y)	0.305	0.305	0.307	0.222	0.222	0.222
R^2	0.160	0.882	0.892	0.101	0.656	0.692
N	451	449	435	451	449	435

Table A.9: Bank performance, capital requirements and liquidity regulation
This table reports estimates from difference-in-differences regressions for bank performance around the introduction of the EU bonus cap of 2013. The sample covers EU banks between 2010 and 2016. Panel A considers bank performance and measures of return and credit risk: *Sharpe ratio* (column 1), *Stock return* (column 2), *Stock return volatility* (column 3), and *Log 5-year excess CDS spreads* (column 4). Panel B considers measures of systemic risk and market risk: *SRISK%* (column 1), *LRMES* (column 2), Δ *CoVaR* (column 3), *Beta* (column 4), and *Correlation* (column 5). *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom *Post* × *Treated* = 1, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. Δ *Tier I* is the change in the bank's Tier I capital over total risk-weighted assets. Δ *Regulatory capital mix* is the change in the bank's Tier I capital over total regulatory capital. Δ *Liquidity* is the change in the bank's ratio of liquid assets over deposits and short-term funding. Included fixed effects are indicated below. The *t*-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Treat. int.	-0.184	-6.625	6.169	0.309***
	(-1.32)	(-1.18)	(1.68)	(3.15)
Δ Tier I	-0.050	0.078	-0.854	-0.018
	(-1.37)	(0.04)	(-1.40)	(-0.82)
Δ Regulatory capital mix	-0.007	-1.122	0.620**	0.007
	(-0.64)	(-1.40)	(2.37)	(1.68)
Δ Liquidity	0.003	-0.059	-0.052	-0.001
	(0.34)	(-0.20)	(-0.76)	(-0.81)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	30	30	30	17
Mean(y)	0.008	-7.275	35.893	1.020
S.D.(y)	1.031	43.716	18.329	0.739
R^2	0.784	0.794	0.855	0.977
N	173	173	173	106

Panel B: Systemic and market risk

	Systemic risk			Market risk	
Dependent variable:	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	0.702***	3.957**	-1.101	0.152**	0.013
	(2.76)	(2.61)	(-0.74)	(2.51)	(0.80)
Δ Tier I	0.010	0.303	-0.208	0.016	-0.000
	(0.38)	(1.01)	(-1.13)	(0.98)	(-0.02)
Δ Regulatory capital mix	-0.001	-0.078	-0.039	-0.003	-0.001
	(-0.08)	(-1.00)	(-0.82)	(-0.80)	(-0.63)
Δ Liquidity	0.000	-0.007	0.083	-0.000	0.000
	(0.05)	(-0.14)	(1.44)	(-0.19)	(0.44)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	30	30	23	30	30
Mean(y)	2.493	51.470	23.157	1.458	0.479
S.D.(y)	2.544	10.167	10.121	0.413	0.107
R^2	0.976	0.848	0.913	0.832	0.876
N	173	173	138	173	173

Table A.10: Bank performance (falsification test)
This table reports estimates from difference-in-differences regressions for bank performance around the introduction of the EU bonus cap of 2013, replacing the bank's *Treatment intensity* used in Table 9 with *Peripheral exposure*, i.e., the bank's exposure to the sovereign debt of peripheral countries (Greece, Ireland, Italy, Portugal, and Spain) relative to its total sovereign debt holdings. The sample covers EU banks between 2010 and 2016. Panel A considers measures of return and credit risk: *Sharpe ratio* (column 1), *Stock return* (column 2), *Stock return volatility* (column 3), and *Log 5-year excess CDS spreads* (column 4). Panel B considers measures of systemic risk and systematic risk: *SRISK%* (column 1), *LRMES* (column 2), Δ *CoVaR* (column 3), *Beta* (column 4), and *Correlation* (column 5). *Post* is an indicator variable equal to 1 from 2014 onward. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Periph. exposure	-0.022	-21.253	12.809	1.056
	(-0.04)	(-0.67)	(0.69)	(1.12)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	15	15	15	12
Mean(y)	-0.095	-7.336	35.840	0.992
S.D.(y)	0.960	38.711	15.107	0.760
R^2	0.784	0.847	0.847	0.972
N	98	98	98	81

Panel B: Systemic and market risk

	Systemic risk			Market risk	
Dependent variable:	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Periph. exposure	0.955	-2.925	-6.521	-0.223	-0.023
	(0.66)	(-0.42)	(-0.82)	(-0.75)	(-1.68)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	15	15	14	15	15
Mean(y)	3.941	53.530	24.457	1.532	0.515
S.D.(y)	2.500	8.352	9.615	0.358	0.086
R^2	0.961	0.897	0.903	0.883	0.932
N	98	98	93	98	98

Table A.11: Excluding bailed-out banks

This table reports estimates from difference-in-differences regressions around the introduction of the EU bonus cap of 2013. The sample covers the period 2010-2016 and excludes bailed-out banks. The dependent variables are executive turnover (Panel A), measures of executive compensation structure (Panel B), bank-level measures of return of and credit risk (Panel C), and bank-level measures of systemic and market risk (Panel D). Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. In Panel A and Panel B, *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. In Panel C and Panel D, *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. All specifications correspond to the most saturated ones in Table 3, Table 6, Table 7, and Table 9. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Turnover

Dependent variable:	Turnover	Turnover (poor perf.)
	(1)	(2)
Post × Treat. int.	0.051*	0.067**
	(1.87)	(2.42)
Bank and executive controls	X	X
Year fixed effects	X	X
Bank fixed effects	X	X
# Executives	88	88
# CEOs	22	22
# Banks	19	19
Mean(y)	0.123	0.094
S.D.(y)	0.329	0.292
R^2	0.232	0.269
N	374.000	374.000

Panel B: Compensation

Dependent variable:	Fixed comp.	Var. comp.	Max. var. comp.	Max. var. ratio	Exp. pay (board, pre)	Exp. pay (board, pre and post)
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int.	329.187***	-583.708**	-881.103***	-0.869***	71.152	-179.221
	(3.07)	(-2.65)	(-4.22)	(-6.61)	(0.41)	(-0.77)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X
Executive fixed effects	X	X	X	X	X	X
# Executives	119	119	107	107	94	96
# CEOs	29	29	28	28	25	26
# Banks	26	26	25	25	21	22
Mean(y)	1,214.012	654.846	2,044.600	1.318	1,864.662	1,840.399
S.D.(y)	842.758	1,172.337	2,897.279	1.401	1,642.815	1,546.219
R^2	0.814	0.775	0.886	0.871	0.892	0.878
N	586	586	492	494	436	442

Panel C: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Treat. int.	-0.282**	-3.893	1.488	0.131**
	(-2.73)	(-1.11)	(0.50)	(2.39)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	19	19	19	12
Mean(y)	0.118	-2.564	32.859	0.811
S.D.(y)	0.995	36.018	15.186	0.738
R^2	0.813	0.817	0.839	0.982
N	119	119	119	75

Panel D: Systemic and market risk

Dependent variable:	Systemic risk			Market risk	
	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	0.194*	3.143	-0.236	0.116	0.032
	(1.79)	(1.70)	(-0.13)	(1.64)	(1.01)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	19	19	16	19	19
Mean(y)	1.751	50.051	23.066	1.396	0.482
S.D.(y)	2.349	9.984	10.065	0.378	0.107
R^2	0.985	0.853	0.910	0.831	0.911
N	119	119	99	119	119

Table A.12: Excluding UK banks

This table reports estimates from difference-in-differences regressions around the introduction of the EU bonus cap of 2013. The sample covers the period 2010-2016 and excludes UK banks. The dependent variables are executive turnover (Panel A), measures of executive compensation structure (Panel B), bank-level measures of return of and credit risk (Panel C), and bank-level measures of systemic and market risk (Panel D). Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. In Panel A and Panel B, *Treatment intensity* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 200% as of 2013 for treated executives. In Panel C and Panel D, *Treatment intensity* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. All specifications correspond to the most saturated ones in Table 3, Table 6, Table 7, and Table 9. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Turnover

Dependent variable:	Turnover	Turnover (poor perf.)
	(1)	(2)
Post × Treat. int.	0.137***	0.161***
	(4.12)	(5.93)
Bank and executive controls	X	X
Year fixed effects	X	X
Bank fixed effects	X	X
# Executives	115	115
# CEOs	31	31
# Banks	27	27
Mean(y)	0.110	0.085
S.D.(y)	0.313	0.279
R^2	0.227	0.261
N	493	493

Panel B: Compensation

Dependent variable:	Fixed comp.	Var. comp.	Max. var. comp.	Max. var. ratio	Exp. pay (board, pre)	Exp. pay (board, pre and post)
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int.	518.108***	-439.895***	-469.230	-1.109***	457.118**	-227.630**
	(3.00)	(-2.75)	(-1.48)	(-10.61)	(2.40)	(-2.08)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X
Executive fixed effects	X	X	X	X	X	X
# Executives	185	185	170	170	143	148
# CEOs	47	47	46	46	39	41
# Banks	40	40	39	39	32	34
Mean(y)	974.042	366.336	1,093.340	0.922	1,418.317	1,422.447
S.D.(y)	673.606	727.518	1,676.682	0.835	1,421.163	1,322.288
R^2	0.813	0.760	0.887	0.883	0.905	0.890
N	913	913	777	779	646	661

Panel C: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(3)	(4)	(5)	(6)
Post × Treat. int.	-0.298**	-7.257	3.127	0.213***
	(-2.14)	(-0.86)	(0.67)	(4.35)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	25	25	25	12
Mean(y)	0.041	-8.496	37.373	0.876
S.D.(y)	1.049	46.535	19.628	0.814
R^2	0.824	0.780	0.829	0.987
N	155	155	155	77

Panel D: Systemic and market risk

Dependent variable:	Systemic risk			Market risk	
	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int.	0.294***	3.399*	-0.132	0.134*	0.027
	(4.12)	(1.79)	(-0.08)	(1.88)	(1.11)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	25	25	18	25	25
Mean(y)	2.057	51.377	23.092	1.459	0.469
S.D.(y)	2.491	10.729	9.939	0.435	0.121
R^2	0.987	0.852	0.913	0.835	0.892
N	155	155	109	155	155

Table A.13: Alternative treatment threshold

This table reports estimates from difference-in-differences regressions around the introduction of the EU bonus cap of 2013. The sample period is 2010-2016. The dependent variables are executive turnover (Panel A), measures of executive compensation structure (Panel B), bank-level measures of return of and credit risk (Panel C), and bank-level measures of systemic and market risk (Panel D). Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 100% as of 2013. In Panel A and Panel B, *Treatment intensity (100%)* is (1) equal to 0 for executives in the control group and (2) equal to the distance between ρ (maximum variable-to-fixed compensation) and 100% as of 2013 for treated executives. In Panel C and Panel D, *Treatment intensity (100%)* is the average treatment intensity of executives within a bank as of 2014 (based on those executives for whom $Post \times Treated = 1$, where *Treated* is the executive-level binary treatment indicator). *Post* is an indicator variable equal to 1 from 2014 onward. All specifications correspond to the most saturated ones in Table 3, Table 6, Table 7, and Table 9. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Turnover

Dependent variable:	Turnover	Turnover (poor perf.)
	(1)	(2)
Post × Treat. int. (100%)	0.055**	0.056***
	(2.73)	(2.92)
Bank and executive controls	X	X
Year fixed effects	X	X
Bank fixed effects	X	X
# Executives	130	130
# CEOs	36	36
# Banks	32	32
Mean(y)	0.109	0.086
S.D.(y)	0.312	0.280
R^2	0.226	0.247
N	561	561

Panel B: Compensation

Dependent variable:	Fixed comp.	Var. comp.	Max. var. comp.	Max. var. ratio	Exp. pay (board, pre)	Exp. pay (board, pre and post)
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treat. int. (100%)	283.384***	-357.964	-634.557***	-0.708***	95.354	-48.897
	(3.84)	(-1.65)	(-3.19)	(-11.31)	(0.68)	(-0.24)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X
Executive fixed effects	X	X	X	X	X	X
# Executives	200	200	185	185	158	163
# CEOs	52	52	51	51	44	46
# Banks	45	45	44	44	37	39
Mean(y)	1,058.330	521.452	1,525.059	1.122	1,541.542	1,552.359
S.D.(y)	758.716	1,047.108	2,431.648	1.201	1,454.112	1, 417.628
R^2	0.825	0.754	0.891	0.874	0.895	0.875
N	989	989	853	855	722	737

Panel C: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(1)	(2)	(3)	(4)
Post × Treat. int. (100%)	0.045	4.022	-0.371	0.251**
	(0.43)	(0.77)	(-0.10)	(2.52)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	30	30	30	17
Mean(y)	0.025	-7.243	35.859	0.997
S.D.(y)	1.048	44.317	18.717	0.738
R^2	0.788	0.769	0.817	0.969
N	189	189	189	111

Panel D: Systemic and market risk

Dependent variable:	Systemic risk			Market risk	
	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3)	(4)	(5)
Post × Treat. int. (100%)	0.405**	2.922**	0.151	0.117**	0.009
	(2.07)	(2.22)	(0.12)	(2.25)	(0.78)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects	X	X	X	X	X
# Banks	30	30	23	30	30
Mean(y)	2.321	50.854	23.099	1.433	0.472
S.D.(y)	2.505	10.201	10.025	0.413	0.114
R^2	0.975	0.850	0.899	0.835	0.891
N	189	189	143	189	189

Table A.14: Binary treatment indicator

This table reports estimates from difference-in-differences regressions around the introduction of the EU bonus cap of 2013. The sample covers executives of EU banks between 2010 and 2016. The dependent variables are executive turnover (Panel A), measures of executive compensation structure (Panel B), bank-level measures of return of and credit risk (Panel C), and bank-level measures of systemic and market risk (Panel D). Treated executives are those whose maximum variable-to-fixed compensation ratio exceeds 200% as of 2013. In Panel A and Panel B, *Treated* is an indicator variable equal to 1 if an executive has a maximum variable-to-fixed compensation ratio exceeding 200% as of 2013. In Panel C and Panel D, *Treated* is computed at the bank-level and is equal to one if at least one treated executive served on the board as of 2014. *Post* is an indicator variable equal to 1 from 2014 onward. All specifications correspond to the most saturated ones in Table 3, Table 6, Table 7, and Table 9. Included fixed effects are indicated below. The t-statistics (in parentheses) are computed from standard errors clustered by bank. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively. Refer to Appendix Table A.3 for variable definitions.

Panel A: Turnover

Dependent variable:	Turnover	Turnover (poor perf.)
	(1)	(2)
Post × Treated	0.166**	0.198***
	(2.35)	(3.25)
Bank and executive controls	X	X
Year fixed effects	X	X
Bank fixed effects	X	X
# Executives	130	130
# CEOs	36	36
# Banks	32	32
Mean(y)	0.109	0.086
S.D.(y)	0.312	0.280
R^2	0.224	0.249
N	561	561

Panel B: Compensation

Dependent variable:	Fixed comp.	Var. comp.	Max. var. comp.	Max. var. ratio	Exp. pay (board, pre)	Exp. pay (board, pre and post)
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treated	999.347***	-714.977	-1,727.356**	-2.425***	595.349	226.337
	(5.66)	(-0.91)	(-2.14)	(-8.11)	(1.67)	(0.34)
Bank and executive controls	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
Bank fixed effects	X	X	X	X	X	X
Executive fixed effects	X	X	X	X	X	X
# Executives	200	200	185	185	158	163
# CEOs	52	52	51	51	44	46
# Banks	45	45	44	44	37	39
Mean(y)	1,058.330	521.452	1,525.059	1.126	1,541.542	1,552.359
S.D.(y)	758.716	1047.108	2,431.648	1.207	1,454.112	1,417.628
R^2	0.828	0.735	0.883	0.872	0.898	0.875
N	989	989	853	855	722	737

Panel C: Return and credit risk

Dependent variable:	Sharpe ratio (in %)	Stock return (in %)	Stock return volatility (in %)	Log 5-year excess CDS spread
	(3)	(4)	(5)	(6)
Post × Treated	-0.377*	-11.017	1.560	0.279***
	(-2.04)	(-1.02)	(0.27)	(4.09)
Bank fixed effects	X	X	X	X
Country-year fixed effects	X	X	X	X
# Banks	30	30	30	17
Mean(y)	0.025	-7.243	35.859	0.997
S.D.(y)	1.048	44.317	18.717	0.738
R^2	0.791	0.770	0.817	0.964
N	189	189	189	111

Panel D: Systemic and market risk

Dependent variable:	Systemic risk			Market risk	
	SRISK%	LRMES	ΔCoVaR	Beta	Corr.
	(1)	(2)	(3))	(4)	(5)
Post × Treated	0.435***	2.480	-0.284	0.078	0.051
	(6.33)	(1.19)	(-0.13)	(0.87)	(1.10)
Bank fixed effects	X	X	X	X	X
Country-year fixed effects		X	X	X	X
# Banks	30	30	23	30	30
Mean(y)	2.321	50.854	23.099	1.433	0.472
S.D.(y)	2.505	10.201	10.025	0.413	0.114
R^2	0.973	0.844	0.899	0.829	0.895
N	189	189	143	189	189

Halle Institute for Economic Research –
Member of the Leibniz Association

Kleine Maerkerstrasse 8

D-06108 Halle (Saale), Germany

Postal Adress: P.O. Box 11 03 61

D-06017 Halle (Saale), Germany

Tel +49 345 7753 60

Fax +49 345 7753 820

www.iwh-halle.de

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