The Effect of Unlimiting Bankers' Incentive Pay on Bank's Risk Profile and Value

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Abstract

How does allowing banks to offer higher incentive compensation affect bank risk and shareholder value? We address this question using UK's recent banker pay deregulation, which removed major restrictions on variable pay imposed earlier by the EU that were binding for UK banks. Contrary to policymakers' fears, UK banks do not experience any increase in tail risk following the pay deregulation, but there is an increase in their systematic risk and leverage. Surprisingly, the pay deregulation does not have a positive effect on the equity value of UK banks, which we attribute to intensified labor competition for banker talent. Using hand-collected remuneration data, we document a significant increase in the per-person remuneration of senior managers at UK banks, driven by an increase in their variable pay even as fixed pay remains unchanged. Our results highlight the unintended labor market effects of regulating bankers' pay.

Keywords: Bonus cap, bank risk, equity value, labor market competition

JEL Codes: G21, G28, G32, J30, J33

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1 Introduction

"*Decisions about pay are a matter for shareholders and not politicians.*"- British Bankers Association. (Vander Weyer, 2014)

"*Let's not have a short memory! We all saw during the crisis that the risks of financial instability were ultimately borne by taxpayers – not only in the UK. We saw for instance that remuneration of bankers set the wrong incentives and allowed excessive risk-taking.*"- Michel Barnier, European Union's Chief Brexit Negotiator. (Barnier, 2018)

"*"These changes are good for banks, but not for bankers" said one senior dealmaker at a European bank. "Our people don't want compensation to change — fixed allowances have been good to us.""* (Clark, 2024)

There is a robust debate among policymakers on whether to impose restrictions on the incentive pay of bankers. Proponents of such restrictions point to the great financial crisis, and argue that high-powered compensation packages incentivize top executives and traders in banking institutions to take on tail risks that may enhance performance in the short run but can cause significant damage to the institution when such risks materialize (Rajan, 2005; Kashyap et al., 2008). These concerns led to regulations on bankers' incentive pay, such as the 2013 Capital Requirements Directive (CRD) IV "bonus cap" regulation in the EU which required that the maximum variable-to-fixed compensation ratio at EU banks should not exceed 100% (or 200%, subject to shareholder approval), and less draconian regulations in the US.[1] On the other hand, opponents argue that the restrictions on incentive pay make it harder for banks to attract high-quality executives and traders, thus hurting bank value.

We note that there is no empirical evidence that pay restrictions are either necessary or sufficient to curtail bank risk, or that repealing the restrictions will improve bank value.

[1]See Section 956 of the Dodd-Frank Act, which addresses "*incentive-based compensation arrangements offered by 'covered financial institutions'*" and would "*prohibit incentive-based compensation arrangements for 'covered persons' that would encourage inappropriate risks by providing 'excessive' compensation.*" See https://www.fdic.gov/news/board-matters/2011/2011memo2.pdf.

Examining the causal effect of incentive pay on bank risk and value is challenging due to omitted variable bias, and the existing literature (which we review in detail in Section 2) finds no conclusive evidence that increase in banker pay convexity *leads to* greater risk. Tighter banking regulations introduced by the Basel III accords also limit the risk-taking by bank executives and traders. Moreover, theories of labor market competition for banker talent (e.g., Thanassoulis, 2012; Acharya et al., 2016) highlight unintended consequences of regulating incentive-based compensation, and cast doubt on the idea that it will lead to lower risk. Does allowing banks to offer higher incentive compensation lead to higher risk? What is the effect on shareholder value? These are the questions we address in this paper.

We use a recent deregulation of banker compensation in the UK to identify the causal effect of bankers' incentive pay on bank's risk and shareholder value; and also to evaluate whether government regulations on banker compensation are effective in curtailing bank risk. On October 24, 2023, UK financial regulators announced that UK banks will not be subject to the EU's bonus cap regulation starting on October 31, 2023 (see Section 3 for details). We use unique hand-collected data on banker remuneration to show that EU's bonus cap rule led to a sharp drop in the variable-to-fixed ratio of compensation for not only C-suite executives (also see Colonnello et al., 2023; Kleymenova and Tuna, 2021) but also non-C-suite material risk takers at UK banks in 2014. Therefore, the recent bonus cap removal significantly expands the compensation contracting space of UK banks. It is widely expected that UK banks will respond to the bonus cap removal by significantly increasing their reliance on variable compensation;[2] and we use recently disclosed UK banker remuneration reports for 2024 to show that there was an uptick in the variable-to-fixed pay ratio right after removal of the cap. Hence, we employ a quasi-natural experiment framework, using UK's bonus cap removal as an exogenous and positive shock to the variable compensation of UK bankers, to study the effect of increase in variable compensation on bank risk and value.

[2]For example, as per a Reuters report in August 2024, an internal memo at the Barclays bank stipulated that: "*The lender's senior bankers will now be able to earn payouts of up to 10 times their base salary, up from a two-to-one ratio previously imposed by the European Union back in 2014 when the UK was a member.*" (White, 2024)

We use a difference-in-differences (DiD) framework, estimated on a bank-quarter panel, to examine changes in bank risk and value of UK banks (the "treated" sample) relative to EU banks (the "control" sample) following the announcements of UK's bonus cap removal policy. We consider the effects of two significant announcement events (see Section 3 for details): the first event was in 2022Q3 when the UK Chancellor announced the government's intention to repeal the banker bonus cap; and the second event was in 2023Q4 when the UK financial regulators formally announced the repeal of the banker bonus cap. We consider both these event dates because we expect the market to price the risk and return implications of change in banker compensation structure when the government first announces its intention to repeal the bonus cap, as well when the policy formally comes into effect. We use the EU banks as control banks because they will continue to be subject to EU's bonus cap.

Contrary to the fears expressed by policymakers, we find no evidence of a significant increase in credit risk or tail risk of UK banks relative to EU banks following UK's bonus cap removal. We establish this using several different measures of risk: CDS spreads of different maturities; measures of tail/downside risk, such as expected shortfall and value-at-risk; total stock volatility and idiosyncratic volatility. One potential explanation for this (non-)result is that banking regulation has been tightened significantly in response to the great financial crisis, which limits risk-taking by bank executives and traders. For example, Basel III accords increased bank capital requirements, introduced new liquidity standards, and tightened risk supervision.

Interestingly, we find a significant increase in the systematic risk (i.e., *beta*) of UK banks relative to EU banks following the announcements of UK's bonus cap removal. The economic magnitude of the effect is large: the *beta* of UK banks increases by about 0.22 after each event, representing a 16% increase relative to the sample mean. This result is consistent with the notion of differential risk-taking incentives associated with variable pay, particularly the use of stock options (Armstrong and Vashishtha, 2012). The idea being that increase in pay convexity provides risk-averse managers with an incentive to increase systematic risk

rather than idiosyncratic risk (Armstrong and Vashishtha, 2012), because managers can hedge the increase in systematic risk by trading the market portfolio (Tian, 2004; Duan and Wei, 2005) but cannot hedge idiosyncratic risk (Carpenter, 1998, 2000). Our evidence is consistent with these arguments, as we observe a quick and sharp increase in UK bank's systematic risk following the removal of the cap, but no significant variation in idiosyncratic risk. Consistent with the increase in systematic risk, we also find that UK banks significantly increase their leverage relative to EU banks after the bonus cap goes into effect.

The critics of EU's bonus cap policy in UK argued that restrictions on incentive pay make it harder for UK banks to attract high-quality executives and traders, thus hurting bank values and making London less attractive to global banks. As per the arguments of these critics– which were crucial to UK's bonus cap removal policy– we would expect an increase in the equity values of UK banks following the repeal of the bonus cap policy, because UK banks now have more flexibility in designing compensation contracts to incentivize and attract high-quality bankers. Surprisingly, however, we find that the announcements of UK's bonus cap removal have no significant effect on the equity value of UK banks relative to EU banks. If anything, there is a short-lived decrease in the Sharpe ratio of UK banks relative to EU banks after the removal of the bonus cap.

The lack of a positive effect on equity value of UK banks suggests that the repeal of the bonus cap has some countervailing negative effect on UK banks which negates the benefits of greater flexibility in compensation contracting. One possibility, based on the theoretical framework of Thanassoulis (2012), is that the bonus cap removal is expected to intensify the competition for banker talent in the UK, thus imposing a negative externality on all UK banks. Thanassoulis argues that competition by banks for banker talent drives up banker remuneration and generates a negative externality that drives up rival banks' default risk (also see Bijlsma et al., 2018). This externality can be economically significant because total remuneration costs accounts for a significant share of banks' shareholder equity.[3] In a

[3]For instance, Thanassoulis notes that in about 10% of cases, the remuneration bill was worth more than 80% of the bank's equity capital.

related vein, Acharya et al. (2016) argue that intense competition for banker talent drives up the incentive compensation for bankers (also see Bénabou and Tirole, 2016) and makes it easy for them to leave their current banks before the long-term risks associated with their strategies materialize, which in turn, makes it harder for banks to observe the true quality or "alpha" of their employees. Therefore, bonus caps may actually benefit banks by lowering the intensity of labor market competition among banks; and conversely, removal of bonus caps can hurt banks by re-intensifying the competition for banker talent.

To test these theoretical arguments about the negative externalities imposed by labor market competition among banks, we examine how the level and composition of banker pay in UK changes after the bonus cap removal. A novel aspect of our analysis is that we hand-collect information on the compensation structure of material risk takers (MRTs) of UK and EU banks for both senior management positions and non-senior management positions. Thus, we can separately examine the effects of UK's bonus cap removal policy on the compensation packages of senior managers and non-senior managers. Because the UK bonus cap removal went into effect in late 2023, we only have compensation data for one year (i.e., 2024) after this policy went into effect. Despite this short treatment period, we find some strong effects of UK's bonus cap removal policy on the compensation of UK bankers.

We show that the *total compensation per person* at the senior management level increases by about 17% in 2024 (i.e., the year after the bonus cap removal went into effect) at UK banks compared to EU banks, which is consistent with the prediction in Thanassoulis (2012). This effect is driven by a large increase in the variable pay of senior management at UK banks, whereas there is no significant change in their fixed pay. Overall, there is a significant increase in the variable-to-fixed ratio of the compensation of senior managers at UK banks in 2024 relative to those of EU banks, which is consistent with the prediction of Acharya et al. (2016) that intense competition for banker talent drives up the incentive compensation for bankers. In contrast, in case of MRTs in non-senior management positions, we find that although there is some evidence of increase in variable compensation per person at UK banks

compared to EU banks in 2024, these effects are not statistically significant and are smaller in magnitude compared to the effects for senior managers. These contrasting results may arise if compensation of senior managers is adjusted quickly compared to those of non-senior managers. Thus, the lack of a significant effect for non-senior managers can be due to the fact that we have only one year of compensation data after the cap removal.

It is possible that the raise in compensation can be due to top executives being entrenched and thus using the cap removal as a way to increase their *total* compensation. The fact that the fixed pay component does not go down would be consistent with this argument. Some recent media articles allude to this concern (e.g., see Martin, 2024). However, we observe the effect across a significant number of employees beyond the top 5 executives (on average there are 50 senior managers per UK bank in our sample), which make it unlikely that the effect is fully driven by top managerial entrenchment arguments. Indeed, the fact that a significant portion of employees obtains greater compensation can more easily explain the fact that bank value did not increase due to increased total labor costs.

In summary, the two main takeaways from our analysis are as follows. First, in the presence of stringent banking regulations, increase in pay convexity of bankers may not have a significant effect on bank left-tail risk, but can still incentivize managers to increase bank systematic risk, highlighting the importance of considering differential risk-taking incentive effects. Second, regulatory interventions in bankers' pay can have unintended effects on the labor market competition for banker talent and equity value of banks, as predicted by Thanassoulis (2012). Restrictions on incentive pay benefit banks by limiting labor market competition among banks, and this may counteract the adverse effects arising from the restrictions on the compensation contracting space. Therefore, repeal of restrictions on incentive pay does not automatically result in increase in bank equity value. To our knowledge, we are the first to empirically examine these labor market effects of regulatory interventions in bankers' pay.

2 Related Literature

Our paper is closely related to Colonnello et al. (2023) who examine the effects of the imposition of EU's bonus cap policy in 2014 (when UK was part of the EU). Among other things, they also examine how this policy affected the risk of EU banks ("treated" sample) compared to that of US banks which were unaffected by this policy ("control" banks). An important difference is that while Colonnello et al. (2023) focus on changes in executive compensation following EU's bonus cap policy, we use unique hand-collected data to examine the changes in compensation of all material risk takers following UK's bonus cap removal. This is important for two reasons. First, as we show below in Figure 1, EU's bonus cap policy was not a binding constraint for EU banks outside of the UK in 2014; and hence, this policy is unlikely to have had a significant effect on the risk-taking incentives of EU bankers outside of the UK. Second, given the intense competition for talent and high labor costs, it is possible that banks use more high-powered compensation contracts for traders compared to C-suite executives. Therefore, as Colonnello et al. (2023) acknowledge, measures of pay convexity based on the CEO's compensation may not reflect the risk-taking incentives of key risk takers within the bank.

We believe that UK's bonus cap removal is a relatively cleaner setting compared to the EU's bonus cap implementation to study the effects of banker compensation on bank risk. First, unlike for non-UK banks, EU's bonus cap policy was a highly binding constraint for UK banks in 2014. Hence, UK's bonus cap removal policy is a positive shock to the variable compensation of UK's bankers. Second, both US and EU banks were subject to other confounding shocks around 2014, which make it hard to isolate the effects of the EU bonus cap policy on bank risk. US banks were subject to a series of major regulatory changes implemented during the 2011–2015 period which were aimed at lowering bank risk,[4] whereas

[4] Buchak et al. (2018) discuss these regulatory shock in detail: tightening of risk-weighted capital requirements under Basel III; mortgage-related lawsuits pertaining to banks' conduct during the financial crisis; and closure of the Office of Thrift Supervision (OTS) which had the reputation of being a lax regulator. Next, the 2013 Supervisory Guidance on Leveraged Lending (GLL) and the subsequent 2014 FAQ notice, which clarified expectations on the GLL, had a negative effect on speculative-grade term-loan origination by

EU banks were still feeling the after-effects of the Eurozone debt crisis during this period. Possibly because of these confounding shocks, Colonnello et al. (2023) find that EU banks actually experience an *increase* in CDS spread, systemic risk, and systematic risk compared to US banks after the imposition of the bonus cap.

Some of our findings are also related to those presented in Kleymenova and Tuna (2021), who study the effects of the UK Remuneration Code implemented in 2010, shortly after the financial crisis. The Remuneration Code is UK's domestic legislation of the remuneration provisions in CRD III, which regulated some aspects of the compensation contract, such as requiring that a portion of bonuses must be deferred for at least 3 years. Kleymenova and Tuna (2021) find mixed evidence. While UK banks' contribution to systemic risk decreases after the code relative to other UK firms, the effect does not hold when compared to EU or US banks. The mixed results could be due to the fact that world-wide regulations in the banking sector were happening during that time, such as the adoption of the Capital Requirement Directives (CRD) in the EU in 2010.

Our paper is also related to several other strands of literature. Several papers have examined the relation between banker compensation structure and bank risk, but have found mixed evidence. On the one hand, Fahlenbrach and Stulz (2011) fail to find evidence that CEO incentives for short-termism impacted bank performance during the financial crisis. Similarly, Erel et al. (2014) conclude that CEO incentives were unrelated to bank holdings of highly-rated mortgage-backed securities which were at the heart of the financial crisis. On the other hand, DeYoung et al. (2013) find a strong positive link between the risk-taking incentives of large US bank CEOs (as measured by their vega and delta) and ex-post risks of these institutions. Similarly, Kolasinski and Yang (2018) find that US financial institutions whose CEOs had more short-term incentives (i.e., those who could cash out their stock and option grants sooner) had more subprime exposure, a higher probability of financial distress,

banks (Calem et al., 2020). The Comprehensive Capital Analysis and Review (CCAR) stress tests of 2011 and 2012 also had a significant negative effect on the provision of mortgage credit by US banks in subsequent years (see Calem et al., 2020; Gete and Zecchetto, 2024).

and lower risk-adjusted stock returns during the crisis, as well as higher fines and settlements for subprime-related fraud.

While the extant literature generally highlights the incentive effects of banker variable pay and potential adverse implications for bank risk, some studies highlight that variable pay can contribute to optimal risk sharing between bank shareholders and employees and, thereby, improve bank resilience against financial shocks because variable pay partially absorbs the effect of negative shocks (see Thanassoulis, 2012; Bijlsma et al., 2018, for theoretical arguments). The implication of this theory is that the effect of banker variable pay on bank risk is not clear cut. Efing et al. (2023) provide empirical support for this view of variable pay as a risk sharing contract.

Our paper is also related to the wider (i.e., outside of the financial sector) literature on the effects of CEO compensation design on firm risk. We note that theory has ambiguous predictions regarding the effect of option compensation on firm risk (e.g., see Carpenter, 2000). Moreover, omitted variable bias is a serious concern in this setting because executive compensation design is endogenous, and the literature show that a firm's risk profile itself affects compensation design (e.g., see Gormley et al., 2013; De Angelis et al., 2017).

To overcome these challenges, researchers have designed various ways to capture exogenous variations in compensation design. For example, Coles et al. (2006) estimate simultaneous equation models and find that convexity in pay for performance relation (vega), a measure of risk-taking incentives often linked to option pay, is associated with riskier corporate policies. Armstrong and Vashishtha (2012) use an instrumental variable approach with cash reserves, tax-loss carry-forward, ROA and stock returns as instruments for CEO equity incentives, and find evidence that vega incentivizes managers to increase firm's systematic risk (but not idiosyncratic risk). Our results, using a shock to the contracting space that captures exogenous variations in pay convexity, are consistent with their findings.

More recently, researchers have used the stock option expense regulation as a negative shock to the use of stock options. The overall evidence using that shock is mixed. While

some of the evidence indicates that a decline in option pay leads management to reduce risk, such as by decreasing leverage (Chava and Purnanandam, 2010), increasing corporate hedging intensity (Bakke et al., 2016), and shifting corporate activities to safer segments (Carline et al., 2023), Hayes et al. (2012) fail to find that the decline in option usage leads to less risky corporate policies. Finally, Shue and Townsend (2017) use variations in the timing of multiyear compensation plans to capture large variations in new at-the-money options grants. They finds that an increase in stock option grant is associated with an increase in equity volatility, and that the increased risk is driven for the most part by an increase in leverage. Given the stringent recent banking regulations, it is unclear whether bank executives could activate that lever nowadays.

3 Institutional Background

3.1 Banker Compensation Regulation in the EU

Given the widely prevalent view that high-powered compensation packages at banks encouraging excessive risk-taking and contributed to the financial crisis of 2008–09, regulators and policymakers around the world have proposed new restrictions on banker compensation structure. In particular, the EU's Capital Requirement Directives (CRD) III introduced many rules on the bankers' compensation package in order to prevent excessive risk-taking. The final rules were laid down in the Directive 2010/76/EU, which was published in December 2010 and became effective as of January 2011.[5] The regulation prescribes minimum levels of deferral and equity grants for identified staff at significant institutions, designed to link bankers' incentives more closely with long-term bank performance and favor prudent risk-taking. At least 50% of any variable remuneration should be in shares, share-linked in-

[5]The text of CRD III Directive 2010/76/EU is available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32010L0076.

struments, or equivalent non-cash instruments. At least 40% of variable compensation must be deferred for at least three years.

CRD III was further updated to CRD IV, which was introduced in 2013 and became binding in January 2014.[6] CRD IV complements the compensation provisions in CRD III with the so-called bankers' bonus cap, which limit the ratio of variable-to-fixed compensation at 100%, or 200% if the shareholders agree. These compensation regulations apply to all so-called material risk takers (MRTs), namely senior managers, internal supervisors, but also those lower-rank employees that can substantially alter the bank's risk profile with their choices (e.g., selected traders). The detailed qualitative and quantitative criteria of MRTs are further set out in Regulation (EU) No. 604/2014.[7]

3.2 Banker Compensation Regulation in the UK

The UK was part of the EU when CRD III and IV came into force. Accordingly, the UK enacted its Remuneration Code in late 2010 to be in compliance with CRD III, and this was revised in January 2014 to incorporate the changes introduced by CRD IV, most notably, the banker bonus cap. However, prominent members of the UK's governing Conservative party broadly opposed the bonus cap, arguing that it would make it harder for UK banks to attract skilled bankers, who would instead flee to rival hubs in New York, Singapore or Zurich. After CRD IV was published in September 2013 but before it came into force, the UK submitted six pleas before the Court of Justice of the European Union (CJEU), challenging the legality of the banker bonus cap (Case C-507/13). All the six pleas were dismissed by the CJEU in November 2014.

After Brexit in January 2020, the legal barrier for the UK to remove the bonus cap was significantly reduced. Despite this, removing the banker bonus cap was considered politically unpopular amidst a cost-of-living crisis in the UK. Indeed, on June 23, 2022,

[6]Text of CRD IV (Directive 2013/36/EU) is available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013L0036.

[7]Text of Regulation (EU) No 604/2014: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R0604.

UK's Prime Minister, Boris Johnson, ruled out lifting caps on banker bonuses.[8] However, the next government under Prime Minister Liz Truss soon reversed this stance a few months later. On September 14, 2022, in a significant announcement, the Financial Times reported that chancellor Kwasi Kwarteng was considering removing the banker bonus cap as part of a post-Brexit shake-up of rules to make London a more attractive place for global banks to do business. The government's desire to remove the banker bonus cap was announced by the chancellor to the UK Parliament as part of the "Growth Plan 2022" speech on September 23, 2022.[9] After a long process of consultations, the two UK financial regulators, the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA), formally announced the removal of the bonus cap on October 24, 2023; and the policy came into force a week later on October 31, 2023.[10]

We must note that the announcements pertaining to the banker bonus cap removal occurred during a period of political and financial turmoil in the UK and other confounding events in the EU. For instance, the Boris Johnson announcement was preceded by announcements of significant policy changes by the European Central Bank (ECB) which was trying to combat fears of a Eurozone debt crisis. Similarly, the "Growth Plan 2022" speech (also known as the "mini budget") delivered by the UK chancellor on September 23, 2022 – which also mentioned the government's desire to remove the banker bonus cap — triggered market instability in the UK and ultimately led to the ouster of the Prime Minister, Liz Truss, after a loss of confidence within her party. Finally, on October 23, 2022 (i.e., the day on which the bonus cap removal was announced), Barclays released its 2023 Q3 financial results that indicated poor performance in corporate and investment sector, and experienced a share price decline of about 6% on that day.

[8]See https://www.reuters.com/world/uk/uks-boris-johnson-rules-out-lifting-curbs-banker-bonuses-2022-06-23/.

[9]The Financial Times report is available at https://www.ft.com/content/e5dac84e-dabf-4408-8d65-1db0ecc315c3. The full text of the Growth Plan 2022 speech is available at https://www.gov.uk/government/speeches/the-growth-plan-2022-speech.

[10]PRA PS 9/23 FCA PS 23/15: https://www.bankofengland.co.uk/prudential-regulation/publication/2023/october/remuneration-ratio-between-fixed-and-variable-components-of-total-remuneration

3.3 Banker Compensation Disclosure Requirements

CRD III also proposed compensation disclosure requirements whereby EU banks would be required to disclose detailed information on the compensation of MRTs on an annual basis. As per these proposals, banks are required to report aggregate quantitative information on remuneration, broken down by business area and by different categories of MRTs (i.e., senior managers vs. others). For each category, banks are required to report the number of employees and total remuneration, split into fixed and variable remuneration; and the variable remuneration is further split into cash bonus, shares, share-linked instruments, and other types. Banks are also required to disclose the amounts of deferred remuneration, new sign-on, and severance payments.

Because of variation in domestic legislation across member countries in incorporating the provisions of CRD III into their remuneration codes, the compensation disclosure requirements did not come into effect immediately. In 2013, the EU published Capital Requirements Regulations (CRR) along with CRD IV, which contained compensation disclosure requirements in Article 450, and came into effect in 2014 (along with CRD IV).[11] However, the CRR did not provide detailed specifications on the format and content of compensation disclosures, which allowed EU banks to adjust the format and content of their disclosures based on their business activities and domestic legal requirements. This issue is mainly reflected in the different classification criteria for business areas and the categories of MRTs across banks.

The format and content of compensation disclosure were not standardized until 2021, when the European Commission published Regulation (EU) 2021/637 laying down the standards of the disclosure required under CRR.[12] Therefore, we have detailed information on the remuneration of MRTs at EU banks on annual basis starting in 2021. Although the UK

[11] The text of CRR (Regulation (EU) No 575/2013) ia available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R0575.

[12] The text of Regulation (EU) 2021/637 ia available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32021R0637. The format and content of compensation disclosure for MRTs are specified in Template EU REM1-REM5 in Annex XXXIII.

exited EU before 2021, UK banks continue to adhere to the disclosure standards set up in Regulation (EU) 2021/637.

4 Data and Empirical Methodology

4.1 Data Sources

Identifying UK and EU banks: UK banks are regulated by the Prudential Regulation Authority (PRA). Therefore, we use the list of PRA-regulated institutions to identify UK banks. To be as comprehensive as possible, and to be consistent with the sampling methodologies employed by recent studies of UK and EU banks (e.g., Kleymenova and Tuna, 2021), we also include building societies, a special form of credit institutions, in the list of UK banks. We use the 2022 NAICS codes to identify EU banks. Specifically, we identify all EU institutions with NAICS codes starting with 522 ("Credit Intermediation and Related Activities") or the code 551111 ("Bank Holding Companies").

CDS spreads and stock returns: We obtain data on bank daily CDS spreads from Markit. We use the 5-year CDS spread as the main measure of bank risk but also examine CDS spreads for other maturities: 1 year, 3 years, 7 years and 10 years. Henceforth, we refer to the sample of UK and EU banks for which we are able to find CDS spread data on Markit as the "CDS sample." Please see the Appendix for a detailed list of banks in the CDS sample.

We obtain daily stock returns of UK and EU banks from Bloomberg. Henceforth, we refer to the sample of UK and EU banks for which we are able to find stock return information as the "stock return sample." The stock return sample is significantly smaller than the CDS sample because the latter also includes many private banks which do not trade on the stock market.

Banker compensation data: As we noted in Section 3.3, the CRD III regulation, which was published in 2011, requires UK banks and EU banks to disclose the remuneration information of material risk-taker (MRT) employees every year. The information must be disclosed in one of the following documents: the annual report, the Pillar 3 report[13], or an individual remuneration report. We use these regulatory disclosures to hand-collect detailed information on the remuneration structure of MRT employees. Given the effort involved in hand-collection, we collect this information for only the banks in our CDS sample.

To hand-collect information on MRT remuneration, we first review all the corporate filings and regulatory filings from 2011 to 2024 of all banks in CDS sample, and scrape the sections on the remuneration report for MRTs. In case of banks where both the parent and subsidiaries have issued CDS contracts, the remuneration report is only available for the parent bank. Next, we collect information on the number of MRTs, the total fixed remuneration, the total variable remuneration, and the breakdown of detailed remuneration components if available. We are able to find the MRT remuneration data for most banks in our CDS sample, although there are a few missing bank-year observations. Moreover, not all banks have disclosed their 2024 reports as of the writing of this draft.

As discussed in Section 3, the format and content of the remuneration of MRTs were not standardized until 2021. Prior to that, the classification of different categories of MRTs varied across banks. In order to standardize the data, we reclassify the data before 2021 according to the disclosure standards outlined in Regulation (EU) 2021/637. Regulation (EU) 2021/637 classifies MRTs into four categories: Management Body (MB), Supervisory function, MB Management function, other senior management and other identified staff.[14] Following the criteria provided in Regulation (EU) 2021/637, we classify executive directors as MB Management function; non-executive directors as MB Supervisory function; senior

[13]Basel 3 consists of three main pillars: minimum capital requirements (Pillar 1), supervisory review (Pillar 2) and market discipline (Pillar 3). Pillar 3 promotes market discipline through prescribed public disclosures for banks. Pillar 3 report is the disclosure of key information on capital structure, risk-weighted assets (RWAs), credit risk, market risk, operational risk, leverage ratio, liquidity metrics, and remuneration policies.

[14]See Annex XXXIV of Regulation (EU) 2021/637 for the definitions and criteria of the four categories.

managers who are not in the board (heads of specific business areas) as other senior management; and all other MRTs as other identified staff. We further simplify these four categories into two groups: MB Management function, MB Supervisory function, and other senior management are classified as Senior Management, other identified staff is Non-senior Management. For the aggregate amount of remuneration and the number of employees, we get the data from annual reports.

The banker compensation data is annual based and the data period is 2011 - 2024. One should note that there are several entities in our CDS sample that belong to the same banking group (for example, Barclays Bank plc and Barclays plc). We only include the consolidated compensation data of the parent because it includes all the subsidiaries. Therefore, the sample for the compensation data includes all the unique parent banks of banks in the CDS sample.

Bank fundamental data: We obtain the key fundamental data of banks from Capital IQ, including total assets, total liabilities, Tier 1 capital ratio, ROA, and ROE. The fundamental data is quarterly based and the data period is 2021Q1 - 2024Q4. Same with the banker compensation data, the bank fundamental data is also based on parent level.

4.2 Empirical Methodology

Our empirical strategy is based on the idea that UK's bonus cap removal is an exogenous and positive shock to the variable compensation of UK banks (the "treated" sample), but has no direct effect on the compensation of EU banks (the "control" sample) which are still subject to the EU's bonus cap policy. As noted in Section 3, all the announcements by the UK government pertaining to the banker bonus cap removal occurred during a period of political and financial turmoil in the UK and other confounding events in the EU. Because of these confounding effects, we cannot undertake short-term event studies around these

announcement dates. Instead, we will examine the longer-term effects of these policy changes on the risk metrics and equity value of UK banks relative to EU banks.

We recall the following important dates from Section 3. The UK government's desire to repeal the banker bonus cap was first announced on September 22, 2002, that is, in *2022Q3* (henceforth "first announcement"). The repeal of the UK bonus cap removal was formally announced on October 23, 2023, that is, *2023Q4* (henceforth, "second announcement"), and became effective shortly thereafter. Market prices should reflect the effects of the bonus cap removal when this policy can be clearly anticipated or formally announced, i.e., starting in 2022Q3. Because we have two significant announcements relating to the bonus cap removal policy, we estimate variants of the following difference-in-differences (DiD) regression to understand the differential effects of these policy announcements on bank risk and equity value of UK banks relative to EU banks:

$$y_{ic,t} = \alpha + \beta_1 \times Treat_i \times Post_1 + \beta_2 \times Treat_i \times Post_2 + \delta_i + \gamma_t + \psi \cdot X_{c,t} + \epsilon_{i,t} \qquad (1)$$

We estimate this regression on a panel dataset in which each observation corresponds to a bank-quarter combination, spans the time period from 2021Q1 to 2024Q4, and includes all UK banks and EU banks. The subscripts 'i', 'c', and 't' denote the bank, the country in which the bank is located, and the quarter, respectively. $Treat_i$ is an indicator variable to identify UK banks (the treated sample); hence, $Treat_i = 0$ identifies EU banks (the control sample). $Post_1$ is an indicator variable to identify the period between the first and second announcements; i.e., it takes the value of 1 between 2022Q3 and 2023Q3 (inclusive), and the value of 0 otherwise. $Post_2$ is an indicator variable to identify the period after the second announcement; i.e., it takes the value of 1 for 2023Q4 and beyond, and the value of 0 in other time periods. Hence, the omitted time period in regression (1) is the time period before 2022Q3 when both $Post_1$ and $Post_2$ equal 0. The regression includes bank fixed effects (δ_i), quarter fixed effects (γ_t), and control for market characteristics in the country in which the

bank is located ($X_{c,t}$). Hence, the coefficient β_1 captures the change in the outcome variable, y, of UK banks relative to EU banks after the first announcement but before the second announcement. On the other hand, the coefficient β_2 capture the change in y of UK banks relative to EU banks after the second announcement compared to the period before the first announcement.

The dependent variable $y_{i,t}$ is a measure of either risk or stock return performance for bank i over the quarter t. The risk measures we examine are as follows: $Log(CDS\ spread)$ which is the natural logarithm of the average CDS spread over the quarter, and is estimated for CDS of various maturities; *Beta* which is estimated using a market model (for UK banks, the market index is MSCI UK index; for EU banks, the market index is MSCI Europe index); $Idiosyncratic\ Risk$, which is the standard deviation of the residuals from the market model; $Return\ Volatility$, which is the standard deviation of the daily stock return over the quarter; $Expected\ Shortfall$ (or ES), which is the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over the quarter;[15] and VaR or value-at-risk, which is the negative of the 5% worst daily return of the bank's stock over a quarter. The stock performance measures we examine are: *Cumulative Return* which is obtained by compounding the daily stock returns over the quarter; *Average Return* which is the arithmetic average of the daily stock returns over the quarter multiplied by the number of trading days in that quarter; and *Sharpe Ratio* which is the ration of *Cumulative Return* to $Return\ Volatility$.

We also implement the following dynamic version of the DiD regression (1) to estimate the quarter-by-quarter treatment effects in the quarters prior to and after the first announcement:

$$y_{i,t} = \alpha + \sum_{\tau=-6,\tau\neq-1}^{\tau=9} \beta_\tau \times t_\tau \times Treat_i + \psi \cdot X_{c,t} + \delta_i + \gamma_t + \epsilon_{i,t} \tag{2}$$

[15] ES is widely used within financial firms to capture expected loss conditional on returns being less than some $\alpha-$quintile (Acharya et al., 2017)

In equation (2), t_τ for $\tau \in -6, +9$ are identifiers for quarters, where t_τ with positive (negative) values of τ identifies the quarter which comes τ quarters after (before) 2022Q3. The omitted quarter in the regression is τ_{-1}, that is, 2022Q2. Hence, the coefficient β_τ captures the change in $y_{i,t}$ for UK banks between 2022Q2 and quarter t_τ relative to EU banks. If the parallel trends assumption is met, then β_τ should equal zero for negative values of τ.

Unlike with market prices, the effects of the bonus cap removal policy on the compensation structure and financial performance of UK banks will be felt only after the policy becomes effective in 2023Q4. We use equation (2) but without controls to further examine the effects of UK's bonus cap removal on bank quarterly financial performance. Data on compensation structure is only available at the annual frequency. Therefore, we use annual variants of the DiD regression (1) and the dynamic DiD regression (2) to examine the effects of UK's bonus cap removal on banker compensation structure and bank financial performance. We estimate these regression on a bank-year panel dataset which includes UK banks and EU banks, and spans the time period from 2021 to 2024. Note that we use only the 2021–2024 data in these regressions because the compensation disclosure format was standardized only starting in 2021. As before, $Treat_i$ is an indicator variable to identify UK banks, whereas $Post$ is an indicator variable which takes the value of 1 for year 2024 (which is the only year after the UK bonus cap removal went into effect), and equals 0 for years 2021, 2022 and 2023. In the dynamic regression, t_τ with positive (negative) values of τ are indicator variables to identify years after (before) 2023.

4.3 Descriptive Statistics

Table 1 provides a breakdown of the number of UK banks (treated banks) and EU banks (control banks) in our sample for the various analyses we conduct.

[Insert Table 1 here]

The CDS sample has 16 UK banks and 48 EU banks. The stock return sample is a smaller subset of the CDS sample because some of the banks in the CDS sample are not publicly traded on the stock markets and some of the banks in the CDS sample have the same listed parent group. It contains 6 UK banks and 29 EU banks. The MRT remuneration sample is smaller than the CDS sample for two reasons. First, as we mention in Section 4.1, in case of banks where both the parent and subsidiaries have issued CDS contracts, we only have the consolidated remuneration report for the parent bank. Second, there are a few banks for which we are unable to find the remuneration disclosures. Overall, the sampling methodology and the sample sizes are broadly consistent with those in recent studies of UK and EU banks (Kleymenova and Tuna, 2021; Colonnello et al., 2023).

We report the descriptive statistics of the remuneration of different categories of MRTs in Table 2: for senior MRTs of UK and EU banks in Panels A and B, respectively; and for non-senior MRTs of UK and EU banks in Panels C and D, respectively. A comparison of Panels A and B indicates that, on average, UK banks employ fewer MRTs in senior-management roles than EU banks (50.22 vs. 107.38), but offer their senior MRTs higher remuneration per person ($2.19 million vs. $1.06 million) and a higher ratio of variable-to-fixed compensation (1.10 vs. 0.49). On the other hand, it is clear from Panels C and D that, on average, UK banks employ more MRTs in non-senior management roles than EU banks (612.04 vs. 562.02), and also offer them a higher remuneration per person ($0.89 million vs. $0.44 million) and a higher ratio of variable-to-fixed compensation (1.11 vs. 0.48). Examining the descriptive statistics on total remuneration, it is clear that UK banks have a higher remuneration bill than EU banks for senior MRTs despite the lower headcount ($84.37 million vs. $54.74 million), and a substantially higher remuneration bill for their non-senior MRTs ($568.03 million vs. $293.49 million).

[Insert Table 2 here]

In Figure 1, we plot the time-series variation in the average ratio of variable pay to fixed pay for UK and EU banks over the 2011-2024 period, separately for MRTs in senior

management and non-senior management roles. As discussed in Section 3, because the disclosure format for MRT remuneration data was not standardized until 2021, we had to reclassify the pre-2021 data to make it comparable across banks and over time.

[Insert Figure 1 here]

The average ratio of variable-to-fixed compensation for UK banks in 2011 was around 300% for non-senior MRTs and around 220% for senior management MRTs, which indicates that UK banks relied more heavily on variable compensation for MRTs in non-senior management roles. After the imposition of bonus cap in 2014, the variable-to-fixed ratio for both categories drops sharply below 100%, suggesting that the bonus cap was binding for UK banks. During the years when the bonus cap was in effect, the variable-to-fixed compensation ratio was well below 100% for non-senior MRTs and was at or below 100% for senior MRTs (the ratio was slightly over 100% in 2017 because some banks may have used a higher ratio with their shareholder approval).

In contrast, we observe that the average ratio of variable-to-fixed compensation at EU banks was well below 100% for MRTs in both senior-management roles and non-senior management roles even before the bonus cap came into effect in 2014. Therefore, it appears that the bonus cap was not binding, on average, for EU banks outside of UK.

With the limited compensation data available for 2024, we can still observe that the ratio of variable-to-fixed compensation of senior MRTs at UK banks increases sharply above 100%, but is relatively unchanged for senior MRTs at EU banks. This again indicates that the bonus cap was binding at UK banks. On the other hand, the variable-to-fixed compensation ratio for non-senior MRTs at both UK banks and EU banks remains unchanged. It is plausible that compensation contracts of higher-ranked employees react faster to the change in regulation.

We report the descriptive statistics of key bank characteristics in Table 3. Panel A is for UK banks and Panel B is for EU banks. In a later section, we also investigate the effect of the imposition of the bonus cap on bankers' compensation. Because both UK banks and

EU banks were all affected when the bonus cap was imposed, we use US banks as additional control sample for the analysis. The full list is in Appendix. Panel C reports the descriptive statistics of the remuneration and employment size of the US banks. Comparing the Panel A and Panel B, it is evident that, on average, UK banks are larger in size than EU banks, but are similar in terms of leverage, Tier 1 Ratio, ROA, and ROE. As noted above, UK banks have a higher total remuneration bill, on average, compared to EU banks, which can be fully explained by the difference in size because UK and EU banks have a similar ratio of remuneration to assets. We also note that, regardless of maturity, the CDS spreads of EU banks are, on average, higher than those of UK banks. This may be because EU banks, on average, are smaller. UK banks, however, have higher average systematic risk (i.e., *Beta*) than EU banks. On average, UK banks and EU banks appear to be similar in terms of average quarterly return, Sharpe ratio, and the stock-based risk measures (e.g., idiosyncratic volatility, return volatility, and expected shortfall).

[Insert Table 3 here]

5 Empirical Results

5.1 Effect of Bonus Cap Removal on Bank Risk

Effects on Credit Risk

We begin by examining the effect of UK's bonus cap removal on bank CDS spreads, which are a proxy for credit risk. If high-powered compensation packages incentivize bank executives and traders to take on excessive risks to enhance short-run stock performance, then we should expect an increase in CDS spreads for UK banks relative to EU banks following the announcements of the bonus cap removal policy because the market will price in the expected increase in credit risk. We examine CDS spreads of various maturities: 1, 3, 5, 7, and 10 years.

We estimate the DiD regression (1) with $Log\ (CDS\ spread)$ as dependent variable to examine the effects of the two major announcements regarding bonus cap removal on CDS spread. We present these regression results in Table 4. In each panel, the five columns correspond to five different maturities of CDS contracts.

[Insert Table 4 here]

We find that the coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ are insignificant in all the columns, which indicates that neither of the two major announcements regarding the UK's bonus cap removal policy had any significant lasting effect on the quarterly average CDS spreads of UK banks relative to EU banks. In other words, there is no measurable worsening of the market's perception of the credit risk of UK banks relative to EU banks following the announcement of UK's bonus cap removal. As noted above, a potential explanation for this (non-)result is that banking regulation has been tightened significantly in response to the great financial crisis, which limits risk-taking by bank executives and traders.

Next, we estimate the dynamic DiD regression (2) with $Log(CDS\ spread)$ as the dependent variable for CDS of various maturities, and plot the corresponding β_τ coefficients in Figure 2. Recall that the coefficient β_τ captures the change in $Log\ (CDS\ spread)$ for UK banks between 2022Q2 and the quarter t_τ relative to EU banks.

[Insert Figure 2 here]

We note that the β_τ coefficient for 2022Q4 is positive and significant in panels (a) through (c) but none of the other coefficients are significant. That is, the 1-year, 3-year, and 5-year CDS spreads of UK banks experience a significant increase after the first announcement relative to EU banks, but this effect is short-lived and dissipates after 2022Q4. In contrast, there is no significant change in the long-maturity (7- and 10-year) CDS spreads of UK banks relative to EU banks following these announcements. Overall, the plots in Figure 2 are consistent with the regression results in Table 4, and indicate that the announcements

of UK's bonus cap removal policy had no lasting effects on the market's perception of the credit risk of UK banks.

Effect on Other Risk Measures

Next, we examine the effect of the announcements of UK's bonus cap removal on stock-based measures of risk. The results of the DiD regression with these risk measures are presented in Table 5. We control these regressions for the market volatility in the respective country, which is defined as the standard deviation of the daily market return (using that country's MSCI index) over the quarter.

[Insert Table 5 here]

The dependent variable in column (1) is *Beta*, which is a measure of systematic risk. The positive and significant coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ indicate that UK banks experience a significant increase in systematic risk relative to EU banks after each of the two announcements regarding UK's bonus cap removal compared to the pre-2022Q3 period. The coefficients indicate a 0.22 increase in *Beta*, which is large compared to the average UK bank *Beta* of 1.38 in our bank-quarter panel data.

The dependent variables in columns (2) and (3) are both measures of stock return volatility. *Idiosyncratic Volatility* is the standard deviation of daily abnormal return (i.e., residual from the market model), and *Total Volatility* is the standard deviation of daily stock return over the quarter. The insignificant coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ in both these columns indicate that there is no significant change in either the idiosyncratic volatility or total volatility of UK banks relative to EU banks after the announcements regarding UK's bonus cap removal.

The dependent variables in columns (4) and (5) are measures of tail or downside risk. *ES* or expected shortfall is defined as the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over the quarter; and *VaR* or value at risk, is

the negative of the 5% worst daily return of the bank's stock over a quarter. Once again, the insignificant coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ in both these columns indicate that there is no significant change in tail risk of UK banks relative to EU banks after the announcements regarding UK's bonus cap removal.

Next, we estimate the dynamic DiD regression (2) with each of the dependent variables in Table 5, and plot the corresponding β_τ coefficients in Figure 3.

[Insert Figure 3 here]

As can be seen, the plots for all the stock-based risk measures, with the exception of idiosyncratic risk, exhibit strong and positive pre-trends prior to the first announcement of UK's bonus cap removal in 2022Q3. This may be because of the political and financial turmoil in the UK prior to 2022Q3, which we touched upon in Section 3. Therefore, although we observe some positive β_τ coefficients after 2022Q3 in panels (c) through (e), it appears that there is no significant change in these risk measures for UK banks relative EU banks compared to the pre-2022Q3 period; and this is consistent with the findings in columns (3) through (5) of Table 5.

On the other hand, in case of plot (a) for *Beta*, the positive β_τ coefficients in the post-2022Q3 period are significantly larger than the coefficients before 2022Q3. This is consistent with the result in column (1) of Table 5, which indicates that UK banks experience a significant increase in systematic risk relative to EU banks after each of the two announcements regarding UK's bonus cap removal compared to the pre-2022Q3 period.

The results in this section are consistent with the notion of differential risk-taking incentives associated with variable pay, particularly the use of stock options (Armstrong and Vashishtha, 2012) that can incentivize managers to increase firm's systematic risk (rather than idiosyncratic risk) since managers can trade the market portfolio (Tian, 2004; Duan and Wei, 2005). Consistent with these arguments, we find a quick and sharp increase in UK bank's systematic risk following the removal of the cap, but no significant variation in idiosyncratic risk (and if anything a slight decrease).

5.2 Effect of Bonus Cap Removal on Bank's Equity Values

Next, we examine the effect of UK's bonus cap removal on various measures of stock return performance of UK banks relative to EU banks. The results of these DiD regressions are presented in Table 6. We control these regressions for the cumulative market return in the respective country (using that country's MSCI index) over the quarter.

[Insert Table 6 here]

The dependent variables in columns (1) and (2) are both measures of stock return over the quarter. *Cumulative Return* is obtained by compounding the daily stock returns over the quarter, whereas *Average Return* is the arithmetic average of the daily stock returns over the quarter multiplied by the number of trading days in that quarter. In both these columns we find that the coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ are statistically insignificant. That is, neither of these announcements regarding UK's bonus cap removal has a significant effect on the stock returns of UK banks.

The dependent variable in column (3) is *Sharpe Ratio*, which is the ratio of *Cumulative Return* to the standard deviation of daily stock return over the quarter. Again, the coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ are statistically insignificant, which indicates that neither of the two announcements regarding UK's bonus cap removal has a significant effect on the Sharpe ratio of UK banks.

The corresponding dynamic DiD plots for the stock return measures are in Figure 4. As can be seen, the plots of the β_τ coefficients are broadly consistent with the regression results from Table 6. The plot in panel (c) indicates a significant drop in the Sharpe ratio of UK banks relative to EU banks in the quarter of the first announcement (i.e., 2022Q3) but this effect is short-lived and is reversed by the next quarter.

[Insert Figure 4 here]

5.3 Effect of Bonus Cap Removal on Banker Compensation

A noteworthy finding in the previous section is that the two announcements of UK's banker bonus cap removal did not have a positive effect on the equity values of UK banks. On the contrary, we find a short-lived negative effect on the Sharpe ratio of UK banks following the first announcement (see panel (c) Figure 4). This is surprising because UK's banker pay deregulation was widely expected to benefit UK banks by providing them more flexibility in design of compensation contracts and making it easier for them to attract bank executives and traders with high talent.

One potential explanation for why we do not find an increase in equity values of UK banks following the announcement of UK's bonus cap removal policy is that pay deregulation is expected to intensify labor market competition among UK banks for banker talent, and lead to increase in total compensation (Thanassoulis, 2012) and variable compensation (Acharya et al., 2016) for UK bankers. In this subsection, we test these hypotheses using our unique hand-collected remuneration data on material risk takers (MRTs) compensation at UK banks and EU banks.

We do this using a variant of the DiD regression (1) estimated on a bank-year panel dataset, which includes all UK banks and EU banks for which we have compensation information, and spans the time period from 2021 to 2024. Note that we use only the 2021 - 2024 data in these regressions because the disclosure format was not standardized until 2021 (i.e., the 2021 - 2024 data is standardized in the same way). We examine the following dependent variables ($y_{i,t}$): $Log\ Fixed(pp)$ which is log of the fixed remuneration per risk taker; $Log\ Var(pp)$ which is log of the variable remuneration per risk taker; $Log\ Total(pp)$ which is log of the total remuneration per risk taker; $Total(pp)$ which is the total remuneration per risk taker in $ million; and $Var\text{-}Fixed\ Ratio$ which is the ratio of variable remuneration to fixed remuneration. As before, $Treat_i$ is an indicator variable to identify UK banks. $Post_t$ is an indicator variable which takes the value of 1 for year 2024 (which is the only year after the UK bonus cap removal went into effect), and equals 0 for years 2021, 2022 and 2023. We

estimate these regressions separately for MRTs in senior management roles and non-senior management roles, and present the results in Table 7.

[Insert Table 7 here]

The results in Panel A indicate that, after the UK's bonus cap removal went into effect, there were significant changes in both the level and composition of the pay of MRTs at the senior management levels of UK banks relative to EU banks. Specifically, total compensation per person increased by 17% (column (3)) which translates to an increase in compensation per person of $0.592 million, on average (column (4)). The increase in total compensation per person was largely driven by a 35% increase in variable compensation per person (column (2)), whereas the fixed compensation per person did not change significantly (column (1)). Overall, there is a 26.2% increase in the variable-to-fixed ratio of compensation in 2024 for senior managers in UK banks relative to their EU counterparts.

In the case of MRTs in non-senior management positions (see Panel B), we find that although there is some evidence of increase in variable compensation per person at UK banks compared to EU banks in 2024, these effects are not statistically significant and are smaller in magnitude compared to the effects for senior managers. As mentioned earlier, these contrasting results may arise if compensation of senior managers is adjusted quickly compared to those of non-senior managers. It is possible, thus, that because we have compensation data for only one year after UK's bonus cap removal, we find significant effects only for senior managers.

Next, we estimate a variant of the dynamic DiD regression (2) on our bank-year panel dataset to estimate the year-by-year treatment effects on compensation structure in the years prior to and after the announcement of UK's bonus cap removal. We do this only for MRTs at senior management levels, because we showed above that there is no significant effect of UK's bonus cap removal on the compensation structure of MRTs in non-senior management positions in the year 2024. We estimate the dynamic DiD regression using all the dependent variables ($y_{i,t}$) in Panel A of Table 7, and plot the corresponding β_τ coefficients in Figure 5.

The results in Figure 5 are broadly consistent with those in Panel A of Table 7, and point to an increase in the variable compensation per person, total compensation per person, and the ratio of variable pay to fixed pay for senior managers at UK banks relative EU banks in the year after UK's bonus cap removal. Moreover, the β_τ coefficients for years $\tau \in -2, -1$ are statistically insignificant for all $y_{i,t}$, which suggests that the parallel trends assumption is satisfied across all these tests.

[Insert Figure 5 here]

Overall, our results are consistent with the predictions in Thanassoulis (2012) and Acharya et al. (2016). Total compensation and variable compensation decrease following the bonus cap removal, while fix pay does not change. These effects would increase the remuneration bill for UK banks, which can explain the lack of increase in equity value.

5.4 Effect of EU's Bonus Cap Policy on Banker Compensation

An important caveat with the analysis in Section 5.3 is that we only have compensation data for one year after UK's bonus cap removal went into effect; and, to date, not all banks have disclosed their 2024 compensation data. Therefore, to complement the analysis of the effect of UK's bonus cap removal on banker compensation, we also study changes in banker compensation following the imposition of EU's bonus cap policy in 2014 to see if these potential changes are consistent with the theoretical predictions of Thanassoulis (2012) and Acharya et al. (2016).

We use a variant of the DiD regression (1) estimated on a bank-year panel dataset to examine the effect of EU's bonus cap policy on banker compensation. Recall that UK was part of the EU in 2014, and hence, was subject to EU's bonus cap policy. Therefore, both UK banks and EU banks are considered treated banks in these tests (identified by $Treat_i = 1$). We include all the UK banks and EU banks at parent level from the CDS sample in the treated group, and use a set of major publicly listed US banks as the control group (identified

by $Treat_i = 0$). The regression spans the time period from 2011 to 2023 (i.e., till UK's bonus cap removal), and we use the indicator variable $Post_t$ to identify years after 2014. Unfortunately, US banks are not required to disclose compensation structure of all MRTs. Hence, we can only examine the following dependent variables ($y_{i,t}$): *Log Remuneration*(*pp*) which is log of remuneration per employee; *Log Remuneration* which is log of total remuneration ; and *Log Assets*(*pp*) which is log of the ratio of total assets to number of employees. Again, note that the employees here, in the analysis presented in this subsection, represent "all" the employees of the bank, not just the MRTs, as presented in the previous subsection. We present the results of these regressions in Table 8, separately for UK banks versus US banks (Panel A) and EU banks versus US banks (Panel B).

[Insert Table 8 here]

The results in panels A and B are qualitatively similar. We find that both UK banks and EU banks experienced a significant reduction in their remuneration per employee following EU's imposition of bonus cap in 2014 (column (1)). The economic magnitude of this effects is large: compared to US banks, the remuneration per employee decreased by about 10% for UK banks and by about 19% for EU banks in the post-2014 period relative to the pre-2014 period. The total remuneration bill of UK and EU banks also fell dramatically in the post-2014 period relative to US banks (column (2)), but this was partly due to the reduction in the asset size of UK and EU banks (column (3)). The sharp drop in remuneration per employee suggests that the EU bonus cap policy improved the bargaining power of EU banks (including UK banks) in the labor market for banker talent. Logically, therefore, we should expect the UK bonus cap removal to weaken the bargaining power of UK banks in the labor market for banker talent and lead to increases in remuneration costs, which can explain the fact that equity values of UK banks did not increase after the bonus cap removal.

We also estimate a variant of the dynamic DiD regression (2) on our bank-year panel dataset to estimate the year-by-year treatment effects on compensation structure in the years prior to and after the EU's bonus cap policy went into effect. We plot the β_τ coefficients from

these regressions in Figure 6. The dependent variables is *Log Remuneration*(*pp*) in Panel (a) and (b), which show the effects for UK banks and EU banks (versus US banks), respectively. As can be seen, the effects on remuneration per employee took time to materialize in the UK, whereas the effects were more immediate for EU banks. The dependent variables is *Log Remuneration* in Panel (c) and (d), which show the effects for UK banks and EU banks (versus US banks), respectively. Both these figures point to a sharp drop in total remuneration for UK and EU banks relative to US banks after the imposition of EU's bonus cap policy. The dependent variables is *Log Assets*(*pp*) in Panel (e) and (f), which show the effects for UK banks and EU banks (versus US banks), respectively. Both these plots indicate a sharp drop in the ratio of assets per employee of UK and EU banks relative to US banks after the imposition of EU's bonus cap policy, which can partly explain the sharp drop in total remuneration. However, the drop in the ratio of assets to employees of UK banks is reversed by about 2020.

[Insert Figure 6 here]

Overall, these results are consistent with the ones in Section 5.3. The existence of the bonus caps helps to decrease compensation expenses for the treated banks.

5.5 Effect of Bonus Cap Removal on Bank Fundamentals

Our analysis in Section 5.3 shows that the compensation structure of senior MRTs changed significantly after the removal of bonus cap. We further investigate the potential effects of this change on bank fundamentals. We estimate the DiD regression (1) estimated on a bank-quarter panel dataset using the fundamental data of our stock return sample from 2021 to 2024. We test changes in the following five variables: *Log Assets*, *Leverage*, *Tier 1 Ratio*, *ROA*, and *ROE*, which captures key fundamentals of banks such as bank size, capital structure, risk exposure, and operating performance. The results are presented in Table 9.

[Insert Table 9 here]

Overall, we observe that UK bank size remains similar remains similar after the announcement and after the implementation of the bonus cap (see Column (1)). On the other hand, both the coefficients on $Treat \times Post_1$ and $Treat \times Post_2$ are statistically significant in Column (2), indicating that UK bank leverage increases significantly after each event. This increase in leverage can explain the increase in systematic that we observe in Table 5 and point to actions that banks can do to increase systematic risk. We note that it is perhaps surprising that leverage increases directly after the first announcement as the bonus cap is not removed yet. Yet bankers may anticipate its removal after the first announcement and may wish to increase systematic risk already. Consistent with this result, we also observe that *Tier 1 Ratio*, which is the ratio of Tier 1 Capital to risk-weighted assets, significantly increases after each event. Finally, we observe some weak evidence that both ROA and ROE decrease after the implementation of the cap removal policy. The coefficients are not statistically significant at the standard level, perhaps because of the limited time span of data after the bonus cap implementation. The increase in labor costs due to the bonus cap removal is a likely explanation for the potential decline in profitability in UK banks.

We also run dynamic DiD regressions (2) of all the dependent variables ($y_{i,t}$) of Table 9 on the bank-quarter panel dataset. We plot the corresponding β_τ coefficients in Figure 7. The results in Figure 7 are broadly consistent with those in Table 9.

[Insert Figure 7 here]

6 Conclusion

We use a recent regulatory change in the UK, which removed restrictions on banker variable pay that were earlier imposed by the EU, to identify the effect of bankers' incentive pay on bank risk and shareholder value. Hand-collecting remuneration data on all material risk takers for each UK and EU banks in our sample, we show that the bonus cap implementation and its removal were highly binding and had significant effects on banker pay.

We find that the announcement of UK's bonus cap removal does not have a significant effect on the CDS spreads and on other measures of left-tail risk of UK banks. That is, there is no measurable worsening of the market's perception of the credit risk of UK banks following the announcement of UK's bonus cap removal, which goes against the fears expressed by policymakers that increase in the pay convexity of bankers will lead to an increase in tail risk. On the other hand, the removal of the cap is associated with a significant increase in bank's market beta, suggesting that UK bank's systematic risk increased. We also observe that UK banks significantly increased their leverage. These results are consistent with the notion of differential risk-taking incentives associated with variable pay, which can incentivize managers to increase firm's systematic risk (rather than idiosyncratic risk).

Surprisingly, however, the announcement of the bonus cap removal is not associated with a positive effect on the equity value of UK banks. It is surprising that such a strong and binding constraint on the contracting space has no significant impact on firm value. Our analysis shows that a potential explanation for this muted effect on the equity value of UK banks is that the removal of the bonus cap is expected to intensify labor market competition among UK banks for banker talent. By unrestricting variable compensation, the positive effect arising from the expanded contracting space can be offset by the negative effect from more intense labor market competition among banks.

Overall, our analysis offers two main takeaways. First, in the presence of stringent banking regulations, increase in pay convexity of bankers may not have a significant effect on bank left-tail risk, but can still incentivize managers to increase bank systematic risk, highlighting the importance of considering differential risk-taking incentive effects. Second, regulatory interventions in bankers' pay can have unintended effects on the labor market competition for banker talent.

List of UK and EU banks
(all included in the CDS analysis)

Bank Name	Remuneration Sample	Stock Return Sample	2024 data
UK			
Barclays Bank plc			
Barclays plc	Yes	Yes	Yes
HSBC Bank plc			
HSBC Holdings plc	Yes	Yes	Yes
Investec Bank plc	Yes	Yes	
Bank of Scotland plc			
Lloyds Bank plc			
Lloyds Bankig Group plc	Yes	Yes	Yes
National Westminster Bank plc			
NatWest Group plc	Yes	Yes	Yes
NatWest Markets plc			
Standard Chartered Bank plc			
Standard Chartered plc	Yes	Yes	Yes
FCE Bank plc	Yes		
Nationwide Building Society	Yes		
Yorkshire Building Society	Yes		Yes
EU			
ABN AMRO Bank NV	Yes	Yes	Yes
Banca Monte dei Paschi di Siena SPA	Yes	Yes	
Banca Nazionale del Lavoro SPA			
Banco Bilbao Vizcaya Argentaria SA (BBVA)	Yes	Yes	Yes
Banco BPI SA			
Banco BPM SPA	Yes	Yes	
Banco Comercial Portugues SA	Yes	Yes	
Banco de Sabadell SA	Yes	Yes	Yes
Banco Santander SA	Yes	Yes	Yes
Bank of Ireland	Yes	Yes	
Bankinter SA	Yes	Yes	
Bayerische Landesbank	Yes		
BNP Paribas	Yes	Yes	
BNP Paribas Fortis SA/NV			
BPCE SA	Yes		
Caixa Geral de Depositos	Yes		

Continued

Bank Name	Remuneration Sample	Stock Return Sample	2024 data
CaixaBank, S.A.	Yes	Yes	
Commerzbank AG	Yes	Yes	
Cooperatieve Rabobank U.A.	Yes		Yes
Crédit Agricole	Yes	Yes	
Criteria Caixa, S.A.			
Danske Bank A/S	Yes	Yes	
Deutsche Bank AG	Yes	Yes	Yes
Dexia	Yes		
DZ Bank AG	Yes		
Erste Group Bank AG	Yes	Yes	
Hamburg Commercial Bank	Yes		
ING Bank NV			Yes
ING Groep NV	Yes	Yes	
Intesa Sanpaolo SPA	Yes	Yes	
Intrum AB	Yes	Yes	
KBC Bank NV	Yes	Yes	
Landesbank Baden-Württemberg	Yes		
Helaba (Landesbank Hessen-Thüringen)	Yes		
Mediobanca Banca di Credito Finanziario SPA	Yes	Yes	
Natixis SA			
Nexi SPA	Yes	Yes	
Norddeutsche Landesbank	Yes		
Nordea Bank Abp	Yes	Yes	Yes
Oesterreichische Kontrollbank AG	Yes		
Portigon AG	Yes		
Raiffeisen Bank International AG	Yes	Yes	
Skandinaviska Enskilda Banken AB	Yes	Yes	Yes
Societe Generale	Yes	Yes	
Svenska Handelsbanken AB	Yes	Yes	Yes
Swedbank AB	Yes	Yes	Yes
Unicredit Bank GMBH			
Unicredit SPA	Yes	Yes	Yes

List of US banks

Bank Name	Country
Ally Financial	US
American Express Company	US
Bank of America Corporation	US
Capital One Financial Corporation	US
Citi Group Inc.	US
Franklin Resources, Inc.	US
JPMorgan Chase & Co	US
KeyCorp	US
Mastercard Incorporated	US
Morgan Stanley	US
Navient Corporation	US
Charles Schwab Corporation	US
Goldman Sachs Group, INC.	US
The PNC Financial Services Group, Inc.	US
Truist Financial Corporation	US
Wells Fargo & Company	US

Definition of Variables

Variable	Definition
CDS Spreads	
1-year CDS Spread	Quarterly average of 1-year daily credit default spread for senior secured debt(in bps, 1bp = 0.01%)
3-year CDS Spread	Quarterly average of 3-year daily credit default spread for senior secured debt(in bps, 1bp = 0.01%)
5-year CDS Spread	Quarterly average of 5-year daily credit default spread for senior secured debt(in bps, 1bp = 0.01%)
7-year CDS Spread	Quarterly average of 7-year daily credit default spread for senior secured debt(in bps, 1bp = 0.01%)
10-year CDS Spread	Quarterly average of 10-year daily credit default spread for senior secured debt(in bps, 1bp = 0.01%)
Stock Market Measures	
Beta	Market Beta of the bank based on MSCI UK index (UK banks) and MSCI Europe index (EU banks)
Idiosyncratic Volatility	Standard deviation of the residuals from a market model estimated quarterly
VaR	5% Value at Risk, computed as the negative of the 5% worst daily return of the bank's stock over a quarter
ES	Expected Shortfall, the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over a quarter
Cumulative Return	Quarterly compounded return from daily stock returns
Average Return	Arithmetic average of daily stock returns over a quarter multiplies number of trading days in a quarter
Total Volatility	Standard deviation of cumulative return
Sharpe-Ratio	Ratio of Cumulative Return over Return Volatility
MRT Remuneration	
Log Fixed(pp)	Log of fixed remuneration per person for material risk takers
Log Var(pp)	Log of variable remuneration per person for material risk takers
Log Total(pp)	Log of total remuneration per person for material risk takers
Total(pp)	Total remuneration per person for material risk takers
Var-to-Fixed Ratio	The ratio of variable remuneration to fixed remuneration of material risk takers
Bank Fundamentals	
Log Assets	Log of total assets (CIQ Data Item 1007)

Continued

Variable	Definition
Leverage	The ratio of total liabilities (CIQ Data Item 1276) to total assets (CIQ Data Item 1007)
Tier 1 Ratio	The ratio of Tier 1 regulatory capital to risk weighted assets (CIQ Data Item 4292)
ROA	Return on assets (CIQ Data Item 4178), computed as (EBIT $\times$ 0.625) / ((total assets(t) + total assets(t-1)) / 2)
ROE	Return on Equity (CIQ Data Item 4128), computed as continuing operations / ((total equity(t) + total equity(t-1)) / 2)
Total Remuneration	
Log Remuneration	Log of total remuneration of all employees
Log Remuneration(pp)	Log of (total remuneration of all employees/employee number)
Log Assets(pp)	Log of (total assets/total number of employees)

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Table 1: Sample Summary

The table provides an overview of the samples used in our analysis. Panel A reports the multiple samples that we use for the analysis of the removal of bonus cap. The observations in CDS sample are bank entities that have issued CDS contracts. The observations in stock return sample are listed bodies. For banks where both the parent and subsidiaries have issued CDS contracts, both entities are included in the CDS sample, but only the parent is kept in the stock return sample. We construct our MRT (material risk taker) remuneration sample based on the CDS sample. We collect the MRT remuneration data for all banks in CDS sample with a few unavailable. For banks where both the parent and subsidiaries have issued CDS contracts, we only keep the parent in the MRT remuneration sample because the remuneration data for the parent is consolidated which already incorporates the data of its subsidiaries. Panel B reports the sample we use for the analysis of the imposition of bonus cap. The treated group comprises all UK and EU banks at the parent level drawn from the CDS sample, while the control group consists of a set of major publicly listed US banks. The detailed lists of banks is provided in the Appendix.

Panel A: Bonus Cap Removal Analysis

Group	CDS Sample	Stock Return Sample	MRT Remuneration Sample
UK Banks (Treated)	16	6	8
EU Banks (Control)	48	29	34
Total	64	35	42

Panel B: Bonus Cap Implementation Analysis

Group	Total Remuneration Sample
UK Banks (Treated)	9
EU Banks (Treated)	41
US Banks (Control)	16
Total	66

Table 2: Summary of Remuneration of MRTs

The table reports the descriptive statistics of the remuneration of different categories of material risk takers (MRTs). The sample period is 2011 - 2024. The 2024 data is currently only available for a subset of the sample (see Appendix). Panel A reports the MRTs in Senior Management positions for UK banks; Panel B reports the MRTs in Senior Management positions for EU banks; Panel C reports the MRTs in Non-senior Management positions for UK banks; Panel D reports the MRTs in Non-senior Management positions for EU banks. The reported figures for fixed, variable, and total remuneration represent aggregate amounts, unless otherwise indicated as per-person values. The figures are in $ million except for Number of MRTs and Var-Fixed Ratio. The original values of the remuneration of MRTs are based on domestic currency. We converted the values into US dollars using the annual spot exchange rates of each year. The exchange rate is from FRED St. Louis.

Panel A: Senior Management (UK)

	Mean	Std.Dev.	p25	p50	p75	Obs.
Number of MRTs	50.22	42.03	26.60	29.50	62.50	76
Fixed Remuneration	41.12	27.00	20.33	36.97	51.64	90
Variable Remuneration	43.25	32.68	20.70	35.21	57.19	90
Total Remuneration	84.37	54.89	40.89	74.83	117.34	90
Fixed Remuneration (per-person)	1.09	0.51	0.57	1.15	1.44	76
Variable Remuneration (per-person)	1.10	0.71	0.48	1.09	1.63	76
Total Remuneration (per-person)	2.19	1.08	1.24	2.20	2.97	76
Var-Fixed Ratio	1.10	0.65	0.64	0.98	1.35	90

Panel B: Senior Management (EU)

	Mean	Std.Dev.	p25	p50	p75	Obs.
Number of MRTs	107.38	170.11	22.00	32.00	111.00	230
Fixed Remuneration	34.66	41.43	10.95	19.29	44.84	220
Variable Remuneration	20.06	36.33	1.96	6.29	20.61	220
Total Remuneration	54.74	75.08	13.47	26.74	62.31	220
Fixed Remuneration (per-person)	0.64	0.58	0.32	0.48	0.78	217
Variable Remuneration (per-person)	0.42	0.63	0.03	0.15	0.53	217
Total Remuneration (per-person)	1.06	1.15	0.38	0.62	1.19	217
Var-Fixed Ratio	0.49	0.44	0.14	0.36	0.75	220

Panel C: Non-senior Management (UK)

	Mean	Std.Dev.	p25	p50	p75	Obs.
Number of MRTs	612.04	551.93	105.00	577.00	1122.50	76
Fixed Remuneration	291.53	322.03	23.57	141.65	461.22	90
Variable Remuneration	276.50	316.11	31.79	125.45	501.90	90
Total Remuneration	568.03	624.78	56.95	363.82	1119.97	90
Fixed Remuneration (per-person)	0.45	0.13	0.38	0.47	0.55	76
Variable Remuneration (per-person)	0.44	0.29	0.23	0.41	0.55	76
Total Remuneration (per-person)	0.89	0.39	0.63	0.91	1.13	76
Var-Fixed Ratio	1.11	0.94	0.64	0.83	1.09	90

Panel D: Non-senior Management (EU)

	Mean	Std.Dev.	p25	p50	p75	Obs.
Number of MRTs	562.02	510.25	142.00	377.50	836.00	230
Fixed Remuneration	172.94	218.21	33.62	105.76	208.23	220
Variable Remuneration	118.59	207.83	7.52	31.62	101.79	220
Total Remuneration	293.49	422.50	42.66	142.42	313.60	220
Fixed Remuneration (per-person)	0.28	0.12	0.19	0.26	0.33	219
Variable Remuneration (per-person)	0.16	0.18	0.03	0.09	0.21	219
Total Remuneration (per-person)	0.44	0.28	0.23	0.37	0.56	219
Var-Fixed Ratio	0.48	0.39	0.19	0.37	0.71	220

Table 3: Descriptive Statistics

The table reports the descriptive statistics for the variables used in our analysis. Panel A is for UK banks, Panel B is for EU banks, and Panel C is for US banks. The CDS spreads are the average of daily spreads over a quarter and in bps (1bp = 0.01%). The stock market measures are quarterly. The bank fundamentals are quarterly. Remuneration and employment variables are annual. *Beta* is the market beta. *Idiosyncratic Volatility* is standard deviation of residuals of market model. *Value at Risk*, computed as the negative of the 5% worst daily return of the bank's stock over a quarter. *Expected Shortfall* is the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over a quarter. *Cumulative Return* is quarterly compounded return from daily stock returns. *Average Return* is arithmetic average of daily stock returns over a quarter multiplies number of trading days in a quarter. *Total Volatility* is standard deviation of *Cumulative Return*. *Sharpe Ratio* is the ratio of *Cumulative Return* over *Return Volatility*. *ROA* is return on assets; *ROE* is return on equity; *Tier 1 Ratio* is the ratio of Tier 1 regulatory capital to risk weighted assets; *Leverage* is the ratio of total liabilities to total assets .

Panel A: UK Banks

	Mean	Std.Dev.	p25	p50	p75	Obs.
Quarterly CDS spreads (Sample Period: 2021Q1 - 2024Q4)						
1-year CDS Spread	39.29	32.71	18.91	28.05	40.52	256
3-year CDS Spread	57.24	36.58	32.52	43.64	69.71	256
5-year CDS Spread	77.16	40.78	47.74	61.00	102.99	256
7-year CDS Spread	92.54	44.13	61.31	78.93	117.08	256
10-year CDS Spread	105.60	47.41	71.66	92.44	124.19	256
Stock Market Measures(Quarterly) (Sample Period: 2021Q1 - 2024Q4)						
Beta	1.38	0.32	1.13	1.40	1.58	96
Idiosyncratic Volatility	0.11	0.02	0.10	0.11	0.13	96
Value at Risk	0.03	0.01	0.02	0.02	0.03	96
Expected Shortfall	0.04	0.01	0.03	0.04	0.04	96
Cumulative Return	0.07	0.12	-0.01	0.05	0.15	96
Average Return	0.07	0.11	-0.00	0.06	0.14	96
Total Volatility	0.14	0.03	0.12	0.14	0.16	96
Sharpe Ratio	0.54	0.87	-0.07	0.42	1.08	96
Bank fundamentals(Quarterly) (Sample Period: 2021Q1 - 2024Q4)						
Total Assets (in $B)	1320.18	937.86	825.83	1058.86	1924.27	95
ROA (%)	0.61	0.35	0.40	0.55	0.73	92
ROE (%)	9.61	4.37	7.44	10.05	12.30	94
Tier 1 Ratio (%)	17.06	1.41	16.20	16.90	17.45	80
Leverage (%)	93.71	1.68	93.39	94.08	94.95	95
Employment and Remuneration(Annual)(Sample Period: 2011 - 2023)						
Total Remuneration (in $B)	6.95	6.39	0.94	6.14	10.93	104
Remuneration per person (in $M)	0.08	0.03	0.07	0.08	0.09	91
Assets per person (in $M)	14.39	4.05	11.01	14.25	17.19	91

Panel B: EU Banks

	Mean	Std.Dev.	p25	p50	p75	Obs.
Quarterly CDS spreads (Sample Period: 2021Q1 - 2024Q4)						
1-year CDS Spread	73.10	414.91	17.65	30.63	48.78	751
3-year CDS Spread	89.26	322.71	31.10	48.33	73.81	751
5-year CDS Spread	108.11	291.16	44.48	65.41	102.76	751
7-year CDS Spread	120.79	275.23	57.36	77.03	119.42	751
10-year CDS Spread	131.21	261.65	67.54	88.12	130.93	751
Stock Market Measures (Quarterly) (Sample Period: 2021Q1 - 2024Q4)						
Beta	0.91	0.36	0.66	0.90	1.14	464
Idiosyncratic Volatility	0.13	0.06	0.10	0.12	0.16	464
Value at Risk	0.03	0.01	0.02	0.03	0.04	464
Expected Shortfall	0.04	0.02	0.03	0.04	0.05	464
Cumulative Return	0.07	0.15	-0.02	0.07	0.15	464
Average Return	0.06	0.15	-0.01	0.07	0.15	464
Total Volatility	0.16	0.07	0.11	0.14	0.18	464
Sharpe Ratio	0.54	0.92	-0.13	0.49	1.07	464
Bank fundamentals (Quarterly) (Sample Period: 2021Q1 - 2024Q4)						
Total Assets (in $B)	711.07	728.76	212.19	402.98	1001.20	458
ROA (%)	0.76	0.66	0.40	0.67	0.96	443
ROE (%)	9.55	7.42	6.74	10.50	13.90	455
Tier1 Ratio (%)	16.55	2.41	14.80	16.20	18.20	386
Leverage (%)	92.16	7.07	92.64	94.05	94.89	458
Employment and Remuneration (Annual) (Sample Period: 2011 - 2023)						
Total Remuneration (in $B)	4.00	4.48	0.85	2.14	5.83	486
Remuneration per person (in $M)	0.10	0.04	0.07	0.10	0.12	476
Assets per person (in $M)	24.26	33.93	9.14	15.87	27.02	489

Panel C: US Banks

	Mean	Std.Dev.	p25	p50	p75	Obs.
Employment and Remuneration (Annual) (Sample Period: 2011 - 2023)						
Total Remuneration (in $B)	12.20	12.16	2.31	5.92	21.77	202
Remuneration per person (in $M)	0.16	0.07	0.11	0.14	0.17	202
Assets per person (in $M)	10.26	6.98	5.82	8.72	14.14	202

Table 4: Change in CDS Spread

The table reports the results of OLS estimation of equation (1) to estimate the effect of bonus cap removal on the CDS Spread with maturity of 1-year, 3-year, 5-year, 7-year, and 10-year. Bank fixed effects and quarter fixed effects are included. The treated group consists of UK banks. The control group consists of EU banks. *Treat* is equal to 1 for the treated group. *Post*1 is equal to 1 for quarters from 2022Q3 to 2023Q3, starting at the quarter when the UK regulator announced the intention to remove the bonus cap and ending at one quarter before the quarter when the UK regulator formally announced the removal of the bonus cap. *Post*2 is equal to 1 for quarters starting from 2023Q4, when the UK regulator formally announced the removal of the bonus cap. The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

	(1) 1-year	(2) 3-year	(3) 5-year	(4) 7-year	(5) 10-year
Treat×Post1	0.071	0.019	0.006	0.001	0.005
	(0.119)	(0.091)	(0.074)	(0.062)	(0.057)
Treat×Post2	0.062	-0.007	-0.022	-0.022	-0.018
	(0.093)	(0.070)	(0.058)	(0.051)	(0.050)
Log 5-year country-average Spread	0.200	0.143	0.123	0.118	0.118
	(0.153)	(0.126)	(0.107)	(0.095)	(0.088)
Constant	-4.947***	-4.688***	-4.436***	-4.267***	-4.134***
	(0.652)	(0.537)	(0.453)	(0.403)	(0.374)
Bank FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
AdjR^2	0.8494	0.8679	0.8812	0.8926	0.8955
Observations	1007	1007	1007	1007	1007

Table 5: Change in Stock Market Risk Measures

The table reports the results of OLS estimation of equation (1) to estimate the effect of bonus cap removal on different risk measures of stock market. Bank fixed effects and quarter fixed effects are included. *Beta* is the market beta. $IdiosyncraticVolatility$ is the standard deviation of residuals of market model. $Total\ Volatility$ is the standard deviation of cumulative stock return over a quarter. *ES* is the expected shortfall, which is the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over a quarter. VaR is Value at Risk, computed as the negative of the 5% worst daily return of the bank's stock over a quarter. $Treat$ is equal to 1 for the treated group. $Post1$ is equal to 1 for quarters from 2022Q3 to 2023Q3, starting at the quarter when the UK regulator announced the intention to remove the bonus cap and ending at one quarter before the quarter when the UK regulator formally announced the removal of the bonus cap. $Post2$ is equal to 1 for quarters starting from 2023Q4, when the UK regulator formally announced the removal of the bonus cap. The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

	(1) Beta	(2) Idiosyncratic Volatility	(3) Total Volatility	(4) ES	(5) VaR
Treat×Post1	0.228***	-0.009	-0.008	-0.000	0.003
	(0.060)	(0.008)	(0.010)	(0.003)	(0.002)
Treat×Post2	0.215**	-0.000	0.001	-0.000	0.002
	(0.097)	(0.013)	(0.014)	(0.004)	(0.003)
Market Volatility	3.674***	0.424**	0.680**	0.221**	0.179**
	(1.202)	(0.193)	(0.259)	(0.095)	(0.069)
Constant	0.664***	0.096***	0.100***	0.022***	0.014**
	(0.098)	(0.016)	(0.021)	(0.008)	(0.006)
Bank FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
AdjR^2	0.5477	0.4853	0.5279	0.4299	0.5764
Observations	560	560	560	560	560

Table 6: Change in Stock Returns and Sharpe-Ratio

The table reports the results of OLS estimation of equation (1) to estimate the effect of bonus cap removal on stock returns and sharpe ratio. Bank fixed effects and quarter fixed effects are included. *Cumulative Return* is quarterly compounded return from daily stock returns. *Average Return* is arithmetic average of daily stock returns over a quarter multiplies number of trading days in a quarter. *Sharpe-Ratio* is the ratio of *Cumulative Return* over *Return Volatility*. *Treat* is equal to 1 for the treated group. *Post*1 is equal to 1 for quarters from 2022Q3 to 2023Q3, starting at the quarter when the UK regulator announced the intention to remove the bonus cap and ending at one quarter before the quarter when the UK regulator formally announced the removal of the bonus cap. *Post*2 is equal to 1 for quarters starting from 2023Q4, when the UK regulator formally announced the removal of the bonus cap. The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

	(1) Cumulative Return	(2) Average Return	(3) Sharpe Ratio
Treat×Post1	-0.022	-0.020	-0.095
	(0.025)	(0.025)	(0.169)
Treat×Post2	0.007	0.007	0.200
	(0.036)	(0.032)	(0.240)
Market Return	0.703***	0.648***	4.434***
	(0.138)	(0.134)	(0.897)
Constant	0.052***	0.052***	0.440***
	(0.005)	(0.004)	(0.032)
Bank FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
AdjR^2	0.2564	0.2245	0.3539
Observations	560	560	560

Table 7: Change in MRT Remuneration around 2023 Bonus Cap Removal

This table reports the results of OLS estimation of equation (1) to estimate the effect of the removal of bonus cap in 2023 on remuneration of the material risk takers (MRTs). Bank fixed effects and year fixed effects are included. The sample period is 2021 - 2024. The treated group consists of UK banks. The control group consists of EU banks. The 2024 data is currently only available for a subset of banks of our sample (see Appendix). Panel A reports the results for MRTs in Senior Management positions. Panel B reports the results for MRTs in Non-senior Management positions. *Treat* is equal to 1 for treated group. *Post* is equal to 1 for 2024. *Log Fixed*(*pp*) is log of fixed remuneration per risk taker; *Log Var*(*pp*) is log of variable remuneration per risk taker; *Log Total*(*pp*) is log of total remuneration per risk taker; *Total*(*pp*) is total remuneration per risk taker (in $Million); and *Var-Fixed Ratio* is the ratio of variable remuneration to fixed remuneration. The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

Panel A: Senior Management

	(1) Log Fixed(pp)	(2) Log Var(pp)	(3) Log Total(pp)	(4) Total(pp)	(5) Var-Fixed Ratio
Treat×Post	0.050	0.313**	0.169***	0.592***	0.262**
	(0.031)	(0.124)	(0.056)	(0.166)	(0.114)
Constant	-0.620***	-1.285***	-0.195***	1.199***	0.576***
	(0.001)	(0.006)	(0.002)	(0.007)	(0.005)
Bank FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
AdjR^2	0.9807	0.9573	0.9776	0.9743	0.8840
Observations	136	121	136	136	141

Panel B: Non-senior Management

	(1) Log Fixed(pp)	(2) Log Var(pp)	(3) Log Total(pp)	(4) Total(pp)	(5) Var-Fixed Ratio
Treat×Post	0.142	0.232	0.163	0.058	0.036
	(0.104)	(0.183)	(0.113)	(0.044)	(0.043)
Constant	-1.343***	-2.363***	-0.953***	0.499***	0.512***
	(0.004)	(0.008)	(0.005)	(0.002)	(0.002)
Bank FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
AdjR^2	0.9785	0.9566	0.9802	0.9749	0.9116
Observations	139	139	139	139	141

Table 8: Change in Total Remuneration around 2014 Bonus Cap Imposition

The table reports the results of OLS estimation of equation (1) to estimate the effect of the introduction of bonus cap in 2014 on total remuneration. Bank fixed effects and year fixed effects are included. The sample period is 2011 - 2023. The treated group consists of UK banks and EU banks. The control group consists of US banks. Panel A compares UK banks to US banks. Panel B compares EU banks to US banks. *Treat* is equal to 1 for treated group. *Post* is equal to 1 for years starting from 2014. *Log Remuneration*(*pp*) is log of remuneration per person. *Log Remuneration* is log of total remuneration. *Log Assets*(*pp*) is log of assets per person. The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

Panel A: UK vs US

	(1) Log Remuneration(pp)	(2) Log Remuneration	(3) Log Assets(pp)
Treat×Post	-0.098**	-0.430***	-0.109*
	(0.044)	(0.125)	(0.054)
Constant	11.710***	22.468***	16.077***
	(0.010)	(0.033)	(0.013)
Bank FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
AdjR^2	0.9417	0.9770	0.9710
Observations	292	306	292

Panel B: EU vs US

	(1) Log Remuneration(pp)	(2) Log Remuneration	(3) Log Assets(pp)
Treat×Post	-0.185***	-0.410***	-0.297***
	(0.041)	(0.079)	(0.055)
Constant	11.687***	22.000***	16.516***
	(0.022)	(0.044)	(0.030)
Bank FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
AdjR^2	0.8661	0.9802	0.9581
Observations	678	688	691

Table 9: Change in Bank Fundamentals around 2023 Bonus Cap Removal

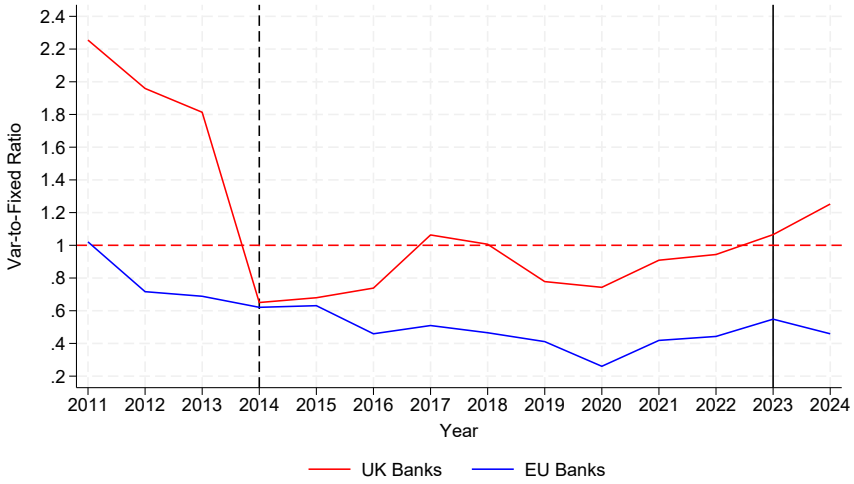
This table reports the results of OLS estimation of equation (1) to estimate the effect of the removal of bonus cap in 2023 on bank key fundamentals. The fundamental data are quarterly. Bank fixed effects and quarterly fixed effects are included. The sample period is 2021Q1 - 2024Q4. The treated group consists of UK banks. The control group consists of EU banks. *Treat* is equal to 1 for the treated group. *Post*1 is equal to 1 for quarters from 2022Q3 to 2023Q3, starting at the quarter when the UK regulator announced the intention to remove the bonus cap and ending at one quarter before the quarter when the UK regulator formally announced the removal of the bonus cap. *Post*2 is equal to 1 for quarters starting from 2023Q4, when the UK regulator formally announced the removal of the bonus cap. *Log Assets* is log of total assets; *Leverage* is the ratio of total liabilities to total assets(in pct); *Tier 1 Ratio* is the ratio of Tier 1 Capital to risk-weighted assets(in pct); *ROA* is return on assets (in pct); *ROE* is return on equity (in pct). The standard errors clustered by bank are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10%, respectively.

	(1) Log Assets	(2) Leverage	(3) Tier1 Ratio	(4) ROA	(5) ROE
Treat×Post1	0.009	0.886**	-1.217**	-0.050	0.004
	(0.033)	(0.369)	(0.578)	(0.120)	(1.658)
Treat×Post2	0.009	0.809*	-1.470**	-0.147	-1.301
	(0.032)	(0.417)	(0.674)	(0.121)	(1.770)
Constant	6.105***	92.336***	16.783***	0.741***	9.629***
	(0.003)	(0.040)	(0.066)	(0.012)	(0.173)
Bank FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
AdjR^2	0.9969	0.9187	0.8202	0.4333	0.3680
Observations	553	553	466	535	549

Figure 1: Change in Variable-to-Fixed Ratio of MRTs

The figure plots the trend in the ratio of variable remuneration to fixed remuneration for material risk takers (MRTs) across two categories: senior management (Panel a), non-senior management (Panel b) from 2011 to 2024. The dash line in 2014 denotes the imposition of the bonus cap. The solid line in 2023 denotes the removal of the bonus cap. The remuneration data of MRTs of 2024 is currently only available for a subset of our sample (see Appendix).

(a) Senior Management



(b) Non-senior Management

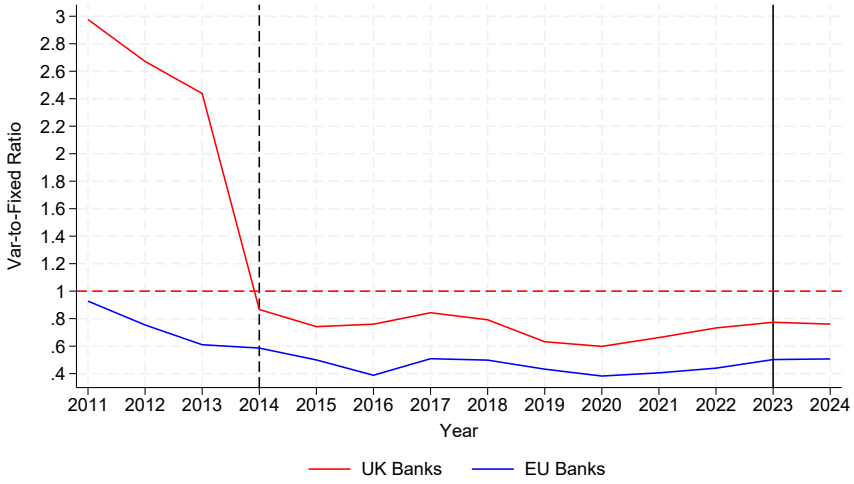
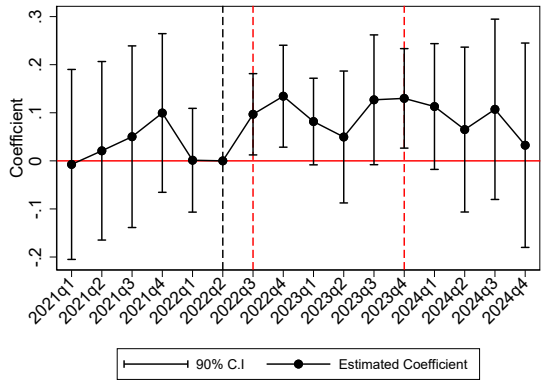


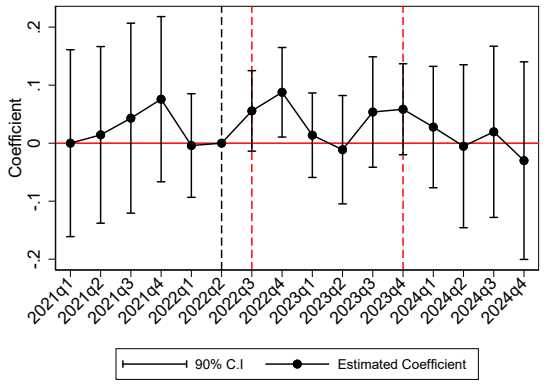
Figure 2: Dynamic Effects of 2023 Bonus Cap Removal on CDS Spreads

The figure plots the dynamic effect of 2023 Bonus Cap Removal on CDS spread with 1-year, 3-year, 5-year, 7-year, and 10-year maturity. We estimated equation (1) except that we replace *Post* with quarter dummies. The treated group consists of UK banks. The control group consists of EU banks. The dots represent the coefficient estimates on the quarter dummies. The black dash line indicates the benchmark quarter. The first red dash line indicates 2022Q3, when the UK regulator announced the intention to remove the bonus cap. The second red dash line indicates 2023Q4, when the UK regulator formally announced the removal of the bonus cap. All regressions include bank and quarter fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents quarters.

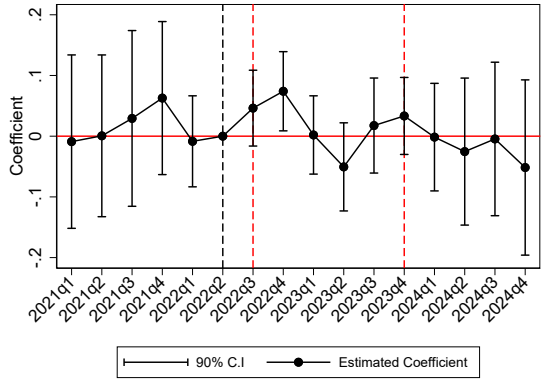
(a) 1-year CDS spread



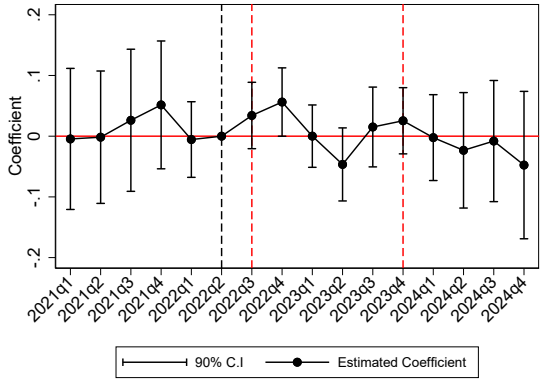
(b) 3-year CDS spread



(c) 5-year CDS spread



(d) 7-year CDS spread



(e) 10-year CDS spread

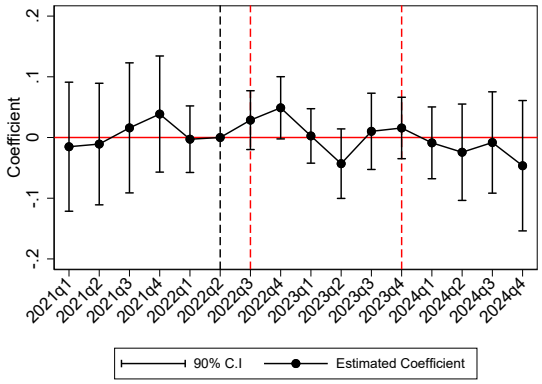
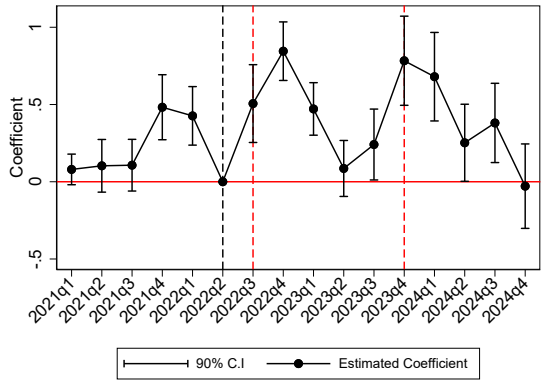


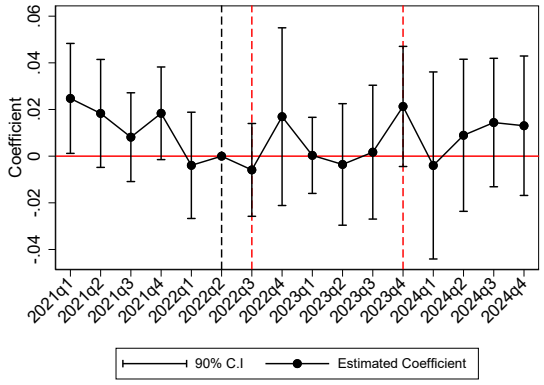
Figure 3: Dynamic Effects of 2023 Bonus Cap Removal on Stock Market Risk Measures

The figure plots the dynamic effect of 2023 Bonus Cap Removal on different risk measures of stock market. *Beta* is the market beta. *Idiosyncratic Volatility* is the standard deviation of residuals of market model. *Total Volatility* is the standard deviation of cumulative stock return over a quarter. *ES* is the expected shortfall, which is the negative of the average return on the bank's stock over the 5% worst return days for the bank's stock over a quarter. VaR is Value at Risk, computed as the negative of the 5% worst daily return of the bank's stock over a quarter. We estimated equation (1) except that we replace *Post* with quarter dummies. The treated group consists of UK banks. The control group consists of EU banks. The dots represent the coefficient estimates on the quarter dummies. The black dash line indicates the benchmark quarter. The first red dash line indicates 2022Q3, when the UK regulator announced the intention to remove the bonus cap. The second red dash line indicates 2023Q4, when the UK regulator formally announced the removal of the bonus cap. All regressions include bank and quarter fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents quarters.

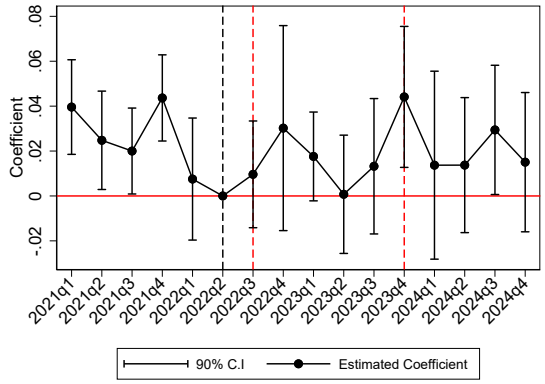
(a) Beta



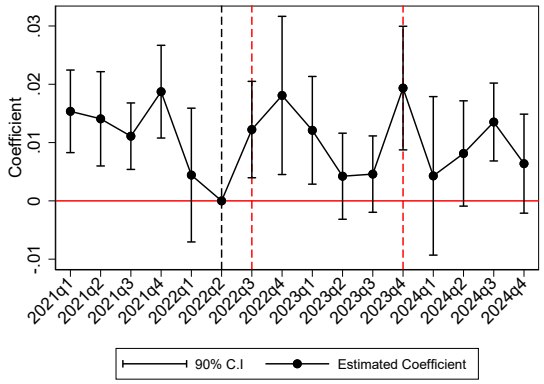
(b) Idiosyncratic Volatility



(c) Total Volatility



(d) ES



(e) VaR

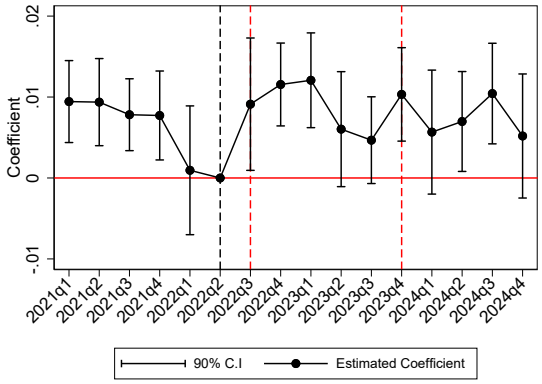
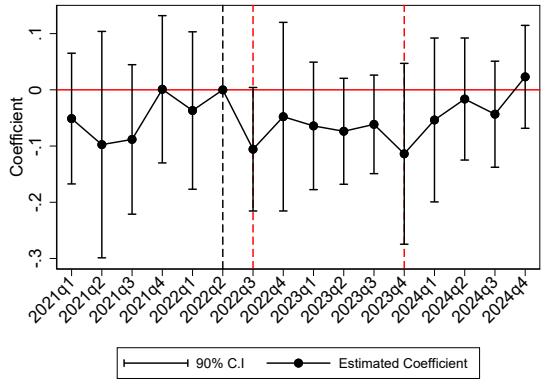

Coefficient
.02
.01
0
-.01
2021q1
2021q2
2021q3
2021q4
2022q1
2022q2
2022q3
2022q4
2023q1
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2024q3
2024q4
90% C.I
Estimated Coefficient

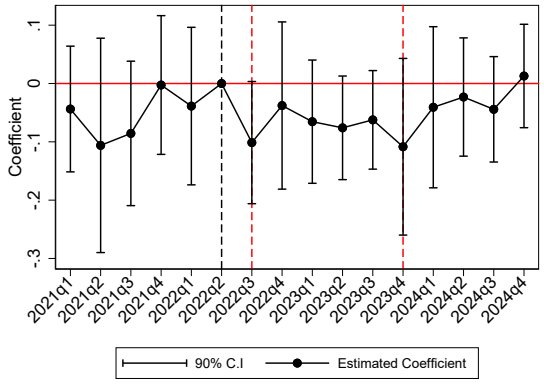
Figure 4: Dynamic Effects of 2023 Bonus Cap Removal on Stock Returns and Sharpe-Ratio

The figure plots the dynamic effect of 2023 Bonus Cap Removal on stock returns and Sharpe Ratio. *Cumulative Return* is quarterly compounded return from daily stock returns. *Average Return* is arithmetic average of daily stock returns over a quarter multiplies number of trading days in a quarter. *Sharpe-Ratio* is the ratio of *Cumulative Return* over *Return Volatility*. We estimated equation (1) except that we replace *Post* with quarter dummies. The treated group consists of UK banks. The control group consists of EU banks. The dots represent the coefficient estimates on the quarter dummies. The black dash line indicates the benchmark quarter. The first red dash line indicates 2022Q3, when the UK regulator announced the intention to remove the bonus cap. The second red dash line indicates 2023Q4, when the UK regulator formally announced the removal of the bonus cap. All regressions include bank and quarter fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents quarters.

(a) Cumulative Return



(b) Average Return



(c) Sharpe-Ratio

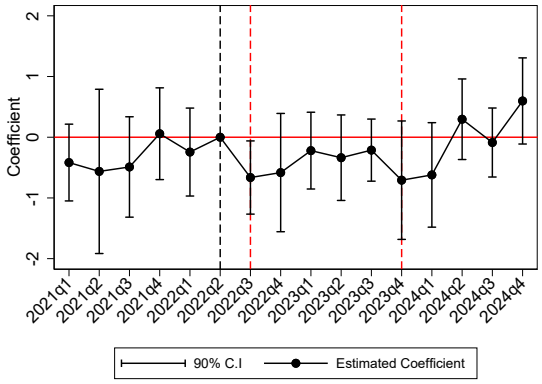
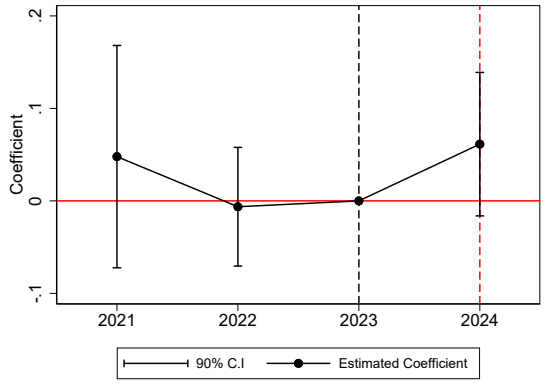


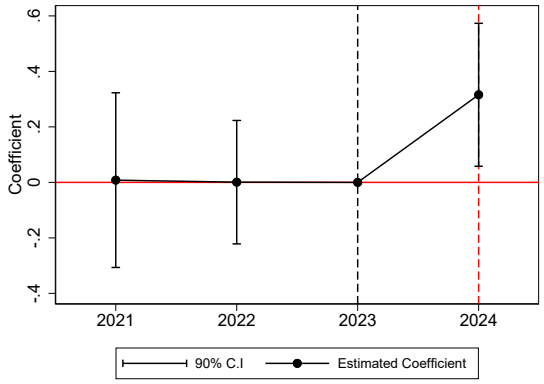
Figure 5: Dynamic Effects of 2023 Bonus Cap Removal on Remuneration of MRTs in Senior Management

The figure plots the dynamic effect of the removal of bonus cap in 2023 on remuneration of material risk takers (MRTs) in Senior Management positions. The sample period is 2021 - 2024. The 2024 data is currently available for a subset of our sample (see Appendix). We estimated equation (1) except that we replace *Post* with year dummies. The treatment group consists of UK banks. The control group consists of EU banks. The dots represent the coefficient estimates on year dummies of 2021 - 2024. All regressions include bank and year fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents the years. Because the cap removal came into force in October 2023, we believe that the adjustment on MRT remuneration would take place in 2024 so we define 2024 as event year, which is denoted by the red dash line. The black dash line denotes the base year. $Log\ Fixed(pp)$ is log of fixed remuneration per risk taker; $Log\ Var(pp)$ is log of variable remuneration per risk taker; $Log\ Total(pp)$ is log of total remuneration per risk taker; $Total(pp)$ is total remuneration per risk taker (in $Million); and $Var\text{-}Fixed\ Ratio$ is the ratio of variable remuneration to fixed remuneration.

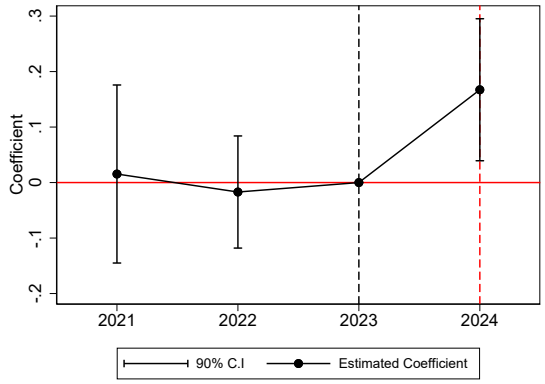
(a) Log Fixed(pp)



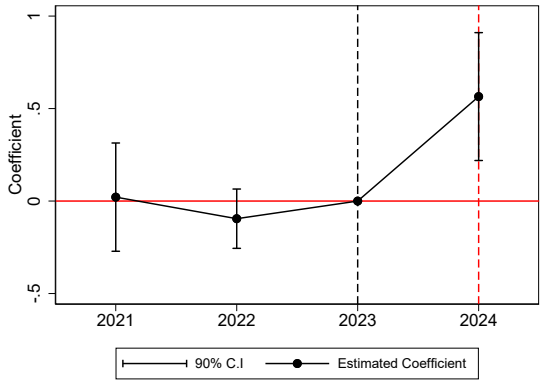
(b) Log Var(pp)



(c) Log Total(pp)



(d) Total(pp)



(e) Var-Fixed Ratio

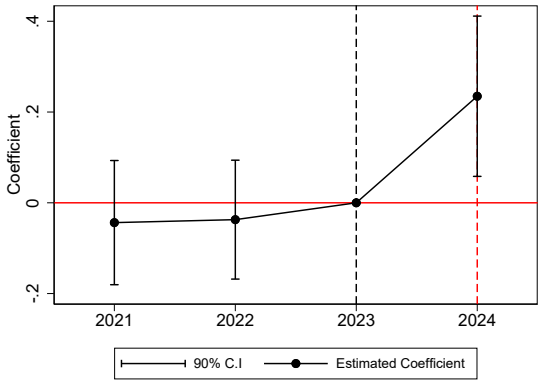
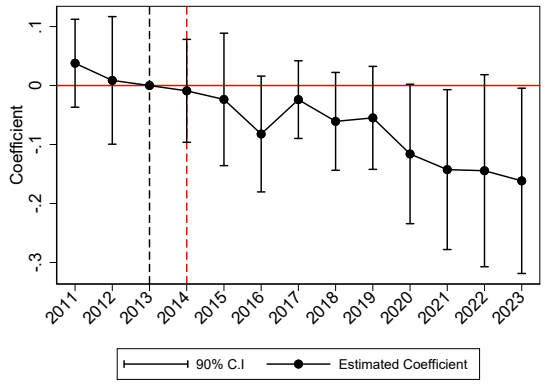


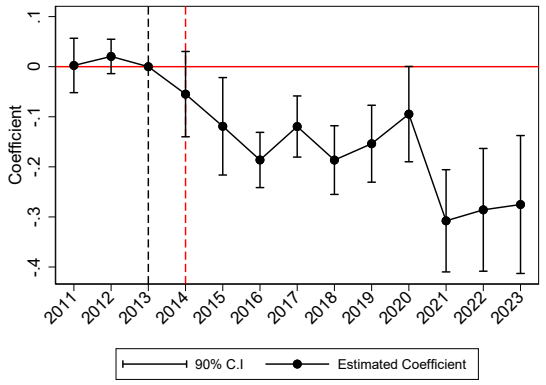
Figure 6: Dynamic Effects of 2014 Bonus Cap Imposition on Total Remuneration

The figure plots the dynamic effect of the imposition of bonus cap in 2014 on total remuneration. The sample period is 2011 - 2023. We estimated equation (1) except that we replace *Post* with year dummies. The treatment group consists of UK banks and EU banks. The control group consists of US banks. The dots represent the coefficient estimates on year dummies of 2011 - 2023. All regressions include bank and year fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents the years. The red dash line denotes the year in which the bonus cap was imposed. The black dash line denotes the base year. *Log Remuneration*(*pp*) is log of remuneration per person. *Log Remuneration* is log of total remuneration. *Log Assets*(*pp*) is log of assets per person.

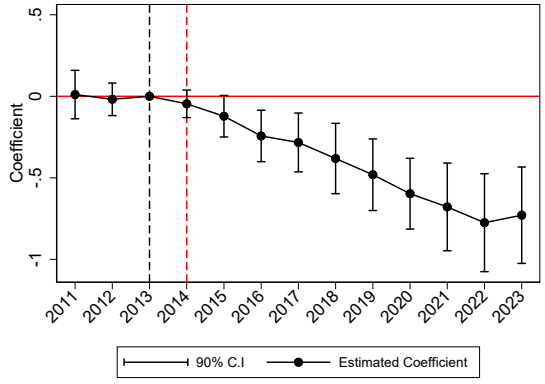
(a) Log Remuneration(pp) (UK vs US)



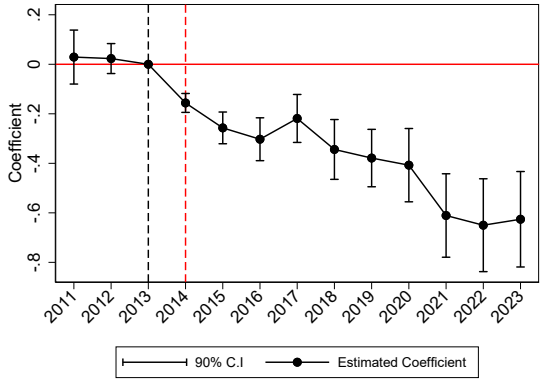
(b) Log Remuneration(pp) (EU vs US)



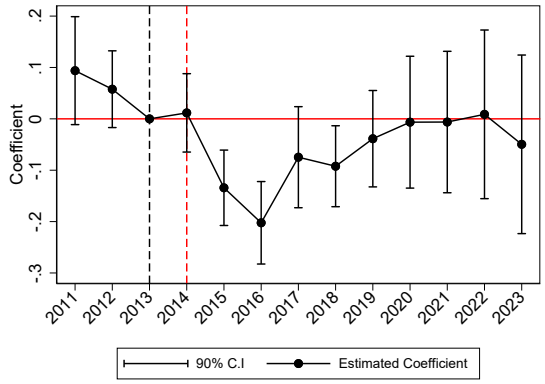
(c) Log Remuneration (UK vs US)



(d) Log remuneration (EU vs US)



(e) Log Assets(pp) (UK vs US)



(f) Log Assets(pp) (EU vs US)

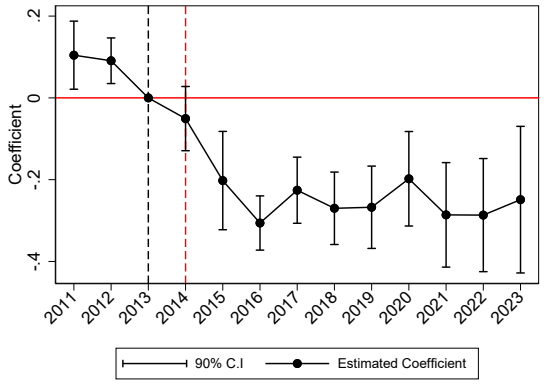
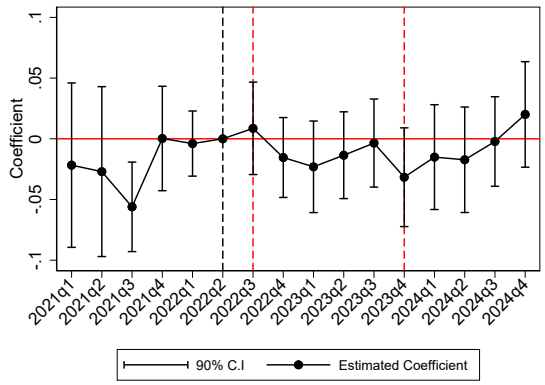


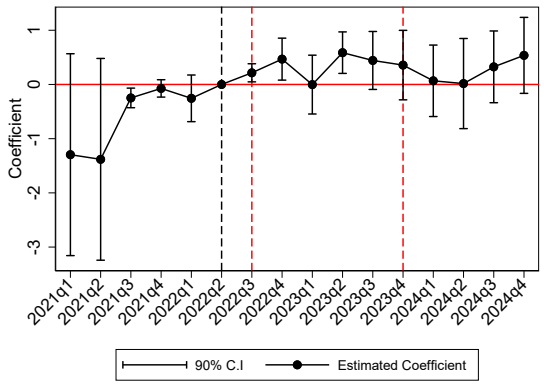
Figure 7: Dynamic Effects of 2023 Bonus Cap Removal on Remuneration of Bank Fundamentals

The figure plots the dynamic effect of the removal of bonus cap in 2023 on remuneration of bank fundamentals. The sample period is 2021 - 2024. We estimated equation (2). The treatment group consists of UK banks. The control groups consists of EU banks. The dots represent the coefficient estimates on quarter dummies of 2021Q1 - 2024Q4. All regressions include bank and quarter fixed effects. Standard errors are clustered by bank. The intervals around dots represent 90% confident intervals. The horizontal axis represents the quarters. The first red dash line denotes 2022Q3, when the UK regulator announced the intention to remove the bonus cap; the second red dash line denotes 2023Q4, when the UK regulator formally announced the removal of the bonus cap. The black dash line denotes the benchmark quarter. *Log Assets* is log of total assets; *Leverage* is the ratio of total liabilities to total assets(in pct); *Tier 1 Ratio* is the ratio of Tier 1 capital to risk-weighted assets(in pct); *ROA* is return on assets (in pct); *ROE* is return on equity (in pct).

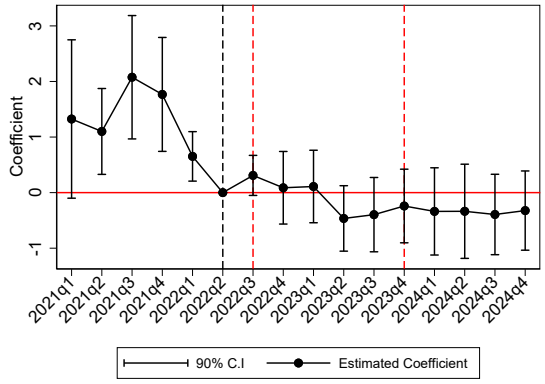
(a) Log Assets



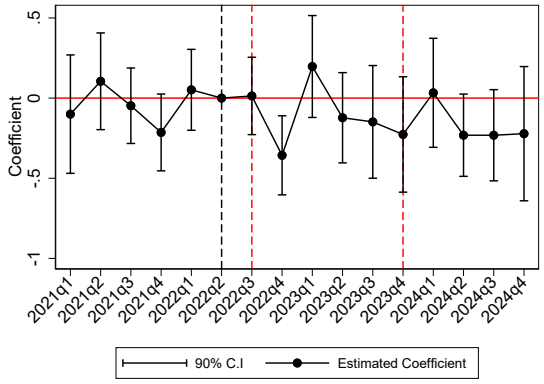
(b) Leverage



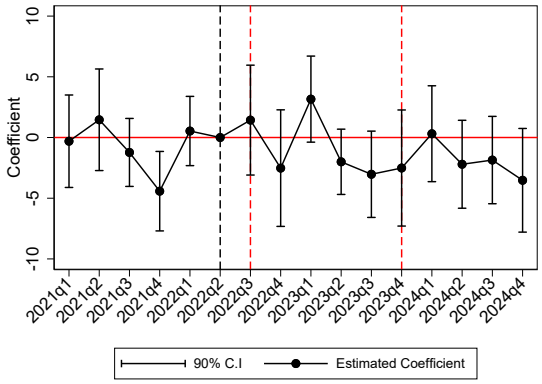
(c) Tier 1 Ratio



(d) ROA



(e) ROE


Coefficient
10
5
0
-5
-10
2021q1
2021q2
2021q3
2021q4
2022q1
2022q2
2022q3
2022q4
2023q1
2023q2
2023q3
2023q4
2024q1
2024q2
2024q3
2024q4
90% C.I
Estimated Coefficient