

Sumandea-Simionescu, Ioan

Working Paper

Paying for prudence? Empirical evidence on remuneration in supervisory banking functions during crisis

SAFE Working Paper, No. 493

Provided in Cooperation with:

Leibniz Institute for Financial Research SAFE

Suggested Citation: Sumandea-Simionescu, Ioan (2026) : Paying for prudence? Empirical evidence on remuneration in supervisory banking functions during crisis, SAFE Working Paper, No. 493, Leibniz Institute for Financial Research SAFE, Frankfurt a. M.

This Version is available at:

<https://hdl.handle.net/10419/343099>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

LawFin Working Paper No. 64

Paying for Prudence? Empirical Evidence on Remuneration in Supervisory Banking Functions During Crisis

Ioan Sumandea-Simionescu

Ioan Sumandea-Simionescu

Paying for Prudence? Empirical Evidence on Remuneration in Supervisory Banking Functions During Crisis

SAFE Working Paper No. 493 | August 2026

Leibniz Institute for Financial Research SAFE
Sustainable Architecture for Finance in Europe

info@safe-frankfurt.de | www.safe-frankfurt.de

Paying for Prudence? Empirical Evidence on Remuneration in Supervisory Banking Functions During Crisis

Dr. Ioan Sumandea-Simionescu¹

Postdoctoral Researcher in Law and Finance

Leibniz Institute for Financial Research SAFE (Frankfurt)

LawFin Center (Goethe University)

WORKING PAPER

Abstract

This research investigates how remuneration structures in supervisory and internal control functions affect bank behaviour during periods of systemic stress, using the COVID-19 shock (2019–2020) as a quasi-experimental setting. Unlike executive or risk-taking roles, supervisory and control functions are explicitly designed to uphold prudential oversight and limit opportunistic behaviour. However, compensation practices in these roles have received limited empirical scrutiny, particularly in terms of how they perform under crisis conditions.

Drawing on a panel of other systemically important credit institutions (O-SIIs) operating under a harmonized regulatory framework, the analysis applies fixed-effects and continuous difference-in-differences (DiD) models to measure the effects of five key remuneration components: fixed pay, variable-to-fixed ratios, deferred remuneration, instrument-based pay (e.g., equity), and clawback mechanisms. Outcomes of interest include bank-level risk-taking (Loan-to-Deposit Ratio) and profitability (Return on Assets).

The results reveal notable misalignments between regulatory intent and actual incentive effects. Both fixed and variable pay were associated with elevated risk-taking before the COVID-19 shock, while variable pay continued to increase risk and reduce profitability in the post-crisis period. Ex post governance tools, such as deferrals and clawbacks, demonstrated limited effectiveness in moderating these effects. By contrast, equity-based remuneration was more consistently associated with risk-reducing behavior, though its impact on profitability was mixed.

By focusing on governance players traditionally seen as neutral or risk-averse, this study provides novel empirical evidence on how remuneration design influences behaviours in governance roles during crisis. The findings suggest that regulatory frameworks must go beyond formal compliance and account for the behavioural realities of incentive design—particularly under systemic stress. The study contributes to the law and economics literature on corporate governance and financial regulation by linking the enforceability and design of remuneration policies to observed bank behaviours during a real-world crisis.

¹ I am especially grateful to Tobias Tröger for his detailed comments, discussions, and suggestions on earlier versions of this paper. I also thank Rainer Haselmann, Florian Heider, Michael Ohlrogge, Vittoria Battocletti, Edoardo Martino, Lucian Bercea, and Wolf-Georg Ringe for helpful comments and discussions. I am grateful to participants at the European Association of Law and Economics Annual Conference, the European Society of Empirical Legal Studies Conference, the Canadian Law and Economics Association Conference, the NYU/SAFE/ESCP Law & Finance Workshop, and the SAFE Brown Bag Seminar for valuable feedback. I gratefully acknowledge research support from the Center for Advanced Studies Foundations of Law and Finance, funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) – project FOR 2774. All remaining errors are my own.

1. Introduction and framing of research question

The debate over the efficiency of banking (financial institutions) corporate governance has never been as relevant as it is now, in the post-crisis economy I live in as well as in the current COVID-19 pandemic.

Why is banking corporate governance different from other types of corporations? Financial crises created a serious focus on regulation, in particular to limit the riskiness of banks (Levine, 2004). This has led some to argue for a shift from a particular shareholder value focus, to one that considers the interests of multiple stakeholders (debtholder, account holders etc.). Through such proposals, they are focusing on two particular market failures: financial stability and principal-agent problems.

How does remuneration fit in this framework? Traditionally, remuneration is used to align the interest of shareholders and directors (PAP), mostly linked to higher performance and risk taking.

The collapse of the financial system had brought about a debate regarding the governance structures of banks in various fields, of which the more controversial being the issue of the remuneration packages of the top management, bringing about the advent of the new remuneration guidelines and regulation (Admati, 2013).

Banking regulation thus warped the use of remuneration to align the interest of directors towards less risk-taking, as a post-crisis scenario, resulting in a paradigm shift.

However, even in the years following the financial crisis, there are still uncertainties as to the way remuneration practices of the banks have achieved their role in tempering and limiting the opportunistic and self-serving interests of directors to avoid similar outcomes to the 2007-2008 financial crisis. New regulation coming in from the European Banking Authority (EBA) have strictly regulated the remuneration practices of banks through the EBA Guidelines on sound remuneration policies (already on its second major review finalised in 2021). It seems clear that the European legislator favours the remuneration policy as a tool to handle some of the specific moral hazard (agency problems) as well as financial stability in crisis scenarios (seen as a negative externality).

My current research focuses on a particular topic (often overlooked) of the remuneration of the internal supervisors of the banks, namely the supervisory function (Board of Directors – one tier system/Supervisory Board – two tier system, herein generally referred to as *the Board*) and the internal control functions (the key people (middle management) within audit, risk management and compliance). These individuals are labelled as material risk takers within European banking regulation but their duties are linked to risk reduction, with the main role of supervising the behaviour of the traditional agents (namely the executive officers and the investment bankers). As such, they are a prime example of the trusteeship strategy within the banking paradigm, relying on conscience and reputation (low-powered incentives), allocating power to an independent monitor, situated between public enforcement and internal enforcement (Armour, 2009). Apart from the traditional examples of auditors and independent directors, in banking internal governance I found new roles allocated to the supervisory function (Board of Directors which holds mostly monitoring duties) as well as to the internal control function which are middle management or above, independent staff (Enriques, 2015). As such, their incentive structure is fundamentally different from that of the more traditional risk-taking agent. However, to my knowledge, the remuneration elements of these key players has been overlooked by recent research, their role being overshadowed by

the debate around traditional top management remuneration. The role of the research is to empirically determine the impact of the remuneration of these players on the risk profile of the banks, while use investigating if the incentive structure set up through the remuneration tool is aligned with the implied trusteeship strategy.

Thus, the main research question can be summed up as follows: is the remuneration legislation and practices concerning the supervisory and internal control function helping in tackling the risk taking-behaviour of the bank? I intend to find an answer to this question through a cross-country empirical analysis. I believe the study can have a relevant impact in the field at least in three ways: firstly, it will provide a new understanding of the law and economics implication of the new remuneration regulation, aiding in the enactment of efficient reform; secondly, it considers the remuneration practices of not only top management but the middle management of the bank, previously undiscussed and; thirdly, it would provide an answer to the queries raised regarding the robustness of remuneration policies in the banking sector in tackling the risk paradigm, with the objectives of improving the regulation framework and practices in the banking industry.

As the robustness of remuneration is put to the test in a crisis scenario, I explored such a potential scenario with the recent COVID-19 crisis. While not a financial crisis, the COVID-19 pandemic provided a unique opportunity for an empirical analysis, functioning as a natural experiment. In May 2020, the European Systemic Risk Board issued one of its first recommendations on the issue of remuneration, cautioning banks to avoid paying any variable remuneration which might affect its financial stability². The decision was indeed only a recommendation and did not expressly state what type of remuneration structure was acceptable, transferring the onus of the decision to the European banks (and its national competent authorities). As such, the banks had to adjust their remuneration structure accordingly, in order to adjust (or maintaining) its risk profile, thus revealing something about its interpretation of the potential of risk mitigation of different types of remuneration. I have thus focused on this shift in the approach on banks, in order to determine the actual impact that such measures have, using a continuous difference-in-difference model which will be explained below.

This study is structured as follows: section 2 considers the banking corporate governance paradigm within the law and economics discussion, focusing on risk, performance and the role of remuneration. Section 3 introduces the European framework on banking remuneration while section 4 will be an in-depth law and economics analysis of the relevant elements. Section 5 and 6 include the empirical research conducted and its results while section 8 offers overall conclusions and policy proposals based on my findings.

2. Corporate governance, informational asymmetry, and the agency problem.

The peculiarities of banking remuneration

We must begin by framing the question of banking remuneration within the wider context of corporate governance. In the traditional governance paradigm, managers work in the interest of their shareholders, which, as residual claimants, receive what is left after fixed claimants have been paid (Armour, 2016). As such, the residual surplus must be large enough, thus also increasing the value of the firm. Shareholders are the most homogenously interested in the welfare of the firms, among the stakeholders. This is reflected in an increase in the value

² ERSB Recommendations on restriction of distributions during the COVID-19 pandemic (ESRB/2020/7).

of the claim, thus the share price. But they also face high coordination cost in dispersed shareholdings (Ellul, 2013). As such, directors are seen as performing the function of monitoring the business on behalf of shareholders.

But, due to informational asymmetry, issues of adverse selection and moral hazard arise. In most agency relationships, positive monitoring, and bonding (agency) costs are present, but there is also divergence between the agent's actions and the decisions that can maximize the utility for the principal (Jensen & Meckling, 1976). The shareholders (principal) cannot monitor the director (agent) although the value of the former is linked to the activity of the latter. The agent's self-interested behaviour leads to agency costs and suboptimal total welfare (Jensen & Meckling, 1976). This is essentially the principal-agent problem (PAP). The agency theory was developed by Coase (1937), and then expanded upon by Jensen and Meckling (1976), followed by Fama (1983).

PAP is tackled by using different governance mechanisms like independent directors (aiding in monitoring), remuneration as a means to align the effort and risk level to long-term and riskier pursuits in line with shareholder interest (Armour, 2009), while duty of care and business judgement rules help in calibrating the optimal behaviour (labelled by us as Y^*).

2.1. Why are banks different from other firms?

Following what has been discussed in the previous section, we must now consider how banks deviate from the traditional corporate governance paradigm. Banks differ in three essential elements (Van der Elst, 2015).

Firstly, they are highly leveraged, as they transform short-term deposits into long-term loans. As such, shareholders stand to gain from risky endeavours at the expense of the creditors, since they bear the risk of the failure. Perversely, traditional corporate governance shareholder-centric may exacerbate this PAP as shareholders, in general, prefer more risk (Hopt, 2013). Debtholders might try to account for these issues by pricing it into the contractual framework, but, considering the problems of incomplete contracts, the framework will never cover all possible scenarios (particularly long term), and so there is a need for a regulatory framework which ensures gap-filling (Martino, 2018).

This is further exacerbated for deposit-holders who hold very little to no negotiation powers and face the highest coordination costs and collective action problems, due to the dispersed structure (Martino, 2018).

Secondly, bank failure has a wider impact than simply affecting shareholder value. It can trigger systemic failure, contaminate other institutions and result in financial instability. This results in a negative externality which is not internalized by the bank and its shareholders (Ferrarini, 2010; Andreson, 2000). The state has thus an incentive to protect the bank to avoid these systemic shocks resulting in bailouts (too big to fail). This results in a market failure which has been subject to ample debate. The issue is also closely linked to the deposit guarantee schemes. While trying to reduce bank runs, deposit insurance created its own moral hazard problem, as it further incentivized shareholders and directors to take risk (Ferrarini, 2015). Moreover, deposit insurance reduces the incentives of debtholders to properly monitor banks, as decreased market signals from depositors due to reliance on insurance causes risk discoordination (Bedard and Gentier, 2021).

Thirdly, financial assets are hard to monitor and observe, since banks collect information on borrowers which is not available to others. So, shareholders and creditors alike cannot reduce the informational asymmetry thus hampering market discipline, as banks are

indeed opaque, so incentive setting is that much more complicated. Thus, these sectors are monitored by regulators or national competent authorities. Moreover, asset substitution is easier for banks, allowing for fast risk-shifting, which again increases agency costs and moral hazard (Ferrarini, 2015; Barth, 2004).

2.2. The evolution and current framing of banking internal governance

The evolution of the banking paradigm has been subject to shifts. Initially, banks were seen as utility subjects of entry and profits were restricted. Thus, shareholder received returns but did not encourage risk. Starting in the 1980s, there was a wave of de-regulation, allowing for more freedom in the financial market, which allowed for more pressure towards risk-taking coming from shareholders (Ferrarini, 2011; Adams, 2012). The assumption was that corporate governance and other banking regulation would tackle any emerging issues. Following the financial crisis, the issue of bank regulation re-emerged with the result of the current framework we face now (Ferrarini, 2013).

Currently, corporate governance in general has been subject to extensive reconsideration, including new Guidelines (EBA/GL/2021/05) drafted by the European Banking Authority, applying the Capital Requirements Directive IV.

The internal governance rules enhanced the role of the internal control functions, allowed for independence, and created mandatory Risk, Audit, Remuneration and Nomination Committees, all task to ensure that both PAP consideration as well as internalization of the negative externality of financial instability would be incorporated into the corporate governance framework.

We do want to highlight a particularity of the trusteeship strategy existing in the current governance framework. Trusteeship is a governance strategy which tries to mitigate PAP, relying on conscience and reputation (low-powered incentives), allocating power to an independent monitor, situated between public enforcement and internal enforcement (Armour, 2009). Apart from the traditional examples of auditors and independent directors, in banking internal governance we find new roles allocated to the supervisory function (Board of Directors which holds mostly monitoring duties) as well as to the internal control function which are middle management or above, independent staff (Enriques, 2015). The function (comprised of risk management, compliance, and audit) reports only to the supervisory function, operating as risk monitors from within, reducing information costs for the Board. All the above is then linked to the creation of a Risk Committee which oversees the risk management process.

2.3. Banking Remuneration – an oddity between risk and performance

Compensation holds an important role in the corporate governance paradigm, as it allows for the mitigation of the PAP by encouraging the risk-adverse, short-term thinking director to align to the interest of the shareholders, by adjusting the effort level as well as the risk assumed. Within the PAP paradigm, remuneration has been seen to differ in two ways (Bebchuk, 2003). Firstly, we have the *optimal contracting approach* (Jensen & Meckling, 1976), where, because the parties (principal and agent) hold equal bargaining power, remuneration is negotiated as an arm's length transaction and results in optimal incentives (operating as a solution to PAP).

Conversely, under the *managerial power approach*, remuneration becomes an agency problem in itself, as self-interested agents can influence the decision-making process for

remuneration (no longer arm's length bargaining), skewing the incentive structure. For example, managers who can affect the independence of the Board (as representatives of the shareholders), to increase or create inefficient remuneration (Bebchuk, 2003; Bohren, 2010; Bruno, 2010). I will consider this duality further on in my analysis.

Prior to the financial crisis, the common belief was that remuneration would aid in tackling some problems in the structure of the banks, as discussed. This proved not to be the case, as remuneration linked to performance and shares would only result in shareholder-centric risky behaviour, thus a misunderstanding of how banking corporate governance is different (Hopt, 2020).

Following the financial crisis of 2007-2008, the regulation of remuneration was subject to debate. From a public interest view, one can consider both arguments for and against regulation. Against regulation, we have found studies (Diamond, 2009; Enriques, 2015) that show that remuneration itself was not directly linked to the market failure, that risk taking results from improper governance. Secondly, remuneration might not be the best risk reducing mechanism for creditor protection and perhaps resolution and recovery regulation or other prudential regulation would be more effective (Ferrarini, 2011). Thirdly, in general, regulation might hamper the discovery process which might generate better regulation.

The arguments in favour are indeed greater. Remuneration can be used to incentives for the internalization of the negative externality of banking failure (Bebchuk, 2003) and, as I have seen, the specificity of bank governance makes creditor involvement difficult and hampers the market mechanism (Buck, 2015; Baker 2010).

My analysis starts from the premise that remuneration is indeed needed. But the level of intervention as well as the type of standards or rules used are of paramount importance in determine what the right remuneration setting looks like. This is what I will attempt to do in the following chapters, including in the empirical analysis which will look in-depth if the remuneration rules used by the EBA are indeed reducing risk exposure.

3. The European Guidelines on banking remuneration

3.1. The evolution of the banking remuneration paradigm

This chapter deals with the particularities of the regulatory framework for remuneration as stated by the new remuneration standards at the level of the European Union, through the guidelines provided by the European Supervisory Authority. The remuneration regulatory framework addresses multiple objectives but my analysis seeks to identify sound remuneration practices targeting the managing of the risk profile of the credit institution. Consequently, only these elements will be considered in this chapter.

As previously discussed, weak and poor remuneration practices are widely recognised as one of the underlying causes of the financial crisis (although subject to some debate) (Ferrarini, 2011; Bebchuk, 2010b), exacerbated by inadequate oversight by the governing body in several systemic banks which in turn contributed to excessive and imprudent risk-taking in the financial sector (Underhill, 2014).

The EBA follows the results of systemic change in the approach of banking remuneration practices following the financial crisis. While the underlining reasoning and the role of remuneration as a risk mitigating methods has been discussed in chapter 3, the need for regulation also emerged due to the need for a convergence of practices (Barotini, 2016).

In theory, where there is high criticism of the bail-out of banks from taxpayer money correlated with criticism of the high levels of pay the top management were receiving, there is less possibility of regulatory capture and possibility of stricter requirements for remuneration practices (Harnay, 2016). However, not all European (and non-EU countries for that matter), implemented the same level of supervision of compensation. So, some form of international cooperation was needed in order to ensure that the optimal behaviour was indeed reached (Murphy, 2013).

The first important attempt to codify the rules on remuneration practices was done by the Financial Supervisory Forum (now the Financial Supervisory Board - FSB). The regulation was a result on negotiation and debate at the international level. To a certain extent, the proposal of the Financial Supervisory Board named Principles for Sound Compensation Practices did indeed satisfy the approach I have underlined above as the standards were formulated with a sufficient level of abstractions that which can smooth over any potential conflicts of approaches and allows for regional flexibility. The Financial Supervisory Board Principles (herein FSB Principles) were structured to function as commonly agreed upon framework at an international setting (Hopt, 2013) which incorporated general standards which allowed for an appropriate adaptability and flexibility by the banks, which, through the process of discovery, could decide on the proper allocation of remuneration.

Due to an inconsistent implementation framework of corporate governance standards, building on the practices of the Financial Supervisory Board, noting the imperative to clarify these notions, the European Banking Authority - EBA issued the Guidance on sound remuneration policies under Articles 74(3) and 75(2) of Directive 2013/36/EU and the disclosures under Article 450 of Regulation (EU) No 575/2013, the first integration of the guidelines, pursuant to Articles 74 and 75 of Directive 2013/36/EU. Following some backlash and considering some discontent from different members states, a new version of the guidelines was drafted and came into force on 31.12.2021, hereinafter called the *Guidelines*.

The analysis in the current study is conducted in accordance with the final version of the Guidelines. For the empirical study, I will focus on disclosure realized for 2020 and 2019, in which remuneration practices were realized in accordance with initial guidelines. While, in itself, this may seem counterintuitive, I consider to be the best approach considering that: a) there is no disclosure available on remuneration paid under the new guidelines, as there have come into force in 2021, pending decision from NCAs and, b) more importantly, the two versions of the guidelines are almost identical, except for consideration on gender neutrality in remuneration practices as well as the easing of some requirements on remuneration of small banks together with some exception to the restrictions on equity-linked instruments and cap of variable remuneration. While these elements will be further discussed, the underlining structures and issues we are discussing in my analysis remain unchanged. The reference to the newest guidelines is used to maintain an up-to-date frame of reference.

Distinguishing themselves from the FSB Principles, the guidelines sought the set express rules on the optimal behaviour to be set on remuneration practices, drawing on international consensus. The Guidelines, applying CRD IV general standards which, to a certain extent mirrored the FSB Principles, went further to expressly set sector specific regulation. The underlying problem which this approach, as I shall further see and briefly discussed above, is that it created strict one size-fits-all rules that limited the ability of banks to allow for discovery within the bank, in setting custom made remuneration. While European banks and national authorities could apply higher restrictions than those set in the guidelines,

the minim rules set a very specific conduct (Y^*) which might not necessarily be the optimal level. At the core of this paper, I will look if indeed the optimal level has been reached, primarily through my empirical study, i.e., has the European Banking Authority really managed to determine the proper remuneration setting to mitigate risk taking in banks.

Given that the remuneration requirements were introduced with the purpose of influencing the level of risk and risk appetite of these entities, it becomes imperative to analyse these concepts in order to determine the final result sought by the European authorities from the point of view of remuneration practices, with a view to offering some consideration from a L&E perspective, as well as provide a foundation for my empirical study.

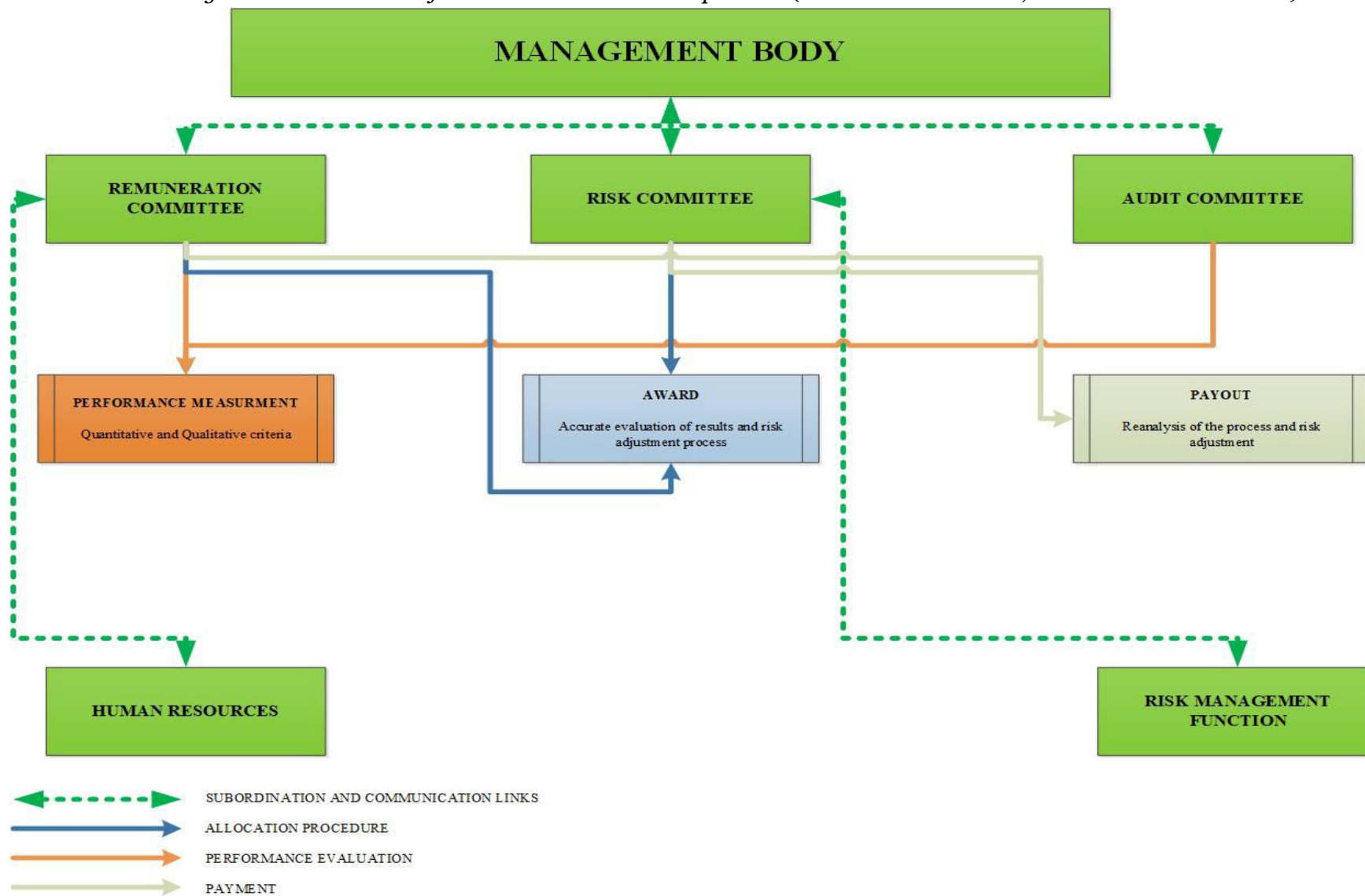
Thus, the Guidelines sets out the requirements on remuneration policies applicable to all staff of institutions and specific requirements that credit institutions must apply to remuneration policies and variable elements of remuneration of identified staff. Credit institutions may also apply these specific requirements to additional categories of staff or to all staff (Ferrarini, 2011).

The remuneration policy should specify all components of remuneration and include the pension policy. A distinction between fixed and variable (performance-linked) remuneration is made. Fixed remuneration is predetermined, maintained over of period, non-revocable, cannot be adjusted or reduced and not performance-linked (art. 131 Guidelines) while any remuneration that is not fixed is considered variable (art. 11 Guidelines).

Banks should ensure that remuneration practices are aligned with overall risk appetite, taking into account all risks, including reputational risks and risks arising from product mis-selling, taking into account the long-term interests of shareholders (Ferrarini, 2011; Berger 2012; Bliss, 2001). The majority of the remuneration restrictions and caps are rule-based, setting a conduct which the banks must follow.

Figure 1 shows the interplay of the trusteeship strategy within the remuneration allocation process, also highlighting that risk management function is present in every stage of the remuneration process, aiding the Remuneration and Risk Committees in their analysis, while final power of decision is given to the supervisory function. However, this also added another layer to the agency problem, considering the managerial power approach discussed above. Internal control must decide on a process which also influences their own remuneration as well as the welfare of the top management, further complicating the incentive structure. The principles that underpin the duties of the supervisory and internal control function are primarily standard-based, allowing for some flexibility in the management of the process. Arguably, it would be highly unlikely to be able to actually set rule as the dynamics of the remuneration process are too complex and entity specific.

Figure 1 - Governance of remuneration allocation process. (Source: author's own, based on EBA Guidelines)



In Table 1, I have realised a comparison of the rules set in the FSB Principles as compared to the newer EBA Guidelines. At a simple glance, one can ascertain that the guidelines used the standard based approach of the FSB and reasoning for applying restriction as a starting point for setting specific rules on remuneration, extend and amplifying the restriction which were applicable to banks. More so, the Guidelines extended the scope of the regulations in that all significant (Globally and Other Significantly Important Banks) would fall under its scope, with the possibility of national competent authorities to extend the scope of to the smaller banks, if considered relevant, effectively creating a European banking remuneration rulebook.

Table 1 – Comparison and analysis of the main banking remuneration frameworks in the EU. (Source: author's own, based on regulation referenced)

Elements of remuneration structure and regulation	FSB Principles for Sound Compensation Practices and FSB Implementation Standards	EBA Guidelines on sound remuneration (revisited), applying CRD IV and CRD V	Comments and consideration from a Law and Economics perspective
Applicability	Applicability to the systemic banks	All banks, but considering proportionality (pct. 85 – 93 of EBA G)	Extension of the scope, as a reaction to the little level of convergence resulted after the FSB application.
Types of staff and bank personnel subject to regulation	Distinguishes between different types of staff according to risk, no clear definition	All applies to Material Risk Takers (clear definition), with special requirements for Supervisory Board, management function etc. Some rules apply to all staff.	The Guidelines acknowledged that the PAP is wider in the banking framework, not limited only to the top management but also middle management. Linking scope with risk impact was indeed an efficient way to allow for flexibility, in order to capture a wider scope of staff, under different shapes and nomenclatures (standards-based approach).
Governance and Approval of remuneration	Competence lies with Board, with the aid of the Remuneration Committee (art. 1), Shareholder approval (Principle 8 and 9)	Competence lies with Board, with the aid of the Remuneration Committee (Sec. 2.4.), Shareholder approval (Sec. 2.2., pct. 44), involvement of internal control	Similar approach to traditional corporate governance, but the introduction of internal control adds a new trusteeship strategy, while also expanding PAP. In both approaches, debtholder input is excluded, raising concerns about an alignment only with shareholder interests (Bolton, 2010).
Identification process of personnel	No clear procedure, mostly principles relating to risk (art. 4.5.)	A detailed procedure regarding the identification of Material Risk Takers (MRTs)	A standards-based approach, but the Guidelines adds more complexity to the framework, trying to achieve better convergence while also reducing the uncertainty and associated compliance costs.

			Inefficiencies on this topic are discussed in-depth below.
Role of internal control	Standards for involvement at every level of approval process, no extensive guidelines (Principle 2 and 3)	Internal control is part of the identification, setting, adjustment and supervision of the remuneration process	Trusteeship strategy, by the introduction of an independent middle management which reports to the supervisory function, trying to align remuneration to risk profile, although agency problem consideration might emerge (discussed further this study).
Typology of remuneration	No real differentiation of types of remuneration, although restriction on variable guaranteed remuneration (art. 11 of the Implementation Standards - IS)	Clear distinction between fixed and variable remuneration, explanation of types of variable remuneration as well as rules for each system (including exit bonus, variable guaranteed remuneration, performance based long vs. short term remuneration)	Rules-based approach which indeed is more efficient as it reduces the costs of compliance and restricts circumvention techniques (hiding variable as fixed remuneration).
Circumvention restriction	No express restrictions	Rules on personal hedging (sec. 10.1), rules on manipulation of remuneration (e.g., treating variable remuneration as fixed, no real risk adjustment etc.)	Circumvention restriction ensures that incentive structures cannot be skewed unilaterally by agents. E.g., If hedging is allowed, the <i>ex-ante</i> risk alignment will be left inefficiently as the agent will not bear any loss (no interest alignment).
Remuneration of supervisory board	No express restrictions, just alignment with risk	Primarily paid only fixed remuneration (sec. 11)	An important principle of the EBA Guidelines is that fixed remuneration is golden as it removes incentives for risk and maintains independence (trusteeship strategy). I argue that it is a problematic approach as incentives for effort levels are still needed and fixed

			remuneration might promote apathy. FSB principle might be optimal in this case.
Remuneration of internal control	Compensation must be set in such a way to allow for risk consideration (Principle 3; art. 2 IS)	Mostly fixed remuneration, if variable remuneration is paid, structured to not affect objectivity (sec. 12)	The same consideration from the remuneration of supervisory board apply here, see above.
Cap on variable remuneration	No express cap	Capped at 100% of fixed remuneration, derogation of up to 200% (sec. 13.2.)	One of the most debated restrictions of the guidelines, this rule can yield strong inefficiencies. The topic is discussed in subsection 5.2.
Years of deferral	3 years (Art. 7 of IS)	Minim 3 (revised to 4 years), 5 years for management body, maximum determined by bank (sec. 15.2)	The topic is discussed in depth in subsection 5.4.
Amount deferred	40% to 60% of variable remuneration at least (art. 6 IS)	at least 40% for identified staff/MRTs, 60% for management body; of variable remuneration (sec. 15. 1)	The topic is discussed in depth in subsection 5.4.
Payment in instruments	Payment must contain a mix of cash and instruments (Principle 7), at least 50% in instruments (art. 8 IS)	At least 50% of variable remuneration is paid in instruments depending on type of bank (sec. 15.4)	The topic is discussed in-depth in subsection 5.5.
Risk alignment	Requirement of adjustment to all types of risk, without guidance on the process (Principle 4 and 5)	Risk alignment in three stages: measurement, award and payout process, using risk sensitive criteria, monitored by internal control (sec. 14.1)	The risk alignment strategy is of paramount importance for efficient risk-mitigation remuneration. Primarily standard-based, as discussed, it relies heavily <i>ex-ante</i> on trusteeship strategies (internal control function and supervisory function), with <i>ex-post</i> verification is done by the national competent authorities, via public enforcement.

Malus and clawback requirements	Not express, just an ability to restructure compensation (art. 10 IS)	Applicable to 100% of variable remuneration, linked to risk sensitive and compliance criteria	The topic is discussed in-depth in subsection 5.6.
Supervisory authority (National Competent Authority - NCA)	Express allocation of general duties and power to supervise remuneration process (Chapter 3 of Principles)	Detailed powers to gather information, monitor and enforce remuneration guidelines (Title VII)	As the Guidelines are primarily rules-based (with some standard-based provisions), enforcement becomes essential to avoid under-deterrence, primarily as some principals (debtholder) cannot rely on their own bargaining powers to influence the remuneration structure. Also, in order to ensure the internalization of the negative externality, proper monitoring but the NCA is an essential component.

4. Particularities of the European banking remuneration framework – a Law and Economics analysis

We will now analyse the most significant parts of the regulation, going more in-depth incentive and, potentially, distortions, that could emerge from the EBA rules.

A preliminary point must be raised concerning the overall approach of the EBA rules concerning the supervision structures within the bank. The main rule which underscores the different mechanism relates to the disentanglement of risk from performance. As such, both the supervisory function and the internal control function cannot have performance-linked remuneration. The implementation of this rule is divergent for the two types, with the Board-level members being encouraged to have primarily fixed remuneration (reducing both variable and instrument-based remuneration) while the middle management level internal control is permitted all types of remuneration structures, as long as the remuneration is linked to risk reduction and not performance. This approach will inform the empirical analysis presented in future sections of the research.

4.1. Economic analysis of material risk taker regulation

Before discussing the underlining issue of the remuneration requirements, it is relevant to understand how the bank staff members which fall under the remuneration regime (generically referred to as identified staff) are to be selected. The EBA Guidelines reference the European Commission rules on the identification of so-called *material risk takers*, which automatically are to be considered identified staff. The regulation that tackles this issue is the Commission Delegated Regulation (EU) 2021/923 (herein *CD Regulation*).

The CD Regulation is the updated version of the standards for the identification of materials risk takers, the first version being the Commission Delegated Regulation (EU) 2014/604. The material risk takers are staff members that have a significant impact on the relevant material business unit's (i.e., the bank) risk profile as referred to in Article 94(2), point (b), of Directive 2013/36/EU (CRD IV). The duty to identify the relevant staff lies with the bank, but the competent national authority holds powers to monitor the implementation.

Summarizing the extensive regulation, the Commission has set general principles for determining the relevant activities which are particularly risky (art. 3 – 4 of the CD Regulation) as well as two sets of criteria for the identification of the material risk takers (herein *MRTs*), namely qualitative (art. 5) and quantitative criteria (art. 6).

The qualitative criteria expressly states that staff that hold managerial responsibilities for, among others, legal affairs; the soundness of accounting policies and procedures; finance, including taxation and budgeting; performing economic analysis; the prevention of money laundering and terrorist financing; human resources; *the development or implementation of the remuneration policy*; information technology; information security etc., must be considered identified staff within the remuneration framework.

The MRTs can be management body members, middle management or, sometimes, lower management. By setting express rules on this topic, the regulation is susceptible to any new risky activities in banking sector, lacking futureproofing. It is not difficult to imagine that the regulation will not keep up with the evolution of financial markets and will inadvertently create loopholes for risk-taking staff to fall outside of the scope of remuneration restrictions. This could be addressed by allowing the bank itself flexibility to determine the relevant staff, as it has better knowledge and is subject to the process of discovery, while adjusting for incentives by allowing NCAs to monitor the implementation. Indeed, this was the framework under the first version of the CD Regulation but,

under the revised version, the European Commission has decided that express rules are better suited to ensure convergence, although arguably ignoring the added value of local knowledge.

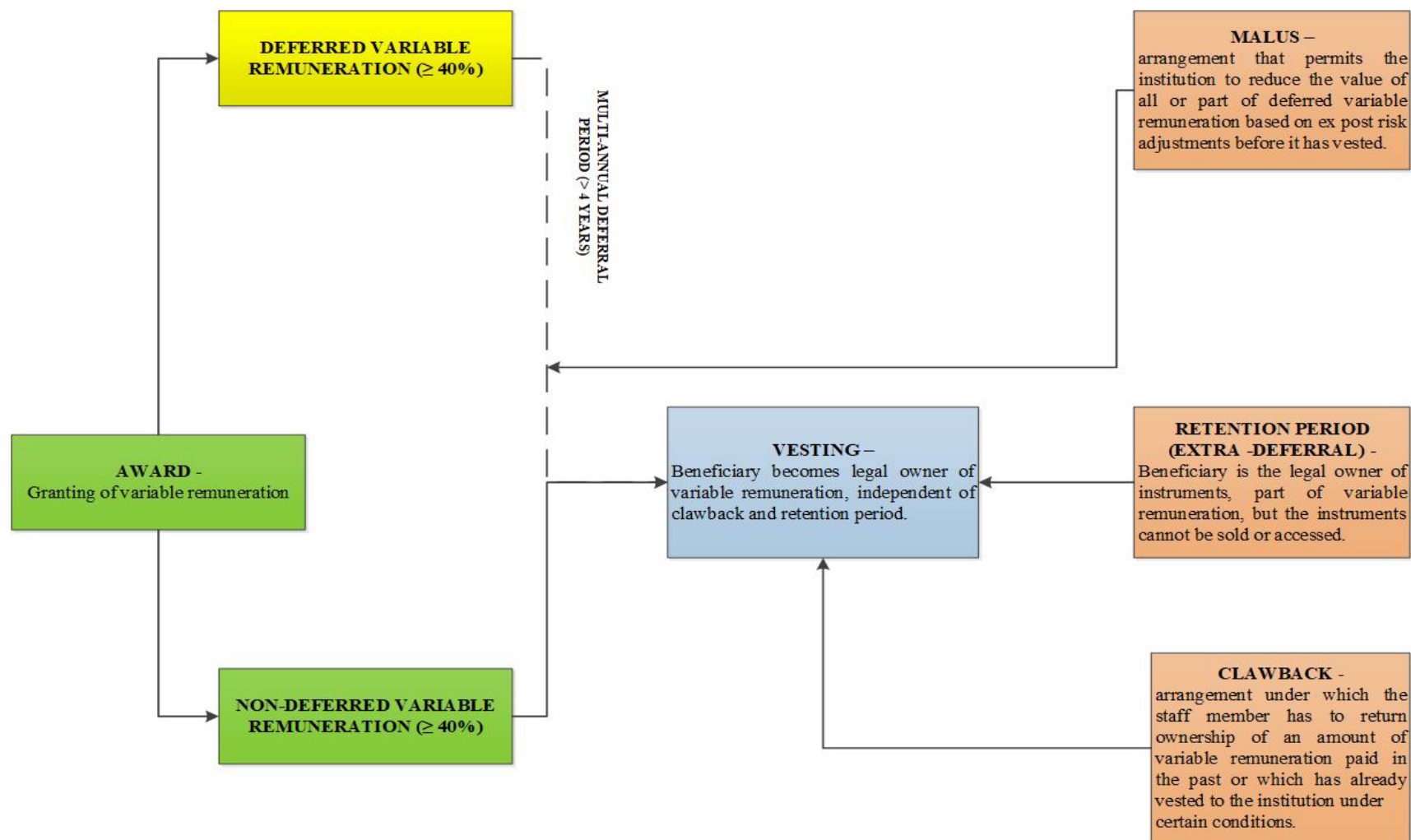
The regulation also holds a contamination provision, in that if a staff member leads a group of MRTs, under certain situations, it will also be considered on MRT (art. 5 pct. e). Such provisions are grounded in the desire to ensure that no perverse incentives lie with the manager of an identified staff whose remuneration is not properly adjusted (*ex-post*). But, *ex-ante*, what can occur is that banks, in an effort to reduce compliance costs of determining remuneration structures for a large number of staff, can actually attempt to centralise the risk-taking activities higher up in the hierarchy, essentially centralising riskiness as the top. This indeed can result in a loss of specific knowledge at the lower levels, as specialisation allows for better information to be used (ear on the ground).

Perhaps a more interesting issue is the quantitative criteria which initially stated that staff that matched the remuneration of the identified staff on qualitative criteria would also be considered MRTs. This was revised and, under the current version, only staff members with annual remuneration above EUR 750.000 or which hold remuneration levels in the 0.3% of staff are to be considered identified staff. While an improvement on the previous version, the underlining assumption can be problematic. In the preamble (pct. 7), the regulator states that remuneration relies on responsibilities, so higher remuneration reflects higher responsibility and thus higher risk taking.

But the level of remuneration itself should not be a marker of risk-taking. This is assuming the traditional paradigm that remuneration is a tool for alignment of directors with interests of shareholders, which tend to skew towards higher risk (but not always). But, as discussed in chapter 3, banking corporate governance is different and, if we are to believe that remuneration has been overall adjusted to tackle risk mitigation and not performance (requirement applicable to all staff), then why should one assume then that higher remuneration implies higher risk? Unfortunately, this mismatch between traditional and banking governance is prevalent in this regulation as well.

Before moving to particular elements of remuneration, it is necessary to briefly explain the general stages of allocation of award. Figure 3 below explain the process of award (right but no ownership over remuneration) to vesting (consolidation of ownership of remuneration). Between award and vesting one may have deferral (postponement of payment), which can be afterwards subjected to malus, clawback and retention. All the above stages will be considered in the following in-depth analysis.

Figure 2 - The evolution of award to vesting in variable remuneration. (Source: author's own, based on EBA Guidelines)



4.2. The cap on variable remuneration – efficiency implications

Following the debate on MRTs, one must then consider one of the main new elements of the CRD IV, as well as the Guidelines, namely the cap on variable remuneration. In accordance with art. 94 (1) (g), variable remuneration cannot exceed 100% of the fixed component, while overall variable remuneration must be appropriately balanced (art. 94 (1) (f)). The restriction has also been introduced in the Guidelines, the official justification being the avoidance of excessive risk taking, although a derogation to up to 200% has been introduced, subject to approval.

The proposal can indeed be considered controversial. In the relevant literature, two issues of remuneration have been raised in regard to the financial crisis, namely the level of remuneration and the structure of remuneration. For the public and politics in general, the former was also seen (maybe justly so) as the more relevant one. However, riskiness can be better linked to an inadequate structure which can seriously alter the incentives (Laroisiere Report, 2011). As such, capping variable remuneration may do very little to stop riskiness, without adequate structure. Moreover, it creates further perverse incentive, as it can lead to an increase of fixed remuneration which makes banks more vulnerable to business cycle and failure (French, 2010).

On the other hand, it can lead to a reduction of variable remuneration, which, in traditional wisdom, can lead to avoidance of “bad risks”, if variable remuneration is higher than fixed (Murphy, 2013). Under the Guidelines, if bad risks emerge, it is irrelevant for the agent, as the remuneration is fixed and bonuses will be capped.

Most importantly, remuneration set by the market, which allows for discovery of information, allows for a better alignment of incentives, as banks are matched with the adequate agents, considering asymmetric information. By tampering with the mechanism through the introduction of the cap, you are removing market mechanism and may result in “bad lemons” emerging (Akerlof, 1970), as executives which wish to higher remuneration will leave. Finally, this could incentivise banks to circumvent the provision by labelling variable remuneration as fixed (such a debate emerging regarding allowances which, although subject to change, had previously been labelled as fixed remuneration). The Guidelines prohibit such attempts, but enforcement of the restrictions is very difficult. This could push banks to remove normal triggers for variable remuneration to avoid detection which might lead to more inadequately structured remuneration. Overall, the restrictions lead again to an inflexible, one-size-fits-all approach, for banks with different levels of risk exposure and different incentive structures, which result in prolonged inefficiency.

4.3. The cap on variable remuneration for the supervisory function and its missed opportunity

We wish to give some consideration to a specific version of a cap on variable remuneration, namely the restriction of payment of variable remuneration for the supervisory function (Board of Directors in the one tier system, Supervisory Board in the two-tier system).

The supervisory function is restricted to receive only fixed remuneration. If variable remuneration is to be paid (exceptionally), there should be a proper explanation as to how this was done to ensure risk alignment and linked to control tasks. While this is motivated by the desire to ensure that the supervisory function assumes just a monitoring and control role (underlining the trusteeship strategy, as discussed previously), this also seems to be a missed opportunity. Instead of setting a default of fixed remuneration, a better approach would have been to allow for some variable remuneration which would be primarily linked to the performance in supervisory activity and not banking performance, of course.

Fixed remuneration will lead to low effort level for the supervisory function, as fixed remuneration is guaranteed and cannot be altered without consent of both parties. So regardless of

the effort in monitoring activity, the members will still receive their remuneration. While this could be adjusted in case riskiness of the bank increases, most of the mechanism of risk adjustment, including clawback and malus, are linked to variable remuneration, so any incentives for the supervisory function are stripped of most content.

This is indeed a puzzling decision on behalf of the regulator, since the internal functions (which operate as the middle management independent supervisors) are allowed to receive variable remuneration (although primarily fixed remuneration is again recommended), using criteria concerning control activity performance (sect. 12 Guidelines) as discussed above, even though they are also a relevant part of the trusteeship strategy.

The banks could opt to set a variable remuneration structure but considering that the default (optimal conduct) is set at fixed remuneration only, there is little to suggest that bank will incur the opportunity costs of structuring and explaining such a framework to the competent authority. Also, there is little incentive for the Board of Directors to actually do so, as they are promised guaranteed remuneration, regardless of effort level, which further exacerbates the traditional principle – agent problem.

4.4. The Law and Economics of deferral in remuneration

The Guidelines, in line with CRD IV, impose a deferral (sect. 15 Guidelines) of 40% of variable remuneration (60% for management body). The period of deferral was initially set at a minimum of 3 years for identified staff and a minimum 5 years for the management body (sect. 15 Guidelines). The revised guidelines extended the general restriction to minimum 4 years.

From a law and economics perspective, the provision does indeed mitigate the PAP, and is seen as an essential element of risk alignment, by forcing the directors to consider long-term versus short-term goals, through deferral and restrictions on vesting (ownership of shares) until the termination of the principal-agent relationship (Ferrarini, 2015). Consensus on this measure might be the reason why deferral period has been extended now to 4 years.

However, some issues should be considered. Firstly, deferral itself is not enough to reduce risk, proper process and structuring is needed, and the role of malus and clawback is essential. While deferral does align interest of directors with shareholders, they must also be incentivized to consider debtholders and other stakeholders in the company, so the way deferral and vesting is designed (based on what triggers) becomes of paramount importance. Secondly, linking to the problem of the variable cap, one can imagine a scenario in which, because of deferral, agents are paid more variable remuneration (to adjust for market demand), which in turn increases fixed remuneration (due to the 100% cap), which means higher remuneration overall. This shows how a lack of alignment between different remuneration measures can yield counterintuitive results.

Thirdly, the issue of deferral is also linked to dividend restrictions. In accordance with the Guidelines, dividends and other interest payments are not allowed in regard to deferred and not vested parts of variable remuneration.

EBA has explained³ that the pay out of dividends on awarded instruments that have not yet vested would limit the possibility to adjust the variable remuneration awarded down to zero. Such payments would also limit the effect that implicit risk adjustments via the change of share or instrument prices have.

We would however argue that this is a misleading argument. Variable remuneration can be adjusted down to zero including dividend payments if payments of dividend is set *pro rata* to the value of vested remuneration (so if no variable remuneration is vested, neither will dividend

³ EBA Analysis and Q&A, part of Guidelines.

payments). Moreover, the lack of dividend payment can also warp the incentives to the identified staff. If they cannot take part in the dividend disbursement, it may cause a lowering of performance due to lowered incentives (resulting in lower profit and dividends).

Perhaps concerns could be raised that there is a counter-incentive to distribute dividends for their benefit when recapitalization is more adequate. But dividend policies are separately monitored by NCAs and an increase of riskiness of the bank due to inadequate dividend policies would simply result in an *ex-ante/ex-post* adjustment of remuneration (and dividends) for the agent. So, there seems to be no efficiency concern here, simply a misalignment of understanding of the interplay of the different mechanisms.

4.5. Instrument-based remuneration – efficiency or misalignment?

A requirement which found its way in both FSB Principles, CRD IV and EBA guidelines was the obligation for 50% of variable remuneration to be paid in instruments (Sec. 15.2. Guidelines). The type of instruments that could be used are referenced in art. 94 of CRD IV, but primarily, for stock companies, it was represented by shares (for listed companies) or share-linked instruments – synthetic shares (for non-listed companies). The underlining economic purpose was to avoid cash payment which incentivize directors to disregard long term goals and risk for shareholders in favour of short-term gains (Chen, 2006; Chesney, 2010).

The duty to allocate share was criticised by many countries (Germany, France, Denmark, Luxemburg etc.⁴), being one of the most opted out provision of the regulation. This was primarily due to the difficulty of creating share allocation plans for listed companies, with wildly different ownership structures while most countries wanted to opt primarily for share-linked instruments for listed companies as well. This led to a revision of the provision, which now allows for share-linked instruments regardless of the type of companies.

However, such instruments are not without fault. Synthetic shares are simply instruments that tie their value to the price of the share, at the moment of vesting. But, at vesting, the payment is made in cash and not in instruments. This indeed allows for a similar loss absorption as a share, but the lack of other rights which are associated with shares (ownership and stake in the company, dividend etc.), some of the incentives of an instrument payment are indeed lost, with agents not reaching the same level of care as they would as potential owners of the company.

Another criticism to this problem is the discussed issue of the shareholder-centric approaches. Shares indeed align interest of agents to the shareholder-principal. What about debtholders? Some have argued that remuneration should be paid in debt-linked instruments primarily (Bhagat, 2014), allowing for a stronger alignment with depositors (an example of such an approach is linking remuneration to credit default swaps) (Bolton, 2010).

Depositors, as discussed, are less aware of risk exposure of the banks and should receive better protection. More so they face collective action problems as they cannot properly coordinate, and regulatory intervention is always possible.

The counterargument to such an approach is that equity is still needed to ensure performance of the bank while depositors free ride on the monitoring powers of shareholders in order to ensure viability of banks. This is true only to a certain extent, as it is equally correct to assume that shareholders will want higher risk and bigger gain as the costs of a bank failure will be borne by the depositors and, ultimately, the state. So, perhaps a hybrid model in which remuneration is linked

⁴ EBA Guidelines Compliance Table, 2015.

partially to debt and equity would be more optimal (Bhagat, 2014), to tackle the above issues. While the EBA does reference payment in *other instruments* including bail-in linked instruments, most rules are still aimed at an equity-based approach.

In the debate surrounding the remuneration of the supervisory structure, payment in instruments for Board members is strongly discouraged, as it might undermine the independence of the players and the trusteeship strategy if they receive instruments which align their interests with the performance of the bank. Oddly enough (and similarly to the debate around variable remuneration), this logic is not extended to the internal control function (which shares the incentive structure), which can receive both variable remuneration and pay in instruments (traditionally equity).

4.6. *Malus and clawback – on the economics of ex-post adjustment regulation*

One of the main novelties of the Guidelines is the provision of malus and clawback requirements. In accordance with the Guidelines definitions (art. 11), *malus means an arrangement that permits the institution to reduce the value of all or part of deferred variable remuneration based on ex-post risk adjustments before it has vested* while clawback is referenced to be an *arrangement under which the staff member has to return ownership of an amount of variable remuneration paid in the past or which has already vested to the institution under certain conditions*.

Clawback and malus provisions are mirror images of the same mechanism, with the latter operating before a deferred part of remuneration is vested, while clawback activates post vesting. Malus and clawback come into play in the principle-agent problem as a means of tackling the bargaining problem and to incentivize and align with long-term interests. However, the mechanisms are not actually caps on remuneration, they simply condition (attach strings) to the remuneration itself. So, they work best in tandem with other mechanism such as deferral and caps on variable remuneration (Stark, 2020).

Within the PAP paradigm, malus and clawback hold a two-fold function: 1. they prevent excessive remuneration when *ex-post* it has been shown that performance was inadequate, or risk was excessive as well as 2. incentivize agents to act in the interest of the company due to the threat of the provisions. Both methods operate *ex-post* (after award and deferral has occurred) but tackle different issues. Malus blocks a new vesting to occur (essentially diminishing the overall variable remuneration) while clawback goes further to remove ownership over remuneration which has already vested.

Clawback and malus thus tackle horizon problems, the time lag between a decision or performance (Stark, 2020) and the observable consequences that is a central element of the PAP (Holstrom, 1979; Grossman, 1983), allowing for recoupment (Chen, 2014). Thus, while these provisions may offer a therapeutic benefit for the public (as paid remuneration can be recovered), primarily it has purpose in its preventive and deterrent goals, as it forces agents to act in such a way that the *ex-post* correction is never triggered (Stark, 2020).

Thus, according to the guidelines, these mechanisms apply to 100% of the variable remuneration, so there is little incentive to circumvent by increasing overall variable remuneration by pricing in the clawback, the only way to bypass the requirement would be to increase fixed remuneration which leads to similar problems as discussed in the variable cap.

The rules set by the Guidelines divide the clawback and malus into two primary types. The first one is a performance based one (Freid, 2010), which include criteria for activation of the adjustments for increased risk, or other markers that indicate an increase in the risk exposure of the bank, essentially allowing for recoupment based on risk. The rules also allow for triggers linked to the

individual conduct of the agent, relating to objectional behaviour, commonly referred to as compliance clawback/malus.

We would argue that the strength of the clawback will come from the fine tuning of the bank itself, as the triggers must be determined by the institutions. These requirements could likely be prone to tampering by the management body, so any discretionary features which may give way to interpretation must be counterbalanced by strong internal governance, which is why both internal control functions and the supervisory body are called to monitor the adjustment (trusteeship strategy).

The principal-agency problem however becomes more complicated when considering that *ex-post* adjustment is applicable to the internal control functions as identified staff, essentially having to act as judge and executioner for their own compensation, which could lead to perverse incentives. The problem of enforcement is indeed the main concern as incentives should be set in such a way that the supervisory body can bypass subjectivity in deciding the triggering of clauses that are wealth decreasing and affect reputation.

Final consideration can be given to the issue of interaction between the adjustment and the retention framework. Under the Guidelines, we have a retention period in which, after vesting, staff can still not make use of the remuneration, for a period between 6-12 months. Considering that clawback is still applicable after vesting, one cannot find efficiency-related reasoning for the retention period, outside of an extra deferral which has been accommodated by the revised Guidelines (increased to 4 years deferral), again showing a mismatch of different understanding of the provisions and incentives, while generating costs of compliance and monitoring for the banks.

5. Empirical analysis

5.1. Research scope and state of the art

In the previous chapters, I have discussed the placement of banking remuneration within the larger debate about corporate governance and shown the need for as well as limitation of the regulatory framework. There is little debate to the fact that the European legislator considers remuneration to be of paramount importance in mitigation the risk exposure of the bank. It seems clear that the European legislator favours the remuneration policy as a tool to handle some of the specific moral hazard (agency problems) in crisis scenarios. The Guidelines, in its second major revision, are still seen as a relevant mechanism in the toolbox of the regulator, to such an extent that the methodology is being adjusted and extended to other investment firms (new regulations should enter into force in 2023).

However, the questions of the effectiveness of the remuneration policies, as with other corporate governance problems, remains oddly unresolved. Most of the empirical studies focused on the situation up to the financial crisis (e.g., Fahlenbrach, 2011; Bebchuk 2010; de Haan, 2013) while the most recent academic offering focus on the normative framework (e.g., Stulz, 2012). Moreover, most of the empirical research focuses on executive (primarily CEO) pay as well as executive directors, tackling the accuracy of the incentive structure (e.g., Cerasi, 2017; Bebchuk 2010).

In the scope of research, I will focus on the primary purpose of remuneration, as presented by the EBA, namely risk mitigation. I will also look at the impact of the European rulebook on remuneration, looking at a recent sample (2019 and 2020), to determine an up-to-date overview. Moreover, I will look at remuneration at every level of regulated structure within the supervisory structures within the bank, namely supervisory body and internal control (identified staff). I will also look at different typologies of remuneration structures, to determine their efficiency in tackling the discussed market failures. To my knowledge, this is the only analysis that goes in depth to the issue of remuneration under the current Guidelines, looking at all levels of material risk takers.

Moreover, the impact of the research is also a direct result of the empirical method used. We implement two empirical models, namely a more traditional fixed effects panel model which, in turn, complements the more innovative continuous difference-in-difference model. While the former exploits the full panel structure, allowing for a control for bank fixed effects and time-invariant characteristics, the latter helps estimate the casual impact of remuneration changes on risk and performance during a shock (the COVID-19 pandemic and the ESRB recommendation).

5.2. Methodology

The main purpose of my research proposal is to answer the following question: **is the remuneration legislation and practices concerning the supervisory and internal control function helping in tackling the risk taking-behaviour of the bank?**

We intend to find an answer to this question through a cross-country empirical analysis. I have extracted the information for the banks from the list of other systemically important institution published by the European Banking Authority. The list of OSII changes every year, the one from 2020 holds 173 institutions. I chose O-SII banks as they are sufficiently similar in scope and riskiness and so comparable but also representative of the specific behaviour and regional and cultural differences. As these are the most significant regional banks (and not globally significant) which comply the Guidelines, I believe they are an accurate marker of the population (European banks). Moreover, different significance of banks might trigger proportionality thresholds, removing the remuneration

structure from the scope of the EBA Guidelines. As the largest banks in each country all fall under the Guidelines at the same level of compliance, these banks are labelled as the comparable, as part of our robustness strategy. We have thus extracted information on a sample of 51 banks, for 2020 and 2019.

As the robustness of remuneration is put to the test in a crisis scenario, I explored such a potential scenario with the recent COVID-19 crisis. While not a financial crisis, the COVID-19 pandemic provided a unique opportunity for an empirical analysis, functioning as a natural experiment. In May 2020, the European Systemic Risk Board issued one of its first recommendations on the issue of remuneration, cautioning banks to avoid paying any variable remuneration which might affect its financial stability⁵. The decision was indeed only a recommendation and did not expressly state what type of remuneration structure was acceptable, transferring the onus of the decision to the European banks (and its national competent authorities). As such, the banks had to adjust their remuneration structure accordingly, in order to adjust (or maintaining) its risk profile, thus revealing something about its interpretation of the potential of risk mitigation of different types of remuneration. This allowed scope for banks to adjust the remuneration of 2020 in such a way to reduce riskiness, which should be reflected in shifts in the remuneration values between 2019 and 2020. I have thus focused on this shift in the approach on banks, in order to determine the actual impact that such measures have, using a continuous difference-in-difference (DiD) model which will be explained below.

The scope of the analysis is not to determine *per se* the impact of COVID-19 on the remuneration practices of banks and their connection to risk or performance. Moreso, I am using COVID-19 as a shock, part of a quasi-natural experiment, in which banks altered what they perceived as risk-reduction remuneration strategies. This reveals the use of the remuneration tools by the banks, which in turn allows for the identification of the impact of instruments in during the 2019 and 2020 paradigm shift. As such, in the research, the COVID-19 event which is the basis of the model will be labelled as *shock*.

We have selected banks from every country which complies with CRD IV disclosure requirements. I have ensured randomization by randomly selecting the comparable banks from each country to be part of the sample, to ensure that an unbiased sample. Because the banks in the sample are not all publicly traded companies, the remuneration data was manually collected from the Pillar 3 (CRD IV) annual transparency reporting, but, where information was incomplete, cross-referenced and recalculated information from annual financial reports and other banking disclosure. All sums in foreign currency were converted to Euro at rate of the date of reporting. For financial and ownership information, I extracted data from the BankFocus (Orbis) and Wharton database as well as the annual Board reports. The remuneration data gathered references the *performance years of 2019 and 2020* (not the report published in 2019 and 2020), thus isolating the remuneration shifts which are directly linked to the shock.

The remuneration information for each type was disclosed per group, so for each series in the sample, I calculated the average value of remuneration. This is done because, for example, supervisory function is comprised of 7 to over 20 MRTs so the average was used in order to make the values comparable.

We implement two empirical models, namely a more traditional fixed effects panel model which, in turn, complements the more innovative continuous difference-in-difference model. While

⁵ ERSB Recommendations on restriction of distributions during the COVID-19 pandemic (ESRB/2020/7). The recommendation was that at least until 1 January 2021 relevant authorities request financial institutions under their supervisory remit to refrain from creating an obligation to pay variable remuneration to a material risk taker, which has the effect of reducing the quantity or quality of own funds at the EU group level and, where appropriate, at the sub-consolidated or individual level (Recommendation A). The document did not explain what this obligation was (which part of the fixed-variable dichotomy should be tempered with) or how it should be adjusted (part from the vague instruction to *refrain*), simply that the financial stability of the institution be maintained (or improved, if possible).

the former exploits the full panel structure, allowing for a control for bank fixed effects and time-invariant characteristics, the latter helps estimate the casual impact of remuneration changes on risk and performance during a shock (the COVID-19 pandemic and the ESRB recommendation). For the fixed effect model, I will include both firm-specific and time-specific fixed effects, defined as unobservable effects on risk and performance that are either time-invariant but differ across banks (specific risk profiles) or times-specific that are the same across banks (European specific regulation, banking shocks etc.). This will aid in avoiding omitted variable bias.

While the sample used does not contain a clear-cut control group — as all banks engage in some payment of remuneration and our subject to the Guidelines — the analysis leverages variation in the intensity and structure of remuneration to assess its role in shaping bank behaviour. The use of a continuous difference-in-differences approach addresses this by estimating how outcomes differ across banks with higher versus lower levels of remuneration before and after the COVID-19 shock. Provided that banks would have followed similar trends in the absence of the crisis — a condition supported by pre-treatment parallel trends (discussed in robustness strategy below) — the results capture differential behavioural responses attributable to remuneration design. This approach is particularly suited to institutional settings where treatment is universal but heterogeneous in strength.

This is also in line the interpretation of the exogenous shock timing as the COVID-19 pandemic was not caused by the banks, and it hit every bank at the (approximately) same time. As such, differences in response are plausibly driven by pre-existing structures like remuneration, governance, etc. Moreover, remuneration is not perfectly endogenous to the shock as we assume that remuneration in 2019 (pre-COVID) wasn't set in anticipation of the crisis — a reasonable assumption considering that the initial effects of the pandemic were only perceived in early 2020.

The econometrical approach is validated by recent literature on continuous DiD models. Callaway et al. (2024) emphasize that treatment can be continuous and vary over time and across units. They introduce generalized DiD estimators and inference procedures designed specifically for continuous treatments, allowing researchers to estimate "dose-response" functions within DiD frameworks while de Chaisemartin et al. (2023) explicitly validates that this type of approach—using continuous DiD model without an explicit zero-dose group—is methodologically rigorous and appropriate.

In addition to the continuous DiD model specification, a fixed effects panel model was estimated to assess the average within-bank relationship between remuneration structures and performance. Although the model does not isolate the causal impact of the COVID-19 shock, it remains valid in the absence of a clear treatment-control distinction, as it relies on variation within banks over time and controls for unobserved heterogeneity and year-specific effects. The results provide robust evidence that incentive and variable pay structures are significantly associated with changes in bank profitability and risk, reinforcing the patterns identified through the DiD approach.

The dependent variables as well as the variables I am controlling for are explained in Table 2 and are the same across for all types of personnel.

Table 2 – Presentation of dependent variables used in empirical research. (Source: author's own)

DEPENDENT VARIABLES		
Name	Variable	Considerations and assumptions
LDR	Loan-to-deposits ratio	LDR is used as a proxy for risk, showing the level of riskiness (lending) engaged in, also working as a proxy for the leveraging paradigm (Voinea, 2016). The choice of LDR among other risk indicators was deliberate as it is a more intuitive indicator of the choice of the bank to engage in a risk level. However, it can be acknowledged that risk can impact asset quality, either endogenous or exogenous. This is why NPL is used as a control variable, to adjust for the deterioration of the asset quality due to exogenous (sector specific) risks.
ROA	Return-on-Assets	ROA is used as a performance measurement (de Andres, 2008; Pi, 1993; Yeh, 2011; Hardwick, 2011; Aebi, 2012). A performance indicator is used in order to show the counterfactual, is remuneration indeed linked to risk mitigation or, as traditionally occurring, to performance?
CONTROL VARIABLES		
Name	Variable	Considerations and assumptions
NPL	Non-performing loan ratio	NPL is used as a proxy for the riskiness of the sector itself, controlling for any unobservable effects that might increase or decrease risk which are unrelated to the remuneration structure (Grove, 2011).
assts	Total Assets	Total assets are being used as a proxy for the size of the bank, to control for any additional risk that might emerge due to the scope of the activity of the banks.
own	Ownership	Ownership (Dupire, 2017; Bebchuk, 1999; Barry 2011) can impact risk-taking so I will be controlling for the impact of ownership on the risk level of banks by using the Herfindahl-Hirschman Index (HHI) to determine ownership concentration (Bednarek, 2014).

The fixed effect multiple regression model can be translated as follows:

A. For the Supervisory function model

$$1) LDR_{it} = \alpha_i + \beta_1 \text{supfixed}_{it} + \beta_2 \text{supvar}_{it} + \beta_3 \text{supinst}_{it} + \mu_{it}$$

$$2) ROA_{it} = \alpha_i + \beta_1 \text{supfixed}_{it} + \beta_2 \text{supvar}_{it} + \beta_3 \text{supinst}_{it} + \mu_{it}$$

B. For the internal control function, respectively:

$$1) LDR_{it} = \alpha_i + \beta_1 \text{VtF}_{it} + \beta_2 \text{fix}_{it} + \beta_3 \text{inst}_{it} + \beta_4 \text{VtF}_{it} + \beta_5 \text{vldef}_{it} + \beta_6 \text{yrdef}_{it} + \beta_7 \text{clawm}_{it} + \mu_{it}$$

$$2) ROA_{it} = \alpha_i + \beta_1 \text{VtF}_{it} + \beta_2 \text{fix}_{it} + \beta_3 \text{inst}_{it} + \beta_4 \text{VtF}_{it} + \beta_5 \text{vldef}_{it} + \beta_6 \text{yrdef}_{it} + \beta_7 \text{clawm}_{it} + \mu_{it}$$

where LDR and ROA are the dependent variables used for risk and performance (Table 2), while each independent variables are indicated in Table 3 and 4, per type of staff of category, for a certain bank i at time t , while in each case μ_{it} is the residual error term by bank and year.

The continuous difference-in-difference model can be translated as follows:

A. For the Supervisory function model

$$Y_{it} = \alpha_i + \beta_1 \text{supfixed}_{it} + \beta_2 \text{supvar}_{it} + \beta_3 \text{supinst}_{it} + \beta_4 (\text{supfixed}_{it} \times \text{PostShock}_t) + \beta_5 (\text{supvar}_{it} \times \text{PostShock}_t) + \beta_6 (\text{supinst}_{it} \times \text{PostShock}_t) + \gamma X_{it} + \lambda_t + \mu_{it}$$

B. For the internal control function model

$$Y_{it} = \alpha_i + \beta_1 \text{ctrlfixed}_{it} + \beta_2 \text{ctrlVtF}_{it} + \beta_3 \text{ctrlinst}_{it} + \beta_4 \text{ctrlvldef}_{it} + \beta_5 \text{ctrlclawm}_{it} + \beta_6 (\text{ctrlfixed}_{it} \times \text{PostShock}_t) + \beta_7 (\text{ctrlVtF}_{it} \times \text{PostShock}_t) + \beta_8 (\text{ctrlinst}_{it} \times \text{PostShock}_t) + \beta_9 (\text{ctrlvldef}_{it} \times \text{PostShock}_t) + \beta_{10} (\text{ctrlclawm}_{it} \times \text{PostShock}_t) + \gamma X_{it} + \lambda_t + \mu_{it}$$

where:

- Y_{it} represents the dependent variable (either the Loan-to-Deposit Ratio, LDR, as a measure of bank risk-taking or the Return on Assets, ROA, as a measure of profitability - Table 2), while each independent variables are indicated in Table 3 and 4, per type of staff of category, for a certain bank i at time t ,
- α_i represents the bank-specific fixed effects, controlling for all unobserved, time-invariant heterogeneity at the bank level.
- PostShock_t is a binary indicator taking the value 1 in the post-shock year (2020) and 0 otherwise. The interaction terms capture how the impact of each remuneration type changes post-COVID shock.
- γX_{it} is a vector of control variables (log of assets, ownership type (OWN), Non-performing Loan Ratio (NPL)).
- λ_t denotes year fixed effects, capturing common macroeconomic shocks.
- μ_{it} is the error term, clustered at the bank level to allow for correlation within banks over time.

Sub-research question 1 for empirical purpose: *Is the remuneration paid to the supervisory function adequate in mediating the riskiness of the bank?*

The first set of multiple regression will focus on the impact of the remuneration of the supervisory function on riskiness and performance. The main independent variables are presented in the below Table 3.

Table 3 – Presentation of independent variables used for remuneration of supervisory function. (Source: author's own)

Name	Independent Variable	Considerations and assumptions
supfixed	Fixed remuneration	Fixed remuneration in general will be used to determine the way in which the structured remuneration overall impact the riskiness of banks. Also, it will help determine if excessive remuneration is still impacting the risk profile as well identifying the possibility of circumvention as a consequence of labelling variable remuneration as fixed, to bypass the cap on variable for the supervisory function.
supvar	Variable remuneration	Variable remuneration is used to determine if banks can bypass the default set by the EBA and allow for variable remuneration which is correlated with the supervisory activity of the bank. It also aids to determine the impact of risk in cases in which banks have opted to allocated variable, deviating from the default rule.
supinst	Remuneration paid in instruments	Remuneration in instruments is used to determine the possible interplay and counterintuitive incentives of allowing primarily fixed remuneration to be paid in instruments, primarily shares, which might promote more riskiness, as discussed in previous chapters.

Sub-research question 2: *Is the remuneration paid to the internal control function adequate in mediating the riskiness of the bank?*

We have included the internal control function MRTs as there are a new form of independent *internal gatekeepers*, that should monitor the behaviour of the management and report to the supervisory function. On the other hand, they present their own PAP in regard to the Board as well as to the shareholders as principals. Moreover, they are present in the remuneration evaluation and adjustment process, further complicating the paradigm (see Figure 1). Their remuneration thus should be set to reflect this.

The second set of multiple regression will focus on the impact of the remuneration of the above on riskiness and performance. The main independent variables are presented in the below Table 4.

Table 4 – Presentation of independent variables used for remuneration of internal control function. (Source: author's own)

Name	Independent Variable	Considerations and assumptions
fix	Fixed remuneration	Fixed remuneration in general will be used to determine the way in which the structured remuneration overall impact the riskiness of banks. As the EBA is enforcing restriction primarily on variable remuneration and incentivizing banks to primarily pay fixed remuneration, the purpose is to determine if indeed such remuneration has this assumed goal.
VtF	Variable to fixed ratio	The variable to fix remuneration ration will aid in determining how the variable cap itself is limiting variable remuneration and, accordingly, riskiness. We shall also determine the impact on performance that this approach has, to see if the cap is indeed limiting efficiency and/or attracting less efficient managers (bad lemons). Also, it will help determine if excessive remuneration is still impacting the risk profile.
inst	Remuneration paid in instruments	The ratio of remuneration paid in instruments will help determine if this strategy ensures risk reduction, or, as under the traditional corporate governance paradigm, it aligns the interests of the agent to the (risk-loving) shareholder
vldef	Deferred amount	The amount of deferred variable remuneration shows how the newly introduced postponement of payments can impact the risk exposure of the bank.
yrdef	Years of deferral	Similarly, to the value postponed, years of deferral shows how if the time horizon problem is solved by using different length periods, considering also its impact on the risk profile.
clawm	Amount adjusted through clawback/malus	The more novel element of banking remuneration, I wish to determine if ex post adjustments are actually taking place and what is the end result in regard to risk and performance.
ctrl	Internal Control Function	Identifier before independent variable, marking that it refers to the remuneration of the internal control function

6. Empirical findings and preliminary Law and Economics implications

6.1. Robustness of the models and summary of descriptive statistics

Several steps were undertaken to ensure the robustness of results obtained from analyzing the impact of remuneration structures within supervisory functions on bank risk-taking (Loan-to-Deposit Ratio - LDR) and profitability (Return on Assets - ROA):

Fixed Effects Estimation. Fixed-effects panel regressions were employed to control for unobserved heterogeneity at the bank level. By utilizing within-bank variation over time, these models significantly reduce omitted-variable bias arising from time-invariant bank characteristics. Such a methodological choice greatly enhances the reliability of causal inferences compared to simpler cross-sectional regressions. The choice of a fixed effects model (as opposed to a random effects model) was validated via the results of the Hausman test.

Difference-in-Differences (DiD) approach with continuous treatments. A continuous difference-in-differences (DiD) model was utilized, incorporating a continuous measure of remuneration as treatment. This approach explicitly investigates how the COVID-19 systemic shock dynamically altered relationships between remuneration structures and bank outcomes. Interaction terms between remuneration variables and the COVID-19 crisis dummy explicitly test whether this systemic event significantly shifted remuneration-related incentives, thus serving as an additional robustness test of the stability of relationships over time.

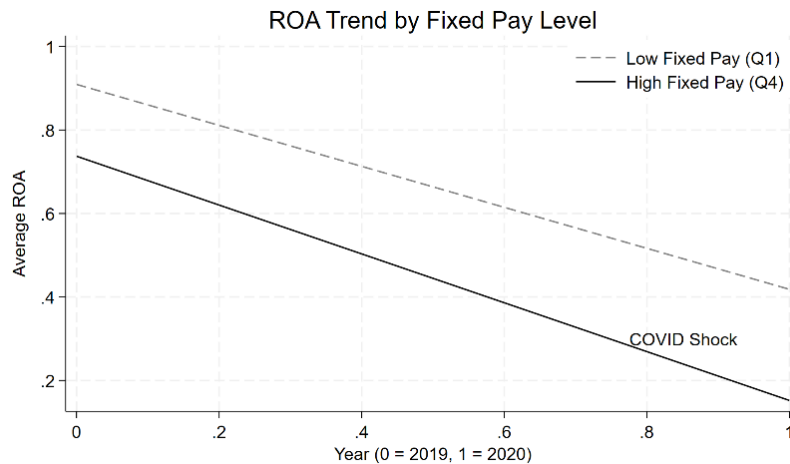
Robust Standard Errors (Clustered by Bank). Standard errors in all regressions were robustly clustered at the bank level. This approach accounts for serial correlation and heteroskedasticity within banks across years, providing statistically robust inference, and safeguarding results from overstated significance levels.

Control Variables and Macro Shocks. Control variables—bank size (log of assets), ownership structure, and non-performing loans (NPL)—were consistently included to isolate remuneration effects from other external influences. Year fixed effects were also incorporated to absorb macroeconomic shocks affecting all banks similarly, such as economic fluctuations, regulatory changes, or broad market movements, thereby helping isolate remuneration-specific impacts.

Collinearity Assessment. Diagnostics for multicollinearity were systematically conducted, resulting in certain variables (e.g., ownership type) being omitted from the final regression models. Addressing collinearity issues enhanced interpretability and stability of parameter estimates, further ensuring the robustness of results.

Validation of Parallel Trends Assumption. The parallel trends assumption, critical for the validity of the DiD methodology, was carefully verified through visual diagnostics. Quartile plots depicting trends in LDR and ROA by remuneration levels before and after the COVID shock were analyzed (see Figure 3 as an example for ROA evolution as linked to fixed remuneration for supervisory function). These visual inspections affirmed the validity of this assumption, ensuring credibility of the causal interpretations of the continuous DiD model results.

Figure 3 - Validation of Parallel Trends Assumption – example for impact of supervisory fixed remuneration on ROA. (Source: author's own)



Consistent Findings Across Specifications. Anticipating some of the results of the empirical analysis, key findings regarding the role of remuneration consistently emerged across various model specifications. For the supervisory function, fixed remuneration was consistently associated with increased risk-taking (LDR) pre-COVID, followed by moderation post-COVID, signalling regulatory or managerial adjustments triggered by the crisis. The insignificant impact of fixed pay on profitability (ROA) across specifications reinforces the regulatory expectation that supervisory remuneration should not incentivize performance chasing. Across different specifications and robustness checks, variable remuneration consistently exhibited statistically significant relationships with risk-taking. The observed negative coefficients (reducing LDR) highlight a consistent, albeit small, beneficial effect in controlling risk-taking, which withstands rigorous testing across methodologies and clustering strategies.

For internal control function, findings related to variable-to-fixed remuneration consistently demonstrated positive and significant effects on risk-taking (LDR) across different model specifications, increasing confidence in this particular result. Furthermore, the reversal of the relationship between variable-to-fixed remuneration and profitability (ROA) post-COVID highlights the stability of this interaction effect under stress conditions.

Collectively, these robustness tests substantiate the reliability and stability of the core empirical findings. The analysis conclusively demonstrates that supervisory remuneration structures possess meaningful implications for banks' risk-taking behaviours. Despite regulatory expectations, misalignments and unintended risk-taking incentives persisted pre-crisis but were partially corrected post-COVID. For the internal control functions, I have found non-negligible implications for bank risk-taking and performance, robustly withstanding different modelling specifications, clustering strategies, and methodological variations. Consequently, the identified incentive misalignments and limited effectiveness of governance tools represent robust and actionable insights for regulatory policy and bank governance structures.

Following my analysis, I provide below a summary of the main descriptive statistics of the sample presented. As it can be seen in Table 5, for some observations in the sample, information on either control function were not presented in the sample, but in an insignificant amount. For all models, p-value for goodness-of-fit test (Prob>F) was below .05, validating the models, confirming that all coefficients are different than 0.

Table 5 – Descriptive statistics. (Source: author's own)

	Variable	Obs	Mean	Std. dev.	Min	Max
SUPERVISORY FUNCTION	supfixed	102	621527.1	2497327	0	1.95e+07
	supvar	102	78721.42	469580	0	3825000
	supinst	102	14685.11	98066.17	0	857666.7
	invclawm	100	7437.24	44262.99	0	351066.7
INTERNAL CONTROL FUNCTION	ctrlVtF	99	.5142022	1.272087	0	8.196721
	ctrlfix	99	2033925	1.79e+07	8052	1.78e+08
	ctrlinst	99	45051.96	168932.2	0	1585185
	ctrlvldef	99	31989.2	63286.84	0	461691.5
	ctrlrdef	100	3.8	1.3484	0	7
	ctrlclawm	99	381.017	3091.493	0	30567.69
DEPENDENT VARIABLES						
LDR		102	78.35618	32.6628	26.75	262.49
ROA		102	.5408824	.7536999	-2.27	2.77

6.2. Empirical results for supervisory function remuneration

The main results of the Continuous Difference-in-Difference model concerning the remuneration of the internal control function can be found below, in Table 8, while the fixed effects panel model can be found in Table 9.

Table 8 – Empirical results for Continuous DiD model - supervisory remuneration. (Source: author's own)

Variables	Loan-to-Deposit Ratio (LDR)	Return on Assets (ROA)
Fixed rem.	.4140625 (.269715)	.0197862 .0163539
Variable Ratio	-4.67e-06* (1.77e-06)	-9.88e-07*** 1.18e-07
Instrument Pay	-.0002803*** (.000039)	-.0000856*** 3.07e-06
Fixed rem. Post-Shock	-.5906943*** (.1276986)	-.0349814*** .0084927
Variable Ratio Post-Shock	-.0000983*** (6.82e-06)	-.00002*** 4.18e-07
Instrument Pay Post-Shock	.0003046*** (.0000614)	.0000381*** 4.15e-06
Size	-2.246935 (1.199438_)	-.2203557 (.2671473)
NPL	.3889306 (.3758694)	-.0715815** (.0260795)
Legend: * p<.05; ** p<.01; *** p<.001. Standard errors in parenthesis.		

The continuous DiD analysis, employing a fixed-effects panel regression model, examines how remuneration structures in supervisory roles influence banks' risk-taking behavior, measured by the Loan-to-Deposit Ratio (LDR), with particular attention to the COVID-19 systemic shock. The regression results yield several key insights.

Fixed remuneration exhibits a positive but statistically insignificant coefficient ($\beta = 0.414$, $p = 0.131$). While not significant at conventional levels, the positive direction suggests that higher fixed pay may have been weakly associated with increased risk-taking prior to the COVID-19 crisis, potentially reflecting agency conflicts or deviations from regulatory expectations. The interaction terms reveal critical post-shock dynamics. The interaction between fixed pay and the post-COVID indicator shows a significant risk-reducing effect ($\beta = -0.591$, $p < .001$), suggesting that the crisis prompted regulatory or governance adjustments that moderated prior risk-taking tendencies.

In contrast, variable remuneration demonstrates a significant negative effect on LDR ($\beta = -4.67e-06$, $p < .05$), indicating that performance-based compensation may have had a slight risk-mitigating effect, contrary to some theoretical predictions about incentive misalignment. Similarly, the interaction of variable pay with the post-COVID indicator negatively influences risk ($\beta = -0.0000983$, $p < .001$), indicating strengthened risk-mitigating incentives during the crisis. The increased effect of the variable remuneration post shock shows the missed opportunity of the EBA Guidelines which chose to remove variable remuneration as a proper instrument for the supervisory function.

Remuneration structured in financial instruments significantly reduces LDR ($\beta = -0.00028$, $p < .001$), aligning with regulatory expectations that equity-based compensation enhances long-term risk management. However, the interaction for instrument-based pay displays a positive and significant effect ($\beta = 0.000305$, $p < .001$), highlighting potential complexities in how crisis conditions altered the incentive structures of equity-linked compensation. This somewhat aligns with the EBA rules, proving that indeed instrument-based remuneration is not compatible with risk reducing incentives.

The model explains approximately 43% of within-bank variation (R^2 within = 0.4288, a good result in social sciences, measuring behaviour), with firm-specific factors accounting for the majority of variance ($\rho = 0.9854$), underscoring the importance of bank-level heterogeneity in risk behaviour. Thus, while remuneration structures do matter (they explain 43% of changes), the dominant factor in risk behaviour is each bank's unique, inherent characteristics. This suggests that regulators might need bank-specific approaches rather than one-size-fits-all remuneration policies. The findings emphasize that changing compensation alone may not dramatically alter a bank's risk profile if its fundamental culture and operations remain unchanged.

The analysis of profitability, measured by Return on Assets (ROA), employs the same continuous DiD framework with fixed effects. Fixed remuneration shows no statistically significant relationship with profitability ($\beta = 0.020$, $p = 0.232$), consistent with regulatory intentions to decouple supervisory pay from performance incentives. The post-COVID interaction terms reveal significant shifts in remuneration dynamics. Fixed pay interactions exhibit a post-crisis reduction in profitability ($\beta = -0.035$, $p < .001$), likely reflecting a regulatory or managerial pivot toward resilience over profit maximization.

Variable remuneration, however, significantly reduces profitability ($\beta = -9.88e-07$, $p < .001$), suggesting that performance-linked pay in supervisory roles might indeed help reduce risk, which in

turn affects overall performance. Variable pay interactions also show a significant post-COVID decline in profitability ($\beta = -0.00002$, $p < .001$). This support our earlier interpretation that variable remuneration is indeed an efficient instrument in the toolbox of the supervisor.

Similarly, remuneration in instruments negatively impacts profitability ($\beta = -0.000086$, $p < .001$), contrasting with its risk-reducing effect on LDR and indicating a trade-off between risk mitigation and profitability constraints. An interesting insight, if we consider that instrument-linked remuneration increases risk, but decreases performance. Conversely, instrument-based pay interactions become positively associated with profitability post-crisis ($\beta = 0.0000381$, $p < .001$), suggesting a rebalancing of incentives towards profit outcomes. The results reinforce the conclusion that overall, this type of remuneration offers no benefit for the supervisory function and the trusteeship strategy, per the EBA Guidelines.

*Table 9 – Empirical results for Fixed effects model - supervisory remuneration.
(Source: author's own)*

Variables	Loan-to-Deposit Ratio (LDR)	Return on Assets (ROA)
Fixed rem.	.3671563 (.2667537)	.0247741 (.0169421)
Variable Ratio	-2.73e-07 (1.24e-06)	-3.61e-07*** (8.79e-08)
Instrument Pay	-9.21e-06*** (1.09e-06)	3.04e-06*** (8.11e-08)
Size	-.9214756 (1.147112)	-.1273352 (.2380586)
NPL	.4907574 (.3636059)	-.0731849** (.0232769)
Legend: * $p < .05$; ** $p < .01$; *** $p < .001$. Standard errors in parenthesis.		

A robustness check using a simpler fixed-effects panel model corroborates earlier findings. Variable remuneration maintains a significant negative association with profitability ($\beta = -3.61e-07$, $p < .001$), enhancing the conclusions on the viability of variable remuneration as a proper instrument for risk reduction.

Notably, remuneration in instruments switches sign ($\beta = 3.04e-06$, $p < .001$) in regard to ROA, while showing a strong negative association with risk-taking ($\beta = -9.21e-06$, $p < .001$) highlighting model sensitivity (not capturing the shift caused post-shock which revealed the reversed incentive structure) but affirming the broader narrative of complex remuneration effects we discussed previously.

6.3. Empirical results for the remuneration of internal control remuneration

The main results of the Continuous Difference-in-Difference model concerning the remuneration of the internal control function can be found below, in Table 10, while the fixed effects panel model can be found in Table 11.

Table 10 – Empirical results for Continuous DiD model - internal control remuneration.
(Source: author's own)

Variables	Loan-to-Deposit Ratio (LDR)	Return on Assets (ROA)
Fixed rem.	3.755511* (1.519592)	.0017444 (.136087)
Variable Ratio	1.737097* (.6780931)	.1769291* (.0881654)
Instrument Pay	.0000119 (.0000163)	7.81e-07 (2.18e-06)
Variable Deferred	-.000055 (.0000442)	-8.21e-06 (5.70e-06)
Amount Clawback/Malus	-.0028397 (.0034927)	-.0001289 (.0002145)
Fixed rem. Post-Shock	-.9054814* (.3696182)	-.0402347 (.0244753)
Variable Ratio Post-Shock	-.0060843 (.6744421)	-.1995895* (.0778408)
Instrument Pay Post-Shock	.0000123 (.0000386)	2.20e-06 (7.52e-06)
Variable Deferred Post-Shock	-8.70e-06 (.0000501)	3.71e-06 (7.40e-06)
Years of Deferral Post-Shock	1.08769 (.8075258)	-.0011869 (.0636233)
Clawback/Malus Post-Shock	.0031214 (.0035383)	.0001528 (.0002188)
Size	-6.806182 (9.278241)	-.3629615 (1.299173)
NPL	.3329277 (.4256818)	-.0670217* (.0259728)
Legend: * p<.05; ** p<.01; *** p<.001. Standard errors in parenthesis.		

Examining risk dynamics through the DiD framework reveals that fixed remuneration shows a significant pre-Shock risk-increasing effect, but the post-Shock interaction term is negative ($\beta = -0.91$, $p < .05$), suggesting that increased scrutiny by the competent authority and the banks during the pandemic may have mitigated risk incentives. However, this also underlines the fact that banks are aware of the reversed incentive structure which undermines the risk mitigating performance, as they shifted the approach to its assumed setting post-Shock only due to the increased scrutiny of the national supervisor.

The variable-to-fixed pay ratio remains persistently positive without post-COVID moderation, indicating that performance-linked pay structures continue to misalign with risk management goals. Clawbacks and deferred pay show no significant post-COVID changes, implying that these mechanisms remain ineffective in altering risk behavior.

In terms of profitability shifts, the variable-to-fixed pay ratio has a positive pre-COVID effect but turns negative post-COVID ($\beta = -0.20$, $p < .05$), mirroring the LDR results, thus conforming that banks indeed are aware of the reversed incentive structure which undermines the risk mitigating performance. Thus, they shifted the approach to its assumed setting post-Shock only due to the increased scrutiny of the national supervisor. This also shows that the Key Performance Indicators

(KPIs) of the remuneration have been tampered with by the management of the bank to undermines the trusteeship strategy that underscores the internal control function.

As opposed to the supervisory function results, the middle managers, due to the subordination element to top management, cannot oppose the reversed incentive structure, calling into question the viability of remuneration as a pillar to reinforce a truly efficient and independent internal control system. Oddly enough, this is done while fully complying with the preset rules on remuneration structures determined by the EBA, while manipulating the less regulated elements of the guidelines, namely the KPIs and the ex-post adjustment mechanisms. This is further complicated by the fact that the Guidelines transfer the decision-making power on these elements to the bank, assuming that the internal control system will be robust enough to properly adjust the entire incentive structure.

*Table 11 – Empirical results for Fixed effects model - internal control remuneration.
(Source: author's own)*

Variables	Loan-to-Deposit Ratio (LDR)	Return on Assets (ROA)
Fixed rem.	3.48356* (1.720532)	-.018646 (.1122803)
Variable Ratio	1.505726** (.5388877)	-.0441758 (.0319399)
Instrument Pay	.0000129 (.0000138)	7.96e-08 (2.37e-06)
Variable Deferred	-.0000563 (.0000359)	-2.15e-06 (2.73e-06)
Amount Clawback/Malus	.0002176*** (.0000626)	.0000284*** (4.09e-06)
Size	-8.512365 (8.27546)	-.1697217** (1.503186)
NPL	.3704611 (.3560581)	-.071273 (.0229195)
Legend: * p<.05; ** p<.01; *** p<.001. Standard errors in parenthesis.		

Regarding risk-taking behaviour, as captured by LDR, fixed remuneration (log-transformed) exhibits a significant positive association, with a coefficient of 3.48 ($p < .05$). This suggests that higher fixed pay in internal control functions correlates with greater risk-taking, contradicting regulatory expectations that fixed remuneration should align with risk-averse behaviour in supervisory roles. The variable-to-fixed pay ratio shows a robust positive relationship with LDR ($\beta = 1.51$, $p < .001$), indicating that performance-linked pay structures may encourage risk-taking, contrary to regulatory intentions. As such, fixed pay is behaving similar to variable pay, with an altered incentive structure that is risk increasing, contrary to the regulatory expectations.

Clawback/malus mechanisms are positively associated with LDR ($\beta = 0.00022$, $p < .001$), implying either weak enforceability or perverse incentives where such mechanisms fail to curb excessive risk. Other factors, such as deferred remuneration and instrument-based pay, show no significant effects, suggesting limited influence on risk-taking behaviour. The results, corroborated with the fixed/variable conclusion, underscore the possibility of undermining of the trusteeship strategy.

Turning to profitability, as measured by ROA, clawback/malus mechanisms demonstrate a small but statistically significant positive effect ($\beta = 0.00003$, $p < .001$), reflecting the alteration of

the ex-post adjustment mechanism by linking them with performance, further deviating from the true purpose of the instrument per the EBA Guidelines. Neither fixed nor variable remuneration significantly impacts ROA, aligning with the argument that internal control pay should not directly drive profitability.

6.4. Limitations and further pathways of research

Concluding on the chapter of my empirical analysis, I wish to highlight some limitations of the study. My research has focused primarily on the information disclosed in Pillar 3 transparency disclosure, annual reports, financial statements etc., looking at quantitative data in connection to the two dependent variable I have selected, ROA and LDR. Other performance or risk markers could be used in similar analysis but my decision to use these variables is based on their wide-spread use in reporting in the EU. The indicator ROA was also referenced in disclosure reports as a widely used performance measure in determining award of remuneration. Consideration is giving to further improve the robustness of research by expanding by including other risk indicators (e.g., z-scores or leverage/solvability ratio) and by expanding the data set on include all years up to date (an extra 3 years in the sample), in order to expand the result of the fixed effects panel model.

In further exploring this topic, qualitative or quantitative analysis can be conducted to determine if the description of the performance evaluation and award/vesting process existing in the reports can offer insights into the remuneration structure (although at a summary glance, the disclosure levels vary strongly across the sample). As this fall outside of my scope, I have focuses only on the quantitative data available.

7. Conclusions and policy proposals

In this study, my main research question was whether banking compensation can indeed influence and reduce the riskiness of the credit institutions. I have initially focused on the corporate governance structure, highlighting the agency-problem (moral hazard) issues that lie at the core of this framework. I have then shown how banking governance is different because of its leveraged position as well as the market failure of financial instability seen as a negative externality. Thus, regulation was indeed considered necessary as a way to adjust the traditional framework of corporate governance to the reality of the banking industry as well as to ensure internalization of the externality.

The issue of remuneration was then considered within this setting. Once a tool to increase riskiness and effort level in order to align with the interest of shareholders, banking remuneration has been turned into a risk reducing mechanism, through new rules concerning deferral, caps on variable remuneration, malus/clawback, payment in instruments etc. Compensation has been subject to much public debate and censorship following the 2007-2008 financial crisis, in both academic and political rhetoric. While remuneration is not conclusively proven to have been a cause of the financial crisis, I consider public interest consideration in regulating, as well as the economics of federalism to determine the accurate level of intervention.

Per the empirical results for the supervisory function, we can preliminarily issue some policy implications.

The study's key findings on the supervisory function remuneration reveal complex relationships between the former and bank risk and profitability. For risk-taking behaviour, fixed pay showed a weak pre-crisis tendency to increase risk that reversed post-shock, suggesting governance improvements and proving that this type of remuneration can indeed reduce risk, under the right internal structure. Contrary to regulatory assumptions, variable pay consistently reduced risk with enhanced effects post-crisis, indicating missed opportunities in the EBA's dismissal of variable pay as a supervisory tool. Instrument-based compensation reduced risk but showed concerning post-crisis reversals, supporting EBA's scepticism about its effectiveness. The analysis revealed that while compensation structures explain a significant portion of risk variation, bank-specific factors dominate, suggesting remuneration changes alone may not override institutional risk cultures.

Regarding profitability, fixed pay showed no significant effects, aligning with regulatory intent, while variable pay reduced profitability as a trade-off for its risk benefits. Instrument-based compensation negatively impacted profitability despite its risk benefits, though post-crisis interactions showed some positive effects. These results present a remuneration trilemma where each compensation type involves trade-offs: variable pay reduces risk but hurts profits, instruments show unstable effects, and fixed pay's effectiveness depends on governance and enforcement conditions. The findings challenge current EBA guidelines, particularly regarding variable pay, while supporting concerns about instrument-based compensation, ultimately advocating for more nuanced, bank-specific remuneration policies that account for institutional differences.

For the internal control function, the findings present several important implications. First, the positive link between fixed pay and risk-taking challenges the assumption that fixed remuneration inherently promotes conservatism. This may reflect misaligned job design or insufficient risk controls in internal governance. Second, the persistent risk-enhancing effect of variable pay ratios suggests that current regulatory limits on bonuses may be insufficient. A stricter prohibition on performance-linked pay in control functions may be warranted. Third, clawback provisions appear ineffective in curbing risk, possibly due to weak enforcement or delayed application. Strengthening these mechanisms with automatic triggers could improve efficacy. Fourth, the moderating effect of post-COVID shock on fixed pay highlights the potential of dynamic supervision on the perverse incentives.

The findings indicate that remuneration structures in bank internal control functions significantly influence risk-taking, often in ways that contradict regulatory expectations. While post-

COVID adjustments show some corrective effects, persistent issues with variable pay and clawback mechanisms suggest the need for deeper reforms. I argue thus that the focus of the EBA to highly regulate remuneration rules, while transferring the duty to set KPIs and ex post adjustment mechanism to the banks might be misaligned with its purpose. However, I would argue that better enforcement and not more regulation, would be key to ensure a better balance between risk and performance.

We propose that more flexibility in determine the structure of remuneration would allow for a discovery process and the emergence of an optimized compensation scheme, favouring *ex-post* correction (primarily standards). The EBA guidelines, the EU rulebook on remuneration, offers a primarily rules-based approach, allowing for standards in the evaluation and allocation process, but not the remuneration structure. The main rules set in the Guidelines are considered from an L&E perspective and then, in the final part, are used as independent variables to determine in what way do the rules actually alter riskiness and performance.

As I have seen in my empirical results, the remuneration variables had either a positive impact or no significant impact over riskiness while having mixed impact on performance. The answer to overarching research question (and sub-research questions) is that the remuneration framework has little risk reduction impact, sometimes conducing a more risk-taker approach, in line with traditional corporate governance approaches.

This offers us an overall interesting insight about how the incentive of banks has changed following the shift in the regulatory framework. As I have previously discussed, the Guidelines rely heavily on rules, more so than standards. At a cursory glance, this may seem apt if we consider Kaplow (1992) which states in his seminal work on the economic analysis of standards and rules, that if a certain conduct is frequent, rules are better suited as the cost of designing them are outweighed by savings when the rule is applied. As the remuneration practices is frequent and can create negative externalities, rules allow certainty and cohesion, by setting an accurate behaviour. However, in this case, a significant element is missing, namely the accuracy and optimization that can emerge from the discovery process, especially using the local knowledge available.

Competition pressure is thus also key (Bedard and Gentier, 2021), as banks with remuneration that encourages inadequate risk-taking will be pressured from deposit-holders to adjust their practices accordingly or face withdrawal of the deposits (bank runs). Thus, sound remuneration and finely tuned remuneration practices emerge from the competition itself, through the pressure of the market. We wish to indicate that the result of case study (Bedard and Gentier, 2021) relate to the 1837 financial crisis and to American banks (not to current banking regulation). The study also shows that such practices will not always reach their desired effect if, however, the incentives to monitor of the deposit-holders are warped by over-reliance on deposit insurance (lender of last resort) or if the debt structure of the bank is mismatched (over-reliance on Government debt subscription as financial stability, which negatively impacted New York banks).

The Guidelines have been drafted based on the assumption that the rules on remuneration can universally yield efficient result, regardless of the specificity of the bank. Based on this assumption, rule-based approaches have emerged, which reflect the optimal structure of banking remuneration (caps on variable remuneration, set deferral periods and ratios etc.). They operate as mandatory rules although they do barrow something from a default as they allow for banks to derogate (usually by increasing the imposed default).

This in turn has created an incentive for banks to simply comply with the set rules, without derogating from the default, proven by the results of my empirical research. For example, in the case of deferral, the mean of the internal control function was the standard of 3.8 years, as banks has chosen to avoid the costs associated with explaining a deviation from the rules to the national authority (adjudicator).

This rule-based approach might not be problematic if the structure of remuneration was optimally set by the regulator. Unfortunately, this is not the case as I have shown in the empirical findings.

Therefore standards, not rules, might be better equipped in setting the right incentive structure. This is because standards leave determination of compliance to an adjudicator (usually the national authority) to determine the right behaviour. I concede that this will generate more uncertainty and higher costs for banks in finetuning the remuneration standards. This system also creates a higher burden on the adjudicator which might be the less informed party, lacking the specific knowledge of the bank but also being mandated to enforce the standard. But this also allows for flexibility to ensure that banks consider their specific risk profile and adjust accordingly. The empirical results do show that banks are indeed the better-informed parties, as they could quickly adjust the incentive structure for the fixed remuneration of the internal control function to be risk-reducing post-shock.

This can be correlated with better default settings, which incentivizes banks to adapt the remuneration to their needs but also, through this process, encourage the revelation of information. If we consider a default of 4 years deferral with the possibility to derogate with longer or shorter periods of deferral, if a bank would opt for a shorter period, it should reveal to the authority why this approach is in line with its risk exposure. It would also fulfil a gap-filling role as the flexibility of the default would make it easier to be adapted to changes in the functioning of a bank which are not addressed by the regulation, which might not be sufficiently forward-looking, especially in issues of remuneration.

This would ensure that the adjudicator also receive better knowledge to enforce the optimal conduct *ex-post*, if needed. The adjudicator is paramount in the enforcement process which ensure the efficiency of both rules and standards to ensure that under-deterrence does not occur. But they may be inefficient due to lack of knowledge of the way remuneration can affect a particular risk profile. Therefore, the revelation function of the default can help national authority gain better and up-to-date information on the existing correlations.

As I have set my general conclusions and policy considerations, I wish to expand on some particular topics, which have raised interesting research insights.

On the topic of the cap on variable remuneration, I would recommend that the variable cap rule be removed and replaced with standard. While other research has highlighted the undesired consequence of an increase in variable and overall remuneration, I have found that that is not the case, as fixed remuneration can be manipulated to replicated variable remuneration incentives in the case of the internal control function. This might be due to circumvention (more variable remuneration is disguised as fix) or, more likely, that fix remuneration has been increased also based on better performance year to year, as variable remuneration becomes less encouraged.

Thus, the cap does very little in order to mitigate risk, if the remuneration KPIs are not properly set and the monitoring system is not properly enforced, with good independence safeguards.

The result is problematic, as it challenges the belief that any fixed remuneration reduces risk, an underling assumption in the entire Guidelines. This becomes more problematic as deferral, restrictions on allocation, clawback and malus provisions cannot be enforced against such types of remuneration, circumventing any risk restricting behaviour.

In the case of the supervisory function, as discussed, variable remuneration might indeed help reinforce the trusteeship strategy, where the control system is not subject to manipulation.

The malus/clawback analysis also offered research insights. For the internal control function, clawback/malus mechanisms are positively associated with LDR, implying either weak enforceability or perverse incentives where such mechanisms fail to curb excessive risk. Other factors, such as deferred remuneration and instrument-based pay, show no significant effects, suggesting limited

influence on risk-taking behaviour. Turning to profitability, as measured by ROA, clawback/malus mechanisms demonstrate a small but statistically significant positive effect, reflecting the alteration of the ex-post adjustment mechanism by linking them with performance, further deviating from the true purpose of the instrument per the EBA Guidelines. This is insightful as some banks had disclosed that variable remuneration was not paid due to breach of risk levels, but still this was not sensitive enough to trigger the adjustments. This hints at the fact that malus/clawback setting is again done deficiently, or it is not enforced by the relevant bodies within the bank. This may be due to failures of the trusteeship strategy but also highlights that enforcement by the national authorities is not occurring, leading to under-deterrence. So, better standards on malus/clawback are needed to incentivize the banks to finetune the provisions, correlated with better monitoring by the competent authorities to avoid simple box checking.

We conclude that it is possible then that the remuneration of the internal control was set in such a way to compromise its independence, undermining the trusteeship strategy put in place, by aligning the interest of the internal control with the management and not with the risk reduction goals set (managerial power approach).

Regarding the supervisory function results, we again underscore the dangers of over-reliance on fixed remuneration. In this scenario, I refer to my initial conclusion that variable remuneration should be allowed and encouraged for the two functions, as long as it is correlated with criteria concerning control activity performance as discussed above.

I do acknowledge that the solution proposed which focuses on enforcement, while encouraging a more market-based approach, would increase monitoring costs for the national authority (fixed remuneration, presumed, requires no monitoring as it is not linked to any other element of performance, while variable requires careful understanding of the incentive structure), but it is equally true that setting the adequate structure with accurate incentives is the main efficiency goal concerning remuneration in general and the only way in which it will become an adequate tool for risk-mitigation, as it has been initially proposed to be.

Bibliography

- Adams, R. (2012). Governance and the financial crisis. *International Review of Finance*, 12(1), 7-38.
- Admati, A. (2013). *The Bankers's New Clothes: What's Wrong with Banking and What to Do about It*. Princeton, 94-95.
- Aebi, V. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance*, forthcoming.
- Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*, 84(3), 488-500.
- Anderson, R. (2000). Corporate control, bank risk taking, and the health of the banking industry. *Journal of Banking and Finance*, 24, 1383-1398.
- Armour, J. (2016). *Principles of Financial Regulation*. Oxford: Oxford University Press.
- Armour, J., Kraakman, R. et. al. (2009). *Anatomy of Corporate Law. A comparative and functional approach*. Oxford: Oxford University Press.
- Barotini, R. (2016). Measuring Compliance with Executive Remuneration Standards at Controlled Corporations. *ECGI Law Working Paper*, 331, 2-33.
- Barry, T. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking and Finance*, 35, 1327-1340.
- Barth, J. (2004). Bank supervision and regulation. What works best? *Journal of Financial Intermediation*, 13(2), 205-248.
- Bebchuk, L. A., Cohen, A. (2010). The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000-2008. *Yale Journal of Regulation*, 27, 257-282.
- Bebchuk, L. A., Fried, J. M. (2003). Executive compensation as an agency problem. *Journal of economic perspectives*, 17, 71-92.
- Bebchuk, L. A., Roe, M. (1999). A theory of path dependence in ownership and governance. *Stanford Law Review*, 127, 69-113.
- Bebchuk, L. A., Spamann, H. (2010b). Regulating Bankers Pay. *Georgetown Law Journal*, 98, 247-287.
- Bedard, M., Gentier, A. (2021). Deposit Insurance and Coordination Failure: The case of the 1837 Crisis in New York State and Massachusetts. *GREQAM Working Paper*, 2-15.
- Bednarek, Z. (2014). The Arrow-Lind Theorem Revisited: Ownership Concentration and Valuation. *Applied Financial Economics*, 24(5), 357-375.
- Berger, A. (2012). Executive board composition and bank risk taking, *Deutsche Bundesbank Working Paper*, 3.
- Bhagat, S., Bolton, B. (2014). Getting Incentives Right: Is Deferred Bank Executive Compensation Sufficient?. *ECGI Law Working Paper*, 241.

- Bliss, R. (2001). CEO compensation and bank mergers. *Journal of Financial Economics*, 61(1), 107–138.
- Bohren, Y. (2010). Governance and politics: Regulating independence and diversity in the board Room. *Journal of Business Finance & Accounting*, 37(9, 10), 1281–1308.
- Bolton, P. (2010). Executive Compensation and Risk Taking. *Federal Reserve Bank of New York Staff Report*, 456.
- Bruno, V. (2010). Corporate governance and regulation: Can there be too much of a good thing?. *Journal of Financial Intermediation*, 19(4), 461–482.
- Callaway et al. (2024). Event-studies with a continuous treatment. NBER Working Paper Series, no. 32118/2024.
- Ceresi, V. (2017). How post-crisis regulation has affected bank CEO compensation. *BIS Working Papers*, 630, 1–43.
- Chen, C., Steiner, T. (2006). Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry. *Journal of Banking and Finance*, 30, 915–945.
- Chen, M., Green, D. (2014). The costs and benefits of clawback provisions in CEO compensation. *The Review of Corporate Finance Studies*, 4, 108.
- Chesney, M. (2010). Risk-taking incentives, governance, and losses in the financial crisis. *Swiss Finance Institute research paper*, 10–18.
- Coase, R. H. (1937). The nature of the firm. *Economica*, 4(16), 386–405.
- Commission Delegated Regulation (EU) 2021/923 of 25 March 2021 supplementing Directive 2013/36/EU of the European Parliament and of the Council with regard to regulatory technical standards setting out the criteria to define managerial responsibility, control functions, material business units and a significant impact on a material business unit's risk profile, and setting out criteria for identifying staff members or categories of staff whose professional activities have an impact on the institution's risk profile that is comparably as material as that of staff members or categories of staff referred to in Article 92(3) of that Directive.
- de Andres, P., Eleuterio V. (2008). Corporate governance in banking: The role of the board of directors. *Journal of Banking and Finance*, 32(12), 2570–2580.
- de Chaisemartin et al. (2023). Difference-in-Difference estimators of intertemporal treatment effects. NBER Working Paper Series, no. 29873/2023.
- de Haan, J. (2013). Corporate Governance of banks: A survey. *DNB Working Paper*, 386, 3–57.
- Directive (EU) 2019/878 of the European Parliament and of the Council of 20 May 2019 amending Directive 2013/36/EU as regards exempted entities, financial holding companies, mixed financial holding companies, remuneration, supervisory measures and powers and capital conservation measures (CRD V).
- Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (CRD IV).

Dupire, M. (2018). Risk Governance of Financial Institutions: The Effect of Ownership Structure and Board Independence. *Finance Research Letters*, 4-31.

EBA Guidelines on internal governance under Directive 2013/36/EU (EBA/GL/2021/05).

EBA Guidelines on Sound Remuneration Compliance Table, 2015.

EBA Guidelines on sound remuneration policies under Articles 74(3) and 75(2) of Directive 2013/36/EU and disclosures under Article 450 of Regulation (EU) No 575/2013 (initial version - EBA/GL/2015/22).

EBA Guidelines on sound remuneration policies under Directive 2013/36/EU (second revision - EBA/GL/2021/04).

Ellul A., Yerramilli, V. (2013). Strong Risk Controls, Lower Risk: Evidence from U.S. Bank Holding Companies. *Journal of Finance*, 68, 1758-1803.

Enriques, L., Zetzsche, D. (2015). Quack Corporate Governance, Round III? Bank Board Regulation Under the New European Capital Requirement Directive. *Theoretical Inquires in Law*, 16, 212-244.

Falenbrach, R. (2011). Bank CEO Incentives and the Credit Crises. *Journal of Financial Economics*, 99, 112-26.

Fama, E. F., Jensen, M. (1983). Separation of ownership and control. *The journal of Law and Economics*, 26, 301-325.

Ferrarini, G. (2010). Executive pay at ailing banks and beyond: a European perspective. *Capital Markets Law Journal*, 2, 197-217.

Ferrarini, G. (2011). Economics, Politics, and the International Principles for Sound Compensation Practices: An analysis of executive pay at European banks. *Vanderbilt Law Review*, 64, 431-502.

Ferrarini, G. (2013). The European Corporate Governance Framework: Issues and Perspectives. *ECGI Law Working Paper*, 214.

Ferrarini, G. (2015). CRD IV and the Mandatory Structure of Bankers' Pay. *ECGI Working Papers*, 289, 4-102.

French, K. (2010). The Squam Lake Report. Fixing the Financial System. Princeton, 2010.

Fried, J. (2010). Excess-Pay Clawback. *Journal of Competition Law*, 36, 720-723.

FSF (FSB) Principles for Sound Compensation Practices. (2009).

Grossman, S. (1983). An Analysis of the Principal-Agent Problem. *Econometrica*, 51, 7.

Grove, H. (2011). Corporate governance and performance in the wake of the financial crisis: Evidence from US commercial banks. *Corporate Governance: An International Review*, 19(5), 418-436.

Hardwick, P. (2011). Board characteristics and profit efficiency in the United Kingdom life insurance industry. *Journal of Business Finance & Accounting*, 38(7-8), 987-1015.

Harnay, S. (2016). The influences of the economic approaches to regulation on banking regulations: a short history of banking regulations. *Cambridge Journal of Economics*, 2, 401-426.

- Hayek, F. A. (1945). The use of knowledge in society. *The American Economic Review*, 35(4), 519-530.
- Hayek, F. A. (1973). *Law, legislation, and liberty: A new statement of the liberal principles of justice and political economy*. Chicago, III: University of Chicago Press.
- High-Level Group on Financial Supervision in the EU. Final Report (Laroisiere Report). December 2009.
- Holmstrom, B. (1979). Moral Hazard and Observability. *The Bell Journal of Economics*, 74.
- Hopt, K. (2013). Corporate governance of banks and other financial institutions after the financial crisis. *Journal of Corporate Law Studies*, 13, 218-220.
- Hopt, K. (2020). Corporate governance of banks and financial institutions: economic theory, supervisory practice, evidence, and policy. *ECGI Law Working Paper*, 207.
- Implementation Standards for the FSB Principles for Sound Compensation Practices. (2009).
- Jensen, M., Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 4, 305-360.
- Kirzner, I. M., Sautet, F. (2006). The nature and role of entrepreneurship in markets: Implications for policy. *Mercatus Policy Series Policy Primer*, 4(1), 1-27.
- Levine, R. (2004). The Corporate Governance of Banks: A Concise Discussion of Concepts and Evidence. *World Bank Policy Research*, Working Paper 3404, 1-20.
- Louis Kaplow. (1992). Rules Versus Standards: An Economic Analysis. *Duke Law Journal*, 42, 557-629.
- Martino, E.D. (2018). Law & Economics of Banks Corporate Governance in the Bail-In Era. *ERN: Banking & Monetary Policy*.
- Murphy, K. (2013). Executive Compensation: Where I are, and how I got there. *Handbook of the Economics of Finance*. Elsevier, 211–356.
- Pi, L., Timme, S. (1993). Corporate control and bank efficiency. *Journal of Banking and Finance*, 17, 515-530.
- Stark, J. (2020). Clawback Provisions in Executive Compensation Contracts. *Max Planck Institute for Tax Law and Public Finance Working Paper*, 06, 2-24.
- Stulz, R. (2012). The credit crisis around the Globe: Why did some banks perform better?. *Journal of Financial Economics*, 105, 1-17.
- Underhill, G. (2014). The emerging Post-Crisis Financial Architecture: The Path-Dependency of Ideational Adverse Selection. *The British Journal of Politics and International Relations*, 1-33.
- Van den Bergh, R. (2016). Farewell Utopia? Why the European Union Should Take the Economics of Federalism Seriously. *Maastricht Journal of European and Comparative Law*, 23, 937-964.
- Van der Elst, C. (2015). Corporate governance and banks: How justified is the match?. *ECGI Working Paper*, 284, 1-49.

Voinea, L. (2016). Are expatriates managing banks' CEE subsidiaries more risk-takers?, *NBR Occasional Papers*, 23.

Yeh, Y. (2011). Committee independence and financial institution performance during the 2007–08 credit crunch: Evidence from a multi- country study. *Corporate Governance: An International Review*, 19(5), 437–458.

Recent Issues

No. 492	Andrea Poinelli, Lorian Pelizzon, Davide Tomio, Benoît Nguyen, Tobias Linzert	Elastic in Cash, Inelastic in Repo: Hedge Funds in the Treasury and Repo Markets
No. 491	Konstantin Egorov, Vasily Korovkin, Alexey Makarin, Dzhamilya Nigmatulina	Risk of Sanctions
No. 490	Claes Bäckman	One Advisor for the Whole World? Cross-Country Evidence on Financial Advice from Large Language Models
No. 489	Aras Canipek, Axel Kind, Lubomir Litov, Jiri Tressl	Bankruptcy Law and Firm Size
No. 488	Aras Canipek	Bankruptcy Law Penalties and Board Independence
No. 487	Salvatore Federico, Andrea Modena, Luca Regis	Coordinating Bank Dividend and Capital Regulation
No. 486	Ulrich Bindseil, Svetla Daskalova, Richard Senner	Gold and the External Wealth of Nations
No. 485	Rainer Niemann, Anna Rohlfing-Bastian	Carbon Taxes and ESG Compensation
No. 484	Vanya Horneff, Raimond Maurer, Olivia S. Mitchell	Defaulting 401(k) Assets into Payout Annuities For “Pretty Good” Lifetime Incomes
No. 483	Luca Enriques, Casimiro A. Nigro, Tobias Tröger	Templates in the EU Inc. Regulation Proposal
No. 482	Alexander Morell, Daniel Schellenberg	Regulating Third-Party Litigation Funding? Weighing the Arguments in the Light of Extant EU Consumer Protection Safeguards
No. 481	Alexander Morell, Daniel Schellenberg	The Incentive Structure of Litigation Finance: How Free Coordination Turns Financed Collective Redress into an Indispensable Internalization Tool
No. 480	Kevin Bauer, Cara Maria Damm, Florian Hett, Lorian Pelizzon	The Double-Edged Mind: How LLMs Expand Stock Market Participation Yet Strengthen Confirmation-Seeking