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Announcements of Capital and Liquidity Requirements: Market Impact for Banks and NBFIs

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M

2026

FACULDADE DE **ECONOMIA**

U.PORTO
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UNIVERSIDADE DO PORTO

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Dissertation
Master in Finance

Supervised by
Ana Paula Serra

2026

Agradecimentos

Gostaria de começar por agradecer à Professora Ana Paula Serra, pela orientação e disponibilidade ao longo de todo o desenvolvimento desta dissertação. O seu apoio, dedicação e espírito crítico foram fundamentais durante este percurso e contribuíram significativamente não só para este trabalho, mas para o meu desenvolvimento pessoal.

A todos os docentes e colegas que partilharam comigo esta etapa da vida académica, tanto em Braga como no Porto, expresso o meu sincero agradecimento.

À minha família, deixo o meu mais profundo agradecimento por todo o apoio e motivação que me deram durante este percurso. Um agradecimento especial à minha tia Querida pela sua disponibilidade e bom humor incondicionais e constantes.

Aos meus amigos, desde os mais fiéis aos mais terríveis quero agradecer por todo o companheirismo, todas as piadas, conversas e momentos inesquecíveis que partilhamos juntos. Todos os cafés, saídas, planos inesperados e planos falhados foram importantes nesta jornada, nunca estive sozinho e nunca duvidei que o resultado fosse outro que não o sucesso graças ao vosso apoio.

Aos meus avós, António, Noémia e Teresa, quero agradecer não só por tudo que fazem por mim, mas por todos os momentos que passamos juntos. São um pilar fundamental na minha vida no qual me apoio vezes sem conta e nunca falham. Obrigado por todos os conselhos e valores que me passaram, sem vocês nada disto seria possível.

À minha irmã, Margarida, deixo um agradecimento muito especial pelo seu suporte e incentivo. É um exemplo de coragem e superação e eu admiro-a imenso apesar de poucas vezes o expressar. Obrigado por acreditares em mim, isso deu-me força para continuar quando as dificuldades surgiram. A tua amizade foi fundamental ao longo deste percurso.

Aos meus pais, Manuel e Susana. São as pessoas mais importantes na minha vida, melhores amigos, exemplos, pilares. Não há palavras que consigam descrever o quão importantes vocês foram não só nesta caminhada, mas em toda a minha vida. O meu maior objetivo de vida será sempre que se orgulhem de mim e tentar ser merecedor de todo o amor, carinho, apoio e suporte que me deram. Um obrigado é insuficiente e, portanto, faço-vos a promessa que sempre darei o meu melhor para vos mostrar o quão grato eu estou por fazer parte da nossa família e ter o privilégio de vos ter como pais.

Abstract

This dissertation examines how capital and liquidity requirement announcements from the Basel Committee on Banking Supervision affect the market valuations of traditional banks and non-banking financial institutions (NBFIs) in Europe. Although prior studies document negative stock-price responses on banks following regulatory tightening, the propagation of these regulatory shocks beyond the banking sector, particularly toward NBFIs, is still largely unexplored. This study addresses this gap by applying an event study framework to a sample of 968 publicly listed European financial institutions, 238 banks and 730 NBFIs across 44 countries, over the period 2014 to 2024, using 33 regulatory announcements.

Banks experience statistically significant negative cumulative abnormal returns across all the three estimation methods employed. The results hold for parametric, non-parametric, and placebo-based tests. Our empirical analysis reveals that these effects are concentrated among larger institutions, EBA-supervised banks, and those exposed to market risk regulation.

For NBFIs, the significance of aggregate abnormal returns is statistically mixed and economically small, suggesting that capital requirement announcements are perceived primarily as bank specific shocks. However, spillover analysis reveals that the abnormal returns of NBFIs are positively and significantly correlated with contemporaneous bank abnormal returns, indicating contagion rather than substitution as the dominant transmission mechanism. This result holds across all NBFI types regardless of their functional similarity to banks, suggesting that transmission operates through system wide channels, such as wholesale funding markets, collateral conditions, and shared investor sentiment, rather than through direct competition. The one exception are EBA supervised NBFIs, which exhibit modestly positive abnormal returns to more demanding regulatory requirements, offering tentative evidence of competitive repricing for the NBFIs that are more similar to banks.

Key Words: BCBS, Basel III, capital and liquidity requirements, event study, abnormal returns, non-banking financial institutions, regulatory spillovers, market reaction, European financial markets

JEL-Codes: G21, G23, G14

Resumo

Esta dissertação analisa se e de que forma os anúncios relativos aos requisitos de capital e liquidez do Comité de Basileia para a Supervisão Bancária afetam as avaliações de mercado dos bancos tradicionais e das instituições financeiras não bancárias (IFNB) na Europa. Embora a literatura existente tenha documentado reações negativas de mercado para as ações dos bancos a medidas regulatórias mais restritivas, a propagação destes choques para além do setor bancário tem sido pouco explorada. Este estudo aborda essa lacuna através de um estudo de eventos aplicado a uma amostra de 968 instituições financeiras europeias cotadas em bolsa, 238 bancos e 730 IFNB de 44 países, durante o período de 2014 a 2024, para um total de 33 anúncios regulamentares.

Os resultados mostram que os bancos registaram retornos anormais cumulativos negativos estatisticamente significativos nos três métodos utilizados para calcular os retornos anormais. Os resultados são robustos para testes paramétricos, não paramétricos e baseados em placebo. Os efeitos são mais significativos para as instituições de maior dimensão, nos bancos supervisionados pela EBA e nos mais expostos à regulamentação do risco de mercado.

No que diz respeito às IFNBs, a significância dos retornos anormais agregados é estatisticamente inconclusiva e de reduzida magnitude económica, sugerindo que os anúncios relativos aos requisitos de capital são percebidos principalmente como choques específicos que afetam sobretudo os bancos. No entanto, a análise de efeitos de contágio revela que os retornos anormais das IFNBs estão positiva e significativamente correlacionados com os retornos anormais dos bancos, sugerindo contágio em vez de substituição como mecanismo de transmissão dominante. Este resultado mantém-se em todos os tipos de IFNBs, independentemente da sua semelhança funcional com os bancos, sugerindo que a transmissão parece operar-se através de canais sistémicos, através do financiamento, colaterais e sentimento comum dos investidores, e não por via da concorrência direta. A única exceção são as IFNB supervisionadas pela EBA, que apresentam rendimentos anormais ligeiramente positivos em resposta a medidas regulamentares restritivas, oferecendo indícios preliminares de uma reavaliação competitiva para as instituições que mais se assemelham a bancos.

Palavras-Chave: BCBS, Basel III, requisitos de capital e liquidez, estudo de eventos, retornos anormais, instituições financeiras não bancárias, *spillovers* regulatórios, reação de mercado, mercados financeiros europeus

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1. Introduction

The 2008 global financial crisis exposed the fragility of the financial system built on inadequate capital buffers, opaque balance sheets and unchecked leverage (Pelster et al., 2018). The regulatory response was the Basel III framework, which was progressively implemented and updated by several jurisdictions, and represented the most comprehensive overhaul of bank capital and liquidity standards in a generation. The decades preceding the crisis saw a steady migration of financial intermediation away from traditional banks and toward a more diverse ecosystem of non-banking financial institutions. A structural shift that accelerated after the crisis precisely because tighter regulation made bank intermediation more costly. By the time the Basel III reforms were being calibrated and implemented, in 2013, NBFIs had grown to exceed banks in total global assets. They also started performing functions including credit granting, maturity transformation and liquidity provision that were once the exclusive domain of banks (Acharya et al., 2024). Banking requirements, designed with banks as their primary target, may have been therefore made less effective since the boundary between banking and non-banking activity became increasingly difficult to draw.

This raises the question that the existing literature has only addressed partially. Studies such as Krettek (2025) and Longo, Fabrizi & Parbonetti (2025) have documented that Basel capital requirement announcements constitute credible and economically meaningful shocks to bank valuations, with larger and more regulatory exposed institutions bearing disproportionately negative abnormal returns. Bruno, Onali & Schaek (2018) extended this logic to liquidity regulation, finding consistent negative market reactions concentrated among banks facing the greatest adjustment costs. What remains underexplored is how these regulatory shocks propagate beyond their intended targets. If banks and NBFIs compete in overlapping intermediation markets, capital and liquidity requirement announcements that constrain banks might reasonably be expected to benefit their less regulated competitors through a substitution effect. Alternatively, if the two sectors are sufficiently interconnected through funding relationships, collateral chains and shared wholesale markets, the same announcements might transmit negative shocks across institutional boundaries through contagion. Distinguishing between these two mechanisms has significant implications not only for understanding how regulation shapes financial market structure, but for assessing whether tighter bank capital and liquidity standards

achieve their systemic stability objectives or simply relocate risk to less regulated parts of the financial system.

This dissertation addresses these questions empirically using an event study framework applied to a sample of 968 publicly listed European financial institutions, comprising 238 banks and 730 NBFIs across 44 countries, over the period 2014 to 2024. Using 33 regulatory announcements from the Basel Committee on Banking Supervision (BCBS), classified by type, as credit, market or liquidity events, and by direction, as tightening or weakening, we compute abnormal returns for both banks and NBFIs around a three-day event window. We employ three abnormal return measures: market model, market-adjusted and mean-adjusted returns. Alongside, we use parametric, non-parametric and placebo-based significance tests to ensure the robustness of the results. The analysis extends beyond the aggregate event study abnormal returns to examine two further dimensions. First, a spillover analysis tests whether NBFI abnormal returns around announcement dates are systematically linked to contemporaneous bank abnormal returns, and whether any such transmission varies with the functional similarity between a given NBFI and a traditional bank. Second, we run cross-sectional regressions to assess if and which firm and event characteristics systematically explain the variation in abnormal returns across both banks and NBFIs and across events, examining, in particular, the role of institution size, regulatory perimeter membership, event type and three sample subperiods.

Our findings show that banks experience statistically significant negative cumulative abnormal returns around regulatory requirements announcements. These effects are concentrated among larger institutions, EBA-supervised banks and those exposed to market risk regulation. For NBFIs, the aggregate abnormal returns are statistically mixed and economically small. However, the spillover analysis revealed that NBFI abnormal returns are positively and significantly correlated with bank abnormal returns, a result that holds regardless of an NBFI's functional similarity to banks. These results suggest that tighter bank regulation objectives may be partially offset by fragility transmitted into a less regulated and less transparent non-bank sector.

The findings from this dissertation contribute to a growing literature on the systemic interdependence of banks and NBFIs and suggest that the effects of bank capital and liquidity regulation extend beyond its direct targets in ways that are economically meaningful and merit continuous regulatory attention.

This dissertation is organized in six different sections. Chapter 2 presents the literature review and positions the study within the existing research on the financial intermediation sector and capital and liquidity requirements. Chapter 3 includes the methodological design describing the event study framework and the empirical specifications used to test the research hypotheses. Chapter 4 presents the data, the sample and descriptive statistics. Chapter 5 includes some preliminary tests of the abnormal returns. Chapter 6 reports the main findings and discusses the results. Finally, Chapter 7 presents the main conclusions and the implications of the results and outlines the limitations of the study.

2. Literature Review

2.1. The 2008 Financial Crisis

The 2008 financial crisis can be viewed as the consequence of the structural interaction between bank incentives, regulatory design, and overall systemic interconnectedness instead as the simply result of isolated failures by individual financial and non-financial institutions (Rajan, 2005). The financial environment in which financial institutions operated prior to the crisis heavily encouraged the expansion of leverage, reliance on short-term funding and engagement in increasingly and overly complex activities with a high degree of opaqueness (Brunnermeier, 2009). As a result, there was an amplification of risk taking, particularly in firms that compensated for governance structures that rewarded short-term returns and underpriced tail risk, creating vulnerabilities across the entire banking sector rather than remaining confined to individual balance sheets (Laeven & Levine, 2009).

Capital regulations played an ambiguous role in this process over time. On the one hand, capital requirements were intended from the start to limit excessive risk taking through alignment of shareholder incentives and financial stability. However, up to 2008, banks responded strategically to these requirements, especially those on RWAs (Risk Weighted Assets), that failed to accurately reflect true economic risk exposures. These allowed banks to seem well capitalized while simultaneously increasing systemic fragility by means of asset composition and leverage management (Koehn & Santomero, 1980; Kim & Santomero, 1994; Mariathasan & Merrouche, 2013). Therefore, the pre-crisis capital indicators were, in reality, poor indicators of bank true solvency. Capital regulation alone proved insufficient to prevent the buildup of systemic risk.

The market outcomes of the crisis revealed how the structural weaknesses of the financial system had economic consequences for the banks themselves. Banks with greater leverage, heavier reliance on short-term funding and higher interconnectedness were the most impacted in stock market performance. The ones with stronger capital buffers, especially when considering the quality of capital, came to be the more resilient (Berger & Bouwman, 2013). So, the relationship between capital and performance became pivotal in times of crisis which indicates that capital is less impactful on profitability in non-crises times, and more impactful as insurance against systemic risk and stress (Beltratti & Stulz, 2012; Demirgüç-Kunt et al., 2013).

When looking at banking governance during those times it was clear that weak supervisory regimes and poor internal governance allowed risk to accumulate unchecked. Stronger governance structures were able to better contain risk and sustain bank performance in crisis times which demonstrates that regulatory enforcement, institutional oversight and incentive alignment within banks were also critical to the observed negative outcomes (Demirgüç-Kunt & Huizinga 2013; Fahlenbrach et al., 2012).

2.2. Capital requirements and Basel Framework

The Basel Committee on Banking Supervision (BCBS)[1] aims to improve the quality of banking supervision worldwide (Bank for International Settlements [BIS], n.d.-a). Its standards are consolidated in the Basel Framework which operates through three pillars: minimum capital requirements, supervisory review and market discipline (Bank for International Settlements [BIS], n.d.-b). The BCBS is a standard setting body, not a regulator and does not directly supervise banks. After developing and publishing their international standards, national regulators and legislators such as the European parliament in trialogue with the European Commission and the European Council decide whether or not to incorporate the Basel standards and to which degree. The EBA and remaining national and regional competent supervisors (such as the ECB) ensure their enforcement. In Europe, the Basel standards are implemented using two legislative instruments, the CRR (Capital Requirements Regulation) and CRD (Capital Requirements Directive). The CRR represents a directly binding law applicable across all EU member state, setting hard, uniform rules for banks. This includes capital and liquidity ratios (European Union, 2013a). The CRD has a national implementation layer, meaning that it is transposed into national law by each EU country and includes supervisory review processes and internal risk controls, giving more discretion to supervisors (European Union, 2013b).

Capital requirements under the Basel framework were designed as a regulatory response to the fundamental problems with the banking industry in which the banks' private incentives to operate in a high leverage and high environment did not align with the core social objective of financial stability. Early theoretical work defined capital regulation as a

[1] The BCBS was bounded by the Group of Ten (G10) in 1974, a coalition of 11 highly industrialized nations, including Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom and United States, that consult and cooperate on international economic, monetary, and financial matters.

mechanism with the goal of mitigating moral hazard which arose from the limited liability and deposit insurance that shareholders benefited from by forcing them to absorb a larger share of the losses when they occurred (Marcus, 1984; Furlong & Keeley, 1989). Simultaneously, portfolio choice models showed that capital requirements could have unforeseen and non-intentional effects such as tighter capital constraints. These could induce banks to shift toward riskier assets to maintain the previous level of expected returns, making the original desired effect of capital regulation on risk theoretically ambiguous (Koehn & Santomero, 1980; Kim & Santomero, 1988).

The earlier Basel agreements, namely Basel I and Basel II, reflected this form of thinking and focused on minimum capital ratios, with the second accord introducing additional risk sensitivity through RWAs and internal models (Basel Committee on Banking Supervision, 1988, 2004). Still, as mentioned previously, the reliance on internal risk models lead to underestimated tail risk and could not address common exposures across institutions, limiting the effectiveness of pre-crisis capital regulation. (Pelster et al., 2018).

With the introduction of Basel III, starting in 2010, there was a shift in regulatory philosophy, introducing a new definition for capital, as macroprudential buffers on top of the buffers against individual bank failure. Through the increase in minimum common Tier 1 requirements and tightening the definition of eligible capital, this new accord, aimed to strengthen banks' capacity to absorb losses during periods of systemic stress. Such actions reduced the likelihood of taxpayer funded bailouts and other government interventions (Basel Committee on Banking Supervision, 2010). Just as the earlier accords were heavily supported by the existing literature on the topic, the shift brought on by Basel III was also supported by research made on the financial crisis which emphasized the role of bank capital in sustaining liquidity provision and financial intermediation during aggregate shocks (Kashyap et al., 2002; Acharya et al., 2010).

In fact, empirical studies suggest that higher and better-quality capital is associated with increased bank resilience during periods of stress. Better capitalized banks tend to have lower bankruptcy risk and funding costs. Capital buffers can also improve stability through the reduction of the probability and severity of financial distress (Berger et al., 1995; Flannery & Rangan, 2008). Taking that into consideration, Basel III changed capital requirements to improve the robustness of the banking system expectedly without compromising the bank's long run performance (Chortareas et al., 2015).

At the same time, literature has also considered important the costs associated with stricter capital requirements. Higher equity requirements can diminish operational efficiency of banks by increasing their cost of capital, reducing the tax benefits of debt, constraining lending, and negatively affecting profitability especially in the short run (Berger and Bonaccorsi di Patti, 2003; Alfon et al., 2004). Empirical evidence looking at the current era of Basel accords suggests that when combining the burden of higher capital and liquidity requirements, they can create an adverse effect on bank efficiency and market valuation in some contexts (Šutorová & Teplý, 2014; Giordana & Schumacher, 2017; Bitar et al., 2018).

Basel capital reforms were designed to affect banking activity through primarily regulatory expectations, balance sheet constraints and bank specific adjustment capacity, rather than through immediate mechanical reductions in lending (Basel Committee on Banking Supervision, 2010). Yet there is evidence of unexpected effects.

2.3. The impact of Basel III Reforms on Banks

The foundational theoretical work, that looked at how capital requirements influence banks' portfolio and lending decisions, predicted that they would increase the cost of equity relative to debt and tighten balance-sheet constraints (Koehn & Santomero, 1980; Kim & Santomero, 1988). These models implied that the rise of regulatory capital standards would result in a reduction of RWAs, adjustment of loan supply, or reallocation of activities towards less capital-intensive business segments.

Importantly, existing literature emphasizes that these adjustments are anticipated by financial markets. Regulatory announcements under the Basel framework convey information about the future constraints that banks capital positions will face. This incentivizes investors to revise their expectations about banks' growth prospects and intermediation capacity. So, market reaction to Basel reforms reflect the anticipated changes in banking activity and risk adjusted performance, rather than the actual realized outcomes (Krettek, 2025). Empirical evidence shows that banks that have capital positions closer to the regulatory capital thresholds or with higher RWA exposure adjust their lending and balance sheet growth more strongly after regulatory tightening (Aiyar et al., 2014; Bridges et al., 2014).

Therefore, the causal effect of Basel capital requirements on banking activity was heterogeneous. Banks with weaker initial capital positions and capital-intensive business

models faced greater adjustment pressure which in turn led to stronger expected contractions or reallocations in their intermediation activity. This subject is central to the literature's interpretation of market reactions and explains why Basel reforms have uneven effects across the banking sector (Krettek, 2025).

Still, existing literature does not jump to the interpretation that these effects are evidence that Basel III requirements permanently suppress banking activity. Instead, the causal mechanism operates mainly through short-run and transitional adjustments. In the meantime, banks restructure balance sheets and investors change their expectations regarding future constraints (Krettek, 2025). Looking at the longer run, higher capital requirements may bring more stability to intermediation by reducing fragility and funding risk, even if they have associated temporary adjustment costs (Basel Committee on Banking Supervision, 2010).

Krettek (2005) looked further into the relationship between the Basel reforms and their implications for shareholders, creditors and taxpayers. He found evidence that capital reforms were perceived by financial markets as credible and economically meaningful regulatory shocks for banks. When reform announcements were made, bank stock prices reacted in a significant manner. This is an indication that the announcements forced investors to reassess their expectations about banks' future operating environment in response to higher and stricter capital requirements. Though, as noted above these reactions were not uniform across the banking sector.

An additional important aspect of the balance sheet transformation that banks had to go through under Basell III is their liquidity positions. Theoretically speaking, liquidity risk is inherent to banking activity due to maturity transformations and is therefore embedded in their balance sheets (Diamond and Rajan ,2001). There is a tradeoff between short-term funding structures and regulatory intervention. Liquidity constraints imposed by regulation affect banks' funding models and directly impact their intermediation structure (Brunnermeier & Oehmke, 2013). In practical terms, these requirements oblige banks to hold more liquid but lower yielding assets and reduce reliance on unstable funding sources which may increase funding costs and induce asset reallocation. Basel Committee's own impact assessments acknowledge these effects and their relation to the implementation of liquidity standards (Basel Committee on Banking Supervision, 2010, 2013).

Bruno et al (2018) analyzed the market reaction to bank liquidity regulation announcements. They found that financial markets reacted significantly to announcements related to the introduction and calibration of liquidity requirements. Bank stock prices consistently moved around regulatory announcement dates. Investors anticipated that liquidity requirements would create adjustments costs for banks due to asset composition and funding models changes, especially for those more exposed to liquidity constraints. Overall, the entire banking sector valuation reacted negatively to these announcements, yet effects varied across banks (Bruno et al., 2018).

Looking into the post-crisis Basel III reforms agenda in Europe, the EU CRD IV/CRR II [2] was one of the most important reforms in Europe, which strengthened the capital, liquidity and leverage requirements. Within the Basel framework, the CRD IV/CRR II banking package brought stringent liquidity and capital standards and disclosure obligations that affected banking activity through changes in information, balance-sheet constraints and market discipline (Longo et al., 2025; Basel Committee on Banking Supervision, 2010).

Theoretically, the tightening of banks' balance sheets and reduction of the scope for excessive leverage affects banks' portfolio choices and intermediation strategies. It increases the relative cost of equity and limits flexibility, leading to a reassessment of growth, asset composition and funding structures (Diamond & Dybvig, 1983; Goldstein & Sapra, 2014). Enhanced disclosure agreements seem to improve transparency and market discipline by allowing investors to better evaluate banks' risk exposure and capital adequacy (Acharya & Ryan, 2016; Costello et al., 2019).

So, the literature emphasizes that regulatory changes in disclosure operate through a trade-off. On the one hand, improved transparency and stronger capital buffers reduce information asymmetries and limit contagion by helping markets distinguish between solvent and fragile banks, reducing adverse selection (Bowen and Khan, 2014). Yet, they can also impose proprietary costs and destabilize funding if negative information is published in

[2] The Capital Requirements Directive IV (CRD IV) is an EU legislative package (Directive 2013/36/EU) that forms part of the EU's implementation of the Basel III regulatory framework. It establishes rules for the supervision, governance, and authorization of banks and investment firms within the European Union. CRD works alongside the Capital Requirements Regulation (CRR), which together form the core of the EU "Single Rulebook" for prudential banking regulation.

periods of stress (Dang et al., 2017). Possibly altering funding conditions, risk-taking incentives, and investor confidence.

Overall, the impact of CRD IV/CRR II, in EU banks, starting in 2014, is also heterogeneous reflecting the Basel III framework. Larger, more complex banks, or with weaker capital positions, faced higher adjustment costs. As a result, they also showed greater sensitivity to the regulatory tightening, leading to stronger market reactions (Herring & Carmassi, 2010; Petrella & Resti, 2013).

Longo et al (2025) looked at the market reaction to the EU CRD IV. They found that the regulatory announcements of this directive were perceived as economically relevant and value-reducing in financial markets for European banks, but in a highly heterogeneous manner. Using an event-study framework, the paper finds negative and statistically significant average abnormal stock returns for EU-listed banks associated with announcements related to the CRD IV regulatory package. Though, the revised valuations were not uniform across all regulatory components and events related to country-by-country reporting disclosure were not statistically significant. This implies that the overall negative reaction is driven by the combined regulatory implications rather than to transparency measures alone. In addition, across banks the ones with more intricate organizational structures and lower pre-existing transparency experienced higher negative abnormal returns. Other relevant characteristics that lead to heterogeneity included bank level and country level characteristics such as higher level of regulatory risk, stronger enforcement or greater exposure to sovereign debt distress.

2.4. Non-Banking Financial Institutions and New Financial Intermediation Models

Following the 2008 financial crisis the global financial system started moving away from a bank-centered model towards a market-based system where non-banking financial institutions were increasingly dominant. These can be divided into three broad categories: i) insurance companies and pension funds, ii) investments funds (mutual funds, ETFs, money market funds, hedge funds), iii) non-bank lenders (finance companies and private credit funds). Particularly, this last category changed structurally how credit originated, spread and supervised. In the traditional model of finance, banks accept deposits, make loans, hold them in their balance sheets and act as the main transmission channel for monetary policy. This

model gradually changed with the rise of a decentralized ecosystem of asset managers, credit funds, securitization vehicles, repo markets, collateral chains and wholesale capital markets. As a result, the new landscape of NBFIs changed who grants capital, how leverage is created, where systemic risk accumulates, how interest rates affect the economy, how crisis propagate and how central banks must act during stress events (Banerjee et al., 2024; Pelizzon et al., 2024).

The classic "originate to hold" finance model's architecture had to be adapted post-2008 because with the financial crisis. Banks faced stricter capital and liquidity regulation, governments massively expanded sovereign debt issuance. The institutional savings pools exploded in size and investors searched for yield in a low-rate environment. Capital markets deepened relative to bank balance sheets, making credit more securitized, traded, syndicated, distributed through investment vehicles and funded through wholesale markets. This forced a migration of financial intermediation away from banks and towards other market based financial institutions. Overall, loans increasingly became assets inside portfolios rather than relationships on bank balance sheets. Instead of originating and holding them, banks now originate loans to distribute to other financial institutions (Pelizzon et al., 2024; Banerjee et al., 2024; Alternative Credit Council, 2019).

As a result, NBFIs are no longer peripheral institutions, on the shadow of banks. NBFI assets now exceed banking assets, making private credit systemically important. In the Euro Area alone the NBFI sector is around 380% of its GDP and performs functions such as maturity transformation, liquidity provision, credit allocation, leverage creation and financing of governments and corporations (Pelizzon et al., 2024; Alternative Credit Counsil, 2019).

Due to this added importance financial stability now depends heavily on market liquidity whereas prior to 2008, bank solvency was the primary concern of regulators. The concept of "too big to fail" does not only apply to banks but also to NBFIs. More than that, monetary policy transmission fundamentally changed as well. Central banks historically operated through banks, now they can also work through asset prices, bond yields, repo funding, collateral conditions and leverage constraints making the transmission mechanism more financialized. As a results monetary policy can have higher impact since monetary measures cascade through markets faster than through traditional banking channels. (Banerjee et al., 2024; Pelizzon et al., 2024).

Consequently, NBFIs create new forms of systemic risk. Systemic risk no longer resides primarily in the banking sector. Many investment funds promise daily liquidity while holding illiquid assets creating fragility if investors wish to redeem. In such cases, they may be forced to fire sales, widening spreads and market dysfunction, similarly, to bank runs but without deposits (Banerjee et al., 2024; Pelizzon et al., 2024). Additionally, NBFIs such as hedge funds and private credit vehicles increasingly rely on opaque synthetic leverage rather than purely balance-sheet forms. This includes exposures embedded into instruments such as repo funding, derivatives and wholesale leverage, and unlike bank leverage, it doesn't show in traditional prudential metrics while still creating systemic vulnerabilities (Banerjee et al., 2024; Pelizzon et al.,2024). Moreover, the financial system is deeply intertwined. Banks most of the time act as financial products originators and funds financial products holders, so risk migrates across institutional boundaries. Therefore, NBFIs and banks tend to behave in a similar manner during stress events and if both sell, withdraw liquidity and deleverage simultaneously it creates feedback loops making shocks much deeper. This implies that systemic rise comes not only from individual leverage positions but from crowded positioning where institutions have very similar strategies financed through similar collateral and funding structures (Banerjee et al., 2024; Pelizzon et al). Furthermore, the highly adaptive nature of leverage allows it not only to migrate between sectors, but to migrate between jurisdictions with weaker regulatory treatment (Banerjee et al., 2024; Pelizzon et al). So, risk is now accumulated through leverage chains, collateral markets, liquidity mismatches, interconnected portfolios and synchronized investor behavior, crises emerge through collateral and margin dynamics rather than the traditional deposit runs (Banerjee et al., 2024; Pelizzon et al).

2.5. The effects of capital and liquidity requirements on NBFIs and banks' activity

Banks and NBFIs are tightly linked, working very closely together. Looking at global assets, NBFIs exceeded banks by a considerable margin in 2021. However, banks are the main source of funding and liquidity insurance for NBFIs (Acharya et al., 2024). The regulatory tightening on banks has created a "transformation view" where loan origination, securitization and short-term funding is transferred into less regulated NBFIs, while banks keep their deposit franchise and lender of last resort capacities. Empirical evidence shows that NBFIs rely on banks for about a third of their liabilities while banks hold around 20%

of their assets in claims creating systemic interdependencies (Acharya et al., 2024). These interdependencies come in three major transformation categories: i) loan and mortgages move to NBFIs while being financed by banks; ii) short-term funding activities shift to NBFIs yet rely on bank credit lines; iii) contingent funding is provided (only) by banks in case of stress. So, shocks propagate both ways, fire sale losses in NBFIs' assets affect banks and bank tightening on credit lines affects NBFIs. Following the 2008 global financial crisis reforms were pushed with the intention of insulating banks. Yet, the correlation of systemic risk measures between the two sectors ended up rising, demonstrating how linked their risk profile is (Acharya et al., 2024).

Looking at the changes made after the 2008 global financial crisis, capital requirements were one of the main instruments used. They targeted directly at banks with one of the main goals being the reduction in exposure in their intermediation activities. However, banks are not the only intermediation providers in the financial sector and face competition from other financial institutions. So, when capital requirements affect lending activity by banks alone, they change the relative attractiveness of bank versus non-bank intermediation. Since non-bank financial institutions are not subject to the same capital requirements as banks, they can answer to bank regulatory tightening by expanding their lending activity (Bednarek et al., 2025).

Several empirical studies on the subject have shown that NBFIs partially substitute for banks when bank credit supply contracts. This leads to a reallocation of lending across intermediaries rather than a direct decline in total credit (Becker & Ivashina, 2014; Buchak et al., 2018). The extent of this substitution depends on a number of factors related to the borrower characteristics and loan types. Literature further shows that larger, more transparent firms are more able to access non-bank credit markets. In turn, this means that they are more likely to shift away from bank lending when faced with tighter capital requirements, while smaller or more opaque borrowers remain dependent on banks (Becker & Ivashina, 2014). Therefore, capital requirements not only affect the level and source of lending but also how it is distributed across borrowers and intermediaries.

Bednarek et al (2025) analyzed the effect of bank capital requirements in the German financial sector. The empirical results show that increases in bank capital requirements led to a contraction in bank lending, binding banks' credit supply. Additionally, banks that were more constrained in capital ratios, reduced their loan growth relative to less constrained

banks. Concurrently, they also found that lending by NBFIs increased after the tightening of bank capital requirements and this expansion occurred in the same credit markets in which bank lending was reduced. These results suggest that non-banks take advantage of the regulatory induced constraints on banks through the expansion of their credit provision in markets in which bank lose competitiveness. Still, the increase in non-bank lending is lower than the decline in bank lending resulting in net negative aggregate credit growth due to an incomplete substitution effect between institutions. Therefore, the composition of lending across intermediaries is reshaped and the aggregate credit changes as well. What dictates how the landscape of intermediation is reshaped is the characteristics of the borrowers. Larger and more transparent firms were more likely to benefit from the expansion of NBFI lending, while smaller and more opaque borrowers were more likely to suffer a larger net reduction in credit availability.

The intricacies and distinct nature of the financial system have created a unique landscape where firms compete against each other intensely. Still, they also deeply rely on each other due to their interconnectedness and joint systemic risk. So, when the regulatory landscape changes, particularly regarding capital requirements, firms that participate in the intermediation market may experience two distinct effects: i) a substitution effect from the loss of competitiveness by some firms, the ones not constrained expand their credit activity, to others are constrained and have to retreat; ii) a contagion effect, since firms are so connected that a simple shock affecting a particular sector quickly propagates to other sectors and becomes a system wide financial shock.

Academic work has long studied how NBFIs and banks interact with each other. Several theoretical models try to explain their relationship. Donaldson et al (2021) argues they coexist in the same market and the main difference between them is in their funding costs. Banks have a lower cost of capital which is an advantage and disadvantage. In this proposed model, the lower cost of capital creates a soft budget constrain problem for banks. The idea is that due to the low costs that banks have when financing a project, even if the project has a high possibility of failure the optimal move for banks is to continue financing the project to try and unlock some future repayment with minimal costs. This creates a situation where entrepreneurs anticipate that funding will continue even after poor performance, weakening their incentives to perform within the initially established terms. Banks lose their credibility to threaten termination because everyone involved knows it is

not optimal, so they cannot effectively discipline high agency cost projects. Non-banks, however, have a higher cost of capital making providing additional funding to bad projects unattractive and allowing them to credibly threaten termination. So, banks' funding advantage creates a soft budget constraint problem, while nonbanks' funding disadvantage becomes an advantage because it gives them commitment power, making them more suited for higher risk lending and neither of them take over the entire market. Others consider that capital regulation is very important in their relationship since the increased competition that shadow banking brings to the market can cause more banks in the economy to engage in value-destroying risk-shifting. To avoid this outcome regulators should set capital requirements high enough so that it becomes less profitable to engage in such activities than socially valuable banking activities (Harris et al., 2014). However, the tightening of capital requirements needs to be optimal since if set to tight, banks may try to bypass them by moving their activities into the shadow banking sector through affiliated NBFIs, to avoid regulation. Which leads to an opaquer and riskier financial intermediation sector (Plantin, 2015).

Focusing on the empirical work, the 2008 financial crisis, allied to the increase in regulatory scrutiny, led NBFIs such as finance companies and Fintechs to increase their credit to smaller businesses, mortgages and riskier borrowers. NBFIs played an important role in the recovery of these companies with most of this expansion coming directly from the reduction in bank lending (Gopal & Schnabl, 2022; Chen et al., 2017; Chernenko et al., 2022).

Looking closer at the capital requirements impact, one consequence was reducing the capacity of banks to make markets in the U.S treasury market and NBFIs have gradually replaced them in that capacity (Duffie, 2023; Metrick & Tarullo, 2022). However, this less regulated expansion in NBFI activity also came with an increase in risk. In fact, studies show that nonbank mortgage companies are more vulnerable to liquidity pressures in both their loan origination and servicing activities with minimal resources to sustain stress scenarios (Kim et al., 2018). Additionally, nonbanks have been increasing their leveraged lending, increasing their borrowings from banks to finance their activities (Kim et al., 2016).

Still, regulation and banks are not the only drivers of NBFI growth. There are business lines for which NBFIs do have the specialization and comparative advantage, largely fueled by technological advances such as technological improvements in securitization.

(Pozsar et al., 2010; Buchak et al., 2024). In addition, the preferences and levels of savers have changed, and NBFI growth can be explained partially by a search for yield in an environment with high levels of real savings. This shifted the preferences of savers away from traditional deposits in banks (Martinez-Miera & Repullo, 2017; Buchak et al, 2024).

2.6. Research Gaps, Research Questions and Hypotheses

The existing literature on capital and liquidity requirements and financial institutions has been constantly updated since the 2008 financial crisis highlighted the importance of a strong banking supervision framework.

Most studies concentrate only on two dimensions. On the one side, event study analyses of regulatory announcements have focused mainly on banks as the unit of analysis. Krettek (2025), Longo et al. (2025), and Bruno et al. (2018) have all established that capital and liquidity requirement announcements generate statistically significant and economically meaningful negative abnormal returns for banks. They have also encountered evidence that these effects are heterogeneous across the banking sector, varying with institution size, regulatory exposure, and event type. These studies fail to acknowledge the full impact of capital requirements by not considering the interconnectedness of the financial system. Capital and liquidity requirements cause structural transformation of financial intermediation, and banks are not the only institutions that provide such services.

One the other side, theoretical literature offers insights on how capital requirement tightening may affect the non-bank sector. However, since only banks are targeted by capital and liquidity requirements it is harder to ascertain the full and true impact of these announcements and studies in this field are more divergent from one another. Becker and Ivashina (2014), Buchak et al. (2018) and Bednarek et al. (2025) support a substitution argument, arguing that when bank credit supply diminishes under regulatory pressure, NBFIs expand their activity to fill the resulting gap. So, tighter capital requirements are beneficial to non-bank competitors through competitive repricing. Acharya et al. (2024) has a different view of the subject, arguing for a contagion effect, which claims that systemic risk measures for banks and NBFIs have become more correlated since the 2008 financial crisis, the deep interconnectedness of the two sectors transmits shocks from banks to NBFIs rather than providing repricing opportunities for the latter.

The two different mechanisms have opposite implications for the sign and direction of NBFI returns around capital and liquidity banking requirements announcements, yet no study has directly tested which of them dominates in financial markets. Additionally, there is also a gap related to the heterogeneity of the NBFI sector itself. NBFIs span a wide spectrum of institutions with different business models that are more or less operationally distant from traditional banking. This dimension of heterogeneity has not been examined empirically in the context of regulatory announcement effects.

Given the research gaps above, the central goal of our study is to contribute to the existing literature by focusing on three points:

- First, it extends the event study methodology developed for bank regulatory announcements to a new group of financial institutions. Providing a systematic analysis of how Basel capital requirement announcements affect NBFI returns in Europe over the past decade. Second, it introduces a spillover analysis framework that tests the transmission elasticity of bank regulatory shocks to the NBFI sector and assesses whether the transmission is heterogeneous given the functional similarity between individual NBFIs and traditional banks. This framework also allows for the substitution and contagion mechanisms to be distinguished empirically, contributing to the broader debate on financial system interconnectedness.
- Third, by extending the sample period through 2024, this study captures the latest implementation phase of the Basel III framework which introduced new regulatory domains such as cryptoassets and environmental issues.

This dissertation is organized around three primary research questions. The first research question asks whether capital requirement announcements from the BCBS generate statistically significant abnormal returns for European banks over the period 2014 to 2024 and whether those effects are heterogeneous across event and firm characteristics. This question replicates and extends previously mentioned studies to a more recent sample period, while providing a necessary baseline against which NBFI reactions are compared.

The second research question asks whether these same announcements generate statistically significant abnormal returns for European NBFIs stocks and if any such effects

differ systematically from those observed by banks. This question addresses the primary gap found in the literature review.

The third research question asks whether NBFI abnormal returns are systematically correlated with bank abnormal returns, around announcement dates, and whether any such correlation varies with the functional similarity between a given NBFI and traditional banking. This question addresses directly the substitution versus contagion mechanisms.

From these three research questions five hypotheses were formulated.

Hypothesis 1 predicts that bank stocks experience statistically significant negative cumulative abnormal returns around BCBS capital requirement announcement dates. This hypothesis is consistent with the existing literature (Krettek, 2025; Longo et al., 2025). The null is no effects.

Hypothesis 2a predicts that NBFIs stocks, unlike banks, experience statistically significant positive cumulative abnormal returns around announcement dates of stricter capital and liquidity requirements, as financial markets price in the competitive advantage from tighter bank capital constraints, consistent with a substitution effect (Bednarek et al., 2025; Becker & Ivashina 2014). The alternative null hypothesis is no effects.

Hypothesis 2b predicts that NBFI stocks' abnormal returns are negative, such as for bank stocks, reflecting the transmission of bank regulatory shocks through shared funding markets, collateral conditions and investor sentiment, consistent with a contagion effect (Acharya et al., 2024). The alternative null hypothesis is no effects.

Hypothesis 3 predicts that NBFI abnormal returns are significantly correlated with bank stocks abnormal returns on announcement dates. Hypothesis 3a predicts that the transmission elasticity between NBFI and bank returns increases with the functional similarity between a given NBFI and traditional banking. The null predicts that the transmission elasticity is uniform across NBFI types regardless of functional similarity to banks.

3. Methodological Design

This chapter outlines the methodological approach used to test the hypotheses formulated above. It provides a description of the criteria used for the selection of the sample of announcements and the construction of the event and estimation windows. We present the three abnormal return measures and the tests to assess statistical significance. Finally, we show the empirical specifications used to test the spillover hypotheses as well as the cross-sectional regression framework used to examine if firm and event characteristics explain the variation in abnormal returns across institutions and events.

3.1. Empirical Strategy

To address the research questions raised previously, this dissertation follows a two-stage empirical strategy.

The first stage employs a standard event study methodology where abnormal returns are calculated around event dates. Three abnormal return measures were considered around BCBS announcements related to capital and liquidity requirements. These are the tests for hypotheses 1, 2a and 2b, establishing whether each group of institutions experiences statistically significant abnormal returns around regulatory announcement dates, in which direction and magnitude. To ensure that the conclusions are not dependent on a single set of distributional assumptions, results were assessed using parametric, non-parametric and placebo-based tests.

The second stage builds on the abnormal returns estimated in the event study and uses them as the dependent variable in two different empirical specification models. Firstly, the spillover regressions tests hypotheses 3 and 3a by examining whether NBFI abnormal returns are systematically related to the abnormal returns of banks around announcement dates and whether this relationship changes with the functional similarity between a given NBFI and bank operations. Secondly, we built a nested regressions framework that explores the cross-sectional determinants of abnormal returns within each subsample, testing for firm characteristics, such as size and EBA supervision, and event characteristics, such as event type and sample subperiods.

Together, these two stages establish whether the regulatory announcements considered generate abnormal returns to explaining why those returns vary and whether the effects observed are transmitted across sectors.

3.2. The Event Study Methodology and Event Announcements

The event study methodology is a common tool used to evaluate the impact of regulatory changes and the inclusion of stock market data in the process has been a regular occurrence ever since Joskow and Rose (1989) provided the framework for such cases.

We use this methodology to test hypotheses 1, 2a and 2b.

To deal with issues regarding the exact definition of the date of the events, due to possible information leakage or anticipation by market participants which could reduce the efficacy of the tests to reject the null hypothesis of no effect (Lamdin, 2001) we follow Krettek (2025). Krettek (2025) built an event identification framework in which all event days refer exclusively to official BCBS announcements that were considered relevant to market, capital or liquidity risk regulation ensuring that only true information was taken into consideration, avoiding rumors and debates in order to prevent noise. To do so, all official communications from the BCBS were examined to ensure that significant information would not go unnoticed and damage the accuracy of the study. Next, every event was evaluated regarding its objective and predicted impact in returns.

The objective of the announcement was assigned based on which type of financial risk the Basel rule addresses. So, market events are rules affecting trading activities and/or market risk, credit events are rules affecting lending and/or counterparty risk and liquidity events are rules affecting funding and/or liquidity resilience. The classification was based on the economic function of the regulation. Events that simply redescribe changes that were already public information were removed to prevent noise since some announcements may not be fully surprising either because investors adjust their behavior to policy signals over time or because communication over time becomes too similar which makes the Basel committee decisions more predictable for investors (Ferreira & Serra, 2022).

The search period for Krettek (2025) was from 2007 until 2019.For the purpose of this study the same sample announcements that fit within the timeline of this study were considered. Afterwards, we extended that same process, reviewing every announcement made by the BCBS. It is worth noting that in this process there is room for interpretation since the sample selection is based on subjective choices and while these are rather comprehensive, they may reflect some discretion to which announcements were considered relevant (Ferreira & Serra, 2022).

3.3. Event and Estimation Windows

The first step when designing an event study is to choose the event and estimation windows, ensuring that they capture only the effects that occur as a result of the sample announcements. For larger samples fixed event windows are more common since errors from wrong window length tend to cancel out while for smaller samples fixed windows can be misleading (Krivin et al., 2003). The size of the event window is also of concern: if the length is too wide, the release of information outside of the scope of this study may distort results and too narrow may not allow sufficient time for investors to revise their expectations and react accordingly, so it becomes a problem of contaminated versus biased estimates (Longo et al., 2025; Bruno et al.,2018; Krettek, 2025; Ferreira & Serra, 2022; Krivin et al., 2003). Considering that this study works with a large dataset and Basel announcements tend to have a rapid response from the market, the event window length chosen was 3 days, the day before the event, the day of the event and the day after the event (a window of [-1, +1]). In cases where the event windows are perfect matches the announcement is only included once to avoid double counting abnormal returns with the same underlying cause.

Regarding the estimation window, when required, it is used to estimate the normal expected return model for the model and as such a longer window includes more data and provides more precise estimates, usually it covers an entire year. The timing relative to the event is also important and it should end before the event window in order to avoid event related information contamination in the estimates. As such, the chosen estimation window was of 250 trading days, which roughly amounts to a year, ending 2 days before the event date (Krivin et al., 2003).

3.4. Abnormal Returns

When it comes to the choice of the method to calculate the abnormal returns, the returns capturing the impact of stock prices reaction to event announcements, there are several alternatives. Therefore, we compute abnormal returns based on three different models (Bruno et al.,2018).

Firstly, we use the most common method found in literature, proposed in Brown & Warner (1985), MacKinlay (1997) and Krettek (2025), whereas abnormal returns are calculated using the market model (*MM*) pioneered by Sharpe (1965). In this case, equation 3.1 was applied where, $AR_{i,t}$ is the abnormal returns of firm i on day t, $R_{i,t}$is the actual return

of firm i on day t and $R_{m,t}$ is the market index return m on day t. The $\hat{\alpha}_i$ and $\hat{\beta}_{1,\mathrm{i}}$ parameters were calculated using observations in the estimation window through an OLS regression.

$$\mathrm{AR}_{i,t}^{MM} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{1,\mathrm{i}} R_{m,t}) \quad \textbf{(3.1)}$$

Next, a market-adjusted (*MAdj*) return was conducted as proposed by several authors (see, for example, for a related study Bruno et al (2018)). This method is relevant since it is free of bias from significant events in the estimation period. Considering that this period covers an entire year and the overall sample covers 10 years, such occurrence is very likely, which might bias the estimation of the alfa and beta (Fuller et al., 2002). Thus, for this method, we have equation 3.2, where $AR_{i,t}$now is the market-adjusted returns of firm i on day t, $R_{i,t}$ the returns of firm i on day t and $R_{m,t}$ the market index return m on day t

$$\mathrm{AR}_{i,t}^{MAdj} = R_{i,t} - R_{m,t} \quad \textbf{(3.2)}$$

The final method performed to identify abnormal behavior was that of mean adjusted (*Mean*) returns which track how unusually a security performs compared to its average. This metric, despite its simplicity, tends to work well in practice and provides a baseline comparison to the other models and helps with the robustness of results. If a complex model doesn't outperform the mean-adjusted returns it may not add value. The equation 3.3 was used for this model where $AR_{i,t}$is the mean adjusted return of firm i on day t, $R_{i,t}$ is the actual return of firm i on day t and $\bar{R}_i$is the average return of firm i over the estimation window (Brown & Warner,1985).

$$\mathrm{AR}_{i,t}^{Mean} = R_{i,t} - \bar{R}_i \quad \textbf{(3.3)}$$

Afterwards, the corresponding cumulative returns (CAR) were calculated over the 3-day event window and averaged out over all events to capture the total average effect. Events that suggest relaxing the regulatory framework compared to the initial were multiplied by -1 because it is not appropriate to aggregate the untreated average CAR over several events with expected opposite impacts. This follows the procedure in related studies (Armstrong et al., 2010; Krettek, 2025).

3.5. Event Study Significance tests

To assess the statistical significance of the results we use parametric and non-parametric tests. The use of parametric tests is standard in the event study literature, but the

inclusion of non-parametric tests is also important due to the nature of daily returns which may exhibit non-normality, event induced volatility, and outliers. So, the combined use of parametric and non-parametric tests enhances the reliability of the results and reduces dependence on statistical assumptions (MacKinlay, 1997).

The tests are described in Appendix A.1and were applied to every study group (banks and NBFIs), for each abnormal return measure (CAR^{MM}, CAR^{MAdj}, CAR^{Mean}). These are the one-sample *t*-test (parametric), the Wilcoxon Signed-Rank test (non-parametric) and the empirical placebo.

The *t*-test is the standard test in event study literature, and it tests whether the mean cumulative abnormal return across all firm event observation is statistically different from zero assuming that returns are approximately normally distributed and independent.

One of the assumptions of the previous test is the normality of distribution of returns. The Wilcoxon Signed-Rank test does not require normality and tests whether the median cumulative abnormal return is significantly different from zero. We first rank the absolute deviations of each cumulative abnormal return from zero and test if the signed ranks are symmetrically distributed around zero, thereby providing robustness to outliers and skewed distributions. If both these tests agree the conclusions of the study are strengthened and if they diverge it may suggest that non-normality is driving the *t*-test results.

The other assumption of the *t*-test is that cumulative abnormal returns are independent and once again that may not be the case, so a placebo test was applied to address this. The placebo test investigates whether the observed average cumulative abnormal returns are larger in absolute value than what would be expected by chance, using the bootstrap method, an empirical null distribution was constructed from 800 random draws. So, on each of 800 iterations, a set of random dates equal in number to the actual event dates is sampled from all trading days and the full event study window framework was rerun on these placebo dates from which a mean cumulative abnormal return was recorded. The empirical p-value is the fraction of placebo means whose absolute value exceeds the actual observed mean cumulative abnormal return. This test requires no distributional assumptions and naturally accounts for cross-sectional correlation because the same firm level data structure is used in both the actual and placebo runs (Longo et al., 2025; Serra, 2004).

3.6. Empirical Specifications to test Hypotheses 3 and 3a

NBFIs and banks are two different sectors within the same industry, however, despite being commonly viewed as operating in parallel, as substitutes, there is a growing trend in more recent literature that argues that NBFI and banks' businesses and risks are so interwoven that they are complementary and work in a beneficial manner towards each other (Acharya et al., 2024). Several academic studies have been published in recent years showing how these two sectors work together in face of regulatory pressures through the transference of assets, risk or lending within one another to avoid regulatory costs, e.g., Bednarek et al. (2025), Acharya et al. (2024), Albuquerque et al. (2026), Li et al. (2025), Chen et al. (2023).

Using the results from the event study, these were analyzed and tested to check whether NBFIs acted as substitutes of banks and if in doing so also gained market capitalization where banks lost it or if they reacted in a similar fashion to capital requirement announcements when in fact only one of the sectors was directly impacted by them. To do so we designed a three-step framework. Firstly, the baseline group difference was tested by means of a univariate mean difference t-test, testing whether NBFIs systematically experience different abnormal returns than banks allowing us to compare the average CARs of banks against NBFIs directly. Therefore, the hypothesis 3.4 was considered where CAR_{banks} is the cumulative abnormal return of banks and CAR_{nbfis} is the cumulative abnormal return of NBFIs.

$$H_0: \mu\, CAR_{banks} = \mu\, CAR_{nbfis} \quad \textbf{(3.4)}$$

Next, rather than just comparing group means, we tested whether the magnitude of bank abnormal returns on a given event date relates to the magnitude of NBFI abnormal returns, capturing the transmission elasticity of how much of the bank shock passes through to NBFIs. To do so, equation 3.5 was devised where, $CAR_{i,t}$is the cumulative abnormal return of firm *i* on event *t*, $\overline{CAR}_t^{Banks}$ is the cross-sectional mean CAR of all banks at event date t and $\varepsilon_{i,t}$ is the error term clustered at firm level.

$$CAR_{i,t} = \alpha + \beta_1 \overline{CAR}_t^{Banks} + \varepsilon_{i,t} \quad \textbf{(3.5)}$$

The previous test had an underlying assumption that every NBFI on an event date sees the same cumulative abnormal return from banks value which in an empirical setting

might not hold. So, to test this assumption er analyzed whether spillover intensity depends on how similar an NBFI is to a bank, thereby testing the uniformity of spillovers between sectors depending on individual firm aspects (hypothesis 3b). To do so, a similarity score was attributed to each institution type. With that in mind the previous equation was extended to include $Similarity_i$ which is the time-invariant bank similarity score for $NBFI_i$ which can be seen in equation 3.6.

$$CAR_{i,t} = \alpha + \beta_1 \overline{CAR}_t^{Banks} + \beta_2 Similarity_i + \varepsilon_{i,t} \quad \textbf{(3.6)}$$

The similarity scores considered are shown in table A.2 in the appendix. These are not directly derived from prior literature and were constructed by us based on the degree to which each NBFI sub-sector performs functions traditionally associated with banking, including credit intermediation, leverage creation, maturity transformations, liquidity provision and participation in monetary policy transmission channels, so they reflect some discretion. Details of the similarity scores are also presented in appendix.

Following Petersen (2008), standard errors in all spillover regressions are clustered at the firm level to account for the correlation of residuals within firms across event dates. Since each institution appears once per event date, OLS standard errors would understate the true estimation uncertainty by treating repeated observations of the same firm as independent. Clustering allows for arbitrary serial correlation and heteroskedasticity within firm clusters while maintaining the independence assumption across firms, producing correctly sized test statistics. The exception is the bank similarity regression, where the time invariant nature of the similarity score precludes firm-level clustering and HC1 heteroskedasticity robust standard errors are used instead.

3.7. Firm and Event Characteristics Effects

Having established whether abnormal returns are statistically significant, the second part of the empirical analysis tried to explain the variation of cumulative abnormal returns across events using firm (banks, NBFIs) and event specific characteristics. These include:

- the size of the institution, proxied by the logarithmic market capitalization of the firm. This enables assessing the heterogeneity argument present throughout the literature review, in studies such as Bruno et al. (2018) for liquidity and Krettek (2025) for market and credit distinctions, where larger banks end up facing higher adjustments costs due to their more complex business models.

- the identification as to whether the financial institution operates under the rules set by the EBA[3], through a dummy variable. The reasoning for this variable is to test the institutional quality and enforcement credibility argument made by La Porta et al. (2006). EBA supervised institutions operate under a binding regulatory perimeter that directly constrains their balance sheet flexibility and should therefore experience different, probably stronger market reactions than non-EBA supervised institutions.

- the type of event that the firm was exposed to, credit, liquidity or market risks. This was motivated by the distinct impact that each transmission mechanisms of credit, market and liquidity regulation, since credit events affect loan book RWAs and lending capacity, market events mainly affect trading book capital and internal model use, and liquidity events affect funding structures and asset composition (Bruno et al.,2018; Krettek, 2025).

- the type of institution was also considered to assess if NBFIs with higher degrees of exposure to intermediation activity may be more exposed to capital requirements announcements shocks.

- finally, to capture the impact of regulation over time the sample period was divided into 3 subperiods, ranging from 01/01/2014 to 31/12/2015, 01/01/2016 to 31/12/2019 and 01/01/2020 to 31/12/2024

The absence of multicollinearity was checked using generalized variance inflation factors (GVIFs). Accordingly, equation 3.7 was applied where $CAR_{i,t}$ is the Cumulative abnormal return for firm i at event t, $Size_{i,t}$ is the logarithm of the market capitalization of firm i at event t in billions, EBA_i is a dummy variable equal to 1 if firm i is EBA supervised and 0 otherwise, $EventType_{t,j}$ dummy for event type $j \in$ {Market, Liquidity} at event t, $InstitutionType_{t,k}$ is a dummy for institution tyke k of firm f and $SubPeriod_{t,p}$ is a dummy, for sub-period $p \in$ {2016–2019, 2020–2024} at event t.

[3] In these cases, for simplification purposes, we will simply write supervised by the EBA

$$CAR_{f,t} = \alpha + \beta_1 Size_{f,t} + \beta_2 EBA_i + \sum_{j=1}^{j} \beta_j EventType_{t,j} + \sum_{k=1}^{K} \beta_k InstitutionType_{t,k} + \sum_{p=1}^{p} \beta_p SubPeriod_{t,p} + \varepsilon_{f,t} \quad \textbf{(3.7)}$$

To further comprehend the cross-sectional variation in cumulative abnormal returns across firms and events, a nested regression framework was employed in which control variables were introduced progressively in theoretically motivated blocks. The purpose of such a structure is, firstly to comprehend the marginal contribution of each variable group by assessing them independently, isolating whether firm level characteristics or event level characteristics each explain variation in CARs beyond what the preceding controls already capture. Secondly, it enables coefficient stability across specifications to be used as a robustness criterion where if a coefficient remains stable in sign, magnitude and significance as additional controls are introduced it provides more evidence that the relationship between it and the dependent variable is genuine and not driven by omitted variable bias under simpler specifications. The opposite case is also true, if instead a coefficient changes substantially with the introduction of new variables, it is a sign that the earlier specification was incomplete (Longo et al., 2025; Bruno et al., 2018). Firm level characteristics such as size and EBA supervision reflect structural exposure to capital requirement changes that persists across all events, while event type and sub-period dummies capture variation in the nature and timing of announcements themselves. By introducing firm characteristics before event characteristics, the framework tests whether firm level exposure is a more fundamental determinant of abnormal returns than event classification, consistent with the heterogeneity argument running through the existing literature (Krettek, 2025; Longo et al., 2025). The full model combining all controls simultaneously serves as the primary specification, while the partial models provide interpretive clarity on the independent contribution of each variable group.

4. Data and Descriptive Statistics

4.1. Data

The data used in this research was collected from Refinitiv Eikon. The focus of this work is to evaluate the market valuation impact on European financial firms of banking capital and liquidity requirement announcements. So, we collected data on daily close prices, denominated in euros and total returns, which incorporates the percentual price change and any relevant dividends in euros of every available publicly traded financial firm with headquarters in Europe between the period of 2014 and 2019.

To ensure sufficient data for the estimation window used in the event study, any firm with fewer than 250 non-missing return observations was dropped from the sample entirely to ensure reliability (Krettek, 2025). Some classification information about each firm was also considered, their industry, number of outstanding shares and country of headquarters.

Financial industries related to funds, such as ETFs and Mutual Funds, were a part of the initial dataset but were taken out because the market valuation of these firms primarily reflects the value and performance of the underlying assets held in their portfolios rather than the operational characteristics of the financial institution itself. Most of these assets correspond to non-financial companies, and changes in fund valuations are driven by unrelated shocks.

Additionally, we extract the daily close prices of EURO STOXX 50, which comprises 50 large, listed companies in the Euro area, covering almost 50% of the free-float market capitalization of the European stock market and works as a proxy for the overall European stock market. The reason to use such an index is because supranational and wide financial instruments are less likely to be biased than national indexes making the effect of banking regulation less visible due to larger diversification of firms and sectors thus making the abnormal effect resultant of the regulatory announcement more isolated and easier to identify (Ongena et al., 2003).

To account for the strong presence of outliers in financial data, in order to avoid the distortion of statistical inference, returns were winsorized at the 1st and 99th percentiles ensuring that results reflect typical financial institution response, not just tail behavior (de-Ramon et al., 2016).

Since daily stock returns are typically small in magnitude, the use of logarithmic instead of simple returns provide preferable aggregation and statistical properties, such as aggregation, more symmetry between gains and losses and built in compounding while maintaining event study inference. So, equation 4.1 was applied whenever both prices were non-missing and non-negative where $R_{i,t}$ is the logarithmic return of firm i on day t and $TR_{i,t}$ is the total return of firm *i* on day *t* (Brown & Warner, 1985).

$$R_{i,t} = \ln\left(1 + TR_{i,t}/100\right) \quad \textbf{(4.1)}$$

4.2. Banks and NBFIs Characteristics

As shown in appendix (table A.3), the sample is comprised of 968 listed institutions with an average market value of 56 billion euros, 238 of them are banks and the rest are NBFIs. These include 11 different financial industries with Investment Management & Fund Operators and Investment Holding Companies covering most of the NBFI universe with 326 and 149 institutions respectively. On the other hand, Reinsurance and Life & Health Insurance are severely lacking in representation with 6 and 16 firms respectively.

As for size, banks have the highest average capitalization with an average size of over 216 billion euros followed by Reinsurance who despite only having 6 representatives has an average value of 14 billion euros. Other highly valued industries include Multiline Insurance & Brokers and Life & Health Insurance with an average market capitalization of 13,5 billion euros and 13 billion euros while Consumer Lending and Financial & Commodity Market Operators & Service Providers are the lowest capitalized groups with average valuations under the 1-billion-euro threshold. Out of the 968 institutions 468 are supervised by EBA, 179 of them are banks and 289 are NBFIs. The only banks excluded from the EBA scope are those not EBA supervised countries[4]. NBFIs, even if they operate on an EBA country they might still not be under the EBA scope since it also depends on their business type. EBA supervision scope are Credit Institutions, Banks, Investment Firms, Payment Institutions and Electric Money Institutions. Only Banks, Consumer lending, Corporate Financial Services, Diversified Investment Services, Investment Banking and Brokerage, Investment Management & Fund Operators were considered as EBA industries.

[4] Includes: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Norway, Iceland, Liechtenstein

Overall, Banks and Investment Management & Fund Operators are the most observed by some margin, meaning that the dataset is highly unbalanced with substantial heterogeneity across NBFI industries which might skew results.

In appendix, table A.4, we present the breakdown of the sample by country. 44 European countries are represented by at least one firm. The UK as a major financial center has 189 institutions and an average capitalization of 3,06 billion euros. However, the vast majority of them are NBFIs, 173 precisely, only 8.5% of publicly traded British financial firms are banking institutions, which still places them fourth in regard to the absolute number of singular banking institutions[5].Germany is the most represented eurozone country, with 129 institutions of which only 8 are banks, once again the overwhelming majority are NBFIs, out of these, 87 are supervised by EBA. Germany despite its size and importance in the EU system has less publicly traded banks than countries like Poland and Denmark and their average valuation is considerably lower than the UK. Still, the EU country with the most banking representation is Italy with 27 distinct banks, 47% of the Italian subsample, second in the dataset only to Norway. Over half of the EU countries considered are supervised by EBA with Germany having the most EBA supervised institutions. Overall, bank dominance in the publicly traded financial sector varies a lot with countries such as Norway, Denmark and Austria having over 70% of their publicly traded financial institutions being banks.

Overall, the sample is geographically unbalanced with UK being a dominant contributor and several countries having few institutions.

4.3. Events

Table A.5 shown in the appendix details the characteristics of each event date considered. Between the years of 2014 and 2024 there were a total of 33 relevant announcements related to capital and liquidity requirements, 15 of them credit events, 12 market events and 6 liquidity events. 21 of the events indicate an intention to tighten requirements and 12 to weaken with a clear tightening trend post 2019 in the Basel III. The year with more announcements was 2014, with 7: This was when the EU's CRD IV package came into force to enforce Basel III standards. 3 of these were liquidity announcements, half of the total liquidity events. As for the rest of the events in 2014, 3 are related with credit

[5] Guernsey, Jersey and Isle of Man are self-governed British crown dependents so their institutions can also be considered as part of to the UK financial system.

risk and 1 with market risk requirements. Altogether this is in accordance with the CRD IV package that focused on stricter liquidity requirements and enhanced risk management. 2020 and 2024 also stand out as heavy intervention years, given that after 2017 there was a clear slowdown in new guidance/regulation. The first one was related to the Covid-19 pandemic and while some temporary benefits were granted to support lending, these were not considered given its non-permanent nature. The long-term vision of BCBS was clear with them already revising their CVA (Credit Valuation Adjustment) risk framework and setting tighter credit risk requirements. The latter set of guidance of BCBS was so significant that many banks and analysts consider this would constitute a new Accord and called it Basel "IV". These recommendations, set to be implemented in the EU in 2025, focus on the enhancement of bank capital requirements and improve RWA calculations with measures such as a 72.5% "output floor" on internal models, standardizing risk measurement for credit, market, and operational risks.

Overall, the sample can be divided into three different periods.

- Firstly, between 2014 and 2015, this is a heavy rule setting period with the initial rollout of the Basel III accords because of the 2008 financial crisis that had the goal of increasing banking resilience and correcting pre-crisis excess leverage. So, during this first period, the financial system saw the introduction of i) the new liquidity standards (Liquidity Coverage Ratio and Net Stable Funding Ratio); ii) the strengthening of capital requirements; iii) the early reforms to securitization market; and iv) a general transition from Basel II to Basel III. There were 11 announcements, 5 on credit risk, 2 on market risk and 4 on liquidity. Out of these, 7 indicated a tightening of restrictions.
- Next, the second period spans from 2016 to 2019. The focus was the refinement and calibration of the capital standards with reforms to the market risk framework, internal models and RWAs. Since fine tuning was the goal, some rules were delayed and softened, creating a mix of policies with more negotiation between regulators and banks which resulted in 10 total announcements, 3 of them on credit risk, 6 on market risk and only 1 on liquidity. 8 of them were indicative of weaker capital requirements and 2 were indicative of tighter requirements.

- Finally, between 2020 and 2024, corresponds to Basel III finalization (or Basel "IV"). Additionally, there are new regulatory domains introduced, namely crypto assets and climate risk. The first one saw the capital treatment of cryptocurrencies and digital assets for the first time and later one saw improvements to their financial risk frameworks and stress testing for climate risk exposure. This period saw 12 announcements, 7 of them on credit risk, 4 on market risk and only 1 on liquidity. All of them indicated a tightening stance.

4.4. Preliminary Analysis

4.4.1. Returns

Table A.6 in appendix, shows the statistics for average and median daily returns of banks and NBFIs Skewness and kurtosis of banks are -0,0208 and 9,3154 respectively, indicating occasional large negative jumps dominate and fat tails. NBFIs show a similar trend with an excess Kurtosis value of 8,583, but with a positive skew of 0,0597 indicating that they have some positive jumps. The market index has excess kurtosis of 16,8, and a slight left sided skewness of -0,889. Overall, all return series deviate from normality.

4.4.2. Preliminary Tests

Table A.7 in appendix shows there is a clear pattern of pre-announcement leakage, though it varies slightly across event types, groups, or return measures. The pattern is broadest and most consistent under the market-adjusted and mean-adjusted measures, where Day-1 effects are significant for nearly every event type/group combination. As for the market model measure, leakage only appears for EBA market events for banks and Non-EBA credit events for NBFIs.

Generally, the magnitude of the impact of the announcements is larger for banks than for NBFIs under the AR^{MAdj} and the AR^{Mean}. On the other hand, according to the AR^{MM}, bank and NBFI gap is less consistent.

4.4.3. Cumulative Abnormal Returns Around Regulatory Events

Figure B.1 in appendix shows the average AR^{MM} for banks and NBFIs over the event window. Banks and NBFIs show a different pattern over the event window. This divergence suggests that capital requirements announcements are not generating a uniform market response across the financial sector with the two groups (banks and non-banks) moving in

different directions. This preliminary evidence suggests that the market considers that these announcements are institution-specific rather than sector wide shocks.

Taking a closer look, bank stocks' average abnormal returns in the day prior to the event are -0.04%. On the day of the event there is a brief recovery to 0.02% which hints that the actual announcement content sometimes contains less bad news than traders anticipated. On Day +1, there is a sharp decline to -0.17%. So, the market appears to take time to fully process the implications of the announcements, with the largest repricing happening on the post-announcement day rather than on the event day itself. As for NBFIs, they behave as a weaker mirror image to banks. They start slightly positive on the first day, 0.04%, dip briefly on day 0 to 0% and go to 0.01% on day +1. The magnitude of returns is much lower than the one of banks and are close to zero throughout the entire event window. This result could reflect that non-banks are immune to the regulatory announcements considered in this study.

4.5. GVIF

Due to the nature of the controls used in the firm and event characteristics section, mostly categorical variables with multiple levels, the use of Generalized-Variance Inflation Factors is preferred instead of Variance Inflation Factors. The use of adjusted values standardizes each GVIF to a common scale equivalent to a single degree of freedom, making all variables directly comparable to the conventional VIF threshold.

Considering the results in table A.8 on the appendix, every single variable in the full specification model passes the conventional adjusted threshold of 2.5 comfortably, with the highest adjusted GVIF being the one associated with the EBA control, of 1,2342. As such, multicollinearity does not seem to be a concern in either the bank or the NBFI sample and that the estimated parameters achieved can be interpreted with confidence as reflecting the independent contribution of each regressor.

5. Main Findings

5.1. Event Study Results

Table 1 presents the core results of our study. Using the methodology previously described we computed the total and average effects for all 33 events considered relevant for this study and the t-test, Wilcoxon and placebo p-values associated to each average cumulative return metric, CAR, CMAR and CAFR.

Table 1-Event Study Results: Average CAR for the window [-1; +1]

Group	Average CAR^{MM} (Market Model)	Average CAR^{MAdj} (MarketAdj.)	Average CAR^{Mean} (MeanAdj.)
Banks (N = 4489)	-0.0019***	-0.0022***	-0.0026***
t-test *p*-value	(0.0001)	(0.0000)	(0.0000)
Wilcoxon *p*-value	[0.0012]	[0.0060]	[0.0000]
Placebo *p*-value	{0.9862}	{0.2062}	{0.2900}
Non-Banks (N = 12,181)	0.0002	-0.0003	-0.0004
t-test p-value	(0.5245)	(0.4164)	(0.2611)
Wilcoxon *p*-value	[0.0167]**	[0.9145]	[0.6810]
Placebo *p*-value	{0.3700}	{0.3825}	{0.1412}

Notes: *** p<0.01 ** p<0.05 * p<0.10 (*t*-test).

Based on the 4.489 observations across the 33 regulatory announcements considered for this study, banks appear to have experienced statistically significant negative abnormal returns. These hold for the three AR metrics considered. Average CAR^{MM} is -0.0019 (circa -0.2%), meaning that, over the 3-day event window, and cumulative returns were on average -0,19 percentage points below what the market model predicted under normal circumstances in that timeframe. The average CAR^{MAdj} of banks is -0.0022(circa -0.2%), which means that over the event window, on average, the cumulative returns of banks underperformed the market by -0,22 percentage points. CAR^{Mean} is -0,0026 (circa -0.3%), which means that in the same circumstances as before, bank returns were negatively affected by 0.26 percentage points in comparison to how they performed on average during the prior 250 days preceding the event window. These results are corroborated by all the statistical tests performed, the *p*-values of the *t*-test and Wilcoxon test all indicate statistical significance at the 1% level for the three AR metrics, confirming that banks reacted negatively and in a economic significant manner to the announcements made by the BCBS. Also, the placebo *p*-values show that in the 800 random event study simulations considered the results were considered statically insignificant at any meaningful confidence level, alleviating the concerns about cross-

sectional correlation issues and confirming that the results are highly unlikely to be driven by chance, granting them further statistical strength.

These results corroborate the hypothesis that the market anticipated tighter balance sheet constraints for banks and accordingly their valuations went down. The metrics used in the event study show that neither market movements nor firm characteristics can fully explain the abnormal returns that these institutions endured, leaving requirements as a strong explanatory circumstance for what happened during the event windows considered for this study. These findings align with studies such as Krettek (2025) and Longo et al. (2025), confirming that regulatory announcements regarding capital requirements constitute credible, economically meaningful shocks to banking institutions.

Based on the 121181 NBFI event observations across the 33 regulatory announcements considered for this study, the average CAR^{MM} is 0.0002, indicating that on event dates, they outperformed what the market model predicted they would return under normal conditions in that time period on average by 0.02 percentage points. Yet looking at the statistical significance of the results, CAR^{MM} shows statistical significance at the 5% level for the Wilcoxon test. This divergence between parametric and non-parametric tests is not uncommon for NBFIs. As highlighted in the previous chapter, the NBFI sample behaves in a non-normal manner which could inflate the Wilcoxon test. As for the placebo *p*-values, they show that in the 800 random event study simulations considered the results for this sample were considered statically insignificant at the 5% level. Considering these results, the findings are mixed depending on the metric and statistical test used. and there is no clean market gain for NBFIs.

So, the evidence supports hypothesis 1 that claims that banks experience statistically significant negative cumulative abnormal returns around BCBS capital requirement announcement dates. Banks showed statistically significant negative CARs across all the three AR metrics and are significant at the 1% level on both t-test and Wilcoxon, with placebo tests confirming the results are not due to chance.

5.2. Spillover Analysis Results

To better comprehend the relationship between bank and NBFI returns during BCBS capital and liquidity requirement announcements, we first run a univariate Mean Difference test *t*-test, Table 2 shows the results. The average CAR for banks is -0.19% while

the average CAR for NBFIs was of about 0.02%, a difference of -0.21 percentage points which is statistically significant at the 1% level under both the Welch two-sample test and the non-parametric Wilcoxon rank-sum test. This first result confirms that the two sectors react in meaningful different directions to the regulatory announcements.

Table 2-Univariate Mean Difference Tests (Banks vs. NBFIs)

Statistic	Value
Average CAR – Banks	-0.0019
Average CAR – NBFIs	0.0002
Difference (Banks − NBFIs)	-0.0021 ***
t-test p-value	0.0004
Wilcoxon *p-value*	0.0002

*Notes: *** p<0.01 ** p<0.05 * p<0.10*

We also looked at whether the magnitude of the bank shock on a given event date is associated with the magnitude of the NBFI response to the same shock. Table 3 shows the results. When bank's CAR event impact is negative 1 percentage point, on average, NBFIs show negative CAR of approximately a -0.30 percentage *ceteris paribus*. So, when banks experience more negative abnormal returns, NBFIs also experience a similar effect consistently, since the results are statistically significant at the 1% level. The results suggest there is contagion of the shock, not substitution. Despite possible better competitive positions by NBFIs, the linkages between the banking industry and the rest of the financial industry is deep and the shock appears to be propagated. So, overall, the findings here are consistent with the contagion argument. A regulatory shock that constrains banks could be perceived by markets as also affecting NBFI that rely on banks, lend alongside them, and share systemic risk with them. The financial system is apparently interconnected enough that the negative shock propagates even though the announcement is directed exclusively at banks. So, the evidence supports hypothesis 3 which predicts that NBFI abnormal returns are significantly correlated with bank abnormal returns on announcement dates.

Table 3-Spillover Regression

Variables	**Estimate**
Intercept	0.0008*
	(0.0004)
CAR_{Banks}	0.3007***
	(0.0529)
N observations	12181
N unique firms	721
N event dates	25

R^2	0.0030
SE type	Clustered (firm level, Petersen 2008)

*Notes: Cells show: Estimate*** with Std. Error in parentheses. *** p<0.01 ** p<0.05 * p<0.10.*

To assess if the effects are stronger for NBFIs that more closely resemble banks functionally, we analyze the effects by the similarity score. The results shown in table 4 indicate that the only statistically significant control is the Banks' CAR at the 1% level. The effects of the similarity score on CAR are therefore inconclusive. In addition, the relationship between the NBFI CAR and banks' CAR holds constant. The transmission mechanism does not seem to be affected by functional similarity but through the broader structural interconnectedness of the financial system. Another possible explanation is that the similarity scores themselves were inaccurately constructed so there may be measurement imprecision that attenuates the coefficient toward zero.

Table 4-Spillover Regression with Similarity Score

Variables	Estimate
Intercept	-0.0007 (0.0013)
CAR_{Banks}	0.3008*** (0.0492)
Similarity Score	0.0027 (0.0025)
N observations	12181
N unique firms	721
N event dates	25
R^2	0.0031
SE type	HC1 robust (time-invariant regressor)

*Notes: Cells show: Estimate*** with Std. Error in parentheses. *** p<0.01 ** p<0.05 * p<0.10.*

Taking together the evidence above, we conclude that banks and NBFIs experience different levels of abnormal returns around capital requirement announcements. While banks show statistically significant negative CAR, NBFIs display positive returns but these are not always statistically different from zero. Yet we also find that NBFI abnormal returns are positively correlated with average banks' CAR. Overall, these results seem to support Acharya et al. (2024), that shows that bank and NBFI systemic risk measures have become more correlated since the financial crisis.

5.3. CAR drivers: Firm and Event Characteristics Results

5.3.1. Banks

To identify the drivers of the variation in CAR across firms and events, we run cross-sectional regressions. We implement a specification test to decide which estimation model better fits the data. The Breusch-Pagan LM test shown in table A.9 on the appendix compares the Random Effects and Pooled OLS models to determine whether random effects are significant in panel data models. In the case of the bank subsample and the variables chosen, the test statistic is 1.17 with a *p*-value of 0.28, so we fail to reject the null hypothesis of no random effects, and the pooled OLS is the preferred model over the random effects one. Taking these results into account, any unobserved firm heterogeneity that does exist is correlated with our covariates. Therefore, the most practical conclusion is that a pooled OLS with robust standard error is the most appropriate course of action.

Table 5 presents the four progressive OLS specifications for the bank subsample. All models use heteroskedasticity-consistent standard errors. Model (1) shows that the average bank-event effect is expected to have a CAR of -0.16% around announcement dates, *ceteris paribus*. Bank size is associated with a decrease in CAR around announcement dates. Estimated parameters are significant at the 1% level. This finding aligns with the literature, in that larger banks tend to have more complex balance sheets, greater RWA exposure, higher reliance on internal models and are more affected by more demanding credit and market risk requirements.

Model (2) builds upon the previous model by adding information on whether the bank is supervised by EBA or not. The size coefficient remains stable. On average, banks under EBA's supervision experience a lower CAR by about 0.23 percentage points than non-EBA supervised institutions. This discrepancy between EBA and non-EBA supervised banks could reflect that the EU and therefore EBA historically follows very closely the BCBS guidelines. Markets therefore treat the announcements as directly relevant to EBA supervised banks' operating environment and reprice them accordingly where in non-EBA supervision the results suggest that investors anticipate more flexibility on the side of regulators and supervisors and regulation may only partially align with the BCBS recommendations.

Model (3) focuses on the characteristics related to the type of announcement. Most of the explanatory variables are not statistically significant at any relevant confidence level

except for market risk announcements, significant at the 5% level, and the 2016-2019 subperiod. So, banks experience more negative abnormal returns for announcements related to market risk regulation trading book activities, when compared to credit and liquidity announcements. Also, for announcements made during the 2016-2019 period, banks experienced more negative abnormal returns when compared to the 2014-2015 or the latter period after COVID. This result is consistent with the preliminary results where announcements of market risk requirements showed the strongest and most persistent negative pattern. The more negative results for the 2016-2019 period, characterized by refinement and calibration of capital standards with a mix of direction. This was the period where the final recommendations for the Basel III aggregate output floor were officially published on December 7, 2017, by the Basel Committee on Banking Supervision (BCBS) setting a minimum threshold at 72.5% on the risk-weighted assets (RWAs) banks can generate using internal models. While this threshold could go up to 90% following initial discussions, this seemed to have been a negative surprise to market participants that probably expected that this would be set at a lower bound. mark

Model (4) combines all the above controls. size remains significant at the 1% level. So does EBA supervision, statistically significant at the 5% level. On average, banks under EBA's supervision experience a lower CAR than non-EBA supervised institutions around announcement dates. The market risk event also shows statistical significance at the 5% level, therefore, when the announcement made is targeted at the market risk, they experienced more negative abnormal returns when compared to credit or liquidity event announcements. The dummy associated with the subperiod 2016 -2019, remains significant at the 10% level.

Table 5-Nested OLS Models – Banks

Model	Model (1): Size	Model (2): Firm Characteristics	Model (3): Event Characteristics	Model (4): All
(Intercept)	-0.0016***	0.0001	0.0002	0.0022
	(0.0004)	(0.0008)	(0.0014)	(0.0016)
Size	-0.0006***	-0.0006***		-0.0006***
	(0.0002)	(0.0002)		(0.0002)
EBA		-0.0023**		-0.0023**
		(0.0010)		(0.0009)
Liquidity Event			0.0011	0.0010
			(0.0021)	(0.0022)
Market Event			-0.0021**	-0.0022**
			(0.0009)	(0.0009)

2016-2019				-0.0024*		-0.0026*
				(0.0014)		(0.0014)
2020-2024				-0.0003		-0.0006
				(0.0015)		(0.0015)
Adjusted R^2	0.0022	0.0030	0.0031	0.0026	0.0026	0.0057

*Notes: HC1 robust SE in parentheses. ***p<0.01 **p<0.05 *p<0.10*

Overall, considering the results obtained, banks' CAR are more negative for larger institutions, for EBA supervised institutions, and for market risk type events. These three findings jointly reflect that the negative market reaction to capital requirement announcements documented in the event study is not uniform across banks but is concentrated in those with greater regulatory exposure, greater balance sheet complexity and greater sensitivity to trading book regulation. This is fully consistent with the heterogeneity argument documented in the literature review (Krettek (2025) and Longo et al. (2025)). The subperiod effects are weaker and warrant caution, but the marginal 2016-2019 suggests that further investigation is needed.

5.3.2. NBFIs

Table A.10 in appendix shows the results for the Breusch-Pagan LM test when applied to NBFI panel. The Breusch-Pagan LM Test has a test statistic of 49.60 and a *p*-value of 0, therefore we strongly reject the null hypothesis that claims no random effects, so the random effects model is preferred to the pooled OLS model. So, random effects is the only specification that accounts for meaningful firm level heterogeneity, making it the most appropriate choice in this case.

Table 6 provides the four progressively richer random effects specifications for the NBFI subsample, similarly to table 5. The models are the same as above for banks except for the variable about the institution type in models (2) and (4)b, given that in the case of NBFIs, the sample is comprised of 15 different financial industries.

Looking at model (1), we see that the variable size lacks significance, contrary to what we observed in the bank subsample.

In model (2), all the firm characteristics were considered. In this case, only two explanatory variables are statistically significant. First, if a NBFI is under the EBA scope of supervision, it will, on average, experience higher CAR compared to non-EBA supervised NBFIs. This result is statistically significant at the 10% level. Compared to banks, the sign is the opposite. There are only a few institution types under EBA regulatory scope, namely

consumer lending, corporate financial services, investment banking and brokerage and investment management institutions, which are the ones most functionally similar to banks. So, this result could be evidence of the substitution effect, in that banks lose competitiveness, and their most direct competitors take advantage of it, which is consistent with the works from Bednarek et al. (2025) and Becker & Ivashina (2014). Regarding the institution type dummies, there is a general lack of significance, suggesting that once size and EBA supervision are controlled for, the specific type of NBFI does not systematically determine how markets reprice these institutions around banking requirements announcements.

Model (3) includes the event characteristics. Not a single variable in this model shows statistical significance at any level. The evidence suggests that event characteristics do not seem to impact NBFI returns in a consistent and statistically significant manner.

The full specification model, model (4), is entirely consistent with the stepwise buildup.

Table 6-Nested Random Effects Models – NBFIs

	Model (1): Size	Model (2): Firm Characteristics	Model (3): Event Characteristics	Model (4): All
(Intercept)	0.0009*	0.0005	0.0010	0.0009
	(0.0005)	(0.0027)	(0.0012)	(0.0028)
Size	0.0001	0.0002		0.0002
	(0.0002)	(0.0002)		(0.0002)
EBA		0.0020*		0.0020**
		(0.0010)		(0.0010)
IT Corporate Financial Services		-0.0022		-0.0023
		(0.0036)		(0.0036)
IT Diversified Investment Services		0.0001		0.0001
		(0.0033)		(0.0033)
IT Financial & Commodity Market Operators & Service Providers		0.0002		0.0003
		(0.0034)		(0.0034)
IT Investment Banking & Brokerage Services		-0.0022		-0.0023
		(0.0034)		(0.0034)
IT Investment Holding Companies		0.0010		0.0011
		(0.0030)		(0.0030)
IT Investment Management & Fund Operators		0.0001		0.0001
		(0.0026)		(0.0026)
IT Life & Health Insurance		-0.0024		-0.0025
		(0.0033)		(0.0033)
IT Multiline Insurance & Brokers		-0.0005		-0.0006
		(0.0029)		(0.0029)
IT Property & Casualty Insurance		-0.0007		-0.0008
		(0.0030)		(0.0030)

IT Reinsurance		0.0012		0.0010
		(0.0033)		(0.0033)
Liquidity Event			-0.0017	-0.0017
			(0.0017)	(0.0017)
Market Event			0.0011	0.0011
			(0.0007)	(0.0007)
2016-2019			0.0005	0.0005
			(0.0014)	(0.0014)
2020-2024			-0.0017	-0.0017
			(0.0012)	(0.0012)
Adjusted R^2	0.0000	-0.0004	0.0010	0.0006

*Notes: HC1 robust SE in parentheses. *** p<0.01 ** p<0.05 * p<0.10. IT=Institution Type*

Therefore, the results in table 6 do not support that NBFI's CAR are driven by firm size or institution type in any systematic way. Instead, the meaningful cross-sectional variation is explained by EBA supervision, which generates, contrary to banks, a positive effect consistent with substitution opportunities for regulated NBFIs, and by event type, where liquidity events generate strong negative contagion effects and market events generate positive competitive repricing. These findings reinforce that banking requirements announcements generate fundamentally asymmetric effects across the financial system, with banks bearing direct adjustment costs and NBFIs experiencing a more nuanced combination of contagion and substitution effects depending on their regulatory proximity.

6. Conclusions

The post financial crisis regulatory agenda placed bank capital at the center of efforts to build a more resilient financial system. The Basel framework sought to address the structural vulnerabilities exposed by the 2008 crisis by requiring banks to hold more and better-quality capital, reducing their reliance on short-term funding and improving the transparency of their balance sheets. This dissertation has examined how financial markets responded to the announcements that shaped that agenda, extending the existing literature to focus something that was largely unexplored: the market impact of capital requirement announcements on the NBFIs that are now central to the European financial system.

The event study results establish clearly that capital requirement announcements from the BCBS constitute credible and economically meaningful shocks to bank valuations. Across 33 events between 2014 and 2024, banks experienced statistically significant negative cumulative abnormal returns under all estimation methods, with results confirmed by both parametric and non-parametric tests and validated by a bootstrap placebo procedure. These results show further that markets seemed to anticipate the adjustment costs that tighter capital standards impose on banks. Altogether our results align with the findings of Krettek (2025) and Longo et al. (2025) while extending them to a more recent sample period.

The cross-sectional regression results of bank CARs adds texture to the aggregate findings. Larger institutions, those subject to EBA supervision, and those exposed to market risk regulation experience systematically more negative abnormal returns, suggesting that market participants believe that the burden of regulatory tightening falls unevenly across the sector in ways that reflect balance sheet complexity, regulatory perimeter membership and the specific transmission mechanism of each announcement type. The marginal significance of the 2016-2019 subperiod suggests that the surprise content of regulatory announcements might affect their effectiveness, a finding consistent with Ferreira & Serra (2022) and warrants further investigation.

For NBFIs the picture is more mixed. In aggregate, these institutions show no significant negative reaction to the announcements which, on their own, might suggest that markets treat such events as bank specific shocks from which non-bank competitors are shielded or even positioned to benefit. The spillover analysis, however, complicates this interpretation. NBFI abnormal returns are positively and significantly correlated with bank abnormal returns, meaning that when bank stocks experience larger negative shocks on

announcement dates, NBFIs tend to move in the same direction. This finding holds across NBFI types regardless of their functional similarity to banks. The dominant dynamic is therefore one of contagion rather than substitution, a result consistent with Acharya et al. (2024) and the broader literature documenting the deepening interdependence of banks and NBFIs since the 2008 financial crisis. The one partial exception is the positive effect of EBA supervision on NBFI abnormal returns in the empirical analysis, which offers tentative evidence that the most bank-similar NBFIs do capture some competitive repricing around announcement dates. But this effect is modest and does not overturn the broader contagion finding.

These results carry implications that extend beyond the academic literature. If capital and liquidity requirement announcements generate negative spillovers across the financial system, then the systemic stability benefits of tighter bank regulation may be partially offset by the fragility they transmit to a sector that remains less regulated and less transparent. The risk identified in the theoretical literature, that tighter bank capital requirements relocate rather than eliminate systemic risk, appears to have some empirical foundation in market pricing, even if the full realization of that risk depends on channels that stock returns alone cannot capture.

Several limitations of this study point toward directions for future research. First, the geographic imbalance of the sample introduces a potential confound between institution type and financial system characteristics that future work should address. Second, the similarity scores, while theoretically motivated, are constructed with discretion and their measurement properties are difficult to validate. Third, the event window of three days, while standard in this literature and appropriate for a large sample, captures only the immediate market response to announcements and cannot speak to the medium and long term adjustment dynamics.

Extending the analysis to longer horizons and linking market reactions to subsequent changes in lending activity and balance sheet composition could be interesting future research avenues.

What this dissertation establishes is that the stock market consequences of bank capital and liquidity regulation do not stop at the boundary of the banking sector. In a financial system where intermediation is distributed across a broad and interconnected

ecosystem of institutions, the regulatory treatment of one part of that system generates effects, through pricing, funding conditions and investor sentiment, that propagate across the rest. Understanding those propagation mechanisms is a prerequisite for better designing regulation.

7. Appendix

7.1. Appendix A. Additional Tables

Appendix A. 1-Statistical Tests

Test	Type	Null Hypothesis
One sample t-test	Parametric	H_0: $\mu(CAR) = 0$
Wilcoxon Signed-Rank	Non-Parametric	H_0: $\eta(CAR) = 0$
Placebo	Non-Parametric (empirical)	Observed mean ≤ random chance

Appendix A. 2-Similarity Scores

Institution Type	Similarity Score	Reasoning
Banks	100%	
Consumer Lending	85%	Able to directly originate loans, perform credit intermediation, replace bank lending functions and finance households and firms, engaging in maturity transformation, leverage and monetary policy sensitive lending, while usually lacking deposit funding, making funding more expensive and dependent on wholesale markets and investors
Investment Banking & Brokerage	80%	participate in wholesale funding, securities financing, repo markets, liquidity provision and leverage creation, however, they rely heavily on market liquidity and have limited traditional lending capabilities
Corporate Financial Services	70%	Can finance companies, provide leasing, commercial credit, specialty lending and factoring but are very specialized for companies and don't provide the full range of banking services such as payments and deposits
Diversified Investment Services	60%	broader financial intermediaries combining several activities such as asset allocation, securities services, investment products and sometimes financing

		activities, but they generally lack direct credit creation and deposit functions
Investment Management	55%	Have the ability to fund companies, influence liquidity conditions, affect monetary transmission and hold systemically important portfolios but they lack the ability to accept deposits or grant loans and, as such
Financial & Commodity Market Operators & Service Providers	50%	Support market infrastructure, trading, clearing, exchange activities and financial market functioning, contributing to liquidity provision and transmission of financial conditions, but they generally do not transform maturities or originate credit
Investment Holding Companies	45%	Have the ability to allocate capital across financial activities and may control financial subsidiaries like banks, however, they usually do not perform operational banking functions themselves
Reinsurance, Insurance (Life & Health), Property & Casualty Insurance	30%	The insurance sectors, like banks, may provide long term funding, provide liquidity provision and reallocate capital however they don' not grant loans
Multiline Insurance Brokers	15%	Mainly intermediate contracts and don't engage in maturity transformation, don't create leverage structurally and don't allocate credit in the same way banks do, being operationally very distant from banking

Appendix A. 3-Sample Composition by Institution Type

Institution Type	TRBC Industry	No. of Firms	EBA Firms	Non-EBA Firms	Avg. Market Cap (€bn)	Total Obs.
Bank	Banks	238	179	59	216	510096
NBFI	Consumer Lending	24	15	9	0	43864
NBFI	Corporate Financial Services	55	48	7	1	107513
NBFI	Diversified Investment Services	29	20	9	0	44929
NBFI	Financial & Commodity Market Operators & Service Providers	30	0	30	12	54116
NBFI	Investment Banking & Brokerage Services	38	28	10	3	79191
NBFI	Investment Holding Companies	149	0	149	3	217406

NBFI	Investment Management & Fund Operators	326	178	148	4	678159
NBFI	Life & Health Insurance	16	0	16	13	38258
NBFI	Multiline Insurance & Brokers	39	0	39	14	80795
NBFI	Property & Casualty Insurance	18	0	18	2	38523
NBFI	Reinsurance	6	0	6	14	16568
Total		968	468	500	56	1909418

Notes: Market capitalization is computed as the product of closing share price and shares outstanding, averaged over all available dates.

Appendix A. 4-Sample Composition by Country of Headquarters

Country	Total Firms	Banks	NBFIs	EBA Firms	Non-EBA Firms	Avg. Mkt Cap (€bn)	Bank Share	EBA Share
United Kingdom	189	16	173	0	189	3,06	8.47%	0.00%
Germany	129	8	121	87	42	1,98	6.20%	67.44%
Poland	73	12	61	64	9	0,9	16.44%	87.67%
Sweden	64	6	58	36	28	2,22	9.38%	56.25%
Italy	57	27	30	50	7	153,13	47.37%	87.72%
Switzerland	50	20	30	0	50	5,7	40.00%	0.00%
Norway	43	30	13	38	5	1,16	69.77%	88.37%
France	39	15	24	34	5	6,35	38.46%	87.18%
Bulgaria	27	4	23	8	19	0,05	14.81%	29.63%
Russia	27	10	17	0	27	299,66	37.04%	0.00%
Denmark	20	14	6	16	4	1,79	70.00%	80.00%
Netherlands	19	2	17	7	12	4,84	10.53%	36.84%
Finland	18	5	13	16	2	2,68	27.78%	88.89%
Guernsey	16	0	16	0	16	0,6	0.00%	0.00%
Ireland	16	4	12	14	2	163,27	25.00%	87.50%
Jersey	16	0	16	0	16	0,12	0.00%	0.00%
Cyprus	15	0	15	8	7	0,03	0.00%	53.33%
Belgium	13	3	10	8	5	5,17	23.08%	61.54%
Spain	13	6	7	11	2	11,21	46.15%	84.62%
Greece	12	7	5	10	2	2826,75	58.33%	83.33%
Austria	11	8	3	8	3	3,13	72.73%	72.73%
Romania	11	3	8	6	5	0,97	27.27%	54.55%
Croatia	9	5	4	5	4	0,45	55.56%	55.56%
Luxembourg	9	0	9	5	4	0,1	0.00%	55.56%
Hungary	8	3	5	5	3	1,83	37.50%	62.50%
Estonia	7	2	5	6	1	0,15	28.57%	85.71%
Malta	7	5	2	6	1	0,27	71.43%	85.71%
Iceland	6	2	4	3	3	0,64	33.33%	50.00%
Czech Republic	5	2	3	4	1	1,35	40.00%	80.00%
Macedonia	5	5	0	0	5	0,18	100.00%	0.00%
Slovenia	5	2	3	3	2	0,61	40.00%	60.00%
Isle of Man	4	0	4	0	4	154,48	0.00%	0.00%

Lithuania	4	1	3	4	0	0,1	25.00%	100.00%
Bosnia and Herzegovina	3	2	1	0	3	0,03	66.67%	0.00%
Latvia	3	0	3	2	1	0,04	0.00%	66.67%
Liechtenstein	3	2	1	3	0	0,77	66.67%	100.00%
Slovak Republic	3	2	1	0	3	0,74	66.67%	0.00%
Portugal	2	1	1	1	1	12,33	50.00%	50.00%
Ukraine	2	2	0	0	2	0,21	100.00%	0.00%
Bermuda	1	0	1	0	1	1,24	0.00%	0.00%
Faroe Islands	1	1	0	0	1	0,12	100.00%	0.00%
Gibraltar	1	0	1	0	1	0,03	0.00%	0.00%
Monaco	1	1	0	0	1	NA	100.00%	0.00%
Republic of Serbia	1	0	1	0	1	0,11	0.00%	0.00%

Notes: EBA = European Banking Authority. EBA share is the fraction of total country firms that fall under EBA supervisory scope. Avg. Mkt Cap is computed as the time-series mean of daily market capitalization (in EUR billions) per firm, then averaged across firms within each country.

Appendix A. 5-Distribution of Regulatory Events by Year and Type

	Type			Direction		
Year	Credit Events	Market Events	Liquidity Events	Tightened	Weakened	Total
2014	3	1	3	5	2	7
2015	2	1	1	2	2	4
2016	2	2	0	1	3	4
2017	1	2	1	0	4	4
2018	0	1	0	0	1	1
2019	0	1	0	1	0	1
2020	1	1	1	3	0	3
2021	0	2	0	2	0	2
2022	1	0	0	1	0	1
2023	2	0	0	2	0	2
2024	3	1	0	4	0	4
Total	15	12	6	21	12	33

Appendix A. 6-Return Statistics

Series	Observations	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
Banks	510096	0,0003	0	0,0204	-0,1008	0,1029	-0,0208	9,3154
NBFIs	1399322	-0,0001	0	0,0268	-0,1008	0,1029	0,0597	8,583
Market Index (STOXX)	3450	0,0001	0	0,0108	-0,1324	0,0883	-0,8891	16,8215

Notes: Returns are computed as the natural logarithm of the gross total return: ln(1 + r/100). Winsorisation bounds are applied at the 1st and 99th percentiles of the pooled firm-day distribution. Kurtosis reported is excess kurtosis (normal = 3 under the Pearson convention used by the moments package). STOXX AG = broad European equity market proxy

Appendix A. 7- Preliminary Tests: Abnormal Returns by Type of Event, Firm and EBA Regulatory Scope

Measure	EBA	Event_Type	Type	Day	Mean_Return
					-0.0008*
					(0.084)
AR^{MM}				-1	[0.004]
					0.0016***
					(0.002)
				0	[0.002]
					0.0014***
					(0.004)
			Banks	1	[0.083]
					-0.0007
					(0.205)
				-1	[0.008]
					-0.0010*
					(0.089)
				0	[0.050]
					0.0001
					(0.925)
		Credit	NBFIs	1	[0.289]
					-0.0025***
					(0.000)
				-1	[0.000]
					0.0003
					(0.501)
				0	[0.447]
					-0.0005
					(0.321)
			Banks	1	[0.180]
					-0.0008
					(0.223)
				-1	[0.147]
					-0.0011*
					(0.090)
				0	[0.001]
					-0.0008
					(0.233)
		Market	NBFIs	1	[0.059]
					0.0013
					(0.365)
				-1	[0.480]
					-0.0005
					(0.702)
	EBA	Liquidity	Banks	0	[0.735]

				0.0008
				(0.597)
			1	[0.831]
				0.0047***
				(0.008)
			-1	[0.066]
				-0.0009
				(0.604)
			0	[0.096]
				0.0018
				(0.280)
		NBFIs	1	[0.454]
				-0.0001
				(0.869)
			-1	[0.296]
				0.0020***
				(0.005)
			0	[0.032]
				0.0006
				(0.487)
		Banks	1	[0.619]
				-0.0013***
				(0.001)
			-1	[0.005]
				0.0005
				(0.228)
			0	[0.001]
				0.0000
				(0.912)
	Credit	NBFIs	1	[0.171]
				-0.0011*
				(0.073)
			-1	[0.018]
				0.0009
				(0.230)
			0	[0.310]
				-0.0004
				(0.439)
		Banks	1	[0.454]
				0.0000
				(0.984)
			-1	[0.727]
				-0.0003
				(0.385)
			0	[0.205]
				-0.0007
Non-EBA				(0.115)
	Market	NBFIs	1	[0.454]

				0.0002
				(0.916)
			-1	[0.175]
				-0.0035
				(0.202)
			0	[0.015]
				-0.0028
				(0.225)
			Banks 1	[0.238]
				-0.0008
				(0.475)
			-1	[0.134]
				-0.0024*
				(0.054)
			0	[0.050]
				0.0021*
				(0.064)
		Liquidity	NBFIs 1	[0.846]
				0.0006
				(0.186)
AR^{MAdj}			-1	[0.170]
				0.0021***
				(0.000)
			0	[0.000]
				0.0008*
				(0.094)
			Banks 1	[0.655]
				0.0008
				(0.201)
			-1	[0.002]
				-0.0003
				(0.597)
			0	[0.526]
				-0.0013**
				(0.038)
		Credit	NBFIs 1	[0.000]
				-0.0005
				(0.328)
			-1	[0.975]
				0.0018***
				(0.000)
			0	[0.000]
				0.0020***
				(0.000)
			Banks 1	[0.000]
				0.0026***
				(0.000)
			-1	[0.000]
	EBA	Market	NBFIs 0	0.0014*

				(0.056)
				[0.010]
				0.0032***
				(0.000)
			1	[0.000]
				0.0091***
				(0.000)
			-1	[0.000]
				-0.0097***
				(0.000)
			0	[0.000]
				-0.0058***
				(0.000)
		Banks	1	[0.000]
				0.0169***
				(0.000)
			-1	[0.000]
				-0.0153***
				(0.000)
			0	[0.000]
				-0.0094***
				(0.000)
	Liquidity	NBFIs	1	[0.000]
				0.0016**
				(0.026)
			-1	[0.005]
				0.0033***
				(0.000)
			0	[0.000]
				0.0004
				(0.686)
		Banks	1	[0.660]
				0.0003
				(0.500)
			-1	[0.000]
				0.0012***
				(0.002)
			0	[0.000]
				-0.0012***
				(0.004)
	Credit	NBFIs	1	[0.000]
				0.0018***
				(0.007)
			-1	[0.001]
				0.0037***
				(0.000)
			0	[0.000]
Non-EBA	Market	Banks	1	0.0035*** (0.000)

				[0.000]
				0.0032***
				(0.000)
			-1	[0.000]
				0.0020***
				(0.000)
			0	[0.000]
				0.0029***
				(0.000)
		NBFIs	1	[0.000]
				0.0109***
				(0.000)
			-1	[0.001]
				-0.0178***
				(0.000)
			0	[0.000]
				-0.0132***
				(0.000)
		Banks	1	[0.000]
				0.0108***
				(0.000)
			-1	[0.000]
				-0.0171***
				(0.000)
			0	[0.000]
				-0.0088***
				(0.000)
	Liquidity	NBFIs	1	[0.000]
				-0.0018***
				(0.000)
AR^{Mean}			-1	[0.000]
				0.0008
				(0.103)
			0	[0.142]
				0.0019***
				(0.000)
		Banks	1	[0.005]
				-0.0014**
				(0.019)
			-1	[0.000]
				-0.0015**
				(0.012)
			0	[0.001]
				0.0002
				(0.688)
	Credit	NBFIs	1	[0.910]
				-0.0052***
EBA	Market	Banks	-1	(0.000)

				[0.000]
				-0.0017***
				(0.002)
			0	[0.001]
				-0.0037***
				(0.000)
			1	[0.000]
				-0.0023***
				(0.000)
			-1	[0.000]
				-0.0017**
				(0.015)
			0	[0.000]
				-0.0023***
				(0.001)
		NBFIs	1	[0.000]
				-0.0117***
				(0.000)
			-1	[0.000]
				0.0113***
				(0.000)
			0	[0.000]
				0.0114***
				(0.000)
		Banks	1	[0.000]
				-0.0039**
				(0.036)
			-1	[0.024]
				0.0051***
				(0.004)
			0	[0.039]
				0.0081***
				(0.000)
	Liquidity	NBFIs	1	[0.000]
				-0.0007
				(0.364)
			-1	[0.007]
				0.0016**
				(0.038)
			0	[0.277]
				0.0010
				(0.229)
		Banks	1	[0.157]
				-0.0019***
				(0.000)
			-1	[0.000]
				-0.0000
Non-EBA				(0.944)
	Credit	NBFIs	0	[0.141]

				0.0003
				(0.463)
			1	[0.000]
				-0.0030***
				(0.000)
			-1	[0.000]
				-0.0002
				(0.750)
			0	[0.647]
				-0.0026***
				(0.000)
		Banks	1	[0.000]
				-0.0016***
				(0.000)
			-1	[0.000]
				-0.0012***
				(0.004)
			0	[0.000]
				-0.0024***
				(0.000)
	Market	NBFIs	1	[0.000]
				-0.0096***
				(0.000)
			-1	[0.071]
				0.0035
				(0.206)
			0	[0.603]
				0.0046*
				(0.060)
		Banks	1	[0.141]
				-0.0098***
				(0.000)
			-1	[0.000]
				0.0044***
				(0.001)
			0	[0.000]
				0.0089***
				(0.000)
	Liquidity	NBFIs	1	[0.000]

*Notes t-test p-value in parentheses; Wilcoxon signed-rank test p-value in brackets. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.*

Appendix A. 8-GVIF

Variable	GVIF	Df	Adjusted GVIF
Size	1,335	1	1,1554
EBA	1,5231	1	1,2342
Event Type	1,123	2	1,0294
Institution Type	2,0106	15	1,0323
SubPeriod	1,1277	2	1,0305

*Notes: Adjusted GVIF= GVIF^(1/(2*Df))*

Appendix A. 9-Specification Test for Bank sample

Test	Statistic	df	p-value	Decision
Breusch-Pagan LM (RE vs Pooled)	1,1657	1	0,2803	Pooled OLS preferred over RE

Notes: H0 for BP: no random effects. H0 for Hausman: RE is consistent (no systematic diff with FE).

Appendix A. 10-Specification Test for NBFI sample

Test	Statistic	df	p-value	Decision
Breusch-Pagan LM (RE vs Pooled)	49,6015	1	0	RE preferred over Pooled OLS

Notes: H0 for BP: no random effects. H0 for Hausman: RE is consistent (no systematic diff with FE).

Appendix A. 71-Event Sample

DATE	EVENT	Type	Impact	Event	Source	Short Description
28/11/2024	Basel Committee publishes a range of practices report on implementing a positive neutral countercyclical capital buffer	Sound practices	Tightened	Credit	https://www.bis.org/press/p241128.htm	The Basel Committee published a report describing how jurisdictions implement a positive neutral countercyclical capital buffer, detailing different approaches to setting and operating a non-zero CCyB in normal risk conditions.
20/11/2024	Basel Committee reaffirms expectation to implement Basel III; finalizes guidelines to strengthen banks' counterparty credit risk management; and progresses work to strengthen supervisory effectiveness	Press Release	Tightened	Credit	https://www.bis.org/press/p241120.htm	The Basel Committee reaffirmed full and timely Basel III implementation, finalized stronger counterparty credit risk management guidelines, and advanced work to improve supervisory effectiveness following the 2023 banking turmoil.
03/07/2024	Basel Committee approves disclosure framework and capital standard for banks' cryptoasset exposures and amendments to interest rate risk in the banking	Standards	Tightened	Market	https://www.bis.org/press/p240703.htm	The Basel Committee approved a new disclosure framework and targeted amendments for banks' cryptoasset exposures, updated interest rate risk standards, and agreed to consult on new third-party risk management principles.

	book standard, and agrees to consult on third-party risk principles					
29/02/2024	Basel Committee agrees to revisions to Basel Core Principles, consults on addressing window-dressing in the G-SIB framework and reaffirms expectation about Basel III implementation	Consultative	Tightened	Credit	https://www.bis.org/press/p240229.htm	The Basel Committee approved revisions to the Basel Core Principles, decided to consult on measures to reduce window-dressing in G-SIBs, and reaffirmed full Basel III implementation.
03/10/2023	Basel Committee reports on Basel III implementation progress	Press Release	Tightened	Credit	https://www.bis.org/press/p231003.htm	The Basel Committee published an update on member jurisdictions' progress in implementing Basel III, showing continued adoption of outstanding standards and ongoing monitoring.
11/09/2023	Governors and Heads of Supervision endorse initiatives in response to the banking turmoil and reaffirm priority to implement Basel III	Press Release	Tightened	Credit	https://www.bis.org/press/p231109.htm	The GHOS endorsed initiatives following the 2023 banking turmoil to strengthen supervision and analytical work, and reaffirmed full and consistent implementation of Basel III.
15/09/2022	Basel Committee advances work on evaluating Basel III reforms and addressing climate-related financial risks, and approves annual G-SIB assessment	Press Release	Tightened	Credit	https://www.bis.org/press/p220915.htm	The Basel Committee advanced work on evaluating Basel III reforms, addressing climate-related financial risks, and approved the annual G-SIB assessment.

01/07/2021	Technical amendments finalised for minimum haircut floors for securities financing transactions	Standards	Tightened	Market	https://www.bis.org/press/p210701.htm	The Basel Committee finalized technical amendments clarifying collateral upgrade transactions and correcting the calculation formula for minimum haircut floors in securities financing transactions.
26/01/2021	Basel Committee proposes amendments to rules on haircut floors for securities financing transactions	Consultative	Tightened	Market	https://www.bis.org/press/p210126.htm	The Basel Committee published for consultation technical amendments to the calculation of minimum haircut floors for securities financing transactions, addressing collateral upgrade transactions and correcting a formula misstatement.
26/11/2020	Basel Committee amends capital requirements for non-performing loan securitisations	Standards	Tightened	Credit	https://www.bis.org/press/p201126.htm	The Basel Committee finalized capital requirements for non-performing loan securitizations, specifying 100% risk weights or higher, with certain exceptions for externally rated exposures.
08/07/2020	Basel Committee publishes final revisions to the credit valuation adjustment risk framework	Standards	Tightened	Market	https://www.bis.org/press/p200708.htm	The Basel Committee published final revisions to the credit valuation adjustment (CVA) risk framework, updating risk weights and treatment of certain derivatives to align with the market risk framework.
19/03/2020	Basel Committee assesses members' implementation of the Net Stable Funding Ratio and large exposures framework	Standards	Tightened	Liquidity	https://www.bis.org/press/p200319.htm	The Basel Committee published assessment reports under its Regulatory Consistency Assessment Programme on the implementation of the Net Stable Funding Ratio and large exposures framework in Hong Kong, Indonesia, and Singapore, confirming compliance with Basel standards.
14/01/2019	Minimum capital requirements for market risk	Standards	Tightened	Market	Krettek (2025)	The market risk framework was adopted without significant changes. Compared to Basel II.5, a weighted average increase of 22% in market risk capital is estimated.
22/03/2018	Revisions to the minimum capital requirements for market risk	Standards	Weakened	Market	Krettek (2025)	BCBS proposes refinements to the standardized approach, including less conservative consideration of liquid foreign exchange (FX) pairs and correlation scenarios and changes to non-linear instruments. Furthermore, BCBS proposes to reduce the risk weights for the general interest rate risk class

						by 20%–40%, and equity and FX risk classes by 25-50%. As an alternative to the standardized approach for small banks, the Basel II.5 standardized approach with a more conservative calibration is proposed.
07/12/2017	Governors and Heads of Supervision finalize Basel III reforms	Consultative	Weakened	Market	Krettek (2025)	Implementation of the market risk framework is postponed by three years to January 1, 2022.
07/12/2017	Basel III: Finalising post-crisis reforms	Press Release	Weakened	Credit	Krettek (2025)	Contrary to the previous consultative document, the foundation IRBA may be used for exposures to banks, large and medium-sized enterprises and other financial companies. The previously discussed capital output floor for the IRB approaches lied in the range of 60% to 90% and is now set to the higher of IRBA RWAs or 72.5% of the RWAs under the standardized approach. A transitional agreement for the output floor is agreed so that it is obligatory on January 1, 2027. The risk weights under the standardized approach have also been weakened compared with the consultation paper. The revised standardized and the IRB approaches will not be implemented before January 1, 2022.
06/10/2017	Implementation of net stable funding ratio and treatment of derivative liabilities	Standards	Weakened	Liquidity	Krettek (2025)	The BCBS allows countries to lower the RSF factor for derivative liabilities from 20% to as low as 5%. In this respect, countries have discretion in setting a floor, which should simplify the implementation of the NSFR as of January 01, 2018.
29/06/2017	Simplified alternative to the standardized approach to market risk capital requirements	Standards	Weakened	Market	Krettek (2025)	BCBS proposes a simplified standardized approach for smaller banks that significantly lowers operational hurdles. Furthermore, under this approach, vega and curvature risk do not have to be backed by capital. The calculation is simplified and comes with reduced risk factor granularity correlation scenarios. As an alternative, the BCBS proposes to use a modified version of the Basel II.5 standardized approach.

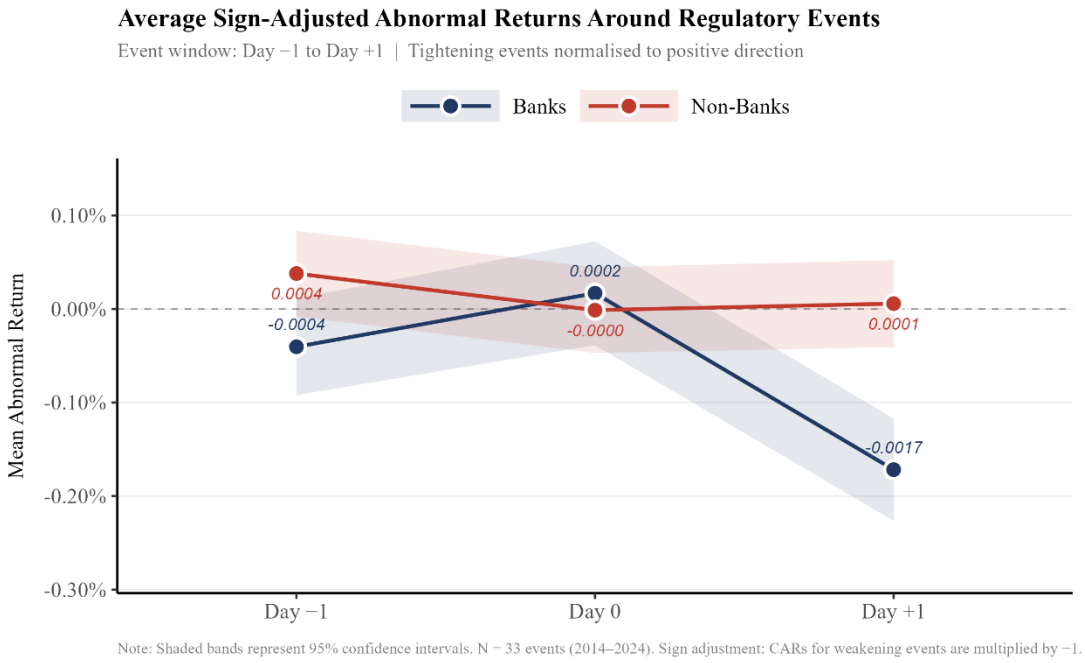
11/07/2016	Revisions to the securitization framework	Consultative	Weakened	Credit	Krettek (2025)	Compared to the November 2015 consultation paper, the risk weights of simple, transparent and comparable (STC) securitizations are lowered and the risk floor for senior exposures has been reduced from 15% to 10%.
21/04/2016	Interest rate risk in the banking book	Standards	Weakened	Market	Krettek (2025)	BCBS decides against capital requirements for interest rate risk in the banking book. Only disclosure requirements and management guidelines will be tightened.
24/03/2016	Reducing variation in credit risk-weighted assets - constraints on the use of internal model approaches	Standards	Tightened	Credit	Krettek (2025)	The use of the advanced and foundation IRBA is to be prohibited for credit exposures to banks, other financial companies as well as large companies (total assets > e50 bn.) and equities. Furthermore, a minimum input floor for the IRBA parameters is given. The BCBS proposes an output floor of the IRB approaches calibrated in the range of 60% to 90% in relation to the standardized approach.
14/01/2016	Minimum capital requirements for the trading book	Consultative	Weakened	Market	Krettek (2025)	New market risk framework comes into force on January 1, 2019.
10/12/2015	Revisions to the Standardized Approach for credit risk	Standards	Weakened	Credit	Krettek (2025)	The complete ban on the use of external ratings is rescinded. They can still be used for exposures to companies and banks, although the mechanistic nature shall be mitigated.
22/06/2015	Net stable funding ratio disclosure standards	Consultative	Tightened	Liquidity	Krettek (2025)	The BCBS is introducing the disclosure requirements for the NSFR as a standard in parallel with the introduction of the BCBS on January 01, 2018.
08/06/2015	Interest rate risk in the banking book	Standards	Tightened	Market	Krettek (2025)	BCBS proposes two potential options for dealing with interest rate risk in the banking book to ensure that banks have enough capital to address losses due to an interest rate increase, especially in times of very low interest rates. The first option involves a minimum Pillar 1 capital requirement, whereas the second proposal involves a quantitative

18/03/2015	Margin requirements for non-centrally cleared derivatives	Consultative	Weakened	Credit	Krettek (2025)	The beginning of the four-year phase-in period is postponed from December 1, 2015 to September 1, 2016.
22/12/2014	Revisions to the standardized approach for credit risk	Standards	Tightened	Credit	Krettek (2025)	The draft proposes to reduce banks' reliance on external ratings and thus to tighten their own risk management with respect to the standardized approach for credit risk.
19/12/2014	Fundamental review of the trading book: outstanding issues	Consultative	Weakened	Market	Krettek (2025)	Development for a treatment of internal risk transfers from the banking to the trading book. There are simplifications for the standard approach, which, in addition to the cash-flow-based approach, also includes a sensitivity-based. Furthermore, revisions to the internal models approach with varying liquidity horizons facilitate implementation, which is easier for banks to implement due to internal systems.
11/12/2014	Revisions to the securitization framework	Consultative	Tightened	Credit	Krettek (2025)	The prior proposal is finalized as standard without significant changes. The securitization framework will be implemented in January 2018.
09/12/2014	Net stable funding ratio disclosure standards	Standards	Tightened	Liquidity	Krettek (2025)	For reasons of market discipline and transparency, the BCBS proposes that banks need to disclose their NSFR according to a given template.
31/10/2014	Basel III: the net stable funding ratio	Consultative	Tightened	Liquidity	Krettek (2025)	The standard of the NSFR is finalized. BCBS makes only minor changes to the RSF. The standard will be implemented as of January 01, 2018.
10/04/2014	Capital requirements for bank exposures to central counterparties - final standard	Standards	Tightened	Credit	Krettek (2025)	There is a new approach to determining capital requirements for bank exposures to qualifying central counterparties as well as a limit on the capital requirement compared to non-qualifying central counterparties. The standard will become mandatory as of January 01, 2017.
13/01/2014	Basel III: the Net stable funding ratio	Standards	Weakened	Liquidity	Krettek (2025)	The BCBS issues the standard for the LCR disclosure requirements. In the second document, the BCBS relaxes the NSFR with respect to a broader recognition and higher ASF factor for deposits while increasing consistency

						with the LCR. In addition, cliff effects in the measurement of ASF and RSF shall be mitigated.

7.2. Appendix B. Additional Figures

Figure 1-Average Sign Adjusted Abnormal Returns Around Regulatory Events



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