Is Bank Regulation Priced by Financial Markets?
Evidence from the CRR II Reform in Europe

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Abstract

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Keywords: banking regulation, CRR II, event study, abnormal returns, price-to-book ratio, European banks, Basel III, capital requirements

This dissertation examines whether European equity markets priced the regulatory milestones of the Capital Requirements Regulation II (CRR II), and whether market reactions reflected a stability-enhancing channel — tighter requirements reducing perceived risk — or a regulatory cost channel — compliance costs and profitability pressures dominating investor expectations.

The empirical strategy combines an event study, analyzing short-term stock market reactions around four CRR II milestones between 2016 and 2021 for a sample of 16 listed European commercial banks, with a panel regression examining whether, over 2018–2024, banks with weaker pre-reform capital or higher non-performing exposure experienced different valuation trajectories.

The event study documents predominantly negative cumulative abnormal returns around the four CRR II milestones, with statistically significant reactions emerging for most events and event windows in the main specification. The Council's agreed stance of May 2018 produces the strongest reaction (CAR $[-1,+1] = -5.36\%$, $p < 0.001$***), shared across all 16 banks. The panel regression finds no statistically significant differential effect on P/B ratios, confirmed by wild cluster bootstrap across twelve specifications. The evidence is more consistent with a sector-wide negative repricing than with a persistent cross-sectional valuation divergence based on pre-reform prudential conditions.

Resumo

A Regulação Bancária é Avaliada pelos Mercados Financeiros? Evidência da Reforma CRR II na Europa

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Palavras-chave: regulação bancária, CRR II, estudo de evento, retornos anormais, rácio preço-valor contabilístico, bancos europeus, Basiléia III, requisitos de capital

Esta dissertação examina se os mercados acionístas europeus avaliaram os principais marcos regulatórios do Regulamento de Requisitos de Capital II (CRR II), e se as reações refletiram um canal de estabilidade — requisitos mais exigentes reduzindo o risco percebido — ou um canal de custos regulatórios — custos de cumprimento e pressões sobre a rentabilidade dominando as expectativas dos investidores.

A estratégia empírica combina um estudo de eventos, que analisa reações de curto prazo em torno de quatro marcos do CRR II entre 2016 e 2021 para 16 bancos comerciais europeus cotados, com uma regressão em painel que examina se, em 2018–2024, bancos com menor capitalização ou maior exposição a créditos não produtivos registaram trajetórias de avaliação distintas.

O estudo de eventos documenta retornos anormais cumulativos predominantemente negativos em torno dos quatro marcos, com significância estatística na maioria dos eventos e janelas analisadas. A posição do Conselho de maio de 2018 gera a reação mais forte (CAR [−1,+1] = −5,36%, $p < 0{,}001$***), comum aos 16 bancos. A regressão em painel não encontra qualquer efeito diferencial significativo no rácio P/B, confirmado pela inferência bootstrap em doze especificações. A evidência é mais consistente com um repricing negativo comum a todo o setor do que com uma divergência de avaliação transversal persistente.

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1. Introduction

The relationship between prudential regulation and the market valuation of banks is one of the most debated topics in the economic analysis of the financial sector. Stricter capital and liquidity requirements are designed to strengthen the resilience of credit institutions and reduce the probability of systemic crises; at the same time, they impose constraints on balance sheet choices, business models and profitability prospects, with effects that investors tend to incorporate rapidly into prices. Understanding how equity markets process regulatory information is therefore essential both for assessing the effectiveness of reforms and for interpreting the signals that markets themselves return to regulators.

The European regulatory framework has evolved significantly over the past decade, in response to the global financial crisis of 2008 and subsequent sovereign turbulence. In the European Union, Basel standards are transposed through the Capital Requirements Regulation (CRR) and the Capital Requirements Directive (CRD). The CRR II represents the European transposition and completion of several post-crisis Basel III reforms, introducing binding leverage and liquidity requirements. The reform, adopted with Regulation (EU) 2019/876[1], introduced a binding leverage ratio requirement, strengthened short and long-term liquidity ratios, namely the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), and consolidated the European prudential framework in line with the final Basel III standards.

This dissertation analyses how European equity markets reacted to the main moments of the CRR II legislative process, and interprets the economic significance of those reactions. The main research question is as follows: how do financial markets react when capital and liquidity requirements for banks become more stringent? Beyond measuring the reaction, the objective is to understand its content: whether investors predominantly read the CRR II as good news in terms of stability, thanks to the reduction in perceived risk, or as bad news, due to compliance costs, constraints on business models and pressures on expected profitability.

The literature does not provide a univocal answer on this point, and it is precisely from this tension between prudential benefits and economic costs that the two hypotheses underlying the analysis arise. According to the stability view (H1), banks with weaker prudential buffers before

[1]Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures and reporting and disclosure requirements.

the reform should react more positively, or less negatively, to regulatory announcements, since stricter requirements improve their perceived resilience. According to the cost view (H2), banks more exposed to compliance costs should instead record more negative reactions, since stricter rules reduce expected profitability or constrain balance sheet flexibility.

To address these questions, a two-stage empirical strategy was adopted. The first is based on an event study measuring abnormal stock returns around the four main institutional milestones of the CRR II process, namely the European Commission proposal in November 2016, the EU Council position in May 2018, the publication in the Official Journal in June 2019 and the entry into force of the leverage ratio requirement in June 2021, on a sample of 16 listed European commercial banks. The second stage uses a panel regression with differential exposure comparing the evolution of P/B over 2018–2024 among banks with different degrees of initial prudential vulnerability, measured by the CET1 ratio and the NPE ratio.

The results show that markets reacted in a predominantly negative manner to all four CRR II milestones, with predominantly negative abnormal returns emerging across different event windows and statistical tests, with the most intense reaction corresponding to the Council position in May 2018 (CAR $[-1,+1] = -5.36\%$, $p < 0.001$***), shared across all 16 banks in the sample. The panel regression does not identify any statistically robust differential effect in the medium term. The overall body of evidence is more consistent with a reading in which markets responded with a negative repricing to the prudential strengthening as such, without producing a persistent cross-sectional divergence in valuations between more and less exposed banks.

The contribution is threefold. On the empirical side, it provides one of the first analyses specifically focused on CRR II as a regulatory setting, integrating event study and panel regression into a coherent strategy. On the interpretive side, it proposes a framework to distinguish the short-term informational component from the medium-term valuation component. On the methodological side, it adopts wild cluster bootstrap with Webb weights to correct the inferential distortion arising from the small sample size.

2. Literature Review

The topic sits at the intersection of two strands of the literature: that on the prudential regulation of banks and that on the reaction of financial markets to supervisory policies. Although both have been extensively explored, their combination, particularly with reference to the recent European framework, still leaves room for relevant empirical contributions.

2.1 Banking Regulation, Capital Requirements and Financial Stability

Banking regulation follows a distinct logic compared to that applied to non-financial sectors. Banks operate with high leverage, transform maturities, depend on the confidence of depositors and investors, and are strongly interconnected with the rest of the system: the difficulties of a single institution can spread rapidly, generating negative effects on the entire economy. Prudential regulation aims not only to limit the risk of the individual intermediary, but above all to reduce the probability and severity of systemic crises.

Aiyar, Calomiris and Wieladek (2015) show that higher capital requirements can strengthen banking stability and reduce the social costs of crises, but at the same time emphasize that this tightening is not without consequences: it can reduce profitability, negatively affect stock prices and contract credit supply. A fundamental trade-off thus emerges, on the one hand greater stability and loss-absorbing capacity, on the other possible costs for shareholders, which constitutes the theoretical starting point of the analysis. The relevance of capital as a resilience signal is confirmed by Demirgüç-Kunt, Detragiache and Merrouche (2010), who show that, during the financial crisis, better-capitalized banks recorded relatively better stock performance. This does not imply, however, that every regulatory tightening is positively received by markets: capital plays a dual role, acting both as a prudential resilience measure and as an element capable of influencing banks' expected profitability. The market reaction depends on the balance between these two effects, and the literature does not provide a univocal answer.

2.2 Adjustment Channels to Stricter Requirements

Higher capital and liquidity requirements are not simple technical thresholds: they influence the business model, the structure of the balance sheet and the bank's capacity to expand credit and generate profits. Cohen and Scatigna (2016) show that an improvement in capital ratios can occur through very different channels, such as retaining earnings, issuing new capital, slowing asset growth or shifting towards lower risk-weighted assets, with non-equivalent economic implications. Gropp, Mosk, Ongena and Wix (2018), analyzing the EBA's 2011 capitalization exercise, show that many banks improved their ratios primarily by reducing risk-weighted assets, with consequent negative effects on credit supply to firms. On the liquidity side, Bruno, Onali and Schaeck (2018) demonstrate that requirements such as the LCR and NSFR modify balance sheet structure without necessarily contracting credit to the real sector, as also confirmed by Banerjee and Mio (2014) for the British case. Taken together, these studies show that the economic effect of regulation cannot be understood by looking at the norm alone: it is necessary to observe the channel through which banks adjust, since it is there that the real costs of the reform are determined and, through this, the market reaction.

2.3 Regulation, Profitability and Market Valuation

The link between prudential constraints and market valuation passes primarily through profitability expectations. A more solid bank may be perceived as less risky, but also as less profitable if prudential strengthening requires more capital, more liquidity and a more rigid balance sheet structure. Bostandzic, Irresberger, Juelsrud and Weiß (2022) show that higher requirements improve regulatory solvency measures, but may worsen some market measures of risk, consistently with a permanent reduction in the market value of equity. García Martínez, Domínguez Jiménez and Queralt Sánchez de las Matas (2024) show, analyzing the P/B of European banks, that the market values capital components linked to earnings generation capacity much more than those that strengthen solvency without improving profitability prospects: what matters is not only the quantity of capital, but its economic quality. This ambivalence between prudential benefits and economic costs justifies the formulation of two opposing hypotheses and is at the center of the interpretive framework of the dissertation.

2.4 Market Reactions to Regulatory Announcements

Event studies on banking regulation do not show a univocal average market reaction. Two methodological problems occur frequently in the literature. The first is bundling, namely the overlap of multiple policy announcements that makes it difficult to isolate the effect of a single measure. The second is anticipation, whereby the date of the formal announcement does not necessarily coincide with the moment when the market learns the relevant information.

Bruno, Onali and Schaeck (2018) show that liquidity announcements produce negative abnormal returns that diminish when separated from the rest of the Basel III package, and that the reaction is more negative in countries with high public debt. Palvig and Östlund Wessberg (2023) observe a negative but non-robust reaction to the December 2017 Basel III package, partly explained by anticipation. Krettek (2025) finds negative reactions for European banks around some Basel reforms on market and credit risk, with weaker results for the United States. Within the European Union, Longo, Fabrizi and Parbonetti (2025) report negative reactions around CRD IV announcements, stronger for larger banks and those in countries with high sovereign risk. Pancotto, ap Gwilym and Williams (2020) show that Banking Union announcements produce heterogeneous effects, while Loipersberger (2017) finds small but positive stock effects for the introduction of supranational supervision.

Overall, the market does not simply react to an increase in regulation per se, but evaluates the specific content of the measure, the macro-financial context and the institutional signal transmitted by the announcement.

2.5 The European Regulatory Framework and CRR II

In the European context, the market valuation of prudential reforms cannot be understood by looking at individual norms in isolation.

As emphasized by Pisani-Ferry, Sapir, Véron and Wolff (2012), the Banking Union is a broader institutional project encompassing supervision, resolution, deposit guarantee, fiscal backstop and governance. The market evaluates not only the micro prudential content of the reforms, but also the credibility of the institutional framework within which they are introduced.

The CRR II does not represent an isolated episode, but a step in the consolidation of the European prudential framework: its market reaction also reflects investors' judgement on the capacity of European institutions to make the new rules credible and effective.

2.6 The Research Gap

Four main elements emerge from the review. First, banking regulation can simultaneously produce benefits in terms of stability and costs in terms of profitability, market value and operational flexibility. Second, banks do not all adjust in the same way: the chosen response channel determines different economic effects. Third, event studies are frequently conditioned by bundling, anticipation and heterogeneity problems in reactions across banks and countries. Fourth, in the European context the market reaction also depends on the credibility of the institutional framework.

What is missing is an analysis specifically focused on CRR II capable not only of measuring whether the market reacts, but of interpreting the economic significance of that reaction through a dual empirical strategy. Whether the market primarily read the CRR II as a resilience factor or as a source of costs remains an open question, and it is in this space that the present research is situated.

3. Methodology and Data

This chapter describes the empirical strategy adopted to address the research question. The choice to combine two distinct approaches, namely the event study and the panel regression with differential exposure, reflects the complexity of the phenomenon under analysis. Banking regulation can produce effects over different time horizons and through different channels: a single method would not be sufficient to fully capture its economic significance.

3.1 Empirical Objective and Two-Stage Strategy

The event study is the most appropriate tool for measuring the immediate market reaction around specific dates on which the regulatory process produces new public information. When a relevant regulatory event is announced, investors update their expectations and this revision is reflected rapidly in stock prices. Observing the cumulative abnormal returns (CARs) around the main CRR II milestones allows one to assess whether the market appears to have interpreted the reform as a positive resilience signal or as a source of costs.

The short-term reaction, however, does not exhaust the economic content of the research. Even if the market responds clearly to a regulatory event, it does not follow that all banks are affected in the same way in the subsequent period. Some institutions may be more exposed to compliance costs, in terms of capital, liquidity or asset quality, while others may be perceived as better able to absorb the new prudential framework. The panel regression with differential exposure makes it possible to analyze whether, in the medium term, the market differentiated the valuation of banks based on their initial prudential conditions. The two approaches are therefore complementary: the event study observes the short-term informational dimension, while the panel regression observes the medium-term valuation dimension.

3.2 Data Sources

The data used in the analysis come from the integration of three main groups of sources. Market data, namely the daily returns of bank stocks and market benchmarks, were collected through Refinitiv/LSEG Workspace, a source chosen for the homogeneity of the historical series and their comparability across banks and over time. The main benchmark used in the estimation of the market model is the STOXX Europe 600 EUR Price Index, a representative index of the entire European equity market; as a robustness check, the estimation was replicated using the

STOXX Europe 600 Banks EUR Price Index, a more conservative sector benchmark that absorbs part of the common shock to the banking sector.

Regulatory data, namely the CET1 ratio, NPE ratio, LCR and NSFR, were collected at annual frequency[2] from the EBA Transparency Exercise publications, the Pillar III reports of individual institutions and, where necessary, from annual reports. Among these indicators, the CET1 ratio and NPE ratio constitute the exposure variables in the panel regression; LCR and NSFR[3] are employed for descriptive purposes to contextualize the liquidity dimension of the CRR II framework. Institutional and legislative data were drawn from the Official Journal of the European Union and from the official communications of the Council and the European Commission, verifying for each milestone the clarity of the timing, the informational content and the plausibility that the event would update market expectations.

3.3 Identification of Regulatory Milestones and Sample

The first step of the analysis consisted in identifying the four main milestones of the CRR II legislative process to include in the event study. The selection was based on precise methodological criteria: the institutional formality of the event, its informational relevance for investors, the clarity of the timing and the absence of problematic overlaps with other policy announcements. Table 1 summarizes the four selected events and their market relevance (see Appendix B).

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[2]Annual frequency is preferred to quarterly data because several key prudential variables, in particular the NPE ratio and liquidity indicators, exhibit incomplete and non-homogeneous quarterly disclosure across banks in the earlier part of the sample period. The use of annual data ensures greater comparability of the series and reduces the risk of distortions arising from differences in Pillar III reporting calendars.
[3]The NSFR is not included among the exposure indicators in the panel regression due to a data coverage limitation: the series is available for only 64 out of 112 observations (57%), with no coverage in 2018 and very partial coverage in 2019–2020, reflecting the fact that the mandatory reporting requirement became operational only upon the entry into force of CRR II. Its role in the analysis is therefore exclusively descriptive.

Table 1. Main CRR II Regulatory Milestones Included in the Event Study

Event	Date	Milestone	Market Relevance
EV1	23 Nov. 2016	European Commission Proposal (COM(2016) 850 final)	First formal public disclosure of the reform content; investors can begin to assess its prudential implications.
EV2	25 May 2018	EU Council formalizes its negotiating position	Substantial reduction in implementation uncertainty; institutional credibility signal for the reform.
EV3	7 Jun. 2019	Publication in the EU Official Journal (OJ L 150/1)	Definitive formalization of the legal text. Parliamentary approval on 16 April 2019 makes an anticipation effect plausible.
EV4	28 Jun. 2021	Leverage ratio requirement becomes binding	First materialization of a concrete prudential constraint; the market concentrates its response in the short term.

The bank sample consists of 16 listed European commercial banks, selected on the basis of precise methodological criteria: stock exchange listing (necessary for the analysis of daily returns), availability of sufficiently reliable historical series, consistency with the focus on large European commercial banks, stock liquidity and absence of relevant methodological problems such as recent mergers or excessively short listing histories. The main sample includes 13 banks; three institutions are included in the robustness samples for specific reasons: ABN AMRO and Deutsche Bank (robustness 1) for characteristics more borderline with respect to the commercial focus; Banco BPM (robustness 2) for a temporal ineligibility. For EV1 specifically, both Banco BPM and ABN AMRO are excluded (n = 14): the former due to temporal ineligibility, having been created from a merger effective 1 January 2017, it cannot be included in EV1; while ABN AMRO is also excluded from EV1: having returned to the stock exchange in November 2015, it did not have sufficient data for the estimation window [−252, −30] trading days as of 23 November 2016. The sample for EV1 is therefore n = 14. The complete composition of the sample with the main prudential characteristics as of 2019 is reported in Appendix A.

3.4 Event Study Methodology

The event study measures the component of stock returns not explained by the normal market movement, namely abnormal returns, around the dates of the regulatory milestones. The logic of the method is grounded in the informational efficiency hypothesis: if an event has relevant informational content, investors' expectations are updated rapidly, and this revision is reflected in prices.

For each bank-event combination, the normal return is estimated through a *market model* applied to an estimation window[4] of [−252, −30] trading days before the event. The estimated model is:

$$R(i,t) = \alpha(i) + \beta(i) \times R(m,t) + \varepsilon(i,t) \tag{1}$$

where *R(i,t)* is the daily return of bank *i* on day *t*, *R(m,t)* is the benchmark return, *α(i)* and *β(i)* are the parameters estimated via OLS, and *ε(i,t)* is the error term. The abnormal return is AR(i,t) = R(i,t) − [α̂(i) + β̂(i) × R(m,t)]. Daily abnormal returns are then aggregated to construct the Cumulative Abnormal Returns (CARs).

The analysis uses three event windows, all measured in effective trading days to ensure comparability across events. Table 2 describes the three windows and their methodological function.

Table 2. Event Windows used in the Event Study

Window	Days	Function	Interpretation
[−1, +1]	3	Main specification	Captures the immediate reaction balancing pre-event noise and small incorporation delays.
[0, +1]	2	Robustness 1 — excludes day −1	Verifies whether the reaction depends on anticipatory movements on the previous day.
[−3, +3]	7	Robustness 2 — wider window	Captures time-distributed reactions or anticipation effects over multiple days.

The statistical significance of the mean CARs is verified through a parametric cross-sectional t-test. As a robustness check on normality, the sign test, which counts banks with negative CARs relative to the total without assuming a specific distributional form, and the Wilcoxon signed-rank test, which considers both the sign and the magnitude of the CARs by assigning ranks to absolute values, are also conducted.

[4]The estimation window of 252 trading days corresponds to one calendar year (252 average trading days). The interval ends 30 days before the event to prevent contamination of the estimate from potential anticipatory price movements. This choice is consistent with the event study literature applied to banking regulation: see MacKinlay (1997) for the general methodology and Bruno et al. (2018) for the application to the banking context.

3.5 Panel Regression Methodology

The second stage of the analysis uses a panel regression with differential exposure to study whether, in the medium term, the market differentiated the valuation of banks based on their degree of initial prudential vulnerability, where the dependent variable is the price-to-book ratio (P/B)[5], which captures investors' expectations about future profitability, perceived risk and the bank's capacity to create value over time.

The identificatory design adopted is known in the literature as within-treated comparison[6] or panel regression with differential exposure. All 16 banks in the sample are subject to CRR II: banks with high CET1 or low NPE do not constitute a genuinely untreated group, but present a lesser degree of adjustment required by the reform; since all banks in the sample are subject to CRR II, what varies across groups is not exposure to the reform, but its intensity. The estimated econometric model is as follows:

$$P/B(i,t) = \alpha + \hat{\beta} \times (Treated(i) \times Post(t)) + \mu(i) + \lambda(t) + \varepsilon(i,t) \tag{2}$$

where $\mu(i)$ are bank fixed effects, which absorb all time-invariant unobservable characteristics of each institution, and $\lambda(t)$ are year fixed effects, which capture all common shocks to all banks in a given year (economic cycle, interest rate changes, Covid shock in 2020). The coefficient $\hat{\beta}$ *measures* the difference in the P/B trajectory between banks with greater and lesser initial exposure to CRR II in the post-reform period, net of the fixed effects. The model is estimated via areg[7], with clustered standard errors at the bank level.

The higher and lower exposure groups are constructed on the basis of 2019 values, used as the prudential pre-implementation baseline, being the last year with complete coverage for all banks, in order to avoid the use of information subsequent to the full application of CRR II. It

[5]The price-to-book ratio is the most widely used market valuation measure in the empirical banking literature. Unlike the price-to-earnings ratio, the P/B is less distorted by short-term earnings fluctuations — particularly relevant for 2020, a year characterised by extraordinary loan-loss provisions related to Covid-19. The P/B directly captures the market's judgement on the excess expected return relative to the cost of equity: a P/B < 1 indicates that the market expects returns below the cost of capital.

[6]Since all banks in the sample are subject to CRR II, the empirical design compares banks with different degrees of exposure to the reform rather than treated versus untreated institutions. Similar approaches are adopted in the literature studying heterogeneous reactions to prudential regulation, including Gropp et al. (2018) and Bostandzic et al. (2022) for EBA capitalisation exercises.

[7]The areg command (Stata 18.5) estimates an OLS model absorbing group fixed effects through the within-group transformation. The absorb option is equivalent to including n−1 bank dummies without estimating them explicitly, reducing computational cost without altering the coefficients of interest.

should however be acknowledged that these values might partially reflect anticipatory adjustments following the 2016 and 2018 milestones; consequently, the group classification may underestimate the original prudential differences between banks. Table 3 summarises the construction of the two main groups.

Table 3. Construction of Exposure Groups in the Panel Regression

Group	Variable	Threshold (2019 median)	Banks in the higher-exposure group
Low CET1	CET1 ratio	< 12.70%	BBVA, Bankinter, BNP Paribas, CaixaBank, BPER Banca, Banco de Sabadell, Banco Santander (n = 7)
High NPE	NPE ratio	≥ 3.072%	BBVA, BNP Paribas, CaixaBank, UniCredit, BPER Banca, Banco de Sabadell, Intesa Sanpaolo, Banco BPM (n = 8)

The analysis does not rely on a single temporal moment, but considers three alternative definitions of the post-reform period: 2019, as an early-adoption specification; 2020, as an intermediate phase including the Covid shock; and 2021, as the main specification, the year in which the leverage ratio requirement became binding. The use of alternative thresholds reduces dependence on a single temporal choice and strengthens the robustness of the empirical design.

3.6 Robustness Checks

The robustness of the results is verified through four distinct checks. The first concerns the definition of the post-reform period, replicating the estimation with the three alternative temporal thresholds described above; the second uses the natural logarithm of the P/B as an alternative dependent variable, to correct possible asymmetries in the distribution; the third replicates the main estimation using the xtreg command with the *fe* option[8], verifying the internal consistency of the estimation pipeline; and finally the fourth, and methodologically most relevant, is the wild cluster bootstrap with Webb weights[9] (9,999 replications, seed = 42), which corrects for the risk of inferential distortion arising from the small number of clusters, 16 banks. Bootstrap p-values are generally higher than the clustered ones, especially in the main

[8]The xtreg fe command estimates the same fixed-effects model as areg through the within-group transformation. The coefficients are algebraically identical; the replication serves as an internal consistency check of the estimation pipeline.
[9]Wild cluster bootstrap with Webb weights is recommended when the number of clusters is small, as conventional clustered standard errors tend to be anti-conservative, producing potentially underestimated p-values (Cameron and Miller, 2015). Webb weights produce more reliable inference than Rademacher weights when clusters are fewer than 20 (Webb, 2023).

specifications, confirming that bootstrap inference provides a more conservative assessment of statistical significance.

For the dynamic specification, the model separately includes the interaction between the higher-exposure group and each year (2019 × group, ..., 2024 × group). This specification serves two purposes: to verify the consistency of valuation dynamics in the pre-implementation period between the groups[10] and to observe whether the eventual differential effect emerges with varying intensity in individual post-reform years. The F-test on the pre-treatment coefficient is not significant for either group, confirming that P/B trajectories were statistically indistinguishable in 2019, prior to any post-reform effect.

[10]In the absence of a genuinely untreated group, the test on the pre-implementation interaction (2019 × group) verifies the consistency of valuation dynamics between the groups in the period preceding the reform. No statistically significant divergences emerge: $F(1,15) = 0.41$ ($p = 0.530$) for Low CET1 and $F(1,15) = 1.22$ ($p = 0.286$) for High NPE.

4. Empirical Results and Discussion

This chapter presents the results of the event study and the panel regression with differential exposure, discussing their economic significance in light of the hypotheses formulated in Chapter 1.

4.1 Event Study Results

The analysis produces distinct results for each of the four milestones. Before commenting on individual events, it is necessary to clarify the significance of the three windows and the statistical tests used. The main window [−1,+1] contains three trading days and balances the risk of including news unrelated to the event with the need to capture small incorporation delays; the [0,+1] window excludes the previous day and serves to verify whether the reaction depends on anticipatory movements; while the [−3,+3] window extends the horizon to seven days and captures time-distributed reactions. The comparison across the three windows is an integral part of the interpretation.

EV1 — European Commission Proposal (23 November 2016). The sample comprises 14 banks. The CAR in the main window is −0.78% ($t = -1.618$; $p = 0.130$, n.s.), therefore not statistically significant in the main specification. The [0,+1] window instead produces a CAR of −1.18% ($p < 0.001$ ***), larger in absolute value despite containing one fewer day: day −1 had a positive abnormal return that attenuated the reaction in the main window. In the [−3,+3] window the CAR reaches −4.26% ($p < 0.001$ ***), with all 14 banks in negative territory[11]. The profile suggests a time-distributed reaction, consistent with the nature of EV1 as the first formal announcement that opens a legislative process still uncertain: the market does not aggressively price a cost that could still be modified.

EV2 — EU Council Position (25 May 2018). EV2 is the most robust result of the entire analysis. The CAR in the main window is −5.36% ($t = -6.071$; $p < 0.001$ ***), with all 16 banks negative across all three windows, a maximum convergence impossible to attribute to random fluctuations. The CAR [−3,+3] reaches −7.54% ($p < 0.001$ ***), the highest absolute value in the analysis. The profile indicates that the reaction had already partially begun in days −3 and

[11]For EV1 in the [−1,+1] window, the sign test produces $p = 0.424$ (non-significant), with 9 out of 14 banks showing negative CARs. The discrepancy with respect to the parametric t-test ($p = 0.130$) is methodologically informative: in small samples, parametric and non-parametric tests can diverge, especially when the reaction is not uniformly distributed across banks. The Wilcoxon signed-rank ($p = 0.096$) confirms a more subdued reaction relative to subsequent milestones.

−2, probably in response to informal anticipations of the Council position contents. It marks the moment at which the reform becomes credible: the formalization of the Council's negotiating position drastically reduces uncertainty about implementation, and the results predominantly reflect a reading in terms of pressure on costs and expected profitability, more than of perceived prudential benefits, at least in the short term.

EV3 — Publication in the Official Journal (7 June 2019). EV3 presents the most complex profile. The CAR [−1,+1] is −1.15% ($p = 0.006$ ***), significant. The CAR [0,+1] is instead +0.47% ($p = 0.121$, n.s.), positive and non-significant: eleven out of sixteen banks show positive abnormal returns in the window that includes only the event day and the subsequent day. This apparent paradox is explained by the 'buy the news' effect[12]: the text of Regulation (EU) 2019/876 had already been approved by the European Parliament on 16 April 2019, almost two months earlier[13]. In the absence of new information, the market reacts with a technical rebound at the materialization of the anticipated event. The [−3,+3] window reports a CAR of −2.56% ($p < 0.001$ ***), with 15 out of 16 banks negative: the negative effect in the days preceding publication is sufficiently large to prevail over the rebound on the event day.

EV4 — Entry into force of the leverage ratio (28 June 2021). EV4 produces a profile opposite to EV3: the narrow windows are strongly significant, while the wider one is not. The CAR [−1,+1] is −1.56% ($p < 0.001$ ***, 13/16 banks negative) and the CAR [0,+1] is −2.00% ($p < 0.001$ ***, 15/16 banks negative). The [−3,+3] window instead produces a CAR of −0.31%, non-significant ($p = 0.619$, n.s.): the sign test in this window is perfectly balanced (8/8 positive and negative), with Wilcoxon $p = 0.326$ (n.s.).[14] The structure is consistent with the nature of EV4: the entry into force of the leverage ratio had been known for years and did not represent new information. The reaction concentrates in the immediate term, probably reflecting the

[12]The 'buy the news' effect occurs when an anticipated event materializes without informational surprise: operators who had positioned their portfolio in advance close their positions, generating a technical rebound. In the case of EV3, the parliamentary approval of 16 April 2019 had already made the content of the Official Journal publication widely known, rendering the event devoid of additional informational content. Bruno et al. (2018) document an analogous mechanism in the context of banking regulation announcements.

[13]The anticipation problem is recurrent in event studies on banking regulation, as legislative processes unfold gradually, and relevant information becomes available progressively before the official announcement date. See Bruno, Onali and Schaeck (2018) and Palvig and Östlund Wessberg (2023) for a discussion of this issue in the context of Basel regulation.

[14]In the [−3,+3] window of EV4, the sign test produces $p = 1.000$ (8/16 banks positive and 8/16 negative) and the Wilcoxon signed-rank $p = 0.326$. The result does not contradict the reaction in the narrow windows, where the CAR remains negative and statistically significant. It indicates that, over seven days, opposing movements cancel out: some banks that had already anticipated the cost show a rebound in subsequent sessions.

concrete materialization of the constraint, and dissipates over wider horizons as banks that had already anticipated the cost show a rebound.

Comparing the four events, a coherent picture emerges: European equity markets reacted in a predominantly negative manner to the main CRR II milestones. The most intense and homogeneous reaction across banks is recorded in correspondence with EV2, the moment at which the reform acquires institutional credibility. The short-term results are overall more consistent with H2 than with H1, although the scope of the evidence does not allow alternative interpretations to be excluded. The results are reported in Table 4.1.

Table 4. Cumulative Abnormal Returns (CARs) per Event and Window.

Event / Milestone	n	CAR [−1,+1]	t-stat	p (param.)	CAR [0,+1]	p (param.)	CAR [−3,+3] | p (param.)
EV1 — Commission Proposal (23 Nov. 2016)	14	−0.78% n.s.	−1.618	0.130 n.s.	−1.18% ***	<0.001 ***	−4.26% *** | <0.001 ***
EV2 — Council Position (25 May 2018)	16	−5.36% ***	−6.071	<0.001 ***	−4.06% ***	<0.001 ***	−7.54% *** | <0.001 ***
EV3 — Official Journal (7 Jun. 2019)	16	−1.15% ***	−3.175	0.006 ***	+0.47% n.s.	0.121 n.s.	−2.56% *** | <0.001 ***
EV4 — Leverage ratio binding (28 Jun. 2021)	16	−1.56% ***	−3.998	<0.001 ***	−2.00% ***	<0.001 ***	−0.31% n.s. | 0.619

*Note: main benchmark: STOXX Europe 600 EUR Price Index. p (param.) = p-value of the parametric cross-sectional t-test, two-tailed. Significance: *** $p < 0.01$; ** $p < 0.05$; † $p < 0.10$; n.s. $p \geq 0.10$.*

The results are partially robust to the choice of benchmark. The replication with the STOXX Europe 600 Banks EUR Price Index produces negative and statistically significant CARs for EV1 and EV2, with attenuated magnitudes relative to the main specification, consistently with the fact that the sector benchmark absorbs part of the common shock to the banking sector. For EV3 and EV4, the CARs lose statistical significance with the sector benchmark, a methodologically expected result: both events produce predominantly uniform reactions across banks, which are absorbed by the Banks benchmark together with the common sector component. The complete results are reported in Tables 5 and 6, detailed bank-level event study results, including estimated market model coefficients and cumulative abnormal returns for each institution, are reported in Appendix C.

Table 5. Event Study Replicated with the sector benchmark STOXX Europe 600 Banks EUR Price Index (narrow window)

Event / Milestone	n	Window [−1, +1]			Window [0, +1]		
		CAR	t-stat	p-value	CAR	t-stat	p-value
EV1 — Commission Proposal (23 Nov. 2016)	14	−0.99% †	−2.044	0.062 †	−0.52% **	−2.379	0.033 **
EV2 — Council Position (25 May 2018)	16	−2.73% ***	−3.283	0.005 ***	−2.39% **	−2.733	0.015 **
EV3 — Official Journal (7 Jun. 2019)	16	+0.03% n.s.	+0.093	0.927 n.s.	+0.42% n.s.	+1.488	0.157 n.s.
EV4 — Leverage ratio binding (28 Jun. 2021)	16	−0.54% n.s.	−1.424	0.175 n.s.	−0.57% n.s.	−1.542	0.144 n.s.

*EV1: n = 14 (ABN AMRO and Banco BPM excluded). Significance: *** $p < 0.01$; ** $p < 0.05$; † $p < 0.10$; n.s. $p \geq 0.10$.*

Table 6. Event Study Replicated with the sector benchmark STOXX Europe 600 Banks EUR Price Index (wide window [-3;+3]

Event / Milestone	n	CAR [−3, +3]	t-stat	p-value
EV1 — Commission Proposal (23 Nov. 2016)	14	−2.35% ***	−3.348	0.005 ***
EV2 — Council Position (25 May 2018)	16	−3.00% ***	−3.573	0.003 ***
EV3 — Official Journal (7 Jun. 2019)	16	−0.81% n.s.	−1.300	0.213 n.s.
EV4 — Leverage ratio binding (28 Jun. 2021)	16	−0.74% n.s.	−1.241	0.234 n.s.

*Note: the direction is consistent with the main specification across all four events. EV3 and EV4 lose significance with the sector benchmark — a methodologically expected result. Significance: *** $p < 0.01$; ** $p < 0.05$; † $p < 0.10$; n.s. $p \geq 0.10$.*

4.2 Panel Regression Results

The results of the panel regression with differential exposure are presented for the four main models in Table 7, estimated with a post-2021 threshold and groups constructed on 2019 values as the prudential baseline, while the robustness specifications with alternative temporal thresholds are reported in Table 8. In none of the twelve estimated models, four main and eight robustness specifications, statistical significance emerges, neither with clustered standard errors nor with the wild cluster bootstrap.

Table 7. Main Models of the Panel Regression with Differential Exposure

Model	DID Variable	β̂	SE (clust.)	t-stat	p (clust.)	p (boot.)	R^2 within
M1: P/B ~ Low CET1	did_low_cet1_2021	−0.0084	0.0633	−0.132	0.896 n.s.	0.885 n.s.	0.482
M2: P/B ~ High NPE	did_high_npe_2021	+0.0978	0.0612	+1.599	0.131 n.s.	0.508 n.s.	0.509
M3: ln(P/B) ~ Low CET1	did_low_cet1_2021	−0.0852	0.1117	−0.763	0.457 n.s.	0.533 n.s.	0.471
M4: ln(P/B) ~ High NPE	did_high_npe_2021	+0.1393	0.1181	+1.180	0.256 n.s.	0.500 n.s.	0.482

. Post-2021 threshold. Exposure groups constructed on 2019 values as prudential pre-implementation baseline. N = 112 observations (16 banks × 7 years), strongly balanced panel. Bank and year fixed effects included. Standard errors clustered at the bank level (16 clusters). p (boot.) = wild cluster bootstrap p-value with Webb weights, 9,999 replications, seed = 42. None of the twelve specifications reaches statistical significance. Significant year fixed effects: 2020 ≈ −0.139 (p = 0.017); 2024 ≈ +0.231 (p = 0.031).

Table 8. Robustness Analysis - all 12 specifications (2 groups x 3 temporal thresholds x 2 dependent variables)

Model	Dep. Var.	Group	Post threshold	β̂	SE (clust.)	t-stat	p (clust.)	p (boot.)
M1a	P/B	Low CET1	post-2019	−0.0447	0.0779	−0.563	0.582 n.s.	0.593 n.s.
M1b	P/B	Low CET1	post-2020	−0.0304	0.071	−0.427	0.676 n.s.	0.665 n.s.
M1 ★	P/B	Low CET1	post-2021	−0.0084	0.063	−0.132	0.896 n.s.	0.885 n.s.
M2a	P/B	High NPE	post-2019	+0.1101	0.080	+1.380	0.188 n.s.	0.515 n.s.
M2b	P/B	High NPE	post-2020	+0.0932	0.073	+1.276	0.222 n.s.	0.466 n.s.
M2 ★	P/B	High NPE	post-2021	+0.0978	0.061	+1.599	0.131 n.s.	0.508 n.s.
M3a	*ln(P/B)*	Low CET1	post-2019	−0.1359	0.136	−1.003	0.332 n.s.	0.508 n.s.
M3b	*ln(P/B)*	Low CET1	post-2020	−0.1304	0.139	−0.935	0.365 n.s.	0.514 n.s.
M3 ★	*ln(P/B)*	Low CET1	post-2021	−0.0852	0.112	−0.763	0.457 n.s.	0.533 n.s.
M4a	*ln(P/B)*	High NPE	post-2019	+0.1062	0.146	+0.730	0.477 n.s.	0.519 n.s.
M4b	*ln(P/B)*	High NPE	post-2020	+0.0826	0.154	+0.538	0.598 n.s.	0.584 n.s.
M4 ★	*ln(P/B)*	High NPE	post-2021	+0.1393	0.118	+1.180	0.256 n.s.	0.500 n.s.

Note: ★ = main specification (post-2021), also reported in Table 7. SE and t-stat reported for all specifications. p (boot.) = wild cluster bootstrap p-value with Webb weights, 9,999 replications, seed = 42. All 12 specifications produce p_boot ≥ 0.466. None reaches statistical significance. N = 112 in all specifications (16 banks × 7 years, balanced panel). n.s. = p ≥ 0.10.

Model M1, which compares banks with CET1 ratio below the 2019 median with those above, produces a coefficient β̂ equal to −0.0084 (SE = 0.063; t = −0.132; p_clust = 0.896; p_boot = 0.885). The negative sign is consistent with a reading in terms of compliance costs, but the magnitude is economically negligible: with a mean P/B of approximately 0.58, a difference of 0.0084 corresponds to less than 1.5% of the mean value. Model M2, based on the High NPE group, instead produces β̂ = +0.098 (SE = 0.061; t = +1.599; p_clust = 0.131; p_boot = 0.508). The positive sign is counterintuitive relative to the hypothesis of greater compliance costs for riskier banks, but the bootstrap p-value, well above conventional thresholds, confirms the absence of a statistically relevant effect[15].

Models M3 and M4, which use the natural logarithm of P/B as the dependent variable, confirm the same picture. M3 (ln(P/B) ~ Low CET1) produces β̂ = −0.085 (p_boot = 0.533), equivalent to an approximate difference of −8.2% in P/B between the two groups, but with a standard error of 11.2 percentage points that renders the effect statistically indistinguishable from zero. M4 (ln(P/B) ~ High NPE) produces β̂ = +0.139 (p_boot = 0.500), positive and consistent with M2. The persistence of the positive sign for the High NPE group is economically interpretable: some banks with high NPE in 2019, in particular BPER Banca and Banco BPM, benefited in the period 2021–2024 from extraordinary de-risking operations that the market may have rewarded with a P/B re-rating.

The robust analysis with alternative temporal thresholds confirms the main conclusions. For the Low CET1 group, the β̂ coefficients associated with the three post-2019, post-2020 and post-2021 specifications range between −0.008 and −0.045 in the level's models and between −0.085 and −0.136 in the logarithmic models. The magnitude of the coefficients decreases as the threshold approaches 2021, suggesting that any gap between banks with CET1 below and above the 2019 median has narrowed over time, rather than widening. This dynamic is not consistent with a growing penalization of initially less capitalized banks. For the High NPE group, the β̂ coefficients are positive across all specifications, with a minimum bootstrap p-value of 0.466 in the post-2020 specification with P/B in levels. In this case too, the result remains far from conventional significance thresholds.

The dynamic specification verifies the consistency of valuation trajectories in the pre-implementation period between the groups through an F-test on the 2019 × group interaction. For the Low CET1 group, the test produces F(1,15) = 0.41 (p = 0.530); for the High NPE group, F(1,15) = 1.22 (p = 0.286). In both cases no statistically significant divergences emerge in the pre-implementation trajectories. The joint test on the post-treatment interactions 2021–2024 is not significant for the Low CET1 group (F(4,15) = 0.79; p = 0.552). For the High NPE group, however, the joint test produces F(4,15) = 2.99 (p = 0.054), a marginally significant result

[15]The p_clust = 0.131 of M2 might appear borderline in a larger sample, but the bootstrap with 16 clusters corrects for the anti-conservativeness of clustered standard errors. The value p_boot = 0.508 indicates that the bootstrap distribution of the coefficient is centred on zero, ruling out any interpretative ambiguity.

driven by the coefficient 2024 × High NPE (+0.308; $p = 0.020$ in the levels models). This signal should be interpreted with caution: it is not confirmed in the logarithmic specification ($p = 0.128$) and concerns only one year out of four in the post-reform period. It is therefore plausible that in 2024, a year of strong recovery in European banking valuations captured by the year fixed effect (+0.231), banks with historically high NPE may have disproportionately benefited from the general improvement in credit quality, generating a transitory relative outperformance not directly attributable to the reform. Additional dynamic specifications and pre-treatment trend tests are reported in Appendix D. The results do not provide evidence of systematic pre-treatment divergences for the low CET1 group, while some dynamic heterogeneity emerges for the high NPE specifications.

4.3 Integrated Reading and Connection to the Hypotheses

The integrated reading of the two approaches returns a coherent, yet nuanced picture. The event study and the panel regression do not contradict each other: they measure different phenomena over different time horizons. The event study measures whether the market reacted, and the answer is yes, with a negative response shared across all banks in the sample. The panel regression measures whether this short-term response translated into a persistent valuation separation between more and less exposed banks, and the answer is no.

This compatibility is explained structurally: a reform that generates a market response common to the entire sector, irrespective of the initial prudential position of individual banks, produces a broad negative repricing in the event study CARs, visible from the substantial homogeneity of results across banks, but β coefficients close to zero in the panel regression, since common variations are absorbed by the year fixed effects. The results are consistent with a reading in which markets incorporated the prudential strengthening as a sector-wide negative repricing, without however producing a persistent valuation separation between banks with greater and lesser adjustment burden.

With respect to the formulated hypotheses, the short-term results are more consistent with a regulatory cost reading, insofar as the negative responses to announcements suggest that the market appears to have incorporated into prices the pressures on expected profitability more than the prudential benefits. In the medium term, however, the absence of differential effects does not allow one to discriminate between H1 and H2: both hypotheses remain empirically unresolved with this sample. The absence of differential effects is consistent both with a genuine absence of heterogeneity in the valuation market and with the limited statistical power of a sample of 16 banks. These limitations are discussed in Chapter 5.

5. Conclusions

5.1 Answer to the Research Question

This dissertation examined whether European financial markets priced the prudential strengthening introduced with CRR II, and whether this response primarily reflects the benefits in terms of systemic stability or the pressures on costs and expected profitability. The empirical evidence indicates that markets incorporated the prudential strengthening as a sector-wide negative repricing, with the most intense and homogeneous response corresponding to the milestones that reduced uncertainty about the effective implementation of the reform.

In the short term, the event study documents predominantly negative cumulative abnormal returns around the four CRR II milestones, with statistical significance emerging for most events and event windows. The EU Council position of May 2018 produces the strongest response (CAR $[-1,+1] = -5.36\%$; $p < 0.001$ ***), shared across all 16 banks in the sample across each of the three event windows. In the medium term, the panel regression with differential exposure does not identify any statistically significant differential effect on P/B, neither for banks with lower capitalization nor for those with weaker asset quality. The result is robust across twelve specifications and its solidity is confirmed by the wild cluster bootstrap.

The answer to the research question is therefore as follows: European financial markets priced the CRR II as a sector-wide negative repricing in the short term, without however producing a persistent cross-sectional divergence in valuations among banks with different initial prudential profiles. The short-term results are more consistent with a reading in terms of regulatory cost pressures than with a reading in terms of perceived stability benefits, although in the medium term the evidence is not sufficiently informative to discriminate between the two hypotheses.

5.2 Sector-Wide Repricing Without Persistent Cross-Sectional Divergence

The central interpretive contribution of this dissertation consists in distinguishing two dimensions of the market reaction to prudential regulation that are often conflated in the literature: the short-term informational response and the medium-term valuation differentiation.

The evidence shows a broad and robust sector-wide repricing in the short term, not a persistent valuation separation between institutions: this result is not contradictory, as the two empirical approaches measure distinct phenomena. The event study captures the immediate informational response to regulatory announcements: the moment at which the market updates its expectations for the entire banking industry. The panel regression captures a different dimension: whether, in the subsequent period, the market differentiated individual banks based on their initial prudential vulnerability. These two questions do not contradict each other, and their respective results are fully compatible. A reform perceived as a burden common to the entire sector generates a broad sector-wide repricing in the short term, exactly what the event study documents, without necessarily producing a cross-sectional valuation divergence in the medium term between more and less exposed banks.

A plausible economic explanation is as follows: markets may have perceived CRR II as a source of pressure on expected profitability, on compliance costs and on the operational flexibility of the entire European banking sector, more than as a factor that selectively penalises banks with weaker prudential buffers. This is consistent with the systemic nature of the reform: CRR II imposes uniform constraints across the entire perimeter of subject banks, irrespective of the initial position of individual institutions. If the market appears to have interpreted the reform primarily as a structural change in the business conditions for the sector, the expected response is a sector-wide repricing.

An additional element concerns the possible role of anticipatory adjustment. Banks with initially weaker buffers may have undertaken corrective actions before the formal entry into force of the requirements, gradually increasing capital and improving asset quality in the period 2019–2021. If adjustment occurs gradually and precedes the post-reform phase, its cost is distributed over time and does not generate an observable divergence in P/B in the period subsequent to the reform. This interpretation is consistent with the literature on bank adjustment channels to prudential requirements (Cohen and Scatigna, 2016; Gropp et al., 2018).

5.3 Implications

For regulators, the results suggest that the communication of the legislative process plays a relevant role in the formation of market expectations, irrespective of the prudential content of the individual norms. The profile of EV2, with the most intense reaction already anticipated in the days preceding the official announcement, indicates that markets incorporate expectations about the reform before its definitive formalisation. Gradual and transparent communication of regulatory intentions can attenuate uncertainty and distribute the price response over time, reducing the concentration of volatility around institutional milestones.

For investors, the evidence indicates that European prudential strengthening tends to generate a short-term sector-wide repricing rather than selection opportunities based on the individual prudential profile of banks. The absence of differential effects in the medium term suggests that, over the analysed time horizon, other common factors, such as interest rates, credit cycle and earnings quality, dominated the P/B dynamics relative to differences in initial prudential conditions.

For banks, the results underscore the importance of proactively managing market expectations on the occasion of major regulatory announcements. The short-term reaction concentrates around institutional milestones, not around the operational entry into force of the requirements, which suggests that the capacity to anticipate and communicate one's position relative to the new rules influences stock price dynamics even before the constraints become effectively binding.

5.4 Limitations

The results must be interpreted in light of some natural limitations of the empirical setting adopted, which circumscribe their scope without undermining their internal validity.

The most relevant limitation concerns the identificatory design: since all 16 banks in the sample are subject to CRR II, it is not possible to construct a genuinely untreated control group. The $\hat{\beta}$ coefficient of the panel regression measures the difference in the valuation trajectory between banks with different exposure intensity, not the absolute causal effect of the reform relative to a clean counterfactual. This is a structural limitation of the empirical setting, shared by the literature analysing reforms with universal perimeter (Gropp et al., 2018; Bostandzic et al., 2022), and not an arbitrary methodological choice.

The sample size limits the statistical power of the panel regression. With 16 banks and 7 years of observations, a two-sided test achieves 80% power only for standardised effects above 0.7–0.8 standard deviations. The absence of statistical significance is consistent both with a genuine absence of differential effects and with insufficient power to detect them. The two cases cannot be distinguished with the available data.

The construction of exposure groups on 2019 values introduces an additional methodological fragility. Although that year guarantees the best comparability of data before the full implementation of CRR II, some banks may have already begun to adjust their prudential buffers after the 2016 and 2018 milestones, attenuating the observable differences between groups in the post-reform period.

Anticipation and bundling problems in the event study cannot be completely eliminated. The profile of EV1 and EV3 suggests that part of the information was already incorporated into prices before the official milestone date, and the overlap of other monetary or prudential policy announcements in seven-day windows cannot be excluded with certainty, although the choice of narrow [−1,+1] windows significantly reduces this risk.

Covid-19 contamination in the panel represents a relevant disturbance. The year 2020 produced a statistically significant negative fixed effect (−0.139; $p = 0.017$) reflecting the compression of banking valuations during the pandemic, irrespective of initial prudential conditions. Although the year fixed effects absorb this common shock, it cannot be excluded that the pandemic altered bank adjustment channels heterogeneously across banks, introducing noise into the post-reform period estimates.

Finally, the overlapping regulatory context makes it difficult to isolate the specific effect of CRR II from that of other prudential and monetary policy measures implemented in the same period, including the ECB support measures and EBA and SSM supervisory initiatives.

These limitations do not undermine the validity of the main results, but indicate that the pricing of prudential regulation remains a complex phenomenon, observable from complementary perspectives. A possible extension of the analysis to debt markets, through, for example, CDS spreads or bank bond yields, could offer a more complete reading of the reaction of creditors and bond investors. Similarly, a larger sample, a longer post-reform horizon or a more direct link between market reactions and bank adjustment channels, such as capital accumulation, RWA reduction, changes in credit, funding structure or liquidity, would permit a better understanding of how regulatory costs are transmitted to bank valuations.

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Appendix A — Bank Sample Composition

The following table reports the complete composition of the sample used in the analysis, indicating the country of origin, the reference sub-sample (main or robustness) and the main prudential characteristics observed in 2019, the year used as the prudential pre-implementation baseline. The CET1 ratio and the NPE ratio are the two indicators used to construct the higher and lower exposure groups in the panel regression. Banks classified in robustness sample 1 (ABN AMRO and Deutsche Bank) present characteristics more borderline with respect to the commercial bank focus. ABN AMRO is excluded from the first event (EV1) for listing history reasons: having returned to the stock exchange in November 2015, it did not have a sufficient estimation window as of 23 November 2016. The bank classified in robustness sample 2 (Banco BPM) is excluded from EV1 due to temporal ineligibility, having been created from a merger effective 1 January 2017. The sample for EV1 is therefore n = 14.

Table 9. Bank Sample Composition

Bank	Country	Sample	CET1 2019	NPE ratio 2019
BNP Paribas	France	Main	12.23%	3.25%
Société Générale	France	Main	12.70%	2.49%
Crédit Agricole S.A.	France	Main	16.07%	2.26%
ING Group	Netherlands	Main	14.57%	1.42%
Banco Santander	Spain	Main	11.41%	2.90%
BBVA	Spain	Main	11.74%	3.54%
Banco de Sabadell	Spain	Main	11.74%	3.36%
Bankinter	Spain	Main	11.61%	2.37%
CaixaBank	Spain	Main	12.03%	3.47%
UniCredit	Italy	Main	13.22%	4.34%
Intesa Sanpaolo	Italy	Main	12.96%	6.83%
BPER Banca	Italy	Main	12.01%	10.63%
Commerzbank	Germany	Main	13.41%	1.09%
ABN AMRO Bank NV	Netherlands	Robustness 1	18.13%	2.20%
Deutsche Bank AG	Germany	Robustness 1	13.63%	1.33%
Banco BPM S.p.A.	Italy	Robustness 2	12.70%	8.71%

Note: CET1 ratio and NPE ratio observed in 2019 (prudential pre-implementation baseline year, with complete coverage for all banks). Source: EBA Transparency Exercise, Pillar III reports, annual reports of individual institutions.

The CET1 ratio is the primary measure of capital strength: it represents Common Equity Tier 1 capital as a proportion of risk-weighted assets. The sample median in 2019 is 12.70%. The NPE ratio (Non-Performing Exposures ratio) measures the share of non-performing exposures on total credit exposures and constitutes the asset quality indicator adopted in the European prudential framework in replacement of the traditional NPL ratio, with which it shares the logic but not the perimeter. The sample median in 2019 is 3.07%.

Appendix B — Detail of Regulatory Milestones

The following table provides details of the regulatory reference text for each milestone included in the event study, together with methodological observations regarding the estimation window and the applicable sample. The dates are verified on the basis of primary sources (Official Journal of the European Union, official ECOFIN Council and European Commission communications).

Table 10. Details of Regulatory Milestones Included in the Event Study

Event	Date	Milestone — regulatory reference	Estimation / observation window
EV1	23 Nov. 2016	COM(2016) 850 final — Proposal for a regulation of the European Parliament and of the Council amending Regulation (EU) No 575/2013	Main window [−1,+1]; sample n=14 (Banco BPM excluded: merger effective 1 Jan. 2017; ABN AMRO excluded: insufficient listing history at 23 Nov. 2016)
EV2	25 May 2018	ECOFIN Council press release — formalisation of the EU Council's negotiating position	Main window [−1,+1]; sample n=16
EV3	7 Jun. 2019	Regulation (EU) 2019/876 — publication in the Official Journal, Series L 150, p. 1	Main window [−1,+1]; sample n=16. EP approval: 16 Apr. 2019.
EV4	28 Jun. 2021	Art. 92(1)(d) CRR II — the 3% leverage ratio requirement becomes binding for all European credit institutions	Main window [−1,+1]; sample n=16. Date known well in advance.

Note: dates are verified on primary sources. EV1 uses a sample of n=14 banks: Banco BPM is excluded for temporal ineligibility (merger effective 1 January 2017) and ABN AMRO for insufficient listing history (listed from November 2015, insufficient data for the estimation window at 23 November 2016). EV2, EV3 and EV4 use the complete sample of n=16 banks

Appendix C — Additional Event Study Results

Table 11. EV1 - Bank Level Results with STOXX Europe 600 EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
BNP Paribas	main	0.0004	1.5001	0.65%	-1.30%	-1.90%
BPER Banca SpA	main	-0.0009	2.3115	0.63%	-0.96%	-6.08%
Banco Bilbao Vizcaya Argentaria SA	main	-0.0002	1.5222	-1.19%	-1.22%	-4.60%
Banco Santander SA	main	0.0001	1.7547	-0.05%	-1.03%	-2.85%
Banco de Sabadell SA	main	-0.0006	1.4213	-5.11%	-0.47%	-10.20%
Bankinter SA	main	0.0004	1.0109	-0.64%	-0.57%	-2.98%
CaixaBank SA	main	-0.0006	1.3822	0.09%	0.33%	-3.92%
Commerzbank AG	main	-0.0016	1.5579	-4.07%	-3.28%	-9.01%
Credit Agricole SA	main	0.0002	1.5340	0.21%	-1.46%	-1.52%
Deutsche Bank AG	robust	-0.0018	1.7865	-1.39%	-0.48%	-2.00%
ING Groep NV	main	0.0004	1.4849	-0.61%	-1.67%	-2.80%
Intesa Sanpaolo SpA	main	-0.0008	1.8339	0.69%	-1.35%	-5.58%
Societe Generale SA	main	-0.0000	1.8086	-1.33%	-1.67%	-2.39%
UniCredit SpA	main	-0.0025	2.0284	1.16%	-1.38%	-3.85%

Note: $\hat{\alpha}$ and $\hat{\beta}$ are estimated through the market model using the STOXX Europe 600 EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 12. EV2 - Bank Level Results with STOXX Europe 600 EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
ABN Ambro Bank NV	robust	0.0004	0.5588	-2.30%	-1.94%	-2.64%
BNP Paribas	main	-0.0002	1.0068	-2.35%	-2.00%	-9.71%
BPER Banca SpA	main	0.0004	0.7496	-8.68%	-7.80%	-9.38%
Banco BPM SpA	robust	0.0001	0.8431	-14.59%	-13.78%	-17.17%
Banco Bilbao Vizcaya Argentaria SA	main	-0.0006	0.9579	-4.39%	-3.69%	-6.43%
Banco Santander SA	main	-0.0001	1.1339	-4.53%	-4.47%	-6.76%
Banco de Sabadell SA	main	0.0001	0.9838	-1.56%	-1.17%	-4.72%
Bankinter SA	main	0.0002	0.7400	-5.72%	-4.79%	-3.87%
CaixaBank SA	main	-0.0001	0.9980	-6.45%	-4.57%	-6.43%
Commerzbank AG	main	0.0008	1.2073	-7.47%	-1.55%	-9.06%
Credit Agricole SA	main	-0.0000	0.8155	-4.42%	-2.48%	-10.69%
Deutsche Bank AG	robust	-0.0014	1.2923	-4.29%	-0.31%	-4.55%
ING Groep NV	main	-0.0002	0.8597	-1.38%	-0.82%	-2.44%
Intesa Sanpaolo SpA	main	0.0008	0.7603	-7.06%	-6.44%	-8.10%
Societe Generale SA	main	-0.0003	0.9460	-1.42%	-1.46%	-7.08%
UniCredit SpA	main	0.0004	0.8071	-9.12%	-7.69%	-11.70%

Note: $\hat{\alpha}$ and $\hat{\beta}$ are estimated through the market model using the STOXX Europe 600 EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 13. EV3 - Bank Level Results with STOXX Europe 600 EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
ABN Ambro Bank NV	robust	-0.0004	1.0426	-1.39%	-0.17%	-0.87%
BNP Paribas	main	-0.0007	1.2548	-1.78%	-0.13%	-1.77%
BPER Banca SpA	main	0.0001	0.9887	0.63%	1.81%	-1.02%
Banco BPM SpA	robust	-0.0005	1.5368	-0.01%	1.86%	-1.96%
Banco Bilbao Vizcaya Argentaria SA	main	-0.0006	1.1484	0.69%	1.32%	-0.76%
Banco Santander SA	main	-0.0003	1.3101	-0.71%	0.26%	-2.16%
Banco de Sabadell SA	main	-0.0018	1.2485	-4.59%	0.20%	-7.89%
Bankinter SA	main	-0.0009	0.8681	-1.44%	1.22%	-2.63%
CaixaBank SA	main	-0.0014	1.0387	-2.00%	-0.14%	-5.98%
Commerzbank AG	main	-0.0007	1.7662	-3.35%	-2.18%	-4.10%
Credit Agricole SA	main	0.0000	1.2734	-0.63%	1.03%	-1.07%
Deutsche Bank AG	robust	-0.0009	1.6970	-1.48%	1.33%	-1.11%
ING Groep NV	main	-0.0005	1.2925	0.59%	1.39%	1.60%
Intesa Sanpaolo SpA	main	-0.0004	1.3031	-1.56%	-0.35%	-2.81%
Societe Generale SA	main	-0.0014	1.1845	-1.58%	-1.23%	-4.42%
UniCredit SpA	main	-0.0007	1.5543	0.19%	1.21%	-4.06%

Note: $\hat{\alpha}$ and $\hat{\beta}$ are estimated through the market model using the STOXX Europe 600 EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 14. EV4 - Bank Level Results with STOXX Europe 600 EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
ABN Ambro Bank NV	robust	0.0003	1.6040	-2.72%	-4.06%	0.55%
BNP Paribas	main	0.0008	1.7656	-0.92%	-1.29%	-1.12%
BPER Banca SpA	main	0.0004	1.3918	-4.35%	-3.69%	-3.60%
Banco BPM SpA	robust	0.0024	1.1130	-3.14%	-3.83%	-4.64%
Banco Bilbao Vizcaya Argentaria SA	main	0.0011	1.5753	-0.76%	-2.34%	2.07%
Banco Santander SA	main	0.0008	1.7871	-1.26%	-2.08%	-0.10%
Banco de Sabadell SA	main	0.0023	1.8340	-4.26%	-4.47%	-3.63%
Bankinter SA	main	0.0011	1.4008	-1.75%	-2.01%	0.10%
CaixaBank SA	main	0.0008	1.2773	-1.14%	-1.46%	-0.36%
Commerzbank AG	main	0.0012	1.4202	-2.41%	-2.82%	-3.58%
Credit Agricole SA	main	0.0008	1.5562	0.68%	0.39%	0.73%
Deutsche Bank AG	robust	0.0005	1.3269	0.70%	0.05%	1.71%
ING Groep NV	main	0.0012	1.7489	0.22%	0.01%	0.77%
Intesa Sanpaolo SpA	main	0.0004	1.2817	-0.23%	-0.93%	0.54%
Societe Generale SA	main	0.0012	1.8255	-1.41%	-0.92%	4.13%
UniCredit SpA	main	-0.0002	1.5953	-2.25%	-2.60%	1.50%

Note: α̂ and β̂ are estimated through the market model using the STOXX Europe 600 EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 15. EV1 - Banl Level Results with STOXX Europe 600 Bank EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
BNP Paribas	main	0.0007	1.0195	0.50%	-0.69%	-0.18%
BPER Banca SpA	main	-0.0002	1.6443	0.32%	-0.02%	-3.36%
Banco Bilbao Vizcaya Argentaria SA	main	0.0002	1.0494	-1.35%	-0.61%	-2.84%
Banco Santander SA	main	0.0006	1.2031	-0.22%	-0.32%	-0.83%
Banco de Sabadell SA	main	-0.0002	1.0559	-5.34%	0.12%	-8.44%
Bankinter SA	main	0.0007	0.7063	-0.76%	-0.16%	-1.79%
CaixaBank SA	main	-0.0001	1.0317	-0.14%	0.89%	-2.21%
Commerzbank AG	main	-0.0011	1.0855	-4.27%	-2.67%	-7.25%
Credit Agricole SA	main	0.0006	1.0262	0.08%	-0.84%	0.21%
Deutsche Bank AG	robust	-0.0012	1.2541	-1.63%	0.22%	0.03%
ING Groep NV	main	0.0008	1.0036	-0.75%	-1.08%	-1.11%
Intesa Sanpaolo SpA	main	-0.0003	1.2959	0.45%	-0.61%	-3.43%
Societe Generale SA	main	0.0004	1.2203	-1.50%	-0.95%	-0.34%
UniCredit SpA	main	-0.0018	1.5199	0.81%	-0.55%	-1.35%

Note: α̂ and β̂ are estimated through the market model using the STOXX Europe 600 Bank EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 16. EV2 - Banl Level Results with STOXX Europe 600 Bank EUR Price Index

Bank	**Sample**	**α**	**β̂**	**CAR [-1,+1]**	**CAR [0,+1]**	**CAR [-3,+3]**
ABN Ambro Bank NV	robust	0.0004	0.6792	-0.74%	-0.94%	0.05%
BNP Paribas	main	-0.0001	1.0985	0.12%	-0.40%	-5.61%
BPER Banca SpA	main	0.0005	1.1821	-5.82%	-6.03%	-4.14%
Banco BPM SpA	robust	0.0002	1.3643	-11.27%	-11.74%	-11.07%
Banco Bilbao Vizcaya Argentaria SA	main	-0.0005	1.0634	-1.99%	-2.14%	-2.42%
Banco Santander SA	main	-0.0000	1.2269	-1.79%	-2.69%	-2.21%
Banco de Sabadell SA	main	0.0002	1.2876	1.46%	0.74%	0.58%
Bankinter SA	main	0.0003	0.8773	-3.71%	-3.51%	-0.44%
CaixaBank SA	main	0.0000	1.2501	-3.55%	-2.73%	-1.39%
Commerzbank AG	main	0.0010	1.5140	-3.98%	0.67%	-3.01%
Credit Agricole SA	main	0.0000	1.0077	-2.09%	-1.00%	-6.66%
Deutsche Bank AG	robust	-0.0012	1.5309	-0.81%	1.92%	1.38%
ING Groep NV	main	-0.0001	0.9116	0.65%	0.50%	0.89%
Intesa Sanpaolo SpA	main	0.0009	0.8299	-5.20%	-5.24%	-5.01%
Societe Generale SA	main	-0.0003	1.1481	1.22%	0.23%	-2.53%
UniCredit SpA	main	0.0005	1.2227	-6.18%	-5.86%	-6.36%

Note: α̂ and β̂ are estimated through the market model using the STOXX Europe 600 Bank EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 17. EV3 - Banl Level Results with STOXX Europe 600 Bank EUR Price Index

Bank	**Sample**	**α**	**β̂**	**CAR [-1,+1]**	**CAR [0,+1]**	**CAR [-3,+3]**
ABN Ambro Bank NV	robust	0.0001	0.8961	-0.67%	-0.29%	0.50%
BNP Paribas	main	-0.0000	1.1695	-0.95%	-0.40%	-0.24%
BPER Banca SpA	main	0.0006	1.1226	1.20%	1.33%	-0.02%
Banco BPM SpA	robust	0.0002	1.6215	0.93%	1.27%	-0.26%
Banco Bilbao Vizcaya Argentaria SA	main	-0.0000	1.0744	1.44%	1.07%	0.64%
Banco Santander SA	main	0.0003	1.0992	0.20%	0.15%	-0.40%
Banco de Sabadell SA	main	-0.0011	1.2761	-3.83%	-0.23%	-6.51%
Bankinter SA	main	-0.0005	0.8418	-0.88%	0.99%	-1.61%
CaixaBank SA	main	-0.0009	1.0070	-1.34%	-0.42%	-4.77%
Commerzbank AG	main	0.0001	1.7344	0.19%	-0.27%	-0.12%
Credit Agricole SA	main	0.0007	1.1783	0.21%	0.77%	0.50%
Deutsche Bank AG	robust	-0.0002	1.5854	1.88%	3.20%	2.73%
ING Groep NV	main	0.0001	1.1503	1.46%	1.19%	3.25%
Intesa Sanpaolo SpA	main	0.0002	1.3047	-0.73%	-0.74%	-1.28%
Societe Generale SA	main	-0.0007	1.1941	-0.85%	-1.61%	-3.09%
UniCredit SpA	main	0.0001	1.5691	1.18%	0.72%	-2.26%

Note: $\hat{\alpha}$ and $\hat{\beta}$ are estimated through the market model using the STOXX Europe 600 Bank EUR Price Index over the estimation window [−252, −30]. CARs are expressed in percentage terms.

Table 18. EV4 - Banl Level Results with STOXX Europe 600 Bank EUR Price Index

Bank	Sample	α	β̂	CAR [-1,+1]	CAR [0,+1]	CAR [-3,+3]
ABN Ambro Bank NV	robust	-0.0004	1.2038	-1.61%	-2.51%	0.12%
BNP Paribas	main	0.0002	1.2076	0.13%	0.21%	-1.67%
BPER Banca SpA	main	-0.0000	0.9288	-3.56%	-2.56%	-4.06%
Banco BPM SpA	robust	0.0020	0.7713	-2.47%	-2.87%	-4.98%
Banco Bilbao Vizcaya Argentaria SA	main	0.0003	1.2539	0.44%	-0.67%	1.69%
Banco Santander SA	main	-0.0001	1.3643	0.01%	-0.31%	-0.56%
Banco de Sabadell SA	main	0.0012	1.5593	-2.73%	-2.34%	-4.01%
Bankinter SA	main	0.0004	1.1497	-0.63%	-0.46%	-0.21%
CaixaBank SA	main	0.0001	1.0750	-0.08%	0.00%	-0.63%
Commerzbank AG	main	0.0004	1.1843	-1.25%	-1.22%	-3.88%
Credit Agricole SA	main	0.0003	1.0509	1.59%	1.68%	0.23%
Deutsche Bank AG	robust	0.0001	0.9053	1.48%	1.16%	1.27%
ING Groep NV	main	0.0006	1.1975	1.27%	1.49%	0.22%
Intesa Sanpaolo SpA	main	0.0003	0.7312	0.31%	-0.13%	0.02%
Societe Generale SA	main	0.0004	1.3348	-0.20%	0.78%	3.61%
UniCredit SpA	main	-0.0007	1.0528	-1.36%	-1.33%	0.96%

Note: $\hat{\alpha}$ and $\hat{\beta}$ are estimated through the market model using the STOXX Europe 600 Bank EUR Price Index over the estimation window $[-252, -30]$. CARs are expressed in percentage terms.

Table 19. Full Parametric and Non-Parametric Event Study Tests

Event	Event Window	N	Mean CAR	t-statistic	Parametric p-value	Negative CARs	Sign Test p-value	Wilcoxon z-statistic	Wilcoxon p-value
EV1	[-1,+1]	14	-0.78% n.s.	-1,62	0,1297	8,00	0,7905	-1,16	0,2455
EV1	[0,+1]	14	-1.18% ***	-5,37	0,0001	13,00	0,0018	-3,23	0,0012
EV1	[-3,+3]	14	-4.26% ***	-6,03	0,0000	14,00	0,0001	-3,30	0,0010
EV2	[-1,+1]	16	-5.36% ***	-6,07	0,0000	16,00	0,0000	-3,52	0,0004
EV2	[0,+1]	16	-4.06% ***	-4,62	0,0003	16,00	0,0000	-3,52	0,0004
EV2	[-3,+3]	16	-7.54% ***	-7,98	0,0000	16,00	0,0000	-3,52	0,0004
EV3	[-1,+1]	16	-1.15% ***	-3,17	0,0063	12,00	0,0768	-2,74	0,0061
EV3	[0,+1]	16	+0.47% n.s.	1,64	0,1214	6,00	0,4545	1,55	0,1208
EV3	[-3,+3]	16	-2.56% ***	-4,45	0,0005	15,00	0,0005	-3,21	0,0013
EV4	[-1,+1]	16	-1.56% ***	-4,00	0,0012	13,00	0,0213	-3,10	0,0019
EV4	[0,+1]	16	-2.00% ***	-5,26	0,0001	13,00	0,0213	-3,21	0,0013
EV4	[-3,+3]	16	-0.31% n.s.	-0,51	0,6194	7,00	0,8036	0,05	0,9588

Appendix D — Panel Robustness Tests

Table 20. Dynamic Panel Robustness tests

Exposure Group	Dependent Variable	Test	F-statistic	p-value
low_cet1	pb	pre2019	0,41	0,5304
low_cet1	pb	post2021_2024	0,79	0,5518
low_cet1	ln_pb	pre2019	0,33	0,5722
low_cet1	ln_pb	post2021_2024	0,83	0,5284
high_npe	pb	pre2019	1,22	0,2862
high_npe	pb	post2021_2024	2,99	0,0535
high_npe	ln_pb	pre2019	0,65	0,4334
high_npe	ln_pb	post2021_2024	2,13	0,1280

Table 21. Wild Cluster Boostrap Results

Model	Dependent Variable	Exposure Group	β̂	Clustered SE	t-statistic	Bootstrap p-value	Clusters	Bootstrap replications
M1	P/B	Low CET1	-0.008	0.063	-0.132	0.885 n.s.	16	9,999
M2	P/B	High NPE	+0.098	0.061	1.599	0.508 n.s.	16	9,999
M3	ln(P/B)	Low CET1	-0.085	0.112	-0.763	0.533 n.s.	16	9,999
M4	ln(P/B)	High NPE	+0.139	0.118	1.180	0.500 n.s.	16	9,999

Note: the table reports wild cluster bootstrap results using Webb weights and 9,999 replications for the main post-2021 specifications. Bootstrap p-values confirm the absence of statistically significant heterogeneity across prudential exposure groups.