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How Fintech Competition Affects Bank Valuation: An Empirical Analysis of Market Capitalization and P/E Ratios of European Banks (2015-2024)

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Abstract

This research aims at studying the impact of fintech competition, regulatory constraints, and macroeconomic conditions on the market valuation of traditional banks in Europe. It contributes to the literature by regressing market capitalization and price-to-earnings (P/E) ratios of 48 listed banks against fintech competition density, the Capital Adequacy Ratio (CAR), and country-level controls such as GDP and interest rates. The sample covers the 2015-2024 period and is constructed using Orbis and Statista databases. The econometric methodology relies on panel data techniques, including Fixed and Random Effects models, Hausman tests, and robustness checks. The results illustrate that fintech density exerts a negative impact on market capitalization, confirming the disruptive innovation hypothesis, while CAR consistently shows a positive effect, demonstrating that prudential capital buffers are rewarded by investors. GDP is also positively significant, whereas interest rates display no robust influence. In contrast, the P/E ratio analysis does not provide enough significance to reject the null hypothesis, suggesting that relative earnings multiples are driven by investor sentiment and bank-specific factors than by structural disruption or regulatory strength. The analysis is introduced after providing an outlook of the evolution of the banking sector, the rise of fintechs, the legislative frameworks and the most influential theories that explain how fintech competition interact to shape the market valuation of incumbent banks. The thesis closes with a discussion of strategies that banks may adopt to mitigate the effects of fintech competition.

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Introduction

Recently, the European banking industry has been facing one of the most significant transformations of its history.

Fintechs (short for financial technologies) refer to companies whose business models rely almost exclusively on technology carrying out key operations provided by financial services, and which affect the manner customers store, keep, borrow, invest, transfer, pay, and protect money (McKinsey, 2024).

Fintechs, ranging from neobanks and online lending platforms to payments apps, have revolutionized both usage and interaction of financial services by consumers. These new entrants have not only gained market share but are challenging traditional banks on multiple fronts: speed, convenience, pricing, and innovation. From one perspective, fintech competition is eroding new sources of revenue of incumbent banks and disrupting new customer relationships. And, from the other, it is introducing needed innovation in the finance segment.

Therefore, European conventional banks are under growing pressure to transform their business models. A few among these have undertaken digital transformation projects, updated their apps, established innovation labs, or invested in fintech start-ups. But adapting is not simple.

Traditional banks find this shift complex and sometimes costly as their business models rely on legacy systems, vertical chains of command, regulatory constraints opposed to the more agile models of fintechs and BigTechs. Such digital adaptation comes at a cost: strategic, financial and operational.

Moreover, the rapidly evolving regulatory environment adds an additional level of complexity to banks' transformation paths. The enforcement of PSD2 (Payment Services Directive 2), Basel III and open banking mandates affects the strategic configuration of competition and raise crucial questions about the actual impact of fintech competition on traditional banks' performance and long-term sustainability.

Over the last 10 years, fintech has evolved from a niche industry trend into a transformative force in the global financial landscape. Originally associated with small startup ventures, fintech today includes multibillion-dollar enterprises. During the last decade, the fintech sector has experienced a significant increase in the number of companies, with a notable concentration in North America and Europe. Simultaneously, there has been a remarkable increase in fintech users globally (particularly in digital payments) with the user base projected to exceed 3 billion in 2024 (Statista, 2024).

Establishing a definitive definition of fintech is difficult because of the segmentations within the industry. Digital banking, digital payments, cryptocurrency and blockchain, insurtech[1], wealthtech[2] and artificial intelligence applied to finance all classify as fintech as they combine innovation in the financial industry with technology.

This thesis examines the implications for traditional banks in Europe in concrete terms.
It examines how fintech competition, banks' digitalization efforts, regulatory compliance, and macroeconomic factors jointly shape financial market perceptions of banking institutions. Specifically, it aims to address the following research questions:

- How does fintech competition influence the market valuation of traditional banks?
- To what extent do regulatory frameworks affect the bank's market valuation?
- Can the general macroeconomic conditions explain for difference in banks' valuation over time?

To address these questions, the study uses a panel data regression model to analyse a sample of 50 major banks across Europe from 2015 to 2024. The model includes key independent variables such as fintech presence, capital adequacy and macroeconomic indicators, while treating market valuation metrics such as P/E ratio and market capitalization as the dependent variables.
In order to capture different aspects of bank heterogeneity, the analysis compares Fixed and Random Effects estimations, and in parallel results are interpreted to highlight consistent valuation drivers across specifications.
The thesis makes three primary contributions. First, it provides updated empirical evidence on the effects of fintech competition on European banking institutions. Second, it provides strategic insights into how regulatory adaptation interact with financial market valuation. Third, it contributes to the academic literature on financial innovation and competitive disruption in traditional industries.
The findings are expected to be relevant not only for academics and professionals but also for policymakers and regulators seeking to promote a stable and inclusive financial ecosystem.

[1] Insurtech: short for "insurance technology," refers to the use of innovative technologies to improve and automate the traditional insurance industry.
[2] Wealthtech: any technology-enabled fintech that facilitates the distribution, manufacturing, and post-trade and back-office activities across the wealth management value chain.

The objective is to bring clarity in a rapidly evolving environment. While there is a lot of talk about “disruption”, this thesis aims to provide a structured analysis at how fintechs are affecting traditional banks and which adaptation strategies seem to work best.

The structure of the thesis is as follows. Chapter 1 introduces the recent history of the banking sector, starting from the second half of the 20th century until now. Another important aspect is the role of regulation in shaping bank practices and the relevance of legal frameworks such as the Basel Accords, MiFID II and PSD2.

Chapter 2 focuses on providing a set of definitions of the concept of fintech. Then it gives an overview of the rising sector by analysing the size of the market and the competition exerted towards established institutions. Then, the legal frameworks applying in the EU are presented, and their impact on fintech companies is assessed.

Chapter 3 presents the theoretical foundations of the thesis by collecting previous studies on relevant aspects regarding the research questions. Established theoretical lenses are applied to discuss the phenomenon of fintech disruption. Chapter 4 contains the quantitative analysis. It begins with the description of the sample, and the selected variables are outlined in detail. After the justification for sample selection, the analysis is conducted separately for both market valuation variables. The final paragraph explains in detail the differences between the results of different models and the implications of the findings.

1. Overview of Traditional Banks

The global financial sector is currently experiencing a significant transformation. Driven by the convergence of technological innovation that is shifting consumer expectations, the incumbents are under pressure to adapt to the changing circumstances.

Traditional banks are historically characterized by vertically integrated models, physical branch networks, and regulatory stability. However, over the decades they have gradually transformed from custodians of deposits to universal financial service providers.

In contrast, fintech firms have emerged as agile and digitally native entrants and they have gained some advantages by delivering specialized financial services at lower cost and greater speed.

Fintechs are reconfiguring the principles of financial intermediation, disaggregating conventional banking operations and reshaping market competition.

How traditional banks are adapting strategically to the pressures introduced by fintech disruption is essential to the scope of this thesis while the interaction between these two business models is central to the analysis.

1.1. Evolution of Traditional Banks

Conventional banks have, over the years, evolved from essentially sole deposit-loan structures to sophisticated money intermediaries. The banks were once repositories of deposits and agents of credit operating through physical branches, through paper-based systems and very local activities.

Specifically in the areas of retail and commercial banking, this model of banking focused on long-term client relationships, trustworthiness, and human contact.

The rise of information technology at the end of the 20th century altered the paradigm first. One of the most revolutionary inventions at the time was the introduction of ATMs[3]. Initially launched in London in 1967, ATMs provided the users the ability to get cash outside the regular bank office timings. This innovation has shaped the modern consumer behaviour, and it has laid the foundation for 24/7 banking access. Since then, clients have less relied on in-branch

[3] Automated teller machine

services. the expectations around self-service in banking changed, thanks to improved customer convenience

In the 1970s and 1980s the banking sector accelerated the transition from paper-based processes to electronic payment systems. The development in 1973 of the international SWIFT[4] payment networks, which standardised and secured international financial messaging and allowed banks globally to communicate and settle transactions more efficiently. Meanwhile the development in the US of the Automated Clearing House network provided a powerful infrastructure offer for the mass processing of large volumes of electronic payments through a faster and more cost-effective alternative to paper-based checks.

The banking industry entered the era of digitization in the 1990s when the internet and information technology were expanding explosively. The decade witnessed the initiation of the first digital banking revolution. Banks launched online banking that allowed bank customers to look at account balances, transfer funds, and pay bills using personal computers. The transformation increased the convenience for consumers while reducing the cost of doing business for the banks through the mechanization of routine transactions.

The internet rise also challenged banks to rethink their business models and customer engagement strategies. Most institutions introduced the first websites, initially only as informational portals and then as online platforms for interactive financial services. This phase signalled a move toward flexible and digital-first banking experiences because early online banks appeared on the scene and served the markets by avoiding the necessity for physical presence in the form of branch offices.

At the same time, the industry experienced a rise in mergers and acquisitions in the 1990s. The acquisitions and mergers served to create very large multinational banking groups capable to invest heavily in innovation as the banks had to get into new markets and exploit technology more effectively.

[4] Society for Worldwide Interbank Financial Telecommunications: a member-owned cooperative that provides safe and secure financial transactions for its members.

So, banks started to adopt Customer Relationship Management (CRM) systems[5] to accommodate this growth and enhance the level of customer service, enabling more personalized marketing, better understanding of the customer and enhanced service delivery.

Overall, these trends formed the basis for the digital transformation that would accelerate in the 2000s and which so fundamentally altered the world banking environment. Banks in the early 2000s continued to adopt the universal model that comprehend the aspects of the commercial bank, investment activities, and insurance in the same institutional form. This bundling accomplished the objectives of economy of scale, diversification of incomes, and higher client retention through bundling. However, it also introduced greater complexity in operational activities and larger networks of interconnected financial risk, making institutions more vulnerable to systemic shocks.

The 2008 global financial crisis exposed several major weaknesses in this model such as excessive leverage, risk exposures not fully comprehended, and weak regulatory supervision. In response, world regulators established wide-ranging reforms, most notable among them the Basel III standard, which added stricter requirements for capital adequacy and liquidity coverage. The reforms requiring banks to concentrate on risk management and operating effectiveness helped shift the emphasis among industry participants from rapid expansion to stability.

The 2010s made digital transformation a strategic imperative. Incumbent banks started to modernize their services and infrastructures by investing in customer relationship and mobile platforms. Progress remained, however, uneven. Institutions struggled with legacy IT systems, the cost and weight of regulatory compliance, and pervasive organizational inertia, and the pace of innovation and flexibility were both restrained. This created rich ground for fintech disruptors who employed data-driven approaches and user-centric design to satisfy underserved customers, mainly in the fields of personal finance and payment systems. The competitive horizon then began to shift as fintechs not only challenged incumbent banks based on technology but on the basis of both customer experience and trust.

[5] CRM system is a technology for managing a company's relationship and interactions with all of its customers and potential customers.

Regulatory development also played a critical part. The introduction and adoption in 2015 of the EU's PSD2 directive pushed the banks to rethink their service-providing function by opening them to third-party providers and redefining their function as platform facilitators in the larger financial ecosystem. As the pressure to reduce costs and create efficiencies, in an environment characterized by low rates and increasing compliance needs, pushed most banks to centralize functions, divest non-core assets and form strategic partnerships with fintech firms. These changes marked the growing recognition that innovation had to extend beyond the universe of internal R&D and require collaboration and ecosystems thinking. At the end of the decade, traditional banks had repositioned themselves as digitally empowered service platforms by integrating core competency and new capabilities to match the needs of the changing financial system.

From 2020 to 2024, the banking sector experienced a decade of accelerated (digital) transformation spur red by the COVID-19 pandemic that led to rapid technological advancements resulting in shifting expectations on the consumers' part. The pandemic acted as a disruptor and accelerated the pace of digitalization and redesigning the service delivery in a digital-first world. In a world when branches closed or downsized, digital channels became the most critical bank-customer interface and has witnessed the increase in adoption of mobile banking channels, contactless payment transactions, and remote onboarding processes.

This was also the period when new technologies such as artificial intelligence, machine learning, cloud computing, and open banking APIs reached the mainstream. These technologies enabled banks to offer more personalized and data-driven services. More particularly, new types of Generative AI were just beginning to revolutionize the customer service through the intelligent and natural language-interacting chatbots and virtual assistants.

At the same time, banks increasingly embraced platform thinking, integrating third-party fintech functions in platforms to offer consumers a greater range of financial functionalities. The development marked growing acceptance that fintech partnerships were central to innovation and agility and cheaper than competition. At the same time, banks increasingly added environmental and social considerations to lending and investment and elevated the visibility of reporting practices sustainability and considerations of ESG.

Despite all these advances, challenges persisted. Most traditional banks continued to struggle with legacy infrastructure, risk security, and complexity when handling the regulators, and this impaired the pace of change. The years 2020-2024 nonetheless represented a significant move towards a more digitally connected, client-focussed, and solid model of banking and provides a foundation for even more innovation in the years ahead.

1.2. Classification of Traditional Banking Institutions

The global banking industry is composed of various types of financial institutions, each serving distinct market segments. The banks tend to be distinguished from one another based on the type of client base they serve, and the services provided. Understanding such differences is key to delineating the composition of the sample utilized for empirical analysis of this thesis, which is a set of banks from Europe having business models of various types.

The most relevant are listed here:

- *Universal Banks:* are large and diversified financial institutions that operate across multiple segments of the industry. They offer a full range of services including retail banking, commercial banking, investment banking, asset management, and sometimes insurance. Universal banks typically serve both individual consumers and corporate clients. They generate revenue through a combination of interest income, fee-based services, and capital markets operations. Their size makes them particularly relevant in studies examining market valuation and strategic adaptation.

- *Retail Banks:* specialize in providing financial services to individual consumers and households. Their primary offerings include deposit accounts, savings accounts, personal loans, mortgages, and payment services. Retail banking operations are typically characterized by extensive branch networks and digital channels aimed at mass-market consumers. While many universal banks have retail divisions, these institutions focus almost exclusively on retail markets, and they are particularly sensitive to changes in consumer behaviour and technological innovation all of which are central themes in the context of fintech disruption.

- *Commercial Banks:* primarily serve the financial needs of small and medium-sized enterprises (SMEs) and large corporations. They provide services such as business loans, treasury management, commercial mortgages, and deposit accounts for businesses. Their core business lies in facilitating corporate finance and business development. In the context of fintech competition, commercial banks face increasing pressure from fintechs offering B2B payment solutions, digital lending platforms, and embedded finance services that traditionally fell within the domain of commercial banks.

- *Investment Banks:* focus on capital markets activities rather than retail or commercial services. Their main functions include advising on mergers and acquisitions, underwriting securities, and facilitating trading of financial instruments. Given that investment banks operate in fundamentally different markets and face limited direct competition from fintech firms, they are excluded from the empirical sample in this study.

- *Private Banks (Wealth management):* refers to personalized banking activity focused on high-net-worth individuals (HNWIs). Private banks serve their customers by providing tailored wealth management, investment advisory and tax optimization services. While some universal banks include private banking divisions, standalone private banks focus exclusively on this affluent client segment. Private banking contrasts with retail banking, which works with specific target customers, to whom services and products are offered that are mainly standardized and pre-packaged. The private banker, on the other hand, builds a personalized relationship with the client, offering solutions modelled on his specific needs.

- *Cooperative Banks*: also known as mutual banks, are financial institutions owned by their members or customers rather than shareholders. Most cooperative banks were founded by a collection of people within a community whose members lacked access to financial services.

  They formed entities that they jointly controlled with the aim of providing each other with banking services: usually credit in the first instance.

  Cooperative banks tend to prioritise customer service and long-term stability ahead of maximising short-term profits, they are strongly anchored in their communities, they

are good “corporate citizens”, and members participate in governance. Despite the dominance of the shareholder model, cooperative banks are a significant presence in European banking, with a combined share of the credit market above 20%. Indeed, the financial crisis and lack of trust in banks in general may favour cooperative banks, whose ownership structure have set them apart from shareholder-owned banks in the minds of many customers.

- *Development Banks*: are state-owned or state-backed institutions that focus on providing long-term financing for infrastructure projects, economic development, and innovation. Development Banks are supranational institutions set up by sovereign states, which are their shareholders. They have the common task of providing financial assistance, typically in the form of loans and grants, to developing countries to promote economic and social development. Their role is largely developmental rather than commercial, and they are not typically subject to the same market valuation pressures as commercial or retail banks.

- *Islamic Banks:* operate in accordance with Sharia law, which prohibits the charging of interest. These banks provide financial services through profit-sharing, leasing, and other compliant structures. Although important globally, Islamic banking is not the focus of this thesis and is not represented in the sample.

1.3. Overview of the European Banking Sector

The EU banking industry continues to be the very cornerstone of the continent’s financial system.
It continues to conduct its basic intermediation and liquidity transformation functions through a multi-facilitated institutional framework by 2025. Meanwhile, the sector is going through rationalization of physical presence and redefinition in digital service delivery. Understanding the structural profile of the sector is essential to contextualizing the pressures it faces from technological disintermediation and policy recalibration, forces that lie at the heart of the strategic tensions examined in this thesis.

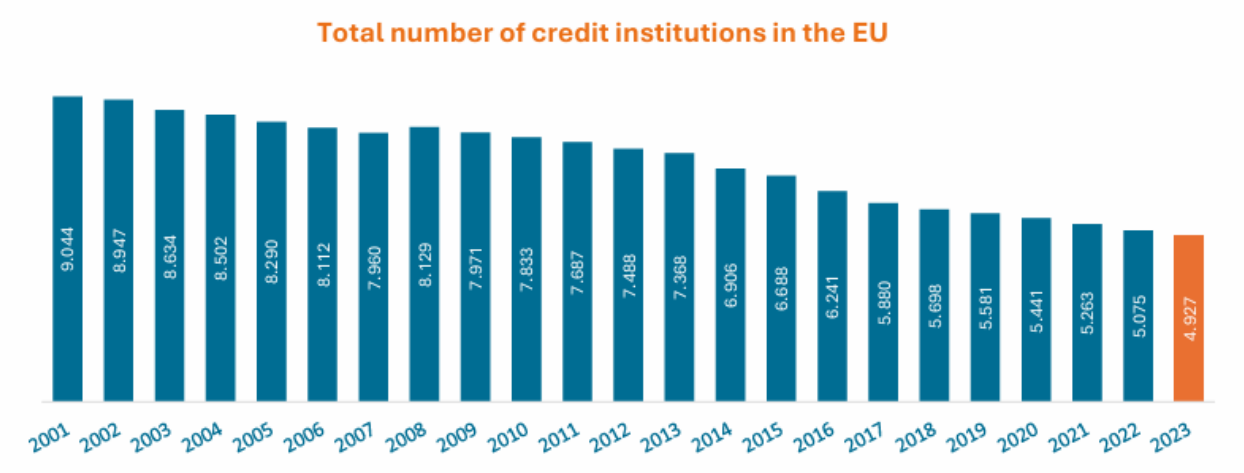

Figure 1. Source: European Banking Federation (2024), Banking in Europe: Facts & Figures 2024 – 2023 banking statistics.

The institutional context has witnessed the decline in the number of credit institutions resulting from consolidation trends and the necessity to control costs.

The EU-27 had 4,927 active credit institutions in 2023, a figure that reveals a decrease by 38.2% since the 2009 level and by 2.9% since the previous year (European Banking Federation, 2024). The consolidation cannot be seen merely as cyclical and needs to be interpreted as part of a structural evolution shifting from diversified retail banking to concentrated and digitally enabled financial intermediation. It should be noted that Germany alone had more than a quarter of EU credit institutions. A statistic that highlights the persistent inequalities in the banking density of Member States (European Banking Federation, 2024).

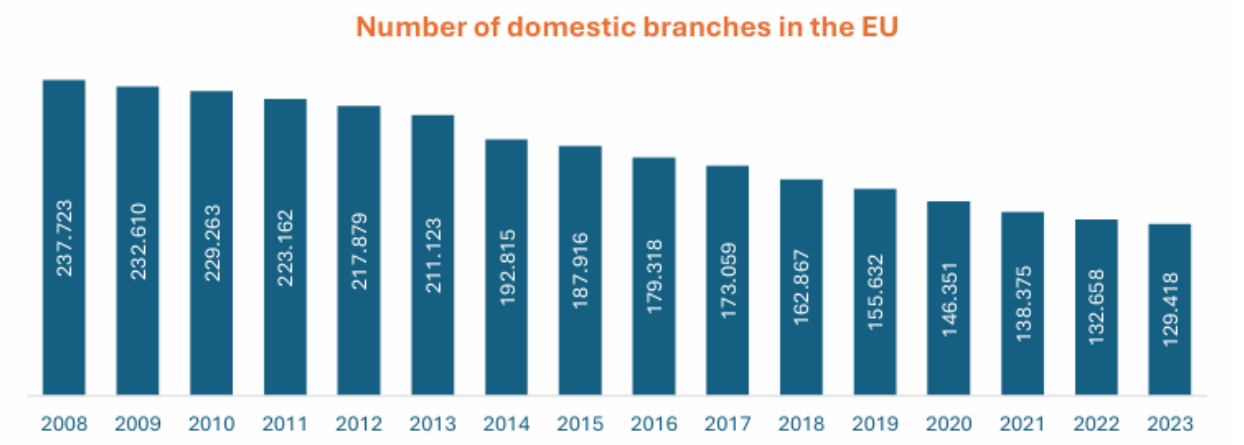

Figure 2. Source: European Banking Federation (2024), Banking in Europe: Facts & Figures 2024 – 2023 banking statistics.

This institutional downsizing is seen in the sharp decline in physical branches. From 2008's high of over 230,000, the EU domestic bank branch number had decreased to just 129,418 by 2023. Elimination rate accelerated during the pandemic when the closure rate since 2009 had

averaged one in three branches. Spain, Germany, and Italy all saw the highest branch network reduction, and this is a generalized sectoral movement in the direction of remote client contact, mobilised platforms, and transactions conducted by digital means.

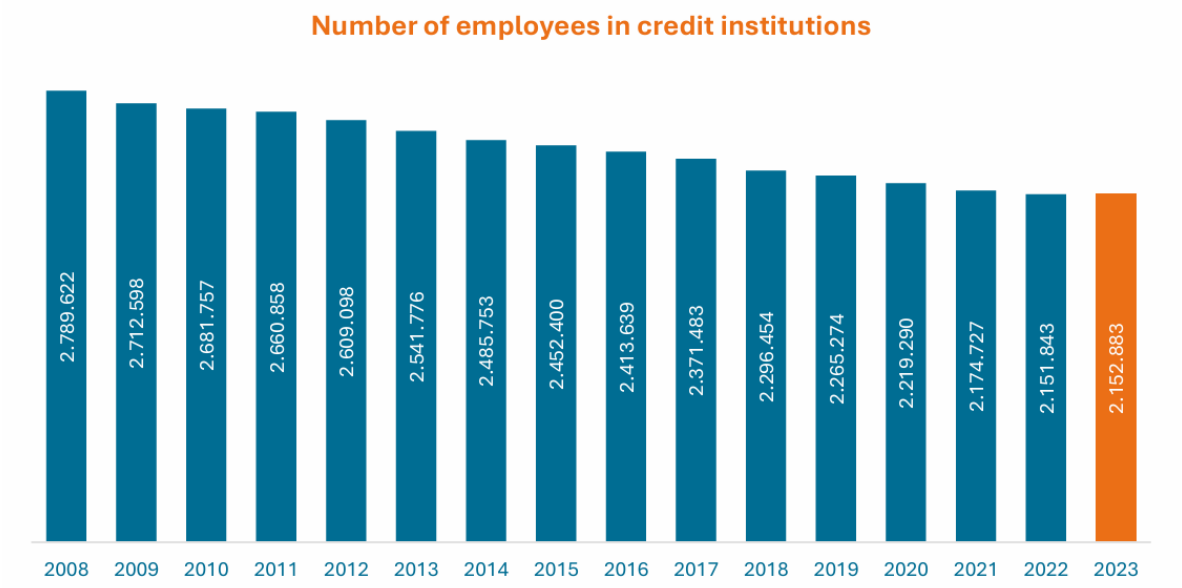

Figure 3. Source: European Banking Federation (2024), Banking in Europe: Facts & Figures 2024 – 2023 banking statistics.

Despite its contraction, the sector remains a substantial employer. By 2023, approximately 2.1 million individuals were employed at EU banks and Germany, France, Italy, and Spain accounted for almost two-thirds the employment share. This is a modest increase year by year, but the long-term trend still remains one of incremental shedding of labour: the mean number of citizens served by each bank worker rose by 158 to 209 in the period 2008-2023. Whilst indicative of larger operational efficiency, this also broaches growing pressure on human capital and particularly incumbent banks undergoing digital transformation by the lack of systemic requalification of the labour force.

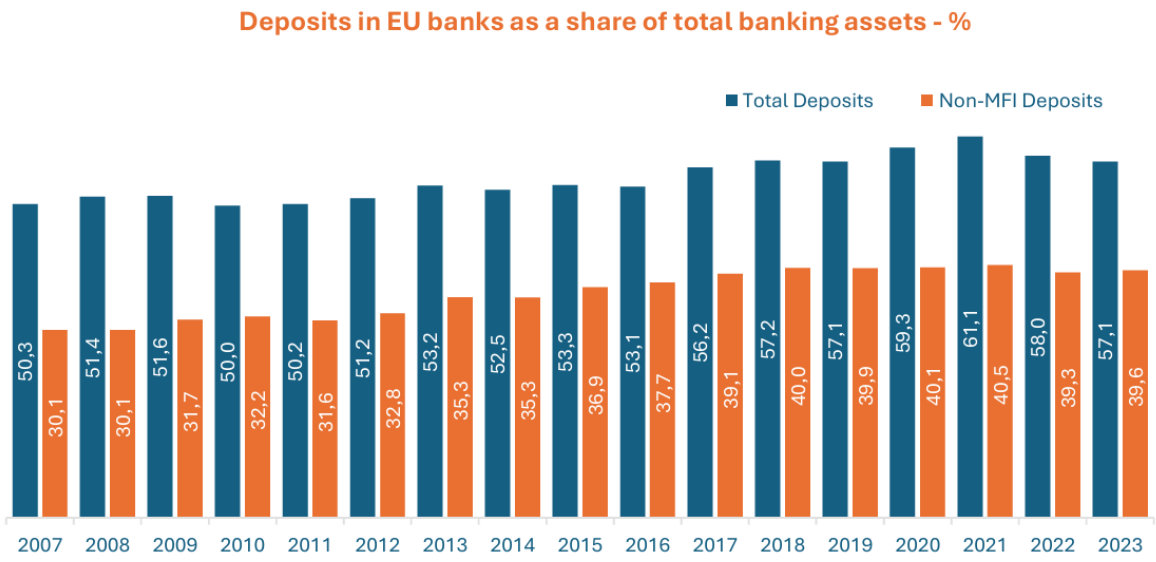

Figure 4. European Banking Federation (2024), Banking in Europe: Facts & Figures 2024 – 2023 banking statistics.

On the funding aspect, the sector maintains its traditionally deposit-intensive composition. Deposits provided 57.1% of the EU banks' assets in 2023, just a little less than in the preceding years but again following the long-established pattern of evidence for the predominance of financing based on deposits (EBF, 2024). It is most pronounced in the case of Croatia, Slovenia, Portugal, and Greece, whose proportion of the deposit-to-asset ratio exceeds 76%. The structural differences reveal the long-existing heterogeneity in the deepening and disintermediation of finances at the Union level. More capital-market-type systems, such as Ireland or Denmark, have banks with a lower share of deposits in the aggregate fund (close to 30%).

The lending markets are equally segmented too. Aggregate loans to the EU banks had reached above €25 trillion by 2023 and composed exposures to households, non-financial corporations, and public entities. Household lending and mortgages dominate Northern Europe, whereas business and SME finance prevail in the Central and Southern European markets. The explanations are national housing finance systems, fiscal incentives, and difference in the structure of the markets. Mortgage markets are better established in the Netherlands and Sweden, where the household debt-to-GDP ratio exceeds the EU level and the presence of securitization in the mortgage market plays a larger role.

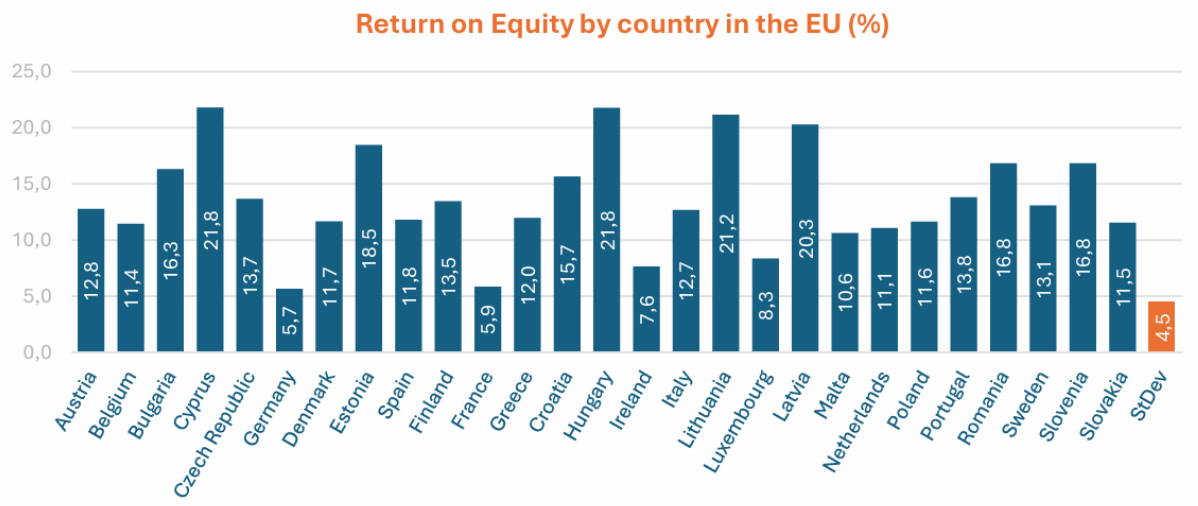

Figure 5. Source: European Banking Federation (2024), Banking in Europe: Facts & Figures 2024 – 2023 banking statistics.

Banking industry performance has shown consolidation and gradual recovery. The euro area average return on equity (ROE) hit 8.6% in 2023 through the support provided by the tailwinds stemming from the tightenings in monetary policies and the improved operating leverage. However, inter-country divergence continues appreciable: Cyprus' profitability reached above 21%, while there were still some single-digit banks in the core euro area. The laggards are usually handicapped by the high cost-income ratio and legacy risk-weighted assets. Even asset quality has also shown bettering trends as the non-performing loans continued the declining trend helped by macroeconomic stabilisation and the pervasiveness of the pandemic-related public guarantee schemes. On the solvency aspect, Common Equity Tier 1 (CET1) ratios also stay healthy as they averaged above 16%. A threshold far beyond the minimum requirements stipulated by Basel III and a reflection of the good capital buffer versus cyclical downturns and the stress in the markets.

What emerges is a sector that, while overall stable at scale, must undergo a double transformation. Along one axis is the macro-structural redefinition of scale economies, efficiencies and asset-liability dynamics: along the other, the systemic challenges of platformization and asymmetric innovation cycles. Such tensions are not peripheral to the competitive frame of incumbent banks operating in the European financial ecosystem but at the very heart of it. As this thesis tries to demonstrate, the ability such institutions possess to change the structural characteristics in response to disruption by fintech holds the key to the future trajectory of the financial system and the world economy.

1.4. The Role of Regulation in Shaping Banking Practices

Regulation has conventionally defined banks' risk behaviour and market conduct. These regulations maintain financial system stability and protect consumers against systemic risks.

The Basel Accords, Basel I (1988), Basel II (2004), and Basel III (2010) represent cornerstone frameworks developed by the Basel Committee on Banking Supervision.
The Basel Committee on Banking Supervision (BCBS) is the primary global standard setter in the prudential regulation of banks and provides a platform for regular coordination on banking supervisory matters. It comprises 45 central banks and bank supervisors who are situated in 28 jurisdictions.
Basel I introduced risk-weighted assets and minimum capital requirements. Basel II built on this model by incorporating internal risk assessment processes. Basel III came into effect after the 2008 global financial crisis. Basel III introduced stricter capital adequacy and liquidity coverage ratios. These models compelled banks to maintain stronger balance sheets and placed greater emphasis on strategic aspects including the preservation of capital and avoidance of risk.

Markets in Financial Instruments Directive II (MiFID II) in the European area, launched in 2018, brought increased investor protection and transparency through reporting commitments and had a notable impact on advisory and trading services. The General Data Protection Regulation (GDPR) enacted in the same period redrafted data handling and privacy standards by all the institutions operating in the EU. The banks were forced to implement proper data governance policies and thus had an influence on functions and cost of compliance.

One such innovative rule for transformation and competition has been the Revised Payment Services Directive (PSD2) that came into effect since 2018. PSD2 obliges banks to share the customer account data (with user permission) to registered third-party providers (TPPs)[6] using APIs[7]. This regulation laid the foundation for Open Banking (i.e. third-party providers of finance are granted access to the consumers' financial information), and fintech businesses can

[6] TTPs are organisations that offers financial services and solutions by leveraging customer data from financial institutions.
[7] APIs let third-party providers access consumer-permissioned financial data held by other parties by acting as a bridge between financial institution

offer customized financial services. PSD2 challenged the platform-based collaboration and data ownership opportunities for traditional banks.

Regulation has both held back and driven innovation overall. It has generated innovation-suppressing compliance costs over the years while releasing competitive opportunities which new fintech entrants rapidly exploit. Such dynamics justify including the regulation variables such as the Capital Adequacy Ratio in the empirical model.

1.4.1. Basel Accords

The Basel Accords constitute the roots of today's prudential banking supervision. Established and constantly revised by the Basel Committee on Banking Supervision (BCBS), the accords strive to achieve global stability by imposing harmonized standards for capital adequacy and later, liquidity risk control. Although not legally binding per se, the Basel Accords have become part of the national legislations and the European legislation through the Capital Requirements Regulation (CRR) and Capital Requirements Directive (CRD IV and V).
Over the years, minimum capital requirements have evolved from a relatively simple system to a complex multi-faceted regulative structure with profound implications for the operations of banks.

The first agreement, Basel I, arrived in 1988 as part of the process addressing growing concern about the solvency of the international banks and the absence of common standards of regulation across jurisdictions. Its major innovation was the acceptance of the risk-weighted approach to capital such that banks were required to hold at least minimum capital amounting to 8% of risk-weighted assets (RWAs). The risk weights were applied at a broad category level depending on perceived credit risk. Sovereign bonds had a typical risk weight of zero while the 100% weight went to corporate loans. The capital itself was distinguished as the Tier 1 (core capital such as retained profit and equity) and the Tier 2 (supplementary such as subordinated debts and hybrids). This system served to provide the banks with a loss-absorbing capital buffer proportional to the riskiness of the assets undertaken by them.

Basel I created a significant turning point in the regulation of traditional banks as it forced banks to internalize credit risk in the process of portfolio allocation by institutionalizing the concept of risk-weighting capital. The requirement imposed by the regulators to hold a minimum 8%

capital buffer became a hard leverage limit and served to contain excessive risk-taking while incentivizing greater caution in lending. However, the simplicity inherent in the risk-based approach created opportunities for regulatory arbitrage. As risk weights did not reflect the granularity in the credit quality of the individual borrower or collateral quality, banks were able to alter the composition of portfolios and lower capital charges while not altering the risk exposure materially. This created increasingly larger misalignments between economic risk and regulatory capital.

To address these limitations, the Basel Committee introduced Basel II in 2004. The new standard constituted an operational shift by introducing a more sophisticated approach to capital adequacy. Basel II had three related pillars. The first pillar extended the coverage of minimum capital requirements not only to credit risk but also to operational and market risk. Further, it introduced differentiated means to calculate risk-weighted assets. Banks had the option to follow a standardized approach based on outside credit ratings or the internal ratings-based (IRB) method subject to the approval of supervisors. The IRB approach by institutions yielded estimation of the likelihood of default by internal data subject to rigorous validating norms.

The second pillar introduced the concept of the Internal Capital Adequacy Assessment Process (ICAAP), and banks were asked to develop their own view of the capital needed to absorb all material risk, both captured and not captured by Pillar 1. The second pillar also complemented the role of the supervisory authorities, who had the mandate to scrutinize the health of the ICAAP and, when necessary, impose supplementary risk management enhancements.
The third pillar focused on market discipline. It requested institutions to disclose a wide variety of information about their capital structure and risk management methods in an effort to permit third parties (investors, rating agencies, counterparts) to reach independent judgments about a bank's risk profile.

For traditional banks, Basel II represented a fundamental change organizational structure and operating procedure. The necessity for IRB approach compliance to develop internal risk models, to gather historical credit data, and to establish monitoring governance mechanisms meant risk management became less a technical support function and more central to business strategy. The necessity to disclose detailed risk information to the market under Pillar 3 increased the reputational cost of risk management decisions. Overall, Basel II introduced

complexity and thus the cost of regulatory compliance for major internationally active banks. Even then, the 2008 global financial crisis underscored inherent weaknesses in the structure.

The financial crisis revealed that internal models and third-party credit ratings may lead to systematic understatement of risk. Banks had made portfolios capital-efficient under Basel II regimes by doing the former while optimizing them, but they had built up exposures that were opaque and liquidity mismatches not captured by the framework. As a result, confidence in the effectiveness of Basel II eroded, prompting the development of a third iteration of the framework.

Most notable evolution in the Basel regimen occurred in the aftermath of the 2008 global financial crisis and culminated in the publication of Basel III in the year 2010. As opposed to the previous versions that were focused mostly on credit risk and internal modelling techniques, Basel III came along with a change in paradigm through the inclusion of more detailed and stringent regulatory limitations that aimed at improving the quality and size of capital and establishing harmonized standards for operational resilience.

A central aspect of Basel III is the redrafting of minimum capital requirements. The new framework also better framed the notion of regulatory capital by placing stricter eligibility criteria on Common Equity Tier 1 (CET1) instruments. CET1, which is currently considered the most loss-absorbing and stable form of capital, includes ordinary shareholder and retained earnings and does not include instruments carrying a contingent feature. The minimum requirement for CET1 rose from the 2% level in place under Basel II to 4.5% of risk-weighted assets (RWAs) under Basel III. The capital conservation buffer at 2.5% was also introduced, putting the effective minimum CET1 requirement at 7% of RWAs for all banks in ordinary times (Bank for International Settlements, 2011).

Also, Basel III retained the 6% Tier 1 capital requirement and 8% total capital requirement (Tier 1 + Tier 2) as in Basel II and added the conservation buffer on top of that to bring the overall capital requirement to 10.5% for banks operating in a standard operating environment. National supervisors also had the discretion to impose a countercyclical capital buffer ranging up to 2.5% depending on macroprudential conditions and mainly in periods when excessive credit growth

exists. Global systemically important banks (G-SIBs)[8] saw the imposition of the systemic surcharge ranging from 1% to 3.5% CET1 to reflect the risk the banks represent to global financial stability (Bank for International Settlements, 2017).

This new definition and increase in thresholds for capital had profound strategic consequences for traditional banks. At first, it increased the cost of the capital-intensive activities because they were now financed by more CET1. Banks were forced to move capital to lower risk and less capital-intensive businesses and to become more efficient at internal risk-weighting models. Second, it placed greater pressure on profitability and capital planning. Companies had to fulfil not only minimum CET1 ratio compliance but also internal capital objectives that considered stress-testing results, planned distributions (e.g., dividends), and supervisor expectations.

From a design perspective for regulators, the higher capital requirements were not just buffers for the unexpected absorption of loss; they were also conceived as pre-emptive checks on excessive risk-taking such that banks would remain in solvency during periods of financial stress. The minimum Basel III capital requirements are ex-post stabilizers and ex-ante behavioural modifiers of managerial practices. Moreover, they provide comparability across banks by standardizing what represents regulatory capital and how the adequacy of capital is computed.

Overall, Basel III was a categorical strengthening of the capital structure. By raising the minimum CET1 threshold from 2% to 4.5% and imposing a conservation buffer and possible countercyclical add-ons, the structure meaningfully enhanced the quantity and quality of capital banks must hold both in ordinary and adverse conditions. The 10.5% effective total capital requirement (composed of CET1, Additional Tier 1 and Tier 2 instruments, and buffers) now forms the minimum prudential position of any adhering institution. This stricter capital regime is not only a quantitative threshold but a strategic constraint that influences lending capacity and competitive advantage. Banks not only must optimize returns but to do so in a capital-intensive and disclosure-driven environment that necessitates more visibility and predictive capital planning.

[8] G-SIBs are financial institutions essential to the stability of the global financial system as their failure may trigger a financial crisis.

1.4.2. MiFID II

The revised Markets in Financial Instruments Directive, or MiFID II, marks a significant development in the regulation of the capital markets. Enlarging the foundation of the original MiFID model in 2007, the new directive was crafted as the response to the gaps exposed by the global financial crisis. Its goals are to strengthen investor protection, enhance the clarity and transparency of the markets, and provide better consistency in the EU's financial architecture. Practically speaking, MiFID II applies a thick set of rules that has reconfigured the nature through which conventional banks engage in the capital markets by redefining the nature of client relationships across their functions.

One of the most innovative aspects of MiFID II is the expansion of the transparency requirements. As opposed to MiFID I, MiFID II expands pre-trade and post-trade transparency to a wide range of asset classes such as equities, corporate bonds, derivatives, and structured finance products. The rule not only extends to regulated markets and MTFs[9] (multilateral trading facilities) but also to OTFs (organized trading facilities). Market makers or dealer banks must publish public real-time information regarding bid-offer spreads, executed orders, and execution prices both aggregate and order-by-order basis. This push for greater transparency has the purpose to reduce information asymmetries long existing in secretive markets.
It forced the conventional banks to introduce the modernization of trading infrastructures, the integration of real-time data systems, and the redesign of execution strategies to comply with the precise publication thresholds and reporting windows.

Equally impactful is the directive's approach to investor protection. MiFID II defines exact client involvement criteria by means of formal processes and appropriateness reviews. When providing investment advice, banks are required to obtain broad information about the client's knowledge of finance, objectives and risk appetite. Such reviews must be captured on paper, auditable and frequently updated. Even in non-advisory relationships, banks are required to ensure that sold products are suitable for the client's knowledge level. This development has transformed advisory services from a relationship function to a highly regulated process involving evidence-based decision-making and traceability should a dispute arise or the bank be the subject of an audit.

[9] MTFs are electronic platforms offering an alternative to traditional exchanges for trading financial instruments.

At the same time, MiFID II implements a comprehensive product governance model. Banks designing or distributing financial products must establish a clear target market for each product, including target client bases, risk tolerances, and distribution channels. This requirement well exceeds classical due diligence: it involves regular monitoring of product performance and client outcomes over the life of the product. Institutions are expected to regularly assess whether the product remains aligned with the needs of its intended users. For conventional banks, this has meant the creation of cross-functional structures whereby the compliance, product, and sales functions participate together on the monitoring and reviewing of product offerings. As a result, product development became risk-sensitive and client-focused and incorporates the expectations of regulators in upstream commercial decisions.

One of the most radical MiFID II-induced reforms has been the unbundling of research and execution services. Historically, banks selling brokerage services provided investment research as part of a bundled commission. But with MiFID II, the research has to be paid for separately by the asset manager through the budget or through a client-funded Research Payment Account (RPA). This has the objective of increasing clarity and removing conflicts of interests by delineating what the client is paying for and who picks up the cost. As a result of this, the banks' business model had undergone a shift. Some banks reduced coverage, and other banks sold research as a stand-alone service offering customized insights and industry-specific intelligence.

From an operational and information perspective, MiFID II imposes a vast set of reporting and recordkeeping obligations. Virtually all transactions in financial instruments are required to be reported to local regulators by the close of the following business day (T+1), including instrument and execution venue codes, timestamp and counterparty information. Banks are also obliged to keep all forms of communication (email, telephony calls and messaging platforms) regarding transactions with standard minimum retention periods of at least five years. Compliance has demanded mass-scale investment in trade surveillance systems, voice capture systems, monitoring compliance dashboards and internal audit capacity. The complexity of the reporting obligation has made data quality and traceability the very centre of managing regulatory risk.

At the leadership level, MiFID II puts explicit responsibility on senior management. Boards and senior managers are requested to be accountable for the implementation of systems of

compliance and for ensuring policies, training programs, and reward systems support responsible conduct. This entails managing the independence of the compliance functions, proper reporting lines, and actively monitoring the risk culture of the institution. Most banks accordingly re-designed internal control systems, extended the function of legal departments, and introduced risk measures to executive scorecards.

What is different about MiFID II as compared to prior regimes is not only the volume of new rulemaking, but the shift in the regulators' mindset. It is not anymore good enough to comply by hitting formal thresholds of disclosure; banks are asked to be able to demonstrate the integrity of internal process before, during, and after client interaction. The processes should be able to be traced, rationalised and customised by risk profile of each service. The emphasis is on process governance and on proving, at every step, that client interests are being prioritized. For banks that means key business activities such as product development and advisory services should be refocused in order to best optimise commercial performance and meet explicit regulatory standards.

Lastly, MiFID II has transformed the manner in which traditional banks operate in the realm of investment services and capital markets. It increased the degree of disclosure, embedded client protection as the very foundation of financial service delivery and created a new culture of accountability through traceability. The directive requires better internal infrastructures and stronger culture shift, one in which the compliance function is not perceived as a box-ticking exercise but as an ongoing process that defines how value is delivered to the client and how risk is managed across the institution.

1.4.3. PSD2

The revised Payment Services Directive (Directive (EU) 2015/2366), better known as PSD2, came into effect across the European Union in January 2018. The legislation represents a clean-sheet redefinition of the EU payments sector, both extending the previous work done by the original PSD (2007) and addressing the evolving needs of digital commerce, cross-border interoperability, and consumer protection Although often associated with the opening of payment markets to new entrants, PSD2 actually has broad-reaching implications for the incumbent banks per se, and those banks that offer services in the greater retail and corporate segments.

PSD2 essentially widens the legal coverage of payment services by applying more harmonised norms for the authorisation and control of payment service providers. The most important rule for banks offering account servicing is the direct request for them to provide access to payment account information, also referred to as the term "access to account" or XS2A.
By Article 66 and Article 67 banks should permit safe and real-time exchange of data to third parties authorized by the client on the client's behalf with explicit consent. The exchange should be conducted by specialized interfaces typically created by means of APIs and should be made available without preferential treatment compared to the bank's digital channels. Importantly, banks cannot establish additional contractual barriers or unjustified delays in the exchange of data. From the perspective of compliance, the obligation demands the creation of robust interfaces, cybersecurity measures and a wholesale rethink of the safeguarding and transmittal of the client's data.

The other fundamental foundation for PSD2 involves the enhancement of payment security by the notion of Strong Customer Authentication (SCA). By Articles 97-101, all card, phone device, and online initiated electronic payment transactions are to be subject to multi-factor authentication by at least two of the following factors: something the user knows (e.g. password), something the user has (e.g. phone or card), and something the user is (e.g. biometric signature). The purpose is to reduce fraud and inject trust in digital transactions. For banks, the adoption of SCA has forced wholesale reform in the fields of authentication, login processes, and monitoring systems for the existence of fraud. Institutions began increasingly using token-based and logging-by-biometrics as part of digital portals. These projects, while challenging at the operational level, provided new platforms by which remote banking and other financial products and services may be distributed.

PSD2 also clarifies the liability structure for unauthorized transactions by reaffirming the rights of payment service users. Banks have to refund the customer for unauthorized transactions at the soonest possible moment, usually not beyond one business day, except if there is clear gross negligence or user fraud. The bank has the burden of proving the case and the threshold for proving customer fault is high. This apportions liability and escalates the operational importance of fraud protection identification systems, incident handling systems, and customer service infrastructure. Banks are incentivized to invest in proactive risk avoidance systems and

customer communication systems capable of handling reimbursement claims effectively and comprehensively in regulatory compliance.

Beyond these consumer-related elements, PSD2 institutes a set of structural obligations which impose repercussions on the provision and monitoring of payment services. Payment service-offering banks are required to meet greater standards on the control of operational and security risk and must introduce incident response planning and business continuity measures. As Article 95 requires institutions to notify notable security breaches to their respective national competent authority and in various situations to the European Central Bank and European Banking Authority, such expectations put risk and IT management at the centre-stage as primary internal support functions and shift them upwards to key regulative touchpoints. Banks have responded by internalising internal reporting lines and by detailing escalation protocols and by reinforcing consequently their governance frameworks.

Additionally, PSD2 amends the exchange rate and fee transparency regime in transactions. Banks must provide pre-contractual and post-transaction standard and conspicuous clarity. This means that banks must reveal charges that are incurred by the client both in the single-transaction scenario and recurrent systems including direct debits or standing orders. These measures require intensive consistency among legal documentation, user interface development, and operating implementation. For the majority of banks and especially banks who uphold diversified product portfolios, the implementation of standard disclosures through all the touchpoints for the business has required widespread cross-departmental collaboration among legal, compliance, advertising, and IT departments.

From a strategic perspective, PSD2 represents a major trade-off for incumbent banks: while aimed at encouraging greater innovation, security, and transparency in payments, it requires the re-engineering of existing infrastructures and processes that were not built to accommodate open access, real-time sharing of information, or common authentication standards. Execution of the directive has thus functioned as a regulatory forcing function, compelling quick digital channel and payment operations transformation and updating of customer-facing platforms.

In practice, the directive turns the payment function that had historically been a closed proprietary function into a function that is regulated as part of a bigger ecosystem, such that the institution responsibilities are defined and operationalized through technology. Banks are no

longer sole repositories for the account information but are actually legally committed to delivering common-secured access while maintaining the whole responsibility for the quality of service delivery, fraud protection, and customer service.

In conclusion, PSD2 has redefined the regulatory foundations of payment services within the EU. The implementation for incumbent banks has introduced new layers of legal compliance and further imposed a fundamental change in how payment systems are governed. The directive elevates data protection and operational transparency to regulatory standards and positions them as central institutional legitimacy dimensions. By doing this, the payments function became a strategic execution frontier and not merely a transactional back-office function.

2. The Rise of Fintechs

Financial technology is creating new opportunities in the financial from consumers to financial institutions and new entrants, to regulators.
The term fintech, short for financial technology, refers to the application of advanced digital technologies to improve the delivery and accessibility of financial services.
Such tools range anywhere from cell phone apps and e-wallets to blockchain protocols, robo-advisory systems[10], and peer-to-peer online lending platforms.
Structurally different from the traditional banks whose businesses heavily rely on physical assets, fintech firms operate solely on cloud technologies and internet platforms (McKinsey & Company, 2024). This structural difference allows them to reduce the cost of doing business, accelerate service delivery, and serve previously underserved or excluded customer segments.

The origins of fintech's new prominence can be dated to the years after the 2008 global financial crisis. The widespread disillusionment with conventional banks that followed the crisis created space for a new wave of digitally native entrants to challenge the status quo.
This period marked the emergence of a new post-crisis paradigm in finance, one in which technological innovation became central to restoring efficiency and trust in financial systems.
Initially concentrating on the business of payment, fintech expanded to nearly all areas of finance.

One of the characteristics of fintech is the diversity of business models it embodies. Even though the term has become synonymous with startups, it includes a wide spectrum of players: ranging from very early-stage startups through scale-ups to neobanks and incumbent banks launching digital arms and even the entry of the BigTechs into the finance universe.
Despite the various orientations in the marketplace, fintech companies generally have a similar set of characteristics. First and foremost, fintechs serve business-to-consumer (B2C) organizations, business-to-business (B2B) organizations, and blended (with B2C and B2B elements) organizations. Fintech solutions are generally "one-to-many" solutions to be able to be used across many organizations rather than being custom-built and used by a single one.
Second, fintechs are often variations on an existing product or process that make it better, faster, and sometimes less expensive, not something completely new.

[10] algorithmic investment and financial advice service that incorporates little or no human involvement

Finally, fintech usually focus on process in addition to technology. This means integrating fintech can involve changing daily routines, work processes, or business processes beyond using the new technology itself.
Although technology is clearly central to solving the problem or seizing the opportunity at hand, the users will be forced to transform key processes, whether the customer is an end consumer or a business.

Fintech growth has also been in close correlation with shifting trends among consumers. Younger generations who have become accustomed to the world of on-demand services and smartphones expect frictionless interactions in finance that traditional banks have struggled to match. Simultaneously, fintech firms have demonstrated their ability to serve clients previously excluded from formal banking, including small businesses, gig workers, and individuals in developing economies. This has created a significant unbundling of the traditional roles of banks, with fintechs specializing in narrow and high-impact services rather than a full-suite of financial solutions.

Between 2015 and 2020, investor interest in fintech reached unprecedented levels. Global venture capital investment in the sector increased from $19.4 billion to $33.3 billion and emphasized the scalability and growth prospects for business models enabled by fintech (McKinsey & Company, 2024).
However recent economic disruption has necessitated sector level strategic rethinking. The majority of fintechs are prioritizing long-term profitability and operating effectiveness at the cost of rapid client acquisition. This is evidence of a phase of maturity and demonstrates fintech going beyond the disruptive challenger function and becoming an established player in the finance ecosystem.

Despite the sector's success, the rise of fintech has not been without challenges, particularly with regard to the regulatory aspect. Most experts believe that prevailing financial rules were not directed at the pace and pattern of fintech innovation and created gaps and ambiguities. As a response measure, a few regulators came up with new initiatives such as "regulatory sandboxes" and innovation hubs by which fintech companies can pilot new products under controlled conditions.

Fintechs introduced new types of intermediation that are transforming the customer dynamics with respect to financial products. This change goes far beyond a technological shift. It is a financial sector structural change that is rewriting the rules of competition.
Traditional banks are increasingly compelled to adapt, either by innovating internally or by partnering with fintech providers to remain relevant.

2.1. How Fintechs differ from Traditional Banking Models

Fintech firms are different from incumbent banks in the fundamental structure of business models. Fintech are not just a tech upgrade but a strategic refocusing of the financial services delivery.
Whereas the incumbent banks operate under vertically integrated models, characterized by physical infrastructures and capital-intensive processes; fintech companies employ platform models believing in specialization, scalability, and cost effectiveness (Gomber et al., 2017). This strategic orientation allows the fintechs to target selective verticals such as payment systems, peer-to-peer online lending platforms, investment advisory platforms, or Buy Now Pay Later (BNPL) services and refine them through lean operating models.

Fintechs' value proposition is operational flexibility and user-centric innovation. Fintechs can externalize non-core functions by using cloud-native architecture and API connectivity, thus lowering fixed spend and accelerate time-to-market for new products. Legacy IT and outdated organizational practices hold incumbent banks back and limit their response by elevating their cost base.
This divergence not only entails efficiencies for fintechs but also a shift in the competitive advantage from scale and access to capital to data-intensive customization, speed, and digital distribution.

From the perspective of the generation of revenues, fintech business models deviate significantly from the interest-margin-dependent logic of traditional banking. The majority of fintechs adopt freemium models, where a minimum set of service offerings are provided for free to acquire users at scale and then money is made through premium services. Others rely on other streams such as interchange revenue, subscriptions and lending spreads calibrated through

algorithmic risk pricing. The unit economics[11] and the lifetime customer value[12], metrics traditionally underweighted in bank strategy but central to fintech scalability.

Moreover, fintechs operate along the lines of an ecosystem logic and embed their services across platforms and contexts outside the conventional parameters of banking. Distribution is digitally native and thus globally scalable. It allows them to acquire and serve customers across borders with minimal marginal cost. This contrasts drastically with the banks' model of geographic expansion that still remains subject to physical presence, regulatory boundaries, and localized infrastructure. Such borderless forms of expansion enhance network effects and user stickiness and reinforce the asymmetry in competitive advantage in favour of fintech versus incumbent.

One characteristic of fintech platform business models is the existence of powerful network effects that also enhance scalability and competitive advantage. As user bases increase, the amount and quality of data rise too and allow for continuous personalization of the service.
The strategic relevance of network effects is especially evident in fintechs offering peer-to-peer payments where each additional user enhances the utility of the system for others. This phenomenon gives rise to the creation of customer lock-in and high switching costs among the users and shifts the dimension for competition from the product and price to the platforms' architecture.
Additionally, increased usage attracts developers and strategic partners, expanding the platform’s functionality and integration with other digital services.
This self-reinforcing cycle is absent in traditional banking, where service value does not increase proportionally with user base growth. As a result, fintech businesses are not only less expensive and more agile, but also structurally capable of facilitating user adoption and engagement through the impacts created by ecosystems.

These structural contrasts explain why fintech competition has nothing to do with technological superiority at all, and everything to do with strategic dislocation. Fintechs redefined the very economics of financial intermediation and unbundled the delivery of service from the traditional cost structure and rigidity of operations. But the rules of the game are changing. *Growth-at-all-costs* is not the mantra anymore. Fintech development has reached the point

[11] direct revenues and costs associated with a single unit of product or service sold by a business
[12] the estimated total net profit a business expects to earn from a customer over the entire duration of their relationship

where prudence (i.e. the ability to avoid adding risk to the financial system) will be important as the ability to generate profitable growth.

2.1.1. Fintech Startups and Traditional Banks: Rivals or Collaborators?

Hybrid business models and collaboration are becoming mainstream trends, while the traditional narrative that sees fintech startups as truly disruptive to the banking sector is slowly fading. The relationship between banks and fintechs goes beyond competition; instead, it develops through a broad spectrum of collaboration and competition.

Four primary modes of fintech-bank interaction can be identified:

- *Competitors:* where fintechs operate independently and aim to displace traditional services.

- *Complementors:* where fintech solutions integrate into existing banking offerings to enhance value.

- *Suppliers:* where fintechs act as backend service providers (e.g., white-label software or APIs).

- *Partners:* where strategic alliances are formed for mutual benefit, including co-development, co-branding, or shared platforms.

This classification recognizes that the fintech startups do not necessarily disrupt in a hostile way but instead function more as innovation catalysts.

As studies demonstrate, the majority of fintechs prefer to collaborate with incumbents rather than compete directly with them. This trend occurs most clearly in the spaces in which regulation, trust, and infrastructure establish the highest barriers to entry, such as in wealth management or credit.
Existing banks recognize that collaboration with fintechs gives them new technologies, rapid innovation cycles, and a better client experience. Most incumbents would rather collaborate

with fintechs than invest heavily in research and development in-house to push digital transformation at a faster pace.
The complementarity between resources and capabilities is emphasized from an operational perspective. Banks offer scale customer bases, licenses granted by the regulators, risk management platforms, and capital while fintechs offer agility, software development expertise, and data-driven models. Such strength alignment can support value creation on both sides.

It should be remarked also how the collaborative models had evolved over the years. The majority of the fintechs had originally focused on head-on competition with the banks. When the market matured and acquiring the client and meeting the legal needs became too expensive, collaboration became the viable model. The banks, who at first were sceptical, became less averse to innovation-related collaboration and established innovation hubs or acceleration programs specialized to integrate the external fintech solutions.
Interestingly, this collaborative approach does not eliminate competition. Incumbents in some segments, such as payment or personal finance apps, still get challenged on convenience by fintechs. Even there, banks end up responding by acquiring or partnering for fintech capabilities and then entering the cycle of innovation and convergence.

In conclusion, the dichotomic perspective on fintechs as competitors or collaborators is increasingly inadequate. As illustrated, the reality is that of strategic hybridity, where incumbent banks and fintechs co-evolve through a complex mix of collaboration and competition. Understanding the dynamic nature of the reality provides insights for the evaluation of banks' strategic response to fintech disruption and for the understanding of how such relations influence valuation and profitability and long-term positioning in the digital world.

2.2. The Fintech Sector in Europe

The European fintech sector registered unprecedented expansion during the 2010s. Over 900 fintech startups were launched both in 2017 and 2018, the maximum annual foundation rates between 2008 and 2024. This period represented the zenith of fintech creation in Europe. Although the combined number of active fintech startups continued growing in the following years, the rate of new entries reduced by a very significant amount.

By 2024, new fintech start-ups had dropped to just 85, representing the lowest annual founding volume in over 15 years Nevertheless, the cumulative effect of earlier exponential growth remains evident, and 9,225 fintech businesses continued to exist across the continent in 2024.

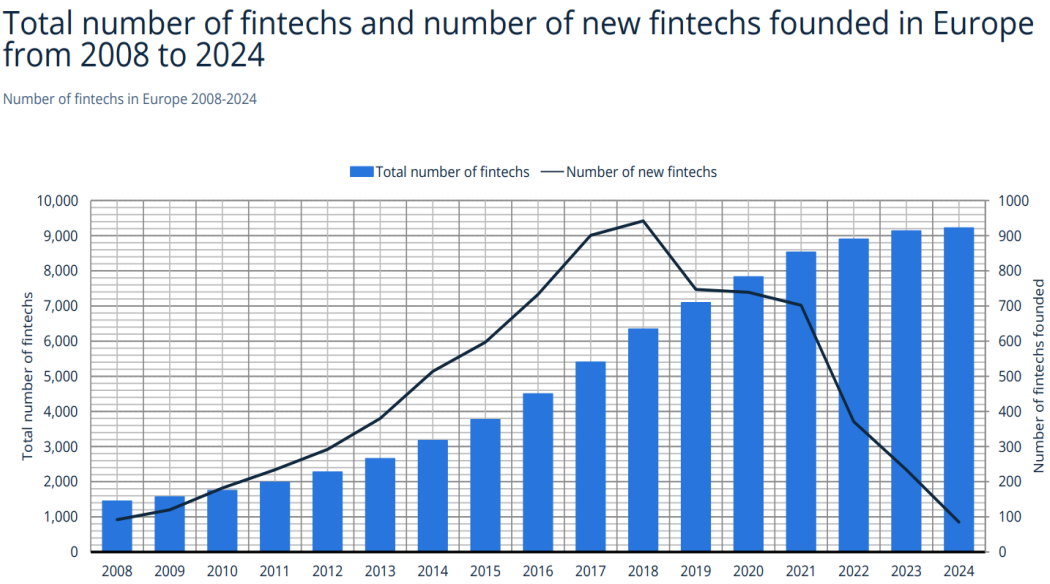

Figure 6. Source: Statista. (2024). Fintech – Statistics & facts (Dossier).

This loss of momentum is not indicative of sectoral decline but a reflection of the industry's transition from early-stage growth to consolidation and maturity. Startup valuations fell following a correction in the venture capital markets in 2022, amplified by macroeconomic pressures and monetary policy tightening.

Therefore, fintechs must be more concerned about profitable growth and sustainable business models rather than rapid expansion. Although the rate of funding dipped in 2023, recent statistics indicate the decline eased in 2024 and the European investment market may be stabilizing.

The COVID-19 pandemic had a mixed impact on fintech. Even while some companies experienced temporary disadvantages resulting from economic disruption, the pandemic eventually spurred the digitalization of finance companies and strengthened the value proposition among mobile-first platforms.

Today, in each of Europe's seven largest economies by GDP, at least one fintech firm ranks among the top five most used banking platforms, highlighting their widespread adoption and rising institutional relevance.

As of 2024, there are approximately 9,200 fintech companies in Europe and it is one of the most concentrated fintech ecosystems globally. The concentration contributes meaningfully to the global fintech ecosystem and enjoys significant traction in the digital payment and digital lending areas.

The digital payments sector has registered unprecedented growth. The European digital payment users are forecast by Statista to hit 368 million by 2025. The value of customer deposits in European digital banks is constantly increasing, surpassing $5.5 billion in 2024 and projected to reach over $8.2 billion by 2029. These findings only confirm the fact that digital banks are not just platforms for transactions but are increasingly becoming secure custodians of savings. What attracts the fintechs to European consumers is the improved user experience they offer, the lower cost at which they engage consumers, and quick time to market. For example, the cross-border transactions conducted by digital platforms can be done at as little as 10% of what the traditional banks typically charge. Moreover, fintechs take approximately two months on the development cycle for new products on average compared to incumbent financial institutions' typical development cycles spanning twelve months. This quick responsiveness has allowed fintechs to bring new products to market in areas such as pay-now-buy-later and embedded finance at a scale at which incumbent banks cannot compete.

Beyond the impact on consumer banking, fintechs become increasingly significant at the macroeconomic level. The European fintech ecosystem by 2022 had reached just over €430 billion in value, bigger than the combined market capitalization of the region's largest seven publicly traded banks and representing the generation of circa 134,000 jobs. McKinsey (2024) thinks that if European fintech markets across all members' states achieved the level of performance observed by regional leaders, the prospective benefits would be staggering. Overall industry employment would be greater than 364,000, aggregate investment could be more than €150 billion, and cumulative valuations of markets would be near to €1 trillion.

However, fintech has not advanced uniformly across Europe. A marked divide exists between high-performing ecosystems and lagging markets.

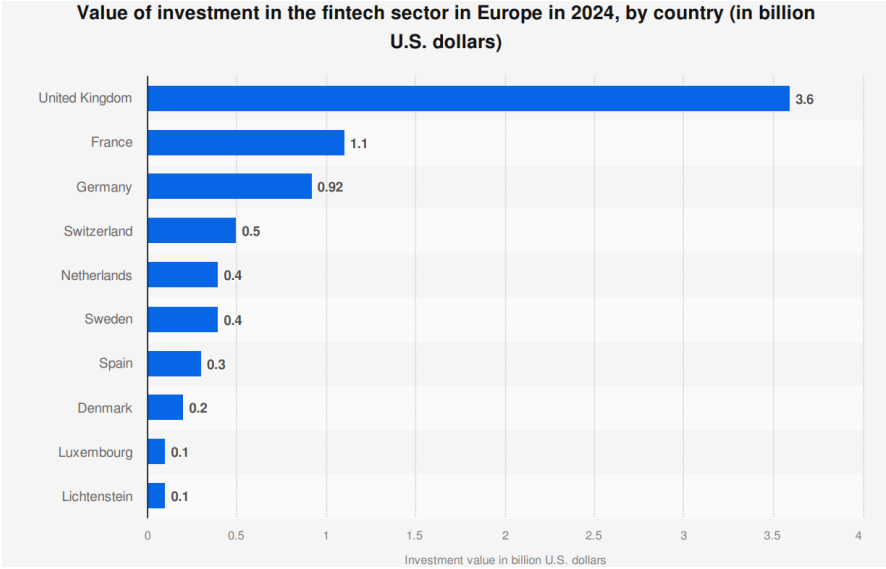

Figure 7. Source: Statista. (2024). Fintech – Statistics & facts (Dossier)

Sweden and the United Kingdom remain the most advanced and globally competitive environments through foresight by the regulators, strength in capital markets, and high digital literacy. Compared to them, numerous Southern and Eastern European markets still face structural and regulative barriers that limit fintech scale and cross-border functionality. Lack of harmonised data accessibility, unbundled licensing regimes, and inconsistent PSD2 and DORA regulation application remain major inhibitors. To fulfil fintech's potential in full measure, key players such as public administrations, regulators, incumbent banks, and fintech innovators must be better aligned through ensuring greater supervisory standards across the member states and through fostering interoperability of digital identity and data-sharing platforms. The European Commission's Digital Finance Strategy and Retail Investment Strategy both proclaim a broad institutional commitment to forge a competitive digital single financial market.

In the future, competition for customer deposits, cross-border services, and interrelated financial infrastructure will continue to intensify. Many traditional banks are not anymore passive observers and instead launched their own fintech-like offerings, established innovation laboratories in-house, or acquired promising digital rivals. The new world order is that of convergence and not disruption, such that digital agility and the presence of a large institution are not incompatible. This hybrid development can be the future step in the fintech evolution of Europe. It will be defined by innovation, integration, resilience, and strategic partnerships.

2.2.1. Key Fintech Players

As fintech transformed from an experimental trend to a permanent feature of the financial landscape, various players have stood out as sector leaders. These institutions, best characterized as “neobanks”, have app-based models of business, no physical branches, user-friendly designs, and low-cost financial products. Many of these have become unicorns, private companies that have a value of over $1 billion.

Revolut, N26, and Monzo exhibit the disruptive nature of fintech by virtue of mobile-led designs, rapid scaling, and rewriting of customer experience.

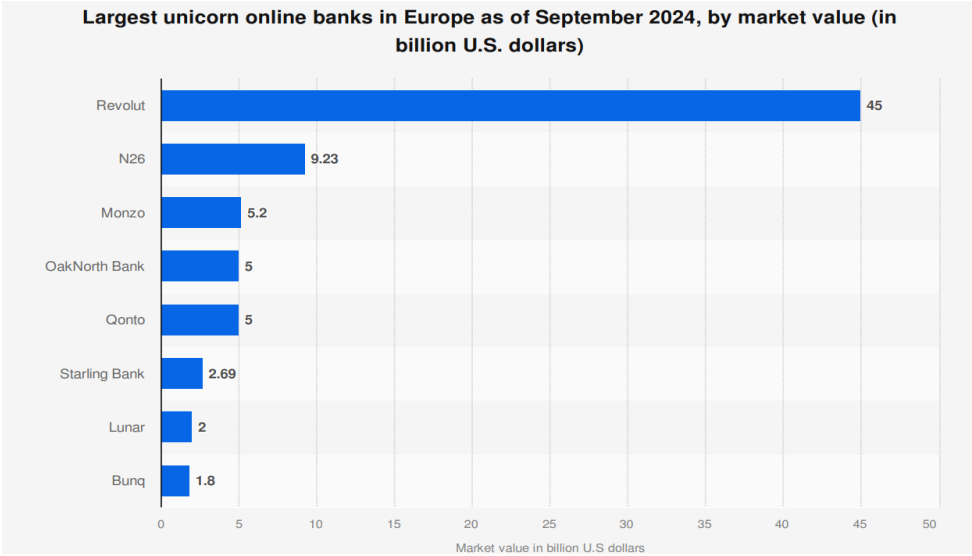

Figure 8. Source: Statista. (2024). Fintech – Statistics & facts (Dossier)

According to data from Statista (2024), Revolut is Europe's best-capitalized unicorn online bank with a valuation of $45 billion in September 2024. Revolut was founded in the United Kingdom, and it went on to expand its service offerings from currency exchange and debit card to a complete financial ecosystem of stock trading, crypto wallets, and business accounts. What is remarkable in its valuation is not merely aggressive geographical expansion but diversification beyond traditional banking products.

The second largest is N26, Germany's $9.23 billion-dollar valued neo-bank. N26 has distinguished itself due to its real-time expenditure categorisation and integration with lifestyle services. N26, despite regulatory hurdles in certain markets (such as its 2022 exit from the UK) continues to grow across the Eurozone and targets younger consumers.

Other significant rivals include Monzo ($5.2 billion), OakNorth Bank ($5 billion), and Qonto ($5 billion). Monzo, again from the UK, has focused on customer experience and transparency and achieved high usage rates among Gen Z and millennial customers, for example. OakNorth positioned itself as a niche SME lender by deploying proprietary credit analytics platforms. Qonto, a French fintech, focuses exclusively on freelancers and small business customers with tailored banking products and has made stunning gains in the B2B segment.

Other relatively small but significant neobanks are Starling Bank ($2.69 billion), Lunar ($2 billion), and Bunq ($1.8 billion). Starling Bank is recognized for its profitability, an uncommon distinction among financial technology startups, and its focus on business banking and integrated finance. The Danish company Lunar concentrates on the region of Scandinavia, and Dutch Bunq focuses on green banking and community-centric functionalities.

While the neobanks have received significant publicity with user-friendly interfaces and expansionist visions, the overall picture of fintech consists of numerous players operating in the payment space, automation, cryptocurrencies, and business financial services. Besides the neobanks, payment infrastructure companies have been the most valuable of the European fintech players.

The Amsterdam-based Adyen is Europe's largest and most valuable among them, having a market value of $43.8 billion. Its all-in-one payments platform enables merchants to accept payments from anywhere in the world by a plethora of means including credit cards, digital wallets, and bank transfers. The company's customers include global giants like Uber, Spotify, and Netflix, and its business model comprises scalability and seamless integrations.

Similarly, Mollie ($6.5 billion) offers payment solutions for small and medium enterprises. The payment processor now supports over 120,000 European companies to facilitate them in receiving various international payment methods. With simplified integration and rates totally transparent, Mollie became an agile payment processor alternative.

Klarna, a $6.7 billion-valued company, has emerged as the biggest European BNPL giant. The Swedish firm enables consumers to break payments into instalments at the check-out point on an interest-free basis. The model is well received among the youth and has been universally adopted by online retailing platforms. Klarna achieved its peak in 2020 as Europe's largest

valued fintech; despite a correction in valuation, its core business remains strong with over 85 million users globally.

In the investing space, Trade Republic ($5.3 billion), a Germany-based business, offers commission-free trading of financial products. As a result of its mission of democratizing investing, it has appealed to retail investors, especially in markets where brokerage fees remain significant. With over 1 million customers and an accessible app, it is a notable illustration of the expansion of fintech into capital markets.

On the infrastructure-as-a-service front, Mambu ($5.5 billion) is distinct. The German fintech provides a banking platform on the cloud on which banks and financial technology disruptors build products such as loans, deposits, and digital wallets. Because it is modular, it integrates quickly with existing systems, making it a digital-transformation strategic partner for institutions.

Blockchain.com, which is worth $14 billion, is based in Luxembourg and is at the intersection of digital asset trading and crypto infrastructure. The organization offers crypto wallets and trading. Having processed payments in over 140 countries and served over 100 million wallets made, it is broadly considered to be among the early players of the European crypto landscape.

UiPath, synonymous with automation in the past, became a fintech enabler with its Robotic Process Automation software. The $7.8 billion Romanian company allows banks and financial institutions to automate onboarding of customers and detection of fraud and streamline compliance processes. UiPath's scalability and low-code platform (i.e. software building by visual means that helps to expedite deployment of programs with minimal hand-coding) have made it desirable for incumbents and challengers to target manual inefficiencies.

Another business of relevance is Pleo ($4.7 billion), a Danish financial technology offering intelligent business cards and automatic expense solutions. The platform makes worker spend easier by simplifying categorization and accounting system connections like Xero (i.e. accounting software). With real-time spend limitations and approval flows, more than 20,000 European companies use Pleo to make financial departments more efficient.

From an academic perspective, these players exemplify the practical reality of the disruptive nature of fintech. Their business models enjoy many of the characteristics described in the literature: customer focus, modularity, processing in real-time, and scalability.
From a strategic standpoint, they have forced traditional banks to respond either by internal innovation (e.g. Santander's Openbank or isybank by Intesa San Paolo) or partnership and acquisitions. The fluid competitive environment also favours the argument that the banking industry is undergoing a radical structural evolution triggered by the scale, speed, and transparency of fintech challengers.

While user acquisition remains an important predictor of competitive traction, sustainability and profitability are becoming equally important. According to McKinsey (2024), increasing rates and volatile investor sentiments are pushing the fintechs to streamline value propositions, prioritize monetization, and acquire customers of high value. Future fintech development will likely rely on scale, but on efficiencies, retention, and ecosystem integration as well.

Customer adoption remains the most tangible indicator of success and competitive position for fintech. Revolut leads in the European region by some distance, having achieved 50 million customers by November 2024, according to Statista (2024). This is Revolut's aggressive global expansion roadmap and its “super app” positioning, offering not just core banking services. Its ability to onboard customers rapidly has been key to earning investor support and holding its market value at $45 billion.

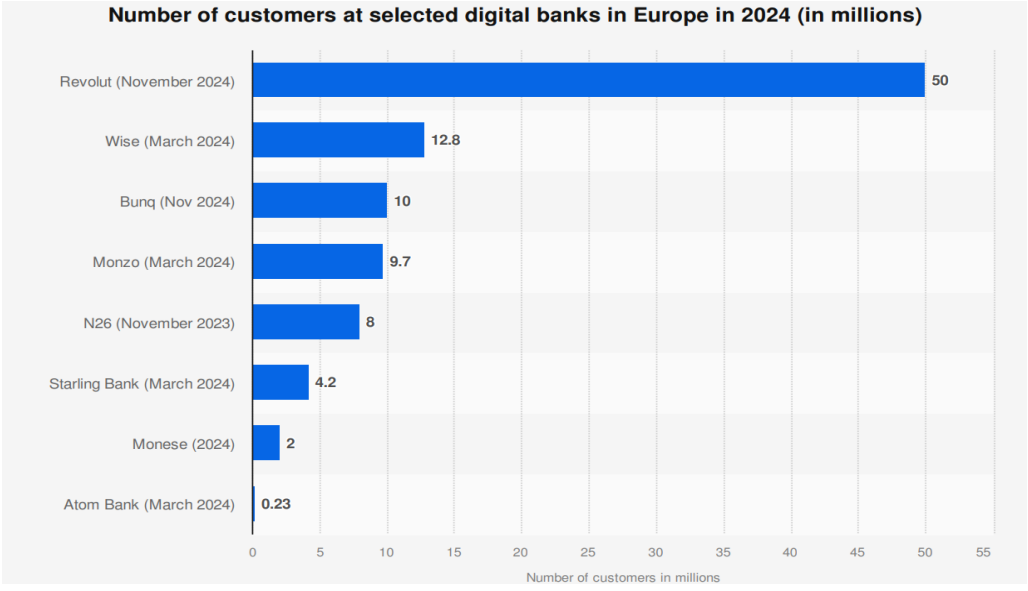

Figure 9. Source: Statista. (2024). Fintech – Statistics & facts (Dossier)

Revolut's second largest rival is Wise (former TransferWise) with 12.8 million customers until March 2024. Although retail banking services as conventional neobanks offer fully, Wise emphasizes cross-border payments and multi-currency wallets and is a leading B2C and B2B money transfer solution. Its user base reflects strong trust among freelancers, SMEs, and expatriates, a segment often underserved by traditional banks.

Interestingly, Bunq currently has more customers than more popular names like Monzo and N26 and reached 10 million customers in November 2024. Bunq, which has its headquarters in the Netherlands, appeals particularly to environmentally conscious customers and travellers through its Green Card and flexible saving features.

Monzo (9.7m) and N26 (8m) display healthy growth but at a slower level than leaders. Monzo has strong brand loyalty in the UK among its younger customers, while N26, having exited the UK in 2022, remains a leading brand for the Eurozone and expanded to Spain, France, and Austria. Steady growth by banks is by virtue of a highly saturated competitive landscape and rising regulatory intensity, which made hyper-growth more challenging to sustain.

Starling Bank, with 4.2 million customers, distinguishes itself through profitability and its focus on small business banking. Unlike Revolut's appeal to the masses, its deliberate, controlled growth has allowed it to build a revenue-generating customer base. Niche players like Monese (2 million customers) and Atom Bank (230,000 customers) appeal to niche segments. Monese appeals to mobile-first migrants and the unbanked in Europe, and Atom Bank tackles mortgage and savings products in the UK in the form of a completely app-based experience

As a whole, the data reflects a fundamental shift in the correlation of customer base and valuation. While high user numbers can signal strong market penetration, they do not necessarily guarantee profitability or customer retention. More attention is now on user quality like average revenue per user (ARPU), customer lifetime value (CLV), and cross-selling. As maturity increases in the European digital banking market, the players need to face a more selective era of expansion. An era in which sustainability of business takes centre stage more than mass acquisition.

2.3. The Regulatory Framework for Fintechs in the European Union

Fintech has extended the borders of traditional finance supervision, obliging the regulators in Europe to rethink the functioning of supervision systems for internet only financial activities. Fintech entities remained for years in legally questionable settings, marketing products and services similar to banking ones, yet not categorizable through the applicable legislation. Fintech entities have capitalized on fragmentation through regulatory arbitrage, developing modular service models that enabled them to extend within the Single Market, avoiding compliance with all regulations applicable to banks.

At the same time, the regulators faced a delicate trade-off: enabling innovation and inclusion in finance and ensuring financial stability and equal competition. The eventual outcome has been the gradual evolution of a specialized fintech regulatory perimeter that is based on bespoke EU instruments which reflect the very peculiarities and ways of doing business that are inherent in digital finance. Unlike traditional banking supervision, this emerging perimeter is defined not by institutional form but by functional activity whether a firm accesses payment accounts, handles digital assets, or relies on outsourced ICT infrastructure.

This chapter explores the three most relevant pillars of this evolving architecture: the Revised Payment Services Directive (PSD2), which provided legal rights to access payment infrastructure and account data; the Digital Operational Resilience Act (DORA), which places all financial actors, including fintechs, in the view of cybersecurity risk oversight; and the Markets in Crypto-Assets Regulation (MiCA), the EU's first attempt at creating a harmonized license regime for crypto-assets and related activities. These norms differ in scope and technical content but taken together represent a structural shift: fintechs are no longer at the edge of the regulators' field of view, they are moving onto the formal radar and subject to compliance requirements proportionate to their complexity and systemic footprint.

Note that such frameworks are not only tools of control, but they also shape market strategy by imposing explicit rule-setting and access requirements. This gives regulatory clarity to firms considering expanding in the EU. Simultaneously, they minimize the room for arbitrage and impose operating burdens that fintechs internalize.

The subsequent sections explore how each rule impacts fintech activities, the challenges it presents in the areas of governance and compliance, and the general implications for the integration of fintech in the EU's body of regulation.

2.3.1. PSD2

The Revised Payment Services Directive (Directive (EU) 2015/2366), commonly referred to as PSD2, represents a foundational regulatory development in the EU's effort to modernize the payments ecosystem and integrate fintech providers into its supervisory perimeter. It was enacted in response to the shift in consumers' behaviour, the development in digital technologies, and the growing imperative for global border interoperability. PSD2 transformed the legal framework of payment services through the development of new classes for the regulated parties, widening the scope for the license requirement, and imposing non-discriminatory access to account infrastructures owned by incumbent institutions.

The most revolutionary feature of PSD2 is captured through Articles 66 and 67, by which the regulated third-party providers (TPPs) enjoy the right to access the customer payment account information and initiate transactions (subject to customer consent) through standardised technical interfaces. This legal principle, the access to account (XS2A), compels the account-servicing payment service providers (typically banks) to release their APIs to two new classes of actors: Account Information Service Providers (AISPs) and Payment Initiation Service Providers (PISPs). The directive categorically excludes the right of banks to impose the technical or contractual stipulations that would filter this access de facto incorporating non-bank actors in the value chain for payments.

PSD2 created a formal point of entry to the EU payment system long enjoyed only by vertically integrated banks. By disaggregating service delivery and data ownership, the directive let fintech firms offer account aggregation, digital wallets, and direct payment services without the custody of client deposits. This unbundling of infrastructure and interface helped fintechs concentrate on innovation and user experience at the front end while utilizing established bank rails for execution. The rule clarity and Single Market passporting provisions accompanying PSD2 did the same for scalability through the member nations and reduced legal fragmentation.

But while PSD2 opened the market, it introduced harsh compliance measures. TPPs are required to request authorization or registration by the national competent authorities, subscribe to security measures, and show ongoing General Data Protection Regulation (GDPR) compliance values. Further, payment service providers (non-banks and banks) are all required to comply with Strong Customer Authentication (SCA) for the greater bulk of electronic transactions, in line with the security mandate by Articles 97-101. This entails the implementation of two-factor protocols and risk-based approaches to authentication designed to provide protection against unauthorized access and fraud. For fintechs whose businesses extend across jurisdictions, the implementation of SCA imposed key costs, complexity, and friction in user experience.

Apart from security, PSD2 introduced broader requirements for operational clarity and liability management. Payment service users enjoy a right to absolute and timely redress for unauthorized transactions except if gross negligence or fraud can be proven. This places the burden of proof squarely on the service providers and raises the stakes for operational incidents and emphasizing the need for mature customer service, dispute handling, and incident response infrastructure. PSD2 also includes explicit requirements for charges on transactions and currency conversion disclosures and places a mandate on fintechs to build sturdy layers of compliance in user interfaces and back-end systems.

Although PSD2 did manage to open up access and stimulate competition in the area of retail payments, implementation revealed key structural tensions. Most banks at first opposed the XS2A mandate in view of security worries and the lack of resources for creating APIs that would be compliant. Meanwhile, the absence of a single API standard for the entire EU separated integration efforts among TPPs and restricted the interoperability and dependability of account access. Additionally, the directive did not provide definitive answers to central questions related to data ownership and liability attribution in multi-party chains and thereby persisted in creating legal ambiguity in some areas of use. These frictions prevented the open banking model contemplated by regulators from realizing full potential

Nevertheless, PSD2 has achieved its strategic objective: it transformed the EU payment markets' structure by incorporating fintech firms as part of the regulative order, shifting power from incumbent gatekeepers, and establishing the legal foundation for user-centric finance services. Even if it still constitutes a multi-faceted and fluid regime, PSD2 has advanced the

EU definitively closer to a regulative open-payments world; a regulative innovation that continues to influence transnational policy debates on open finance.

2.3.2. DORA

The Digital Operational Resilience Act (Regulation (EU) 2022/2554), commonly referred to as DORA, marks a turning point in the European Union's approach to regulating information and communication technology (ICT) risk in financial services. Adopted in December 2022 and applicable as of January 2025, DORA institutes a legally enforceable standard that governs how banks, ranging from systemic banks to fintech startups, respond to and disclose cyber threats and operational failures.
Unlike prior rules, which touched on technology risk indirectly or through sectoral guidance, DORA places digital operational resilience squarely on the regulators' agendas as a category in and of itself, growing from the insight that systemic risk increasingly originates not on balance sheets, but digital platforms.

The coverage of DORA is intentionally comprehensive. It extends not only to traditional credit establishments and investment firms but also to a wide array of non-bank organizations such as payment institutions, providers of crypto-assets and related services, and crowd-funding platforms. The cross-sectoral coverage represents a strategic shift in policy: in a financial system shaped by platform-based models and outsourced digital infrastructure, operational continuity cannot be assumed to be endogenous to the institution. Fintech firms scaled at bullet pace on the basis of lightweight business models using primarily cloud services, APIs, and third-party technology providers. DORA provides formal content to the regulative expectation that such firms should internalize ICT governance effective and independent of size and business model.

At the heart of DORA is the requirement for all covered firms to implement an ICT risk management regime. This involves identification of critical assets, monitoring of system performance, ranking and mitigation of vulnerability, and preservation of business continuity through backup systems. Firms must put in internal control functions, define escalation processes, and maintain board-level digital risk oversight. For fintechs, this represents a definitive shift: operational risk, which previously may have been potentially handled on a reactive basis, needs to be institutionalized through the creation of formal documentation and

governance. Compliance involves not only the maintenance of infrastructures but also the development of a demonstrable capacity to predict, resist, and rebound from ICT-related disruptions.

DORA also institutes binding reporting rules on adverse and ICT-related incidents. Financial institutions are required to report severe ICT-related incidents including cyberattacks or data breaches to national competent authorities within very narrow reporting timescales and submit detailed root-cause analysis and impact assessment. This reporting should be conducted using a standardised reporting format, enabling supervisory convergence and timely identification of systemic trends at the earlier end. For fintechs who may not be accustomed to prior experience in handling structured supervisory dialogue, such requirements call for the implementation of in-house processes for monitoring and real-time outside coordination among regulators. The reputational and regulatory risk for non-compliance are considerable, particularly while addressing repeated or unresolved failures.

One of the newest areas of DORA is ICT third-party risk control. The control offers a regime for the direct oversight of major ICT service providers (CTPPs) like major cloud providers and data centres that offer services to numerous EU finance institutions. Financial institutions are required to perform vigorous vendor due diligence, continue monitoring performance and resilience, and seek contractual agreements that include access, audit, and termination rights. For fintech firms, most of them who heavily rely on outsourced infrastructures, this presents a new aspect to legal and operating complexity. They must not only manage their own systems but also embed regulatory safeguards into commercial relationships with upstream providers many of whom may not be EU-established or directly supervised.

DORA also requires all financial institutions to conduct threat-led penetration testing (TLPT) at least sporadically on their major ICT systems. This entails institutions simulating real-world cyber-attacks in safe spaces, testing and validating defence measures in position, and recording remediation actions. Even for the small fintechs who do not qualify as systemically significant institutions, DORA still requires proportionate testing for digital resilience, risk cycles, and the simulation of events. This significantly raises the minimum threshold for operational security and pushes digital resilience from a discretionary investment to a regulatory baseline

Strategically, DORA alters the calculus of fintech competitiveness. So far, lightweight technology stacks and short development cycles had afforded fintechs competitive edge over legacy institutions burdened by compliance-intensive architecture. With DORA, the assumption must be that all financial institutions should be able to meet common standards of resilience whatever the risk profile or business model. This puts the playing field onto a level surface but also diminishes the space for non-compliance or underspending on ICT systems. Operationally, effectively, resilience ceases to be a reputational differentiator, it is a condition of the license to operate, a matter of compliance, and a measure of institutional credibility.

Overall, DORA constitutes a clear EU regulator response to resetting the risk perimeter of the financial system to the realities of digitalization. By overseeing ICT risk as a central rather than peripheral feature of supervision, the message conveyed is that digital infrastructure is now systemically important. For fintechs, it entails a structural change in the manner risk is conceptualized, operationalized, and governed. The rule not only generates cost and complexity; it also redefines legitimacy by imposing the expectation that digital-native financial actors must be just as resilient as incumbent traditional actors.

2.3.3. MiCA

The Markets in Crypto-Assets Regulation (Regulation (EU) 2023/1114), or MiCA for short, represents the European Union's first endeavour to create a single uniform legal standard for crypto-assets and the companies that issue or offer such assets or services. Agreed in 2023 and scheduled to become applicable in full effect between mid-2024 and early 2025, MiCA plugs a long-standing gap in supervision by applying previously unregulated or lightly supervised activities to prudential and disclosure obligations in a binding manner. Its implementation represents a strategic shift in the EU's approach to supervision: instead of waiting for crypto markets to mature before intervening, the EU has chosen to embed them within its financial supervisory perimeter from the outset.

MiCA regulates a wide variety of crypto assets that are not within the scope of the dominant EU finance directives like MiFID II. Bitcoin and other decentralized digital currencies are not directly governed, but any firm that offers services related to them comes squarely within the coverage of MiCA's rules. The regulation establishes a single EU license for the Crypto-Asset Service Providers (CASPs), enabling businesses to conduct activities across all Member States

using a single compliance standardization system that tackles the previous fragmentation of crypto regulation across the EU.

For the fintechs operating in the crypto space, MiCA presents a defined set of expectations that had previously been vague or absent. CASPs are now required to be in compliance with defined standards in such matters as governance frameworks, internal control processes, conflict-of-interest provisions, and capital adequacy requirements whose thresholds are set at EUR 50,000 and EUR 150,000 respectively depending on the nature of the activity. Firms are also required to establish custody controls, maintain incident response processes, and be subject to rigid disclosure requirements to the customers. These obligations mirror, in most ways, the supervision norms applicable to the traditional investment firms but scaled to the practical dimensions of the businesses that are crypto-native.

From a compliance perspective, MiCA drastically raises the bar for the previously loosely regulated crypto-active fintechs. The authorization to operate by MiCA will not just entail the meeting the capital and governance thresholds, but also the implementation of proper risk management systems, cyber security controls and Anti Money Laundering (AML) controls aligned with related legal measures such as the Sixth Anti-Money Laundering Directive (AMLD6) and the future AML Regulation. Such controls are aimed at removing blind spots in the regulation through which fraud, abuse of the markets and illegal flows were perpetrated pre-MiCA.

Strategically, MiCA presents both opportunities and constraints. The positive aspect provides long-overdue regulatory clarity for fintech businesses seeking to scale across a series of EU jurisdictions, replacing the patchwork of national regimes with a standardized set of rules. This facilitates easier scaling, fundraising, and institutional onboarding for businesses seeking partnerships through the conduit of licensed financial institutions or payment infrastructure access. The negative aspect sees the administrative cost of the compliance work, particularly in the areas of client onboarding and incident reporting, become too high for new businesses. The regulation defines a standard of compliance that screen the industry, to the benefit of better-established industry participants who can institutionalize risk, governance, and disclosure protocols.

Interestingly, MiCA does not seek to suppress innovation. Its structure reflects a risk-based approach in the sense that regulatory intensity shifts in proportion to potential market impact and investor risk exposure.

However, by including crypto-assets in the legal terminology of EU financial law, MiCA de facto eliminates the previous regulatory vacuum in which the majority of the crypto-related fintechs had operated. It redescribes legitimacy through license, codifies market conduct rules, and incorporates the crypto services as part of the formal financial architecture and not as an external competitor to the same.
Finally, MiCA represents a historic regulation that transforms the sector of crypto assets from a regulatory frontier to a supervised sector of EU financial law. For fintech firms, the coming of MiCA ends the era of the rule of regulatory ambiguity and inaugurates a new phase defined by institutional compatibility, compliance, and transparencies.

2.4. Trends influencing the Evolution of Fintech

The fintech industry continues to experience a strategic shift marked by a decisive move from expansionary growth to a viable and profitable growth model. The evolution has been accelerated by continued macroeconomic turbulence in the form of high interest rates and inflation and risk-averse investment climate that has limited the inflow of cheap capital.
As BCG's 2024 Global Fintech Report demonstrates, global fintech revenues continue to rise at a 14% annual average rate in the past two years, the sector has entered a new stage when scale takes the backstage and profitability takes centre stage. Surprisingly, the EBITDA margins in key fintech segments have improved over the years, witnessing improved cost control, monetization focus, and recalibrated go-to-market strategies. McKinsey (2024) also notes in the similar context that fintechs are no longer evaluated solely by the user acquisition parameters but by the parameters of the economics of the unit, cash flow duration, and long-term strategic fit.

This maturation is occurring concurrently with a succession of technological trends remodeling competitive dynamics across the industry At first, product development is maintained through the integration of advanced technologies, led by artificial intelligence, blockchain, and cloud-native architecture. The predictive analytics and highly personalized financial services provided by the generative AI are redefining the competitive landscape for fintechs in lending, wealth

management, and fraudulent activities detection. At the same time, the growth of embedded finance and open banking continues to transform fintechs from product innovation disruptors to ecosystem enablers. The firms now integrate the finance capabilities into third-party platforms such as mobility solutions, company software, and retail apps to extend accessibility and raise switching costs for users.

Regulation is also playing a central role in reshaping fintech trends. The previous competitive advantage fintechs had by operating in lightly regulated spaces has diminished. The EU implementation of PSD2 and the Digital Operational Resilience Act (DORA), and future laws on AI and data governance, continues to narrow the gap between incumbent banking and fintech compliance requirements. As such, the majority of fintechs are considering investing significantly in RegTech[13] solutions to optimize onboarding standardization, enhance cybersecurity, and automate regulatory reporting, functions vital not only to survival, but for scaling within regulated financial ecosystems. This convergence has significant implications for incumbents as well, many who are only beginning to follow fintech business models by imposing open APIs, real-time decisioning engines, and modular architecture to stay competitive.

Meanwhile, the sector retains the industry origin mission to advance financial inclusion. Digital-native platforms continue to provide major financial services to the underserved demographics, from gig economy professionals to micro-entrepreneurs, where branch bank infrastructures are geographically restricted. The long-term popularity of fintech persists as a matter of friction elimination, cost reduction, and greater accessibility, traits that continue to disrupt incumbent value chains and set expectations among consumers. Yet, as the fintech model grows more institutionalized, the competitive advantage continues to shift on from speed of innovation to execution quality and scale.

These trends as a whole represent a structural change in which fintechs are not just competitors to the established finance order, but co-creators of the new finance architecture. This new paradigm, defined by the presence of hybridization and platform-based distribution and increasing convergence in the realm of regulation, foreshadows the fintech future as one defined by convergence with the traditional banking sector. It is within the hybrid finance world that

[13] technology management of the financial industry's regulatory processes.

the market valuation and strategic flexibility shall be the yardsticks of long-term success for fintechs and incumbent banks.

2.4.1. Technologies Shaping the Future of Fintechs

The competitive finance industry is increasingly shaped by the new generation of emerging technologies that are the innovation and disruption drivers. In the next years, the technologies will continue and increasingly accelerate the rate at which fintech solutions are created and deepen their impact on strategic behaviour among new participants and incumbent banks.

Among these technologies, artificial intelligence (AI) takes centre stage by offering hyper-personalization services, real-time risk assessment, and smarter fraud detection. According to McKinsey (2024), generative AI alone can add as much as $4.4 trillion to the global economy each year and the banking industry should be able to capture major value through the power of automation, cost savings, and better decision-making.
Incumbent organizations are rapidly adopting AI not just to support customer interactions by using chatbots and digital assistants but also to improve credit decisioning and operational efficiency and close the digital gap to fintech organizations.

Blockchain technology is also a foundational shift by offering decentralized, transparent, and manipulation-proof solutions to the traditional modes of financial intermediation. From tokenized assets and smart contracts to cross-border payment systems, blockchain applications are forging new payment and lending business models and new types of asset management. Such trends are most disruptive to traditional banking infrastructures and are prompting banks to examine pilot projects or partnerships to remain viable in a decentralized finance world.

On the infrastructural level, fintech innovation is enhanced by the use of open-source software, serverless computing, and Software-as-a-Service (SaaS) delivery models which reduce fixed costs and development time. For fintechs, such tools allow rapid iteration and scalability; for incumbents, adoption ceases to be optional and becomes a necessity in opening digital subsidiaries or complementing incumbent tech infrastructures.

Moreover, open APIs, introduced by Open Banking laws such as PSD2 have become the centre of platforming finance. APIs enable secure data sharing and seamless interoperability with

external services and transform banks from producers of services to ecosystems orchestrators. It forces incumbent banks to unbundle major services and vary products, somewhat emulating the agility of fintechs.

These technologies collectively do not merely optimize service delivery, they redefine the very basis of competitive advantage throughout the whole banking industry. Where scale, branch network, and access to capital once delineated strength in the market, the new success predictors are digital integration, velocity, flexibility, and data-driven intelligence. For traditional banks, failure to harness these tools risks strategic obsolescence. If these tools are not used productively, traditional banks face strategic obsolescence. If these tools are productively incorporated into operating models, not only they enable traditional banks to compete with fintechs but may redefine the entire financial ecosystem.

3. Key Theoretical Frameworks and Previous Studies

The intersection of financial technology and traditional banking has captured increasing scholarly attention, partly due to the implications of fintech on bank profitability, market

dominance, valuation, and regulation. These arguments borrow and combine the most influential evidence and theory, together revealing how fintech competition interact in order to shape the market valuation and strategic response of incumbent banks.

3.1. Fintech and Disruptive Innovation

Clayton Christensen's Disruptive Innovation Theory (1997) offers a foundational lens for interpreting the competitive threat posed by fintech firms.

It gives the very first definition of disruptive innovation. Disruptive Innovation creates substantial growth by offering a new performance trajectory that, even if initially inferior to the performance of existing technologies, has the potential to become markedly superior. This superior performance can achieve remarkable growth by creating new kinds of customers or by attacking the cost basis of the established businesses.

As Christensen describes it, established firms generally cannot compete effectively with disruptive new competitors since they develop sustaining innovation aimed at traditional high-margin users. Disruptors generally introduce lower-priced and less complex products that cater to underserved markets and then transform the model to align with mainstream incumbent products. Fintech companies in the banking sector do the same by delivering fast, user-centric, digital-first products that especially resonate among the younger and underbanked population.

Disruptive innovation has long been the standard model by which new entrants seek to challenge established industries, and the last decade has seen the theory applied to the arena of financial technology. While Clayton Christensen (1997) introduced the concept by outlining how new technologies start by addressing a niche or underserved segment prior to displacing incumbents, recent studies have placed disruption in the context of the industry of financial services, in which regulation, consumers' trust, and physical hurdles provide industry-specific barriers to entry.

Revell (2022) offers a new appreciation for disruptive innovation applied to the fintech scenario and argues that fintech firms do not simply compete at price or convenience level with incumbents but redescribe the architecture of value delivery. By separating the back-end banking infrastructure from the user-facing experience, fintechs compete on specific functions (paying, lending, deposits) while not reproducing the whole-stack activities of traditional banks. This modularity in targeting single functions at the bank tears apart the structural advantage conventionally enjoyed by incumbent banks. Banks are thereby forced increasingly to move beyond the vertically integrated forms, in which they control the entire value chain and own all

the activities along it, and move towards more open and interoperable platform forms in which outsiders can plug in through APIs and other digital channels to their systems.

One of Revell's central insights in this model is the move from the concept of "product-level disruption" to that of "infrastructural disruption." Incumbent banks can react to product innovation (e.g. a new mobile app) by imitating or acquiring the product or company, but they fail when the disruption impacts the way financial services are constructed, delivered, and captured. Fintech companies usually operate using cloud-native architecture, embedded APIs, real-time data analysis, and platform economics and as such, the cost curves of such incumbent banks are fundamentally different.

The paper also clarifies that disruption in banking does not inherently imply the disruption is linear or confrontational. Fintechs at times undergo "silent disruption": they gradually erode the relevance of incumbent services without necessarily engaging in direct competition. For instance, when fintechs capture the user interface layer (e.g. digital wallets or personal finance dashboards), they may be able to drive banks into commoditized infrastructure roles, stripping them of customer ownership and brand visibility even if core banking activities remain formally intact.

This insight explains why incumbent banks fail to respond adequately to fintech threats even if the short-term financial impact looks small. As Revell (2022) explains, disruption in banking most commonly takes place on a strategic level before a financial one and by the time a revenue stream looks unquestionably affected by change, the shift in market power may already be irreversible. Overall, this new definition of disruption widens and enriches Christensen's original theory by explaining new competitive dynamics for digitally modular industries and justifies the thesis' argument for considering fintech competition as a multi-dimensional variable operating not only on prices and profits, but on organizational relevance and market visibility. It also justifies the thesis' emphasis on market-oriented indicators (e.g. P/E ratio and market capitalization) as proxies for how capital markets value disruption risk.

3.1.1. Structural Implications of Fintech Innovation on Banking Models

Fintech is not just introducing new tools into the financial sector; in fact, it transforms the architecture of the process of financial intermediation. Beck and Levine (2023) think that

fintech implies a shift in paradigms redefining how core banking functions are executed, who performs them, and under what institutional structures they operate. The traditional model of banking where large, centralised banks that simultaneously take deposits, provide loans, process transactions and retain risk exposure encounters increasing competition from technology-centred models that unbundles the services and redistributes them among a greater number of specialists.

The authors observe that fintech innovation disrupts three central functions that conventionally justified the central role of banks in the economy: (1) production of information regarding borrowers and projects, (2) risk management and risk diversification, and (3) execution of transactions. Fintech firms make use of the advances made in artificial intelligence, big data analytics, and platform-based business models to outperform incumbents in such areas as cost effectiveness, personalization, and scalability.

The digital non-bank lenders, for example, utilize the machine learning methods and alternative data sources to gauge the creditworthiness precisely and serve the customers who do not adhere to the conventional credit model. The payment fintech such as the digital wallets and the open APIs for banking allow frictionless user experience that enables disruption to the banks' dominance in the transaction facilitation. The incumbent banks are then pushed not only to internalize the fintech-like abilities but also change the internal operating models by moving towards more module-based and platform-based configurations.

Beck and Levine (2023) also highlight the wider consequences for the structure of markets and financial stability. On the one hand, fintech can democratize the delivery of financial services by cutting the costs of transactions and facilitating more granular risk pricing and encouraging inclusion and innovation. However, it also presents considerable regulatory and systemic difficulties. Fintech companies usually fall into the grey areas of regulation and enjoy less strenuous supervision than banks, especially in dimensions such as capital adequacy, consumer protection and cybersecurity. This regulatory asymmetry creates conditions for regulatory arbitrage, which may compromise the safety and soundness of the financial system, especially if fintech activities remain outside the established prudential frameworks.

Additionally, the data advantage enjoyed by fintech companies, particularly the ones merged with giant technology platforms, can potentially bring structural imbalances in transparency

and market power. The centrality of data in fintech-driven finance brings new asymmetries and dependencies and may transform competition and trust in the financial sector. The new risks have called for a functional kind of regulation in which control takes place through the nature of the services provided and not through the institutional nature of the firm providing the services.

In light of these dynamics, the authors argue the banks-fintech relationship cannot be dichotomously positioned as disruption or partnership. Instead, fintech represents the reallocation by banks of their key functions onto new institutional and technological horizons. Such an understanding also supports the central thesis argument: that banks' responses to fintech ranging from internal development to strategic partnerships and M&A activity represent key predictors of banks' market-based valuation, strategic alignment, and long-term competitiveness.

Accordingly, Beck and Levine (2023) work offers a strong theoretical lens through which both the structural dynamics reforming banking and the incumbents' strategic reactions can be understood and interpreted, which this thesis investigates empirically through market capitalization and P/E ratio performance.

3.1.2. What are Incumbents doing to prevent Disruption from Fintechs?

Fintech has challenged established banks to reassess strategic priorities and change the way they operate in order to protect their position in the market.
Fintechs had managed to highlight incumbent finance institution weaknesses both in operating efficiencies and digital user experience. It almost does not matter how much market share fintechs take from incumbents when they have so successfully recast customer expectations.

As opposed to the earlier perception that fintechs were niche actors, the growing risk of digital-first competitors in lending, payment systems, wealth management, and deposits has spurred incumbents to innovate more than just incrementally and instead reconfigure their core business models. The most competitive banks cited by McKinsey (2024) are those that are proactively going end-to-end digital, not only replacing user interfaces but redefining the infrastructure, operating model, and decision-making by virtue of cloud architectures, data and analytics, and machine learning. Such investments are not only cost-reduction tools but necessary steps to

keep pace with the expectations of real-time and mobile-first services by the user. Digital investment has become a key differentiator in this context: banks that are behind the digital curve suffer more market skepticism that converts to their market capitalization and price-to-earnings multiples.

To accelerate this transformation, incumbents have mostly opted for strategic partnerships or fintech acquisitions. By means of partnerships, banks may introduce best-in-class technologies without the risk and time taken by internal development. Examples include Goldman Sachs' collaboration in the Apple Card with Apple, BBVA's investment in Atom Bank, and JPMorgan Chase's acquisition of WePay. Such initiatives signal to the investor the bank's proactive response to competitive threats and digital expansion, and such proactive action can mitigate the valuation pressure arising from fintech intrusions. It has been seen by Deloitte (2023) that banks who strategically collaborate with fintechs typically lead the peer group in customer growth and digital engagement, the keys to future earnings potential.

At the same time, incumbents have launched digital-native subsidiaries operating outside the legacy systems' boundaries. Those organizations, such as New10 at ABN AMRO or Chase UK, are intended to replicate fintech flexibility and the incumbent bank's brand recognition and compliance platform. Such ventures are not only about gaining new customers but also offer internal testing laboratories for experimentation with modular architectures and new KPIs such as digital channel profitability or customer lifetime value. Such bifurcation of operations, with the legacy banking and the innovation arm separate from each other, is a strong indicator of strategic change and forms part of the larger trend towards the "two-speed" organization[14], as observed in BCG's innovation reports in the banking industry (2022).

Meanwhile, a less visible but equally significant response has been the physical and organizational downsizing of traditional infrastructure.

[14] a strategy where digital-facing applications would use agile, high-speed methods while core, legacy enterprise systems would continue with traditional, slower-paced, and stable processes.

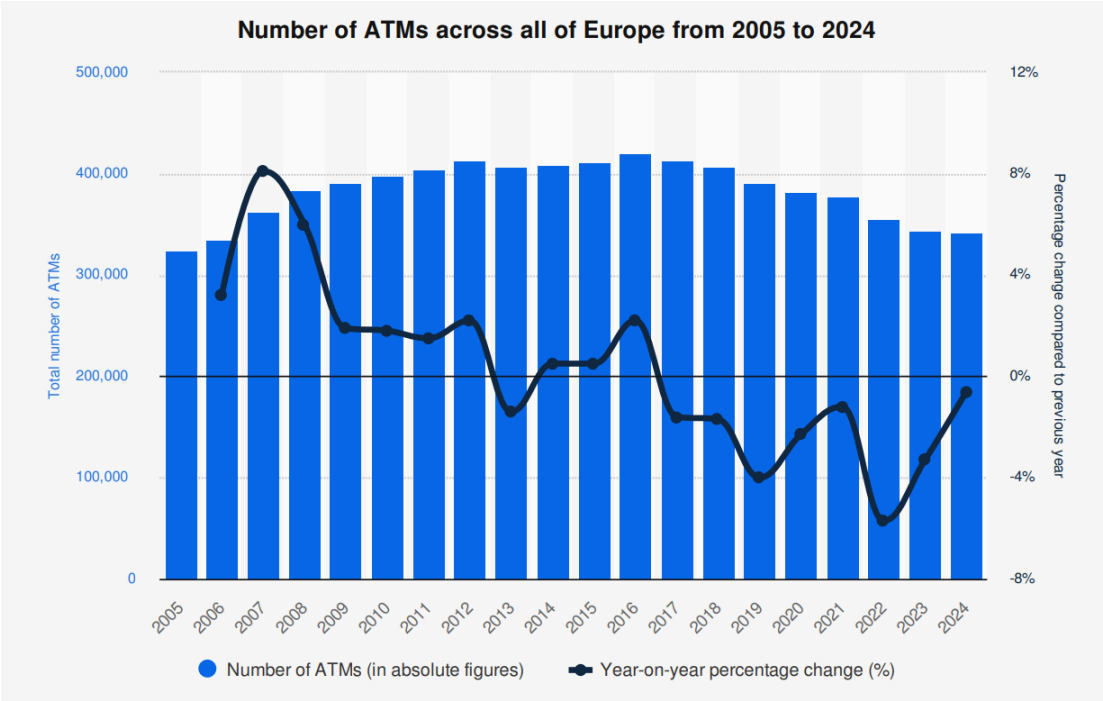

Figure 10. Source: Statista. (2025, June). Number of ATMs across all of Europe from 2005 to 2024.

The ATMs in Europe recorded a slow increase since the year 2005 and peaked in 2016 at approximately 420,200 ATMs. Since then, the trend has reversed, such that the number of ATMs installed continued to drop each year. As of December 2024, the collective number had fallen to approximately 341,879. This decline reflects the broader shift away from cash transactions in favour of digital and contactless payment methods, coupled with rising costs of maintaining ATM infrastructure. The year-on-year percentage change line in the graph also reflects that most years since 2016 reached negative rates confirming the structural fall in the usage and installations of ATMs in Europe.

Staff reductions have followed a similar path: between 2015 and 2023, leading banks such as Deutsche Bank, UniCredit, and Société Générale eliminated collectively tens of thousands of jobs and refocused capital on tech-intensive activities and remote service models.
Even if such efforts provoke short-term reputational or labour backlash, markets generally welcome them as proof of long-term operating efficiencies improvements. From a valuation standpoint, the leaner model supports higher margins and signals operational discipline in the face of fintech-led cost competition.

Regulatory adaptation is another central pillar for incumbents' defence strategies. The advent of PSD2 in the European region and open banking mandates has propelled traditional banks to

allow access to customer information and end the informational monopoly that they had. Although it created a threat at the beginning, the majority of banks converted the threat to a strength by opening API marketplaces, investing in RegTech for faster compliance, and designing platforms for data sharing to accommodate personalized delivery of services. Banks that respond to change in the case of regulation are better perceived by institutional investors, who increasingly view regulatory agility as a source of competitive advantage in financial services.

Lastly, incumbents that combine digital investment, strategic partnerships, operating restructure, and regulatory insights are best positioned to preserve or even increase their market valuation. These actions are not only defensive but are part of a strategic realignment toward a platform-centred, digitally connected, and data-driven model of finance. In this new paradigm, the ability to scale efficiently, personalize services, and innovate continuously becomes central to valuation. Fintech disruption has raised the bar, and incumbent banks are assessed by how rapid and effective they respond.

3.2. Resource Based View

The Resource-Based View (RBV), originally defined by Barney (1991), is a comprehensive theory that describes how firms sustain competitive advantage through their internal resources and capabilities. According to RBV, if organisations have resources which happen to be valuable, rare, inimitable, and organisationally embedded (VRIO), then probabilities of outperforming competitors in the long term would rise.
The lens provides perspective on why fintech companies thrive not only through expansion into new markets but through the development of new digital competencies that cannot be reproduced by incumbents.

Ng and Kwok (2022) broaden the RBV application to fintech by looking at how fintech platform businesses design and deploy strategic resources. Fintechs outperform incumbent finance businesses not just through technological innovation alone, they say, but by assembling complementary bundles of resources that supports agility, scalability, and resiliency. These are fast-moving software development abilities, cloud-native system architectures, advanced data analytics capabilities, and user-centred service design pursuit. These resources are embedded

within modular digital platforms that allow for rapid service iteration, seamless integration with third-party tools, and personalization at scale.

One key concept that Ng and Kwok bring forth is that of resource orchestration and how it defines the firm's capacity to repeatedly reconfigure and redeploy resources to respond to the dynamics of the market. Fintechs are very good at this function because they have lean practices, adaptable models of governance, and the capacity to move outside the standard boundaries of industry. Their orchestration strength enables fintech companies to penetrate new segments and scale geographically relatively easily. By comparison, incumbent banks will find it difficult to efficiently redistribute resources because the hierarchies are rigid and legacy systems incur the kind of technical debt that hinders change.

Another feature stressed by Ng and Kwok (2022) is the strategic shift from vertical integration to platform orchestration. Rather than offering all services vertically, fintechs act as hubs in larger ecosystems by interconnecting users, developers, and service providers. This allows them to expand the value proposition without bearing the entire burden of the cost of the infrastructure or the development of the product. Fintech platforms achieve competitive advantage through their ability to scale rapidly and benefit from external innovation and network effects that are structurally difficult for incumbent banks to replicate.

Additionally, the paper highlights the strategic value of data as a resource. Fintech organizations embed data collection and analysis as key activities, transforming data into a source of personalization and predictive decision-making. With the RBV model, such data (specifically when complemented by proprietary algorithms and real-time behavioural data) meets the VRIO criteria and forms a sustainable source of competitive differentiation.

This RBV understanding of fintech strategy emphasizes the aspect that competitive advantage in digital finance does not emerge solely by acquiring advanced technology, but by integrating dynamic capabilities aimed at a scalable and flexible business model. It also clarifies why the majority of banks, even if they invest in the same technologies, are not able to replicate fintech outcomes: lacking organizational routines and flexibility in architecture, they cannot fully mobilize and integrate the resources sufficiently.

In the context of this thesis the RBV approach offers guidance for the inclusion of internal capacity variables such as capital adequacy, organizational adaptability, and digital sophistication when analysing bank performance. It supports the hypothesis that fintech competition both impacts product-level outcomes and the market's perception of the firm's strategic capacity to adapt. Thus, RBV offers a robust theory foundation for interpreting how resource asymmetries between fintechs and traditional banks may influence their valuation and market dynamics over time.

3.3. Revisiting Structure-Conduct-Performance in the Age of Fintech

The Structure-Conduct-Performance (SCP) paradigm, for long the basis of industrial organization economics, offers a useful perspective to interpret the shifting dynamics of financial markets in the fintech period. The traditional SCP model posits a causal relationship whereby the structure of a market (concentration, barriers to entry, degree of product differentiation) determines firm conduct (pricing and investments), which in turn determines firm and industry performance (profitability, efficiency, and welfare to consumers). Applied to banking, the model had long been used to describe how protection by regulators, high barriers to entry, and economies of scale had created a relatively stable and concentrated industry. Fintech entry has completely transformed this status quo.

Carletti, Claessens, Fatás, and Vives (2020) contend that fintech not only embodies technological innovation, but also a radical redefinition of the structure of the financial markets. Digital new entrants have used data processing, cloud, and mobile user interface advances to deliver vertical-specialist services challenging the vertical integration of incumbent banks. Financial structure is therefore becoming decentralized, where new entrants segment old services, such as payments, lending, insurance, and wealth management, into modular services provided through agile platforms, which revolve around customer needs. The disintegration of banking services reduces customer lock-in, raises transparencies, and promotes new patterns of behaviour in which consumers engage simultaneously through multiple financial providers.

Yet, and as the authors confirm, this initial fragmentation can be followed by a secondary process of concentration, particularly among platform-based fintech firms. Because digital platforms also experience powerful economies of scale, data network effects and algorithmic learning advantages, the former can very quickly accrue dominant positions in the market. The risk, then, is not just the disruption of incumbent bank market power, but the creation of quasi-

monopolistic fintech ecosystems wielding excessive influence over the payment flows, credit decision-making, and user data. Such processes follow patterns observed in adjacent sectors such as e-commerce and social media, where a handful of giant platforms have concentrated market power.

The conduct of both fintechs and traditional financial institutions is adapting accordingly. Incumbent banks, in response to rising fintech competition, are accelerating their own digital strategies, engaging in cloud adoption, automating credit decisioning, and redesigning customer journeys. Many pursue strategic partnerships or invest in fintech startups, effectively "buying time" to reconfigure legacy infrastructures. Carletti et al. (2020) point out that this often leads to a form of strategic convergence, where fintechs acquire licenses and regulatory recognition to expand into core financial services, while banks experiment with platform logic and open APIs to defend their customer relationships.

This strategic evolution not only affects firm behaviour but also market performance in a broader sense. Fintech facilitates performance through increased transactional efficiency, increased product diversity, and reduced intermediation costs. However, it also presents new challenges: cyber risk, operational vulnerabilities linked to cloud dependency, and the risk of protection gaps for consumers when services are extended across borders with variable coverage by regulation. The authors argue that performance in fintech-influenced markets must be evaluated along expanded dimensions, including system resilience, adaptability to regulation, and the inclusiveness of financial access, not just short-term profitability.

The consequences of such structural change are at the heart of the empirical model constructed in this thesis. By illustrating how fintech impacts the structural profile of banking, Carletti et al. (2020) offer conceptual support for the inclusion of variables such as fintech presence. Additionally, the focus on reshaping investor expectations and competitive positioning benefits the application of market-based indicators, here the P/E ratio and market capitalization, as proxies for how capital markets internalize fintech-driven structural change. These indicators not only reflect the past performance but also the future expectations of markets over the strategic value of a company in the face of dynamic competitive forces.

Lastly, the application of the SCP model to fintech confirms that the disruption extends beyond the product innovation level and penetrates the architecture of the financial intermediation

itself. Fintech has emerged as a structural driver and reshaped who participates in the market, the way through which value delivery occurs, and what forms of regulation are necessary to preserve systemic integrity. As such, any analysis of traditional banks' strategic behaviour and valuation must consider the deeper reorganization of market logic underway.

3.4. Empirical Evidence on Valuation Effects and Competitive Signalling

As the finance industry faces disruption by technology, the influence of fintech on incumbent banks extends beyond direct competition in products and services. Increasingly, fintech also influences the informational landscape through which capital markets evaluate incumbent banks. Faced with uncertainty and informational asymmetry, financial actors interpret external developments (such as fintech funding rounds) not just as events affecting new entrants, but as signals carrying implications for incumbents' strategic positioning and future performance.

Thus, in this context, Del Sarto, Comeig Ramírez, and Gai (2025) conduct an event study analysis to examine the response of stock prices to public announcements regarding fintech equity financing by conventional banks. From a dataset of 160 funding events among European fintech startups in the 2010-2019 period, the authors ask the question of whether such events, broadly perceived as events of strategic momentum and validation for fintech entities, translate into measurable effects on the valuation of incumbent banks.
They found support in signalling theory (Spence, 1978), according to which in the presence of uncertainty, agents with privileged information can influence others' expectations by transmitting observable and credible signals. The object in question, the financing of fintech startups, represents such a signal for technological progress and future competitive pressure.

The authors find that the digital lenders' announcement of funding generated statistically significant negative abnormal returns among listed European banks. The effect is most pronounced among banks most exposed to large volumes of SME lending and consumer credit and among banks most likely to regard fintech new entrants as direct substitutes capable of eroding future market share and profitability. The paper gives a rare empirical measure of future-oriented market reactions: while there is no such change in competition ex ante, the threat of disruption alone may be enough to move stock prices. The reactions are not all the same, however. For digital payments the influences are mildly positive or neutral. Payment innovations are often perceived as complementary to existing bank operations, or as potential

enablers of partnerships and operational efficiency, especially in areas like transaction processing and open banking APIs.

This varied investor response by fintech vertical underscores the necessity to frame fintech as a multi-dimensional disruptor. Not all fintech innovations are interpreted equally by the market. Payment-related initiatives possibly enhance bank service coverage or facilitate bank participation in larger-scale financial ecosystems. For researchers, this heterogeneity justifies the functional disaggregation of fintech exposure in empirical models, enabling more detailed analysis of the specific strategic threats posed by different fintech verticals.

The study also contributes to the literature on market-valuation measures by presenting evidence for the use of such measures in the estimation of fintech impacts. Because the stock market reactions seen are antecedent to the change in financial outcomes, the authors confirm that the change in valuations comes from expectations and not ex-post realizations. This further supports the case for using price-to-earnings (P/E) measures and market capitalization as dependent variables throughout this thesis. Such measures do not just capture current earnings; they capture investor future views on risk and growth prospects and the strategic defensibility of banks' business models when exposed to the evolution of fintech.

Moreover, the research shows how narratives and investor psychology affect bank valuation. Fintech funding rounds, especially when backed by major venture capital firms or media coverage, act as third-party endorsements, increasing perceived credibility and competitive threat. In doing so, they alter the strategic narrative surrounding incumbents: from stability to potential obsolescence.

At the policy and regulatory level, the paper also offers central considerations. The fact that external innovation can affect bank valuations through informational channels, considers the needs for supervisors and regulators of markets to keep watch on information externalities of innovation ecosystems. The policy takeaway for banks is simple: they not only must invest in digital talent, but also actively manage their innovation narrative, both to reduce perceived vulnerability and to maintain investor confidence.

In the broader context of this thesis, Del Sarto et al.'s findings offer a compelling foundation for treating fintech as both a competitive and communicative force. Fintech influences bank

performance not just by competing for customers, but by shaping the informational environment by which banks are evaluated. The introduction of such signalling effect allows for added theoretical complexity to the analysis and corroborates the utilisation of market-based indicators in the econometric analysis. It also offers evidence that the market reactions may be faster and more responsive than the fundamental changes (sale revenues, net incomes…), especially in regions where innovation cycles are rapid and investor attention high.

In conclusion, fintech financing announcements are strong signals that affect investor expectations and consequently the market valuation of traditional banks. This mechanism operates through anticipated competitive pressure, perceived technological obsolescence, and narrative transformation. The empirical evidence put forth by the paper by Del Sarto et al. thus provides convincing evidence for the thesis' central hypothesis: that fintech activity has predictable and quantitative effects on traditional banking institutions not only through business competition, but through the strategic signalling effects that influence capital markets.

3.5. Regulatory Impact on Fintech Behaviour

The rise of fintech has created not only technological disruption but also a profound regulatory dilemma: how can financial supervision adapt to an innovation environment characterized by rapid change and actors operating outside traditional banking perimeters.
As such, the institutional infrastructure of regulation (how supervisors are organized, how rules are designed, and how technology impacts oversight) becomes one of the central variables shaping the strategic conduct of traditional banks. Fintech does not act in isolation; it interacts with, and is mediated by, the regulatory frameworks in which it operates.

According to a research of the International Monetary Fund by Bains and Wu (2023), the supervisory bodies around the world are undergoing structural reform in response to fintech. Bank supervision has long adhered to the entity approach such that the shape of legal entity and license status established the nature and degree of the rule. The model fails when fintech businesses offer regulated activities such as payments, lending, and fund management beyond the bank license tradition. The effect is a perimeter of regulation which excludes wide tracts of new finance, and which creates both supervisory blind spots and competitive asymmetries.

To remedy this, most jurisdictions are moving to activity-based and functional supervision models, such that any company carrying on regulated financial activities, whatever legal form, comes under the watchful eye of the regulator. For conventional banks, this shift has profound strategic consequences. Entity models used to offer incumbent banks a kind of regulatory protection: compliance requirements put fintech startups at an entry barrier. As that protection erodes, banks must get used to a world in which regulatory privilege cannot be relied on to offer protection from agile competitors. The playing field becomes more level, and more demanding.

Another key institutional change is the growing implementation of SupTech[15]. Supervisors are implementing infrastructures to conduct real-time monitoring. This contrasts sharply with traditional supervisory cycles based on quarterly or annual reporting. SupTech decreases the banks' freedom in how and when they communicate with supervisors. Compliance becomes integral to operations and necessitates investment in the management of regulatory data, predictive risk tools, and integrated governance-IT systems. Failing to develop such capabilities may leave institutions behind in both the efficiency of compliance and public perception in the markets.

In jurisdictions with advanced regulatory design, such as the UK, Singapore, and Australia, institutional arrangements also include dedicated innovation functions, such as regulatory sandboxes, fintech liaison offices, and open banking regimes. Bains and Wu observe that such environments not only drive fintech innovation but incumbent innovation too. Banks operating in these ecosystems are more likely to engage in controlled experimentation, API integration, and RegTech adoption, which can strengthen competitiveness. By comparison, banks in jurisdictions whose systems of supervision are fractured or reactive are more likely to experience greater ambiguity and respond in defensive manners such as delaying, lobbying, or not committing to digital transformation.

This institutional perspective is reinforced by Alaassar, Mention, and Aas (2022), who provide a systematic overview of the drivers of fintech innovation. Regulatory and institutional encouragement is the most salient among the six remarked areas. The authors show that regulatory flexibility, through sandboxes, principle-based guidance, and multi-stakeholder collaboration, lowers uncertainty for innovators and enhances resource access. For established

[15] Supervisory Technology: the use of advanced technologies by supervisory bodies to enhance effectiveness in regulating financial markets and institutions.

banks, such frameworks possess a double-edged sword status: they stimulate fintech legitimacy and diffusion at a greater pace while offering banks the choice to innovate together and alleviate risk through supervised experimentation.

The authors also highlight the strategic importance of cross-sector collaboration, particularly between regulators, fintechs, and incumbents. In supportive environments, banks are not just responders to disruption but active participants in shaping the evolution of the regulatory agenda. This requires internal cultural shifts toward openness, modular integration of fintech capabilities, and a willingness to test new business models under regulatory oversight. Institutions that fill this role can draw reputational advantage, reduce innovation cycle time, and be in sync with investor expectations about future flexibility.

Together, these two studies highlight how regulation becomes a strategic field.
Regulatory architecture, technology, and institutional design do not merely impact compliance costs; they constitute the incentive frameworks and risk portfolios of innovation. Markets take such signals into account. Banks dealing in jurisdictions whose systems of regulation are looking forward have stable innovation trajectories, lower valuation risk, and smoother transitions to digital business models. Banks dealing in poorly aligned or too rigid systems confront strategic inertia, greater market skepticism, and diluted comparative advantage.

Such dynamics offer rationale for the inclusion of regulatory strength and as a contextual variable in the econometric analysis in this thesis. In particular, the use of market-based measures of valuation such as market capitalization and P/E ratio are especially fitting since they capture not only earnings and fundamentals, but also what investors expect about the exposure to regulators, innovation potential, and competitive advantage.

Lastly, the strategic responses of traditional banks to fintech disruption are inseparable from the institutional arrangements that govern financial innovation. Regulation when structured to be adaptive, technologically enabled, and innovation-focused acts as a transformation driver rather than a constraint. Banks who understand and internalize such rationale in their strategic thinking are better positioned not just to survive disruption but to forge the future finance paradigm.

3.6. The Systemic Reach of Fintech

Fintech has become increasingly a double-edged transformation in the financial system: while it promotes wider access to services and introduces valuable efficiencies, it also raises central questions regarding risk, fragility, and imbalance in regulation.
Sant'Anna and Figueiredo (2024), in their comprehensive systematic review of the literature, survey over a hundred papers in a bid to determine if fintech leads to or undermines financial inclusion and stability. They conclude that the two aims, though often described in complementary terms, actually can work in opposing ways depending on the institutional environment within which fintech develops and the respective response of banks and regulators.

Fintech, however, offers credit, savings, and payments over mobile platforms, which tend to reach individuals that traditional banks have historically overlooked due to high costs or limited reachability. By removing many entry barriers and reducing dependence on physical branches, fintech revolutionizes the dynamics of inclusion and forces the traditional banks to review their business models, customer strategies, and geographic approach. It expands the competitive space not just by creating new firms, but by reframing the very concept of what it takes to "do banking."

However, these gains in inclusion are tightly connected to new risks. Most of these fintech companies manage to evade the banking regulation perimeter if they do not accept deposits or hold capital buffers. Their business is typically built on third-party digital infrastructure, at the risk of cybersecurity threats, and under algorithmic decision-making devoid of transparency. Sant'Anna and Figueiredo (2024) argue that this creates a structural problem: fintech unleashes new types of risk which are hard to monitor, harder to regulate, and potentially contagious if incumbent banks take fintech solutions through partnerships, white-labelling platforms or acquisitions and remain insensitive to the operating risk they inherit. These risks can move quickly across systems, not through credit defaults or capital shortages but by way of weaknesses in the software, failure of the data or abrupt change in the behaviour of the user. The problem is made worse when regulatory systems are fragmented, slow to adapt, or not equipped to oversee firms that fall between categories, neither banks nor fully unregulated tech players.

Such settings do not merely permit fintech to evolve in a vacuum, they induce fintech to evolve into the niches produced by outdated supervision sometimes accelerating financial access at the cost of long-term system resilience. The authors show that the scenario influences not only

fintech firms themselves, but also banks who share the business space. Banks that innovate not fast enough risk ending up irrelevant, banks that innovate too quickly risk operational and reputational issues. It thus forces banks into a strategic trade-off: whether to innovate and aim for competitiveness and market share, or whether to preserve stability and compliance and risk stagnation. The right answer depends heavily on context.

In countries whose regulators have applied modern instruments such as SupTech, innovation sandboxes, and open banking APIs, fintech and banks share common rules and expectations and a safer playing field to innovate. Stability and inclusion are then more likely to reinforce one another through innovation supported by institutional coordination and public trust. But in less coordinated regimes, innovation outpaces regulation and yields confusion and ambiguity that make it difficult for banks and investors to gauge future risk and future opportunity. This has a direct impact on the markets. As Sant'Anna and Figueiredo show, fintech is not only about technology, but also about how markets interpret the credibility, readiness, and adaptability of financial institutions. This is why price-to-earnings multiples and market capitalization are key: they reflect not merely historical earnings, but investor perceptions about whether or not a bank is on the right path, managing risk properly, and positioned to succeed in a changing landscape. In other words, fintech exposure depending on how it is managed and regulated can either improve or damage a bank's strategic profile in the eyes of the market. This supports the methodology of this thesis, which does not view fintech competition as a single uniform threat or opportunity, but as a force that reshapes bank strategy through multiple channels: customer access, operational risk, regulation, and investor expectations.

As a whole, Sant'Anna and Figueiredo's (2024) study clearly demonstrates that fintech innovation cannot be understood in isolation from the institutional and strategic context in which it occurs Their consequences are not only technological, but organizational, political, and fiscal consequences, too. It is the classic dilemma of traditional banks between embracing innovation and securing long-term robustness, under circumstances in which overreaction and underreaction might be rewarded and punished, respectively, by the marketplace, and in which their future balance will decide not only their future performance, but their future role in the emerging financial system.

4. Quantitative Analysis

This chapter investigates how fintech competition, regulatory strength, and macroeconomic conditions shape the market valuation of traditional banks in Europe. Using a panel of listed banks observed from 2015 to 2024 (initially 50 institutions, reduced to 48 due to missing data), the analysis focuses on two dependent variables as complementary proxies for market performance: market capitalization and price-to-earnings (P/E) ratio.

Fintech competition is proxied by (i) the total number of fintech firms and (ii) the annual entry of new fintech startups. Regulatory resilience is captured by the Capital Adequacy Ratio (CAR), while the macroeconomic environment is controlled for using real GDP (constant prices, converted to euro) and the central bank policy interest rate.

The empirical strategy relies on panel data techniques, using fixed effects and random effects to account for unobserved heterogeneity across banks and over time. Both valuation measures are log-transformed to mitigate skewness and allow elasticity-style interpretation.

For each dependent variable, we test:

H_0: Fintech competition, regulatory strength, and macroeconomic conditions have no statistically significant effect on the valuation metric considered.

H_1: Fintech competition, regulatory strength, and macroeconomic conditions have a statistically significant effect on the valuation metric considered.

The remainder of the chapter details data sources and database construction, it describes the econometric specification, and presents the results, followed by a discussion of their strategic implications for incumbent banks adapting to fintech disruption.

4.1. Sample Selection

This thesis adopts a multi-year panel data approach to empirically investigate how fintech activity, regulatory developments, and macroeconomic dynamics shape the market valuation of incumbent banks operating in Europe.
The empirical strategy relies on an original panel dataset composed of 50 publicly listed banks headquartered in various European jurisdictions, observed annually over a ten-year period from 2015 to 2024. This structure provides an appropriate foundation for the study of structural

change within the banking sector as it enables the identification of both short-term fluctuations in valuation and longer-term strategic adjustments

The decision to include exclusively listed banks in the sample finds both conceptual and empirical support. Theoretically, the research concentrates on market-based measures of valuation, i.e., market capitalization and price-to-earnings (P/E) ratios, available for publicly traded corporations and automatically connected to investor expectations. Empirically, listed banks are exposed to standardized disclosure requirements on accounting items by the International Financial Reporting Standards (IFRS), and also to the European Banking Authority (EBA) and relevant national regulators for supervision. These frameworks ensure the availability and reliability of financial data, including core variables such as total assets, net income, regulatory capital, stock price, and market-based performance metrics, all of which are essential for constructing valid econometric models.

By contrast, non-listed banks and investment banks have been excluded from the analysis. Non-listed banks can be less transparent in the disclosure of financial statements, adhere to jurisdiction-specific accounting norms, and usually do not release enough information for multi-year comparisons. Additionally, their strategic positioning differs considerably from that of universal banks, particularly with regard to retail market exposure and digital transformation trajectories. The investment banks derive revenues primarily from capital markets activities and are less structurally exposed to fintech competition for the retail financial services. Including these types of organizations would introduce noise and methodological inconsistency and possibly bias the result.

The geographical composition of the sample includes members and non-members of the European Union such as Norway, the United Kingdom, and Switzerland. While these non-EU jurisdictions fall outside the direct legislative reach of EU directives, their regulatory frameworks are closely aligned with European standards All countries included in the sample have implemented Basel III capital standards and open banking policies equivalent to the PSD2 (Second Payment Services Directive) or the similar convergent policies. This convergence ensures a reasonable degree of regulatory harmonization while preserving institutional context difference. Such difference is central for capturing the effect of the national differences in the banks' responses to exogenous shocks such as fintech disruption.

The temporal window from 2015 to 2024 has been selected to cover a whole decade of digital and regulative development and key macro-financial shifts. These years witnessed a succession of key events including the endorsement and implementation of PSD2, exponential expansion in the scale of neobanks and platform-based fintech companies, and the structural push in digitalization delivered by the pandemic of COVID-19. The years also cover key macroeconomic events ranging from the prolonged period of low interest rates and quantitative easing to the aftermath of 2022 scenario of monetary tightening and trends of inflation. Such cyclical shifts are central to the research question since they directly affect bank profitability and innovation incentives. A ten-year horizon ensures sufficient variation to capture the interaction between structural and cyclical factors and to detect the medium-term strategic consequences of financial innovation.

The panel format of the data permits application of fixed and random effects models, common econometric methods to handle multi-year data. These are models that correct for hidden heterogeneity potentially distorting coefficient estimates when it is excluded. Unobserved heterogeneity refers to specific characteristics of each bank that are not included in the dataset, either because they cannot be observed or measured, but remain constant over time. Specifically, they capture the fact that banks and other financial institutions possess structural attributes not captured by observed variables but can significantly influence outcomes such as market valuation.

The fixed effects model presumes there are bank-specific and time-invariant characteristics embedded in the panel that are related to the independent variables. These unseen ones can include long-term management practices, lifelong compositions of business models or simply country differences. Rather than attempting to capture them through direct measures, the fixed effects model controls for them by allowing each bank to have its own intercept. This approach ensures estimated coefficients for time varying explanatory variables reflect within-bank variation only and hence identify relationship between predictors change such as fintech intensity, change in regulation, or change in macroeconomics and corresponding change in valuation over time. This is particularly true for this thesis, whose mission it is to identify change of the market-based measures of performance with respect to changing external stimuluses and controlling for stable internal attributes wherever those attributes differ by banks.

The random effects model, on the other hand, assumes the unobserved individual-specific effects are not correlated to the explanatory variables. With this assumption, the random effects model views the heterogeneity at the bank level as part of the error structure and not controls directly through bank-specific intercepts. The advantage of this approach is that both time-varying and time-invariant regressors can be used. This is particularly useful when some of the regressors are time-constant or when capturing structural attributes that are constant during the sample period but are theoretically meaningful, for example, the ownership structure or the listing segment. Moreover, random effects models are generally more efficient in terms of degrees of freedom, especially in datasets with a relatively large number of cross-sectional units compared to time periods.

The choice of Fixed versus Random Effects estimator is grounded in theoretical arguments and intentions to account for different sources of heterogeneity. Fixed Effects control for observably and temporally fixed characteristics unique to each bank, whereas Random Effects allow and include both within-bank and inter-bank variation to enter estimates. In practice, both models are estimated in parallel to evaluate the robustness of the results and see whether the observed relationships remain consistent when moving from specification to specification.

The application of fixed and random effects models in combination further enables an enriched comprehension of the phenomenon. The fixed effects model captures within-bank dynamics by accounting for how variations in exposure to fintech competition or regulatory pressure affect variations in valuation over time among the same bank's observations. This longitudinal perspective is key to drawing an informed portrait of short- to medium-term adaptation processes. The random effects approach, by contrast, controlled for both within and between-entity change and yields information about whether permanent bank differences like size, capitalization, or organizational sophistication intermediate innovation pressure and valuation By comparing these two perspectives, subsequent analysis can thus distinguish shifts in valuation based upon internal strategic repositioning and change based upon structural attributes differentiating institutions from each other.

While the methodology does not aim to establish causality in the strict econometric sense, it does provide a rigorous and interpretable framework for identifying statistically significant patterns in the data. The fact that both modelling approaches are used provides some evidence

on the complexity of the question and the need to control for a broad range of sources of variation present in the banking sector.
Ultimately, this modelling strategy supports the broader aim of the thesis: to empirically explore how market-based measures of bank performance respond to technological disruption and regulatory transformation.

4.1.1. Market Valuation of Traditional Banks

The dependent variables in this study capture how financial markets evaluate traditional banks considering their strategic responses to fintech presence, regulatory compliance and macroeconomic factors. The use of market-based metrics is essential, since the research question focuses on the market valuation of banks.
Both market capitalization and P/E ratio are widely used in finance to assess the market valuation of publicly traded firms. They are particularly valuable when we talk about fintech disruption because investment mindsets are potentially influenced by banks' technology readiness, strategies, flexibility to respond to shifts in regulation, and so forth. These dependent variables allow the analysis to link tangible market outcomes to the explanatory factors of interest.

- **Market Capitalization (€ million)**

Definition: market capitalization is the total market value of equity. It is calculated by multiplying the current stock price by the number of shares outstanding. It provides an objective measure of the financial market's aggregated valuation of the bank at any given point in time.

Market Cap = Current Share Price * Total Number of Shares Outstanding

Rationale for inclusion: in this thesis, market capitalization is used to capture how banks' digital adaptation and exposure to fintech competition are priced by investors. Since market capitalization reflects not only current performance but also expectations of future profitability and competitiveness, it is sensitive to both tangible financial results and intangible strategic moves such as digital investments or partnerships with fintechs. The use of this metric allows the study to assess whether and how fintech competition influences the overall value attributed to traditional banks by the market.

COUNTRY	BANKS NAME	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	CUR
United Kingdom	HSBC Holdings PLC	140.922,25	122.380,32	102.976,70	91.084,80	77.165,49	120.234,07	129.609,96	153.345,05	130.498,10	105.550,35	GBP
France	BNP Paribas SA	66.966,61	71.820,61	65.728,16	75.010,33	53.872,57	66.026,86	49.335,80	77.741,50	75.506,01	65.088,31	EUR
France	Crédit Agricole Group	40.415,30	39.233,79	29.911,42	39.075,37	30.100,23	37.284,60	27.030,50	39.276,24	33.527,11	28.715,88	EUR
Spain	Banco Santander SA	69.174,18	61.167,98	47.066,31	50.990,16	42.176,78	61.985,57	64.507,91	88.409,99	72.313,83	65.792,42	EUR
United Kingdom	Barclays PLC	38.666,16	23.304,67	25.159,20	31.323,72	25.462,61	31.117,34	25.788,30	34.649,67	37.904,37	36.785,28	GBP
France	Société Générale SA	21.736,60	19.291,59	19.955,27	25.776,09	14.526,09	26.467,32	22.476,27	34.780,86	37.753,64	34.320,31	EUR
Switzerland	UBS Group AG	96.003,69	90.360,49	60.641,36	60.793,79	48.122,42	47.176,95	47.170,21	69.106,62	n.s.	n.s.	CHF
Italy	banca popolare di sondrio	3.690,56	2.656,84	1.713,80	1.676,62	997,45	955,74	1.193,31	1.380,11	1.418,19	1.882,46	EUR
Germany	Deutsche Bank AG	33.311,52	25.172,52	21.982,20	22.817,18	18.580,29	14.308,27	14.417,81	32.768,69	23.799,36	31.150,88	EUR
Spain	banco de sabadell SA	10.211,30	6.262,81	4.956,23	3.330,04	1.991,95	5.852,04	5.629,78	9.318,25	7.430,17	8.893,17	EUR
United Kingdom	Lloyds Banking Group PLC	33.201,96	30.328,88	30.551,13	33.948,80	25.813,81	43.782,85	36.898,32	48.984,79	44.615,72	52.152,79	GBP
Netherlands	ING Groep N.V.	47.620,03	47.316,58	42.437,80	47.793,57	29.805,01	41.647,25	36.620,71	59.549,05	51.854,83	48.178,36	EUR
Italy	Intesa Sanpaolo S.p.A.	68.775,58	48.330,58	40.376,50	44.184,87	37.162,70	41.121,60	33.964,65	43.931,61	38.475,84	48.974,37	EUR
United Kingdom	Natwest Group PLC	32.386,80	19.311,69	25.650,18	25.468,62	20.334,55	29.061,67	26.109,33	33.261,49	26.554,83	35.106,19	GBP
Italy	UniCredit S.p.A.	59.768,45	43.840,25	29.692,94	30.301,47	17.110,58	29.078,57	22.065,37	34.676,29	16.890,16	30.641,46	EUR
Spain	Banco Bilbao Vizcaya Argentaria (BBVA)	54.474,57	49.071,98	33.973,68	35.006,40	26.904,92	33.226,08	30.908,99	47.422,01	42.118,27	42.905,06	EUR
United Kingdom	Standard Chartered PLC	23.978,77	17.765,27	18.016,92	13.806,77	14.704,65	22.769,81	20.161,41	25.714,61	21.795,51	18.478,03	GBP
Norway	DNB Bank ASA	338.655,11	333.204,45	303.215,80	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	NOK
Republic of Ireland	Allied Irish Banks PLC	12.410,58	10.160,76	9.667,12	5.808,78	4.562,87	8.430,87	9.988,92	14.929,10	n.s.	n.s.	EUR
Cyprus	Bank of Cyprus Holdings PLC	2.027,94	1.494,77	760,77	472,97	327,06	535,44	691,61	1.097,65	n.s.	n.s.	EUR
Spain	CaixaBank S.A.	38.055,71	27.952,94	29.598,70	19.458,40	12.567,00	16.736,06	18.925,27	23.261,81	18.781,72	18.718,30	EUR
Finland	Nordea Bank Abp	36.777,64	39.688,28	36.995,30	43.682,78	27.021,28	29.321,65	29.443,15	n.s.	n.s.	n.s.	EUR
Poland	BANK POLSKA KASA OPIEKI SA (Pekao Bank)	36.194,62	39.908,57	22.703,66	32.021,34	16.036,92	26.365,11	28.609,23	33.989,87	33.018,73	37.664,45	PLN
Germany	Commerzbank AG	18.587,46	13.320,00	11.015,74	8.395,81	6.619,96	6.916,77	7.213,58	15.635,68	9.082,10	12.020,13	EUR
Denmark	Danske Bank A/S	175.627,00	155.538,00	118.377,00	97.383,00	86.778,00	92.943,00	115.488,00	226.337,00	210.771,00	186.796,00	DKK
Austria	Bawag group	6.378,39	3.771,23	4.108,50	4.831,51	3.387,41	3.619,17	3.584,00	4.446,00	n.s.	n.s.	EUR
Netherlands	ABN AMRO Bank N.V.	7.012,30	6.400,07	6.086,90	6.082,66	3.776,94	7.638,65	9.673,11	12.668,29	5.919,26	4.468,85	EUR
Belgium	KBC Group NV	7.012,30	6.400,07	6.086,90	6.082,66	3.776,94	7.638,65	9.673,11	12.668,29	5.919,26	4.468,85	EUR
Austria	Erste Group Bank AG	24.491,29	15.786,55	12.851,02	17.772,23	10.719,21	14.424,09	12.485,69	15.517,93	11.959,19	12.425,52	EUR
Italy	Credito Emiliano (credem)	3.700,46	2.734,53	2.203,76	1.934,52	1.465,85	1.725,12	1.671,93	2.351,67	1.897,96	2.278,55	EUR
Denmark	Jyske Bank AS	32.778,77	31.107,69	31.139,70	24.452,98	16.913,92	19.835,63	19.979,07	31.490,98	31.999,97	29.661,98	DKK
Austria	Raiffeisen bank international ag	6.496,56	6.141,30	5.049,22	8.512,96	5.486,71	7.364,96	7.302,46	9.933,98	5.091,98	3.985,98	EUR
Sweden	Svenska Handelsbanken AB	222.093,55	212.855,85	204.396,08	190.315,89	160.638,59	196.169,31	187.647,06	214.181,07	241.660,80	211.325,63	SEK
Poland	mBank	23.248,32	22.712,98	12.557,06	18.356,37	7.591,89	16.491,23	17.959,35	19.675,14	14.174,41	13.263,02	PLN
Italy	BPER Banca S.p.A.	8.720,24	4.276,54	2.711,35	2.576,38	2.098,70	2.333,97	1.619,12	2.026,31	2.435,42	3.388,41	EUR
Italy	Banco BPM S.p.A.	11.836,60	7.244,09	5.051,62	4.000,08	2.739,45	3.072,79	2.981,88	3.969,78	n.s.	n.s.	EUR
Italy	Banca Monte dei Paschi di Siena S.p.A.	8.573,45	3.837,01	2.424,40	894,15	1.045,51	40,99	43,85	114,76	442,16	3.612,32	EUR
Spain	Bankinter S.A.	6.867,34	5.209,83	5.634,09	4.052,99	3.976,58	5.871,39	6.308,24	7.104,64	6.615,66	5.882,18	EUR
Spain	Unicaja Banco S.A.	3.276,01	2.362,80	2.737,13	2.307,05	1.129,53	1.558,77	1.851,85	2.115,94	n.s.	n.s.	EUR
Slovenia	Nova Ljubjanska Banka (NLB)	2.550,00	1.700,00	1.248,00	1.524,00	916,00	1.240,00	1.240,00	n.s.	n.s.	n.s.	EUR
Hungary	OTP Bank Nyrt	6.073.200,22	4.424.000,16	2.830.800,10	4.648.000,17	3.740.800,13	4.320.400,15	3.161.200,11	3.001.600,11	2.352.000,08	1.680.000,06	HUF
Sweden	SKANDINAVISKA ENSKILDA BANKEN AB	320.442,60	293.677,35	258.440,60	273.096,92	183.366,63	191.135,30	186.838,66	208.972,86	207.345,35	193.999,73	SEK
Czech Republic	Komerční banka a.s.	161.256,80	137.690,69	124.482,27	177.696,06	124.862,36	157.645,86	160.971,72	173.895,07	168.193,60	188.148,77	CZK
Greece	Eurobank Ergasias Services and Holdings	8.199,12	5.983,53	3.914,76	3.306,35	2.146,12	3.412,43	1.180,44	1.858,10	1.409,97	2.273,44	EUR
Greece	National Bank of Greece S.A.	7.006,72	5.753,56	3.427,44	2.681,94	2.068,17	2.762,44	1.006,19	2.917,94	2.268,49	3.137,47	EUR
Greece	Piraeus Bank S.A.	4.813,91	4.001,18	1.798,03	1.612,97	567,66	1.305,61	366,79	1.340,54	1.825,24	2.427,82	EUR
Republic of Ireland	Bank of Ireland Group PLC	8.836,02	8.683,44	9.524,83	5.379,01	3.560,12	5.266,81	5.243,08	7.654,25	n.s.	n.s.	EUR
Italy	Banca Generali	5.241,96	3.930,89	3.746,26	4.528,00	3.183,04	3.384,02	2.118,52	3.241,46	2.638,18	3.387,57	EUR
Republic of Ireland	Permanent TSB Group Holdings PLC	784,79	927,50	987,52	727,51	391,95	519,26	691,14	1.023,06	1.254,96	2.092,05	EUR
Poland	PKO BP SA	74.700,00	62.900,00	37.862,50	56.162,50	35.900,00	43.075,00	49.337,50	55.387,50	35.175,00	34.162,50	PLN

Figure 11. Market Capitalization 2015-2024. Source: Orbis database (Bureau van Dijk, 2024).

Data for market capitalization were first taken with the original currency of the annual reports, then standardized in euros to ensure comparability across countries using historical currency exchange ratios at years-end.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
EUR/GBP	0,72585	0,81948	0,87667	0,88471	0,87777	0,88970	0,85960	0,85276	0,86979	0,84662
EUR/CHF	1,06786	1,09016	1,11170	1,15500	1,11240	1,07050	1,08110	1,00470	0,97180	0,95260
EUR/PLN	4,18412	4,36321	4,25700	4,26150	4,29760	4,44300	4,56520	4,68610	4,54200	4,30580
EUR/DKK	7,45870	7,44519	7,43860	7,45320	7,46610	7,45420	7,43700	7,43960	7,45090	7,45890
EUR/SEK	9,35346	9,46890	9,63510	10,25830	10,58910	10,48480	10,14650	10,62960	11,47880	11,43250
EUR/HUF	309,99600	311,43800	309,19330	318,88970	325,29670	351,24940	358,51610	391,28650	381,85270	395,30390
EUR/CZK	27,27920	27,03430	26,32580	25,64700	25,67050	26,45510	25,64050	24,56590	24,00430	25,11980
EUR/NOK	8,94963	9,29060	9,32700	9,59750	9,85110	10,72280	10,16330	10,10260	11,42480	11,62900

Figure 12. Exchange rates at years-end. Source: Banca d'Italia, "Tassi di cambio - Serie storiche" (2024)

- **Price-Earnings (P/E) Ratio:**

Definition: the price-earnings (P/E) ratio measures a company's shares price relative to its earnings per share. It can also be the ratio of the market value of equity to the firm's earnings. It is one of the most widely used indicators of market sentiment and growth expectations.

P/E Ratio = Share Price / Earnings Per Share

Rationale for Inclusion: The P/E ratio complements market capitalization by providing a relative valuation ratio. The P/E ratio is a measure used to assess whether a stock is over- or under-valued based on the idea that the value of a stock should be proportional to the levels of earnings it can generate for its shareholders. A high P/E ratio may indicate optimism regarding a bank's competitive strength, while a low P/E may signal market skepticism.
In the context of fintech competition, this ratio helps assess whether traditional banks are seen as agile enough to sustain profitability in a changing financial landscape.

COUNTRY	BANKS NAME	TICKER	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
United Kingdom	HSBC Holdings PLC	HSBA.L	6,116	5,881	7,429	7,615	19,724	18,977	11,808	15,82	38,788	10,988
France	BNP Paribas SA	BNP.PA	5,853	5,736	6,548	6,388	6,635	6,694	8,34	9,368	7,474	9,212
France	Crédit Agricole Group	ACA.PA	5,229	4,691	5,499	5,164	8,782	5,945	6,86	9,022	6,782	8,078
Spain	Banco Santander SA	SAN.MC	4,786	4,504	4,529	5,285	n.s.	8,259	8,622	11,078	7,986	11,429
United Kingdom	Barclays PLC	BARC.L	4,671	4,574	4,672	3,965	9,143	8,461	12,108	n.s.	10,836	67,279
France	Société Générale SA	GLE.PA	3,698	5,554	8,637	3,098	93,618	5,662	6,255	10,943	6,786	7,449
Switzerland	UBS Group AG	UBSG.SW	19,391	3,027	8,222	8,008	6,831	10,942	13,606	62,964	n.s.	n.s.
Italy	banca popolare di sondrio	BPSO.MI	5,565	4,692	6,319	5,176	8,079	7,054	12,946	9,28	14,132	12,56
Germany	Deutsche Bank AG	DBK.DE	8,208	4,256	3,995	8,585	24,543	n.s.	70,067	n.s.	n.s.	n.s.
Spain	banco de sabadell SA	SAB.MC	4,692	4,72	4,735	5,675	n.s.	6,676	24,293	11,374	11,278	15,564
United Kingdom	Lloyds Banking Group PLC	LLOY.L	7,071	5,408	8,065	5,058	22,32	13,767	9,649	13,729	17,19	58,951
Netherlands	ING Groep N.V.	INGA.AS	6,896	5,448	10,805	8,311	11,783	8,121	10,428	11,273	9,066	11,487
Italy	Intesa Sanpaolo S.p.A.	ISP.MI	6,979	5,658	9,941	10,511	11,649	8,874	10,948	5,469	11,346	17,026
United Kingdom	Natwest Group PLC	NWG.L	5,213	4,574	6,475	6,48	n.s.	7,173	14,124	21,304	n.s.	n.s.
Italy	UniCredit S.p.A.	UCG.MI	5,462	3,659	4,093	11,065	n.s.	7,281	7,14	5,83	n.s.	16,664
Spain	Banco Bilbao Vizcaya Argentaria (BBVA)	BBVA.MC	5,245	5,102	4,499	5,951	12,085	7,57	6,616	9,695	7,959	15,751
United Kingdom	Standard Chartered PLC	STAN.L	5,951	6,756	6,454	8,4	29,844	11,797	26,107	26,802	n.s.	n.s.
Norway	DNB Bank ASA	DNB.OL	7,011	7,851	9,06	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Republic of Ireland	Allied Irish Banks PLC	AIBG.I	4,635	4,919	9,499	8,753	n.s.	24,474	11,561	13,476	n.s.	n.s.
Cyprus	Bank of Cyprus Holdings PLC	BOCH.L	3,641	2,396	10,436	12,948	n.s.	n.s.	n.s.	n.s.	n.s.	
Spain	CaixaBank S.A.	CABK.MC	6,052	5,725	7,863	3,719	9,62	9,424	10,684	13,256	14,475	27,704
Finland	Nordea Bank Abp	NDA-FI	7,435	7,636	9,922	9,42	11,244	17,877	11,018	n.s.	n.s.	n.s.
Poland	BANK POLSKA KASA OPIEKI SA (Pekao Bank)	PEO.WA	6,638	4,538	15,06	11,613	17,658	12,69	13,69	14,01	16,222	18,883
Germany	Commerzbank AG	CBK.DE	5,65	5,699	6,625	21,021	n.s.	11,855	12,547	56,184	23,941	11,663
Denmark	Danske Bank A/S	DANSKE.CO	7,247	6,351	n.s.	7,532	18,003	6,337	11,433	10,608	9,39	14,353
Austria	Bawag group	BG.VI	6,541	5,59	12,341	8,646	9,648	7,472	9,459	9,846	n.s.	n.s.
Netherlands	ABN AMRO Bank N.V.	ABN.AS	2,899	2,516	3,034	3,993	n.s.	4,361	4,838	4,058	2,814	2,18
Belgium	KBC Group NV	KBC.BR	7,989	7,438	9,659	11,334	15,47	9,81	10,799	10,488	8,679	8,706
Austria	Erste Group Bank AG	EBS.VI	4,992	3,579	5,386	6,013	10,692	7,319	7,022	8,517	6,733	8,127
Italy	Credito Emiliano (credem)	CE.MI	5,241	4,435	6,487	5,131	7,126	8	11,254	11,861	14,439	14,388
Denmark	Jyske Bank AS	JYSK.CO	6,567	5,66	6,974	6,504	9,829	7,778	10,518	10,197	8,85	12,916
Austria	Raiffeisen bank international ag	RBI.VI	5,169	2,006	1,659	4,948	6,093	5,155	6,65	6,389	7,29	8,355
Sweden	Svenska Handelsbanken AB	SHB-A.ST	7,833	6,574	8,53	9,466	11,572	10,879	11,63	14,529	13,216	14,339
Poland	mBank	MBK.WA	11,788	741,157	n.s.	n.s.	105,855	16,198	14,774	15,853	11,385	12,861
Italy	BPER Banca S.p.A.	BPE.MI	4,664	2,541	1,662	4,581	15,301	4,939	4,515	13,099	143,732	14,653
Italy	Banco BPM S.p.A.	BAMI.MI	4,993	5,245	6,519	6,466	164,049	3,686	n.s.	6,95	n.s.	n.s.
Italy	Banca Monte dei Paschi di Siena S.p.A.	BMPS.MI	3,182	1,596	n.s.	3,541	n.s.	n.s.	0,284	n.s.	n.s.	53,186
Spain	Bankinter S.A.	BKT.MC	6,505	6,347	8,437	3,406	14,134	10,298	13,761	14,421	12,089	15,878
Spain	Unicaja Banco S.A.	UNI.MC	4,964	10,638	8,488	1,847	14,26	8,326	13,898	14,802	n.s.	n.s.
Slovenia	Nova Ljubjanska Banka (NLB)	NLBR.LJ	4,172	2,631	2,944	5,023	3,63	6,035	5,45	n.s.	n.s.	n.s.
Hungary	OTP Bank Nyrt	OTP	4,907	3,537	10,66	9,901	12,717	9,165	9,394	9,307	9,741	21,209
Sweden	SKANDINAVISKA ENSKILDA BANKEN AB	SEB-A.ST	8,901	6,789	8,837	9,63	11,349	9,586	8,529	13,563	17,116	12,757
Czech Republic	Komerční banka a.s.	KOMB.PR	8,723	8,497	8,442	11,629	14,862	10,6	11,196	11,746	12,88	14,875
Greece	Eurobank Ergasias Services and Holdings	ETE.AT	4,723	4,562	2,576	8,436	n.s.	21,328	17,606	14,618	6,072	n.s.
Greece	National Bank of Greece S.A.	TPEIR.AT	5,859	4,231	2,713	2,455	50,793	n.s.	n.s.	n.s.	n.s.	n.s.
Greece	Piraeus Bank S.A.	TPEIR.AT	4,358	3,998	1,605	n.s.	n.s.	3,039	n.s.	n.s.	n.s.	n.s.
Republic of Ireland	Bank of Ireland Group PLC	BIRG.I	6,071	6,2	8,513	4,252	n.s.	10,959	10,413	10,625	n.s.	n.s.
Italy	Banca Generali	BGN.MI	10,689	11,129	17,25	12,455	10,561	10,707	15,521	15,209	16,684	15,786
Republic of Ireland	Permanent TSB Group Holdings PLC	IL0A.IR	5,181	17,391	3,749	n.s.	n.s.	19,802	300,099	26,151	n.s.	n.s.
Poland	PKO BP SA	PKO.WA	7,477	8,666	13,508	9,987	n.s.	11,877	13,941	14,593	10,855	14,976

Figure 13. Price-to-earnings (P/E) ratios, 2015-2024. Source: Orbis database (Bureau van Dijk, 2024).

4.1.2. Fintech Competition

Fintech competition represents the external market pressure exerted on traditional banks by digitally native financial service providers.

This section captures the intensity and dynamics of this competition via two different measures. Both variables reflect the intensity of competitive pressure that banks face from fintech entrants. A higher number of fintech firms, or rapid growth in new fintechs, potentially threatens bank traditional sources of income and pressures it into making changes in strategy that can impact its valuation.

- **Number of Fintech Startups**

Definition: These variable measures the density of fintech activity by counting the total number of fintech firms operating in the European market. A higher number of fintech startups indicates a more competitive environment where traditional banks risk losing market share.

Rationale for Inclusion: The existence of a large number of fintech companies is itself a structural change in the European financial services industry. This competition, as new players increasingly challenge banks for revenue streams, can have a direct impact on market sentiment towards traditional banks and lower their market valuation if investors believe them to be at risk of being displaced. The reason this variable is included in the regression is to reflect the overall competitive intensity with which banks are confronted in their domestic markets.

The European fintech sector recorded an unprecedented growth through the 2010s to its all-time highest rates of new firm formation with 2017 and 2018 being its best years when over 900 fintech start-ups were founded per annum.
Even as the total number of fintechs as a whole continued to rise, new foundations decreased sharply after this peak period. The trend was at its complete manifestation when only 85 new fintech companies founded during 2024, the lowest number of founding annually in the observed period. Even with this decrease in new entries, the European fintech space remained large with 9,225 companies active during 2024, reflecting the cumulative impact of the sector's earlier explosive growth.

YEAR	TOT NUMBER OF FINTECHS
2024	9.225
2023	9.140
2022	8.906
2021	8.535
2020	7.833
2019	7.094
2018	6.347
2017	5.405
2016	4.504
2015	3.771

Figure 14. Total number of fintechs in Europe, 2015-2024. Source: Statista (2025), based on CrunchBase data: "Total number of fintechs and number of new fintechs founded in Europe from 2008 to 2024."

- **New Fintech Startups per year**

Definition: This variable counts the number of newly founded fintech companies per year in Europe.

Rationale for Inclusion: While the total number of fintechs is a reflection of existing market saturation, the new entrant by year is a reflection of the speed and acceleration of market disruption. A surge in new entrants may be a signal of increasing competition or a rapidly evolving technological landscape, which could lead investors to rethink the future competitive position of incumbents. The variable allows the analysis to account for the speed of transformation driven by fintech, rather than just its static level.

YEAR	NUMBER OF NEW FINTECHS
2024	85
2023	234
2022	371
2021	702
2020	739
2019	747
2018	942
2017	901
2016	733
2015	597

Figure 15. Number of new fintechs founded in Europe, 2015-2024. Source: Statista (2025), based on CrunchBase data: "Total number of fintechs and number of new fintechs founded in Europe from 2008 to 2024."

4.1.3. Regulatory Constraints

Regulatory constraints are particularly relevant to this study because they meet digital transformation at a point of influencing how banks allocate resources, manage risks, and position themselves competitively. The selected regulatory variable captures a core dimension of financial stability and resilience that is very salient to investors and has direct implications for banks' safety and profitability views.

- **Capital Adequacy Ratio (CAR)**

Definition: The Capital Adequacy Ratio (CAR) is a regulatory measure that expresses a bank's capital as a percentage of its risk-weighted assets (RWAs). As noted above, RWAs represents the value of a bank's assets and exposures, adjusted by risk according to their risk profile.

The CAR is one of the pillars of Basel III framework, seeking to ensure banks maintain at least a minimum level of capital as a cushion to absorb financial shocks and avoid insolvency.
Under Basel III, banks are required to meet a minimum CAR of 8% but no bank operates below 10.5% because the Capital Conservation Buffer (+2.5% of RWA) is a mandatory condition under Basel III's full implementation.

CAR = (Tier 1 + Tier 2 Capital) / Risk-Weighted Assets

Rationale for Inclusion: The Capital Adequacy Ratio is one significant measure of financial soundness and risk-taking capacity.
Investors and managers pay growing attention to CAR because it is a signal for a bank's ability to absorb financial stresses, distress, and regulatory pressure.

From a market valuation perspective, a higher CAR typically increases investor confidence by giving a signal towards stability, conservative risk management, and international standards compliance, which can potentially impact market capitalization and stock price multiples positively.
Conversely, maintaining excessively high capital buffers can limit profitability as banks' ability to lend or earn equity returns may fall and impact valuation negatively.

For this thesis, we need to control for CAR. This ensures that differences in valuation are not simply an artefact of differences in financial resilience but instead capture the differential effect of technological and competitive adaptation.
While application of Basel III to regulation may vary from jurisdiction to jurisdiction, particularly those such as United Kingdom and Switzerland, financial strength is globally and universally accepted as being measured by Capital Adequacy Ratio (CAR).
The sample countries all follow the standard Basel III capital requirements by direct application or by national equivalents and hence guarantee that CAR is an identical and relevant control variable for all banks observed.

COUNTRY	BANKS NAME	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
United Kingdom	HSBC Holdings PLC	20,60	20,00	19,30	21,20	21,50	20,40	20,00	20,90	20,10	17,20
France	BNP Paribas SA	17,13	17,3	16,19	16,43	16,37	15,5	15	14,8	14,5	13,6
France	Crédit Agricole Group	17,39	17,22	17,46	17,74	19,19	17,5	17,8	18,3	20,1	20,3
Spain	Banco Santander SA	17,2	16,31	15,81	16,41	16,16	15,02	14,77	14,48	13,87	13,05
United Kingdom	Barclays PLC	19,5	19,9	20,4	21,6	21,2	20,4	19,8	20,7	18,5	18,6
France	Société Générale SA	18,92	18,22	19,17	18,69	18,92	18,9	16,5	17	17,9	16,3
Switzerland	UBS Group AG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	banca popolare di sondrio	18,04	17,5	17,86	18,77	18,44	18,61	13,52	13,66	13,55	13,44
Germany	Deutsche Bank AG	19,2	18,6	18,4	17,7	17,3	17,4	17,5	18,4	16,6	15,4
Spain	banco de sabadell SA	17,6	17,76	17,02	17,7	15,91	15	14,13	16,02	13,74	12,79
United Kingdom	Lloyds Banking Group PLC	19	19,8	19,7	22,6	21,3	18,3	20,5	18,5	18,4	18
Netherlands	ING Groep N.V.	18,94	19,75	19,4	21,01	20,09	19,09	18,44	19,14	19,68	17,45
Italy	Intesa Sanpaolo S.p.A.	19,7	19,2	19	18,9	19,2	17	16,5	17,9	17	16,6
United Kingdom	Natwest Group PLC	19,7	18,4	19,3	24,4	24,5	21,2	21,8	21,3	19,2	19,6
Italy	UniCredit S.p.A.	20,31	20,65	20,88	19,68	20,02	17,69	15,8	18,1	11,66	14,23
Spain	Banco Bilbao Vizcaya Argentaria (BBVA) S.A	16,9	16,58	15,94	16,98	15,92	15,42	15,5	15,3	14,71	14,4
United Kingdom	Standard Chartered PLC	21,5	21,2	21,7	21,2	21,2	21,1	21,4	20,1	20,4	17,9
Norway	DNB Bank ASA	23,8	22,5	21,8	24	22,1	24,4	20,9	20,6	20	17,9
Republic of Ireland	Allied Irish Banks PLC	19,8	20,4	21,3	21,9	20,8	20,5	19,1	19	17,6	15,5
Cyprus	Bank of Cyprus Holdings PLC	24,01	22,42	19,7	18,79	16,74	16,5	13,2	13,7	n.a.	n.a.
Spain	CaixaBank S.A.	16,64	17,1	17,34	17,9	18,1	15,7	15,3	15,7	15,4	14,64
Finland	Nordea Bank ABP	21	22,2	20,8	21,2	20,5	20,8	19,9	25,2	n.a.	n.a.
Poland	Bank Pekao SA	16,1	16,8	17,4	17,7	18,7	17,1	17,4	17,12	17,64	17,7
Germany	Commerzbank AG	20,9	19,34	18,92	18,4	17,7	16,4	15,9	17,5	15,3	14,7
Denmark	Danske Bank A/S	22,3	23,1	21,8	22,1	22,6	22,5	21,2	22,3	19,9	21
Austria	Bawag group	21,2	19,9	18,5	20,4	19,6	17	16,3	15,2	16,2	15,7
Netherlands	ABN AMRO Bank N.V.	20,2	18,7	20,9	22,4	23,7	25,9	27,3	26,6	n.a.	n.a.
Belgium	KBC Group NV	18,7	18,8	18,3	18,6	21,2	20,6	19,2	20,2	20,02	19
Austria	Erste Group Bank AG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	Credito Emiliano (credem)	18,7	17,5	17,7	16,9	17,7	17,2	16,1	15,55	14,44	13,93
Denmark	Jyske Bank AS	23,1	21	19,5	22,8	22,9	21,5	20	19,8	18,3	17
Austria	Raiffeisen bank international ag	21,5	21,4	20	17,6	18,4	17,88	18,16	17,84	18,9	16,8
Sweden	Svenska Handelsbanken AB	23,4	23,9	23,8	23,3	24,3	23,2	21	28,3	31,4	27,2
Poland	mBank SA	15,9	17	16,4	16,6	19,86	19,46	20,69	20,99	20,29	17,25
Italy	BPER Banca S.p.A.	20,77	18,06	15,65	16,16	19,3	14,94	14,93	16,47	14,6	12,5
Italy	Banco BPM S.p.A.	20,33	19	18,04	18,4	17,7	15,5	12,4	15,21	n.a.	n.a.
Italy	Banca Monte dei Paschi di Siena S.p.A.	20,57	21,6	19,5	14,56	13,5	14,7	12,8	14,97	10,4	15,95
Spain	Bankinter S.A.	16,27	16,09	15,27	15,39	15,02	13,94	14,29	14,32	12,59	12,73
Spain	Unicaja Banco S.A.	19,1	18,5	17,05	15,8	16,6	15,4	13,7	13,3	12,4	11,5
Slovenia	Nova Ljubjanska Banka (NLB)	18,7	20,3	19,2	17,8	16,6	16,3	16,7	15,9	17	16,2
Hungary	OTP Bank Nyrt	20,3	18,9	17,5	19,1	17,7	16,3	15,3	14,6	18,2	16,2
Sweden	Skandinaviska Enskilda Banken AB	22,5	22,4	22,5	23,1	25,1	23,3	22,2	24,2	24,8	23,8
Czech Republic	Komerční banka a.s.	18,77	18,78	19,45	21,31	22,34	19,72	18,48	18,63	16,18	16,34
Greece	Eurobank Ergasias Services and Holdings	19,5	19,4	18,4	15,3	14,6	17,1	14	15	14	13,4
Greece	National Bank of Greece S.A.	20,89	20,22	16,76	15,54	13,76	13,73	12,86	17	16,3	14,6
Greece	Piraeus Bank S.A.	19,9	18,2	16,5	13,51	13,43	12,88	10,66	15,12	16,9	17,4
Republic of Ireland	Bank of Ireland Group PLC	19,6	19	20,3	21,4	18	17,4	17,2	17,9	n.a.	n.a.
Italy	Banca Generali	24,4	18,97	16,6	17,4	18,45	16,1	19	21,02	18,7	16,7
Republic of Ireland	Permanent TSB Group Holdings PLC	20,4	19,7	21,3	19,5	18,2	16,3	13,5	16,1	16,3	16,6
Poland	PKO Bank Polski SA	18,58	18,65	19,07	18,23	18,18	19,88	18,88	17,37	15,81	14,61

Figure 16. Capital Adequacy Ratios (CAR) 2015-2024. Source: Orbis database (Bureau van Dijk, 2024).

4.1.4. Macroeconomic Controls

Macroeconomic conditions may be fundamental drivers of banking sector performance. Since banks operate in different national economic environments, failing to control for external shocks can produce biased estimates in the regressions or omitted variable bias, and thus distort the true impact of fintech competition and digital transformation.

In order to secure the robustness of analysis, two key macroeconomic variables widely cited in banking and finance literature are added to the framework: the real GDP stock (in EUR) and the central bank's policy interest rate.

- **Gross Domestic Product, constant prices (in EUR)**

Definition: This variable represents the real Gross Domestic Product (GDP) of each country expressed in constant national currency.
It measures the total value of goods and services produced by a country, adjusting for inflation to show changes in the actual volume of economic output, rather than simply changes in price. For international comparability at the country level, these figures are converted to euros by using end-year annual exchange rates.

Rationale for Inclusion: Real GDP provides insight into a country's economic size adjusting for the impact of inflation. A larger economy is likely to host a larger banking sector and wider financial flows with larger cross-border positions. This yields larger business prospects for banks. Including this variable controls for differences in national economic size that otherwise would lead to a distortion in the estimation of how fintech competition or regulatory pressure influence market valuation.

Using real GDP and not nominal GDP ensures that year-to-year fluctuations in price levels do not distort the analysis, and cross-country variations are based on actual producing capacity and not temporary inflation or currency-driven distortions.

Country	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Austria	372,75	380,65	389,30	398,97	405,97	380,32	398,56	419,59	415,58	410,71
Belgium	454,51	459,94	466,72	475,48	487,10	463,75	492,52	513,37	519,79	524,97
Cyprus	17,90	19,08	20,18	21,44	22,71	21,97	24,48	26,28	26,97	27,89
Czech Republic	196,37	198,15	203,48	208,87	208,68	202,49	208,92	218,06	223,16	213,25
Denmark	288,58	289,10	289,36	288,79	288,29	288,75	289,42	289,32	288,88	288,57
Finland	210,19	215,60	222,72	225,38	228,42	222,73	228,69	230,44	228,25	227,95
France	2347,03	2364,12	2418,16	2456,53	2507,52	2317,13	2475,33	2540,28	2568,62	2596,03
Germany	3352,52	3429,27	3522,32	3561,64	3597,00	3449,53	3576,14	3625,04	3615,47	3607,09
Greece	174,24	174,18	176,75	180,40	184,51	167,54	182,04	192,50	196,98	201,46
Hungary	147,63	146,95	148,01	143,51	140,69	130,29	127,65	116,96	119,85	115,77
Ireland	305,93	309,68	340,79	366,51	384,98	412,54	479,60	520,94	492,13	498,14
Italy	1759,42	1781,17	1809,73	1824,69	1832,53	1670,01	1819,16	1906,87	1920,51	1934,45
Netherlands	792,44	811,65	834,24	853,10	872,72	838,89	891,55	936,19	936,87	946,05
Norway	572,26	551,26	549,11	533,63	519,89	477,63	503,92	506,95	448,28	440,41
Poland	478,88	459,22	470,68	470,18	466,23	450,97	438,90	427,58	441,14	465,34
Slovenia	36,76	37,88	39,84	41,58	43,04	41,28	44,75	45,95	46,93	47,67
Spain	1146,86	1180,28	1214,44	1243,52	1267,91	1129,19	1204,67	1279,15	1313,33	1354,72
Sweden	579,64	572,57	562,70	528,51	512,00	517,10	534,34	510,05	472,32	474,23
Switzerland	625,27	612,48	600,62	578,10	600,24	623,73	617,62	664,58	687,08	700,93
United Kingdom	3161,43	2800,21	2617,55	2593,76	2614,27	2579,21	2669,53	2690,94	2638,25	2710,46

Figure 17. Gross Domestic Product (GDP), constant prices (EUR) 2015-2024. Source: International Monetary Fund (IMF), World Economic Outlook (WEO) Database, 2024.

- **Interest rates (%)**

Definition: This variable captures the monetary policy rate set by each country's central bank, as of December of each year. It is the short-term benchmark rate used to inform liquidity and credit conditions in the economy. Importantly, the specific instrument used as a reference varies across countries, and it is dependent on institutional frameworks.

These are the borrowing cost reference rates that affect banks' cost of borrowing directly, the reference rate utilized while pricing loans and deposit products, and overall borrowing and saving levels in the economy.

Rationale for Inclusion: Bank profitability is greatly influenced by interest rates, primarily through net interest margins (NIMs)[16].

In a low-interest rate environment, NIMs are squeezed and can substantially reduce bank profitability and therefore market valuation. Higher rates can boost margins temporarily but concurrently weakens credit demand and increases default risk.

European countries, from 2015 to 2021, saw historically low interest rates, and negative rates by the European Central Bank (ECB) lasted for close to a decade. Yet, in response to the inflation shock due to the post-COVID-19 pandemic and 2022 energy shock, European central

[16] the spread between the interest income generated from lending and the interest paid on deposits or wholesale funding

banks led by Bank of England (BoE), Hungarian National Bank, and others proceeded with aggressive tightening phases.

	ECB Rate (%),	BoE Rate (%)	Hungary	Poland	Sweden	Denmark	Norway	Switzerland	Czech Republic
2024	3,00%	4,75%	6,50%	5,75%	2,50%	2,60%	4,50%	0,50%	4,00%
2023	4,00%	5,25%	10,75%	5,75%	4,00%	3,60%	4,50%	1,75%	6,75%
2022	2,00%	3,50%	13,00%	6,75%	2,50%	1,75%	2,75%	1,00%	7,00%
2021	0,50%	0,25%	2,40%	1,75%	0,00%	-0,60%	0,50%	-0,75%	3,75%
2020	0,50%	0,10%	0,60%	0,10%	0,00%	0,00%	0,00%	-0,75%	0,25%
2019	-0,50%	0,75%	0,90%	1,50%	-0,25%	0,00%	1,50%	-0,75%	2,00%
2018	-0,40%	0,75%	0,90%	1,50%	-0,25%	0,00%	0,75%	-0,75%	1,75%
2017	-0,40%	0,50%	0,90%	1,50%	-0,50%	0,00%	0,50%	-0,75%	0,50%
2016	-0,40%	0,25%	0,90%	1,50%	-0,50%	0,00%	0,50%	-0,75%	0,05%
2015	-0,20%	0,50%	1,35%	1,50%	-0,35%	0,00%	0,75%	-0,75%	0,05%

Figure 18. Central bank interest rates (as of December each year, 2015-2024). Source: European Central Bank (ECB) and respective national central banks.

4.2. Econometric Specification

The empirical analysis employs a multivariate panel regression model designed to assess how fintech competition, regulatory strength, and macroeconomic context affect the market valuation of incumbent banks. The general form of the model is expressed as:

Market Valuation it = $\alpha + \beta 1$ Fintech Competition it$+ \beta 2$ Regulation it $+ \beta 3$ Macroeconomic Factors it $+ \epsilon$ it

Under this specification, the Market Valuation is the endogenous variable and is measured through two distinct indicators, that is, the market capitalization and the P/E ratio.
These two-valuation measures are two complements, not substitutes: while market capitalization captures the absolute value that the market puts on a bank, the P/E ratio captures the relative price that investors will pay per unit of current earnings.

In the regression specification, α denotes the intercept term, which represents the baseline level of bank valuation when the explanatory variables take a value of zero, it is a reference point that does not carry strategic meaning as no bank operates in a world with zero fintechs and zero GDP.

The independent variables are grouped into three broad conceptual categories. The first includes measures of fintech competition, operationalized through (i) the total number of fintech firms

active each year and (ii) the annual number of newly founded fintech startups. These variables both reflect the intensity and the frequency of market entrance in the field of fintech and are introduced in order to capture external pressure due to competition. The second is regulatory constraints and is captured using the Capital Adequacy Ratio (CAR), and it measures prudential soundness and Basel III requirement observance of a bank's balance sheet. The third is comprised of the macroeconomic controls, namely real GDP and central bank policy interest rate, added to account for variation due to broader economic conditions prevailing for all banks in a nation.

It is important to note that the empirical model does not include a direct proxy for internal digitalization efforts, such as digital investment intensity or the share of digitally active customers. While digital transformation is a key conceptual pillar of the thesis, lack of the latter is an indication of the limit of data availability and the lack of any common measure in the whole panel of banks. Nonetheless, the model indirectly captures the impact of digital readiness through market-based valuation indicators, that are motivated by investors' expectations of strategic innovation as well as the competitive positioning in the context of technological transformation.

Both fixed effects and random effects approaches are used to estimate the model, as discussed in the previous section, in order to examine how valuation outcomes vary both within banks and across banks over time. This dual estimation strategy allows the analysis to differentiate between temporal dynamics (such as changing exposure to fintech pressure) and cross-sectional heterogeneity driven by persistent institutional traits. The estimates from both models are presented in the final chapter and their theoretical and strategic implications are investigated.

Results and Discussion

The following section describes empirical findings considering the panel data analysis conducted during 2015-2024 using 48 European banks as samples. The objective is to determine whether and to what degree fintech competition, capital adequacy, and economic environment do influence traditional bank performance through market capitalization and price-to-earnings ratio. Two types of panel models are used for each dependent variable: Random Effects models, which reflect both cross-sectional and temporal variation, and Fixed Effects models, which control for unobserved bank-specific characteristics.

Although there are 50 banks listed initially, 48 remain in the end sample dataset. Two banks are eliminated since there are missing observations for some crucial variables (i.e., market capitalization, P/E ratio, or capital adequacy) for a certain number of years. Their exclusion was necessary in order to maintain the integrity and consistency of the panel data structure as well as the robustness of the econometric estimation.

The chapter is divided into two main sections. The first considers market capitalization as a bank total market valuation proxy. The second considers the P/E ratio as a relative indicator of valuation considering estimates by investors of future profitability and future growth.
In both cases, a logarithmic transformation is applied to normalize the distribution and interpret the estimated relationships in relative, rather than absolute, terms.

For each outcome, results are interpreted and linked to key theoretical and strategic implications. Subsequently, both Fixed and Random Effects models are estimated in parallel, which allows the analysis to capture different forms of variation across banks and over time and to assess the consistency of the results across specifications. The chapter then conducts a robustness analysis in order to assess the consistency of the results, prior to concluding with the comparison of the two dimensions of valuation and the presentation of what they reveal concerning the adaptive ability of incumbent banks in the context of fintech disruption.

4.3. Results - Market Capitalization

The first econometric analysis investigates whether competition in fintech, supervisory rigor and macroeconomic factors have an impact on the market valuation of conventional banks measured through the natural logarithm of market capitalization. Two panel data models are estimated: a Random Effects model that accounts for both bank- and country-level heterogeneity, and a Fixed Effects model that controls for unobserved time-invariant characteristics at the bank level.

First, it is important to clarify the rationale behind the use of the logarithm of market capitalization as the dependent variable. Market capitalization data are typically highly skewed, especially in financial datasets that include institutions of vastly different sizes. The sample of banks includes large multinational universal banks and smaller region-based banks and thus has a right-skewed distribution with outliers.

Applying the natural logarithm to market capitalization helps to normalize the distribution and thus improving statistical properties for the regression model. Specifically, it reduces the influence of extreme values (outliers), mitigates heteroskedasticity, and allows for more reliable coefficient estimates.

Preceding the reporting of regression outcomes, hypotheses tested in the market capitalization model are defined as follows:

- ***H₀***: Fintech competition, regulatory strength, and macroeconomic conditions have no statistically significant effect on the market capitalization of traditional banks.

- ***H₁***: Fintech competition, regulatory strength, and macroeconomic conditions have a statistically significant effect on the market capitalization of traditional banks.

4.3.1. Random Effects Model - Market Capitalization

The Random Effects model provides robust evidence on how fintech competition, regulatory resilience, and macroeconomic metrics influence the market valuation of traditional banks By adding random intercepts at bank and at-country levels, respectively, the model accounts for unobserved heterogeneity at institutions and at-country levels that would otherwise bias coefficient estimates.

```
Formula: log_mc ~ NUMBER_OF_FINTECH + NEW_FINTECH + ANNO + CAPITAL_RATIO +      GDP_STOCK + INTEREST_RATES + (1 | BANCA) + (1 | NAZIONE)
   Data: database_stock

REML criterion at convergence: 486.5

Scaled residuals:
    Min      1Q  Median      3Q     Max
-9.7992 -0.5013  0.0603  0.5388  4.2111

Random effects:
 Groups   Name        Variance Std.Dev.
 BANCA    (Intercept) 1.05313  1.0262
 NAZIONE  (Intercept) 0.19083  0.4368
 Residual             0.09807  0.3132
Number of obs: 404, groups:  BANCA, 48; NAZIONE, 19

Fixed effects:
                    Estimate Std. Error t value
(Intercept)       -5.482e+02  1.137e+02  -4.821
NUMBER_OF_FINTECH -4.281e-04  7.105e-05  -6.025
NEW_FINTECH        9.463e-05  1.866e-04   0.507
ANNO               2.766e-01  5.653e-02   4.893
CAPITAL_RATIO      6.124e-02  1.027e-02   5.964
GDP_STOCK          5.248e-04  1.466e-04   3.581
INTEREST_RATES     2.449e-01  2.830e+00   0.087

Correlation of Fixed Effects:
            (Intr) NUMBER NEW_FI ANNO   CAPITA GDP_ST
NUMBER_OF_F  0.979
NEW_FINTECH -0.667 -0.675
ANNO        -1.000 -0.979  0.666
CAPITAL_RAT  0.110  0.049 -0.049 -0.111
GDP_STOCK    0.022  0.021  0.079 -0.024  0.000
INTEREST_RA  0.159  0.056  0.513 -0.160  0.033  0.024
```

Figure 19. Output of Random Effects Model for Market Capitalization

The variance components indicate cross-sectional differences: the standard deviation of the random intercept for banks (BANCA) is 1.026, while for countries (NAZIONE) it is 0.437. These figures suggest that bank-level characteristics such as organizational size, governance structures or technological readiness, or more general country conditions such as supervisory regime, financial market development, or investor composition explain significantly organizational differences in market capitalization beyond the apparent covariates.
The residual standard deviation is lower (0.313), which again supports the idea that much of the variance is due to variation across banks and countries but not within banks over time.

In terms of model fit, the Random Effects specification achieves an overall R^2 of 0.287 and an adjusted R^2 of 0.278. These moderate statistics indicate that roughly one-third of the dispersion of market capitalization at banks-country level is consistently explained by fintech competition, capital adequacy and macro fundamentals. This level of explanatory power is consistent with what is typical in panel data setting, whereby macro shocks and unobservable heterogeneity can account for much of the dispersion.

Among fixed effects, it is observed that number of fintech firms is a very significant predictor variable with negative coefficient ($\beta = –0.000428$, $t = –6.025$). This provides evidence to justify the argument that fintech saturation is pressuring incumbent banks' market capitalization. In line with disruptive innovation theory, a denser fintech ecosystem is perceived by investors as a threat to incumbents' long-term competitive position, given fintechs' superior technological agility and scalable platforms.

By contrast, the number of new fintech entries per year is not statistically significant ($\beta = 0.000095$, $t = 0.507$), indicating a lack of responsiveness by investors to short-term fluctuations in fintech entry rates. Instead, cumulative presence and embeddedness by fintech firms appear to characterize investor views with respect to erosion of financial banking institutions.

The time trend (ANNO) is significant and positive ($\beta = 0.2766$, $t = 4.893$), and it suggests a general improvement or upward adjustment in valuations over the observed ten-year period.
This finding suggests that, beyond those direct effects of fintech competition and capital adequacy and those from macroeconomic variables, there has been a structural improvement in the sector's perceived value. This upward adjustment is more than likely linked with balance sheet rebuilds and cost reorganizations in the post-financial crisis phase, enforcement of more

stringent regulations such as Basel III, and recovery of profitability. In addition, rising shareholder returns in the form of dividends and buybacks, together with gradual progress in digital transformation, have reinforced the perception of long-term value creation among incumbent banks.

The Capital Adequacy Ratio (CAR) shows a strong and positive relationship with market capitalization ($\beta = 0.0612$, $t = 5.964$), confirming that capital strength is consistently rewarded by markets. The current environment of strengthened regulative attention and financial ambiguity sees better-capitalized banks as more solid and consequently more valuable. This result aligns with Basel III principles, emphasizing the role of prudential buffers in building investor confidence.

Moreover, the GDP stock variable is significant and positive ($\beta = 0.000525$, $t = 3.581$), indicating banks from large economies are worth more. Healthier national economies generally present a deeper pool of investment opportunities, more liquid capital markets and a less risky macroeconomic environment, all reducing perceived risk and raising earnings opportunities.

The interest rate variable does not yield a statistically significant effect on market capitalization ($\beta = 0.2449$, $t = 0.087$). The finding is consistent with the broader evidence in the banking and finance literature, that the association among interest rates and banks' valuations is volatile and variable. Theoretically, increases in policy rates can improve banks' net interest margins, since loans typically reprice faster than deposits, consequently supporting profits and in the short run valuations of the market.
However, the effect is subject to long and variable delays: sharp rate hikes can depress credit demand prospects and increase default risk, while prolonged low-rate periods reduce margins but may stimulate lending volumes. Moreover, banks differ widely in their balance-sheet structures: those with variable-rate portfolios may benefit from higher rates, whereas institutions more exposed to fixed-rate assets can experience valuation losses.
At the aggregate level, these offsetting mechanisms help explain why interest rates do not emerge as a robust determinant of market capitalization in the model.

Overall, it is verified by the Random Effects framework that internal regulation ability and competitive pressures conclusively dictate how financial markets capitalize traditional banks. Statistical significance for dynamic variables such as fintech density and the Capital Adequacy

Ratio (CAR) suggests the importance of considering cross-sectional bank heterogeneities and temporal bank variations. These findings indicate that in the scenario of a digitized and fragmented financial system, market capitalization is determined both through the firm-specific financials (ROE, EBITDA, profit, costs…) as well as through the extent of how well the adaptation to new competitive and regulatory conditions in the environment is handled.

4.3.2. Fixed Effects Model - Market Capitalization

The Fixed Effects specification offers a more restrictive analytical lens. It does so by eliminating all time-invariant heterogeneity across banks, thus focusing exclusively on how changes in explanatory variables over time within the same institution, influence market capitalization. This model structure assumes that each bank has a unique baseline level of valuation determined by unobserved but persistent traits (such as ownership structure, client base composition, corporate culture, governance practices or historical brand equity) and removes these effects from the estimation process. In doing so, it isolates the impact of within-bank variation and discards the between-bank information that may otherwise drive statistically significant results.

```
plm(formula = log_mc ~ NUMBER_OF_FINTECH + NEW_FINTECH + ANNO +
    CAPITAL_RATIO + GDP_STOCK + INTEREST_RATES, data = pdata,
    model = "within")

Unbalanced Panel: n = 48, T = 3-10, N = 404

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-2.9481318 -0.1356062  0.0054073  0.1522679  1.3811041

Coefficients: (2 dropped because of singularities)
                    Estimate  Std. Error t-value  Pr(>|t|)
NUMBER_OF_FINTECH -8.7262e-05  1.3846e-04 -0.6302    0.5290
NEW_FINTECH       -1.2330e-03  8.7021e-04 -1.4169    0.1574
ANNO2016           9.9309e-02  2.4790e-01  0.4006    0.6890
ANNO2017           5.3277e-01  5.0707e-01  1.0507    0.2941
ANNO2018           3.1033e-01  6.6849e-01  0.4642    0.6428
ANNO2019           2.0782e-01  6.1327e-01  0.3389    0.7349
ANNO2020          -3.3012e-02  6.2144e-01 -0.0531    0.9577
ANNO2021           2.6679e-01  6.8067e-01  0.3920    0.6953
ANNO2022          -5.0370e-02  2.9569e-01 -0.1703    0.8648
CAPITAL_RATIO      6.1798e-02  1.0205e-02  6.0554 3.669e-09 ***
GDP_STOCK          2.2218e-04  2.4928e-04  0.8913    0.3734
INTEREST_RATES    -1.5684e+00  1.0397e+01 -0.1509    0.8802
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    50.515
Residual Sum of Squares: 31.105
R-Squared:      0.38425
Adj. R-Squared: 0.27864
F-statistic: 17.8892 on 12 and 344 DF, p-value: < 2.22e-16
```

Figure 20. Output of Fixed Effects Model for Market Capitalization

Within this framework, the fintech variables lose statistical significance. The coefficient for the number of fintech firms becomes close to zero (β = –0.000087, p = 0.529), while the number of new fintech entrants also turns insignificant (β = –0.00123, p = 0.157), suggesting that

temporal fluctuations in fintech intensity within the same country-bank pairing do not meaningfully alter how investors value traditional banks.
In other words, if in a given year more fintechs are born in Italy or France, this does not impact the valuation of Intesa San Paolo or BNP Paribas.
This stands in contrast to the findings from the Random Effects model and reveals that fintech-related market devaluation is likely driven by structural differences between banks, particularly the jurisdiction in which they operate or their degree of strategic exposure to fintech competition, rather than by changes within a given institution.

Year dummies for the 2016-2022 period are included. The intuition is not to test any year versus a base year, but to control for universal shocks such as macroeconomic disturbances or system crises potentially hitting all banks equally irrespective of their bank-specific characteristicshe lack of statistical significance for these year dummies means there is no universal valuation shock at work affecting all observations during this period once bank-specific impacts are controlled for.

Despite the lack of significance among fintech and macroeconomic variables, however, the Capital Adequacy Ratio (CAR) remains a significant predictor of market capitalization with a positive and extremely significant coefficient ($\beta = 0.0618$, $p < 0.001$). This result confirms that despite controlling all bank-specific fixed characteristics, improvements in regulatory capital over time within a bank are associated with valuation gains. The consistency of this finding with respect to both Fixed and Random Effects models further support its significance in investors' consideration as a financial strength and institutional credibility indicator.

While for the macroeconomic variables. Both GDP stock ($\beta = 0.00022$, $p = 0.373$) and interest rates ($\beta = -1.568$, $p = 0.880$) fail to reach statistical significance, suggesting short-run variations in national output or monetary policy fail to significantly influence how investors adjust the same bank's value over time. This further supports that, once unobserved bank-specific characteristics are controlled for, temporal variation in macroeconomic conditions is not an important determinant of valuations behaviour within banks.

In terms of explanatory power, the Fixed Effects specification achieves a within R^2 of 0.384 and an adjusted R^2 of 0.279. These indicate there is a considerable percentage of within-bank variation in market capitalization over time explained by the model. While the R^2 is moderate,

this is consistent with the stringent structure of Fixed Effects, which excludes all cross-sectional differences and isolates only temporal dynamics within institutions. Compared to the Random Effects model (overall $R^2 = 0.287$), the higher within-bank explanatory power suggests that although fintech and macroeconomic variables lose significance when heterogeneity is removed, capital adequacy alone is sufficient to explain a substantial portion of valuation changes inside banks.

These findings can therefore imply that while fintech competition is a genuine menace to incumbent banks, its implications for valuation are to a very significant degree reflected by the institutional and competitive environment and are less subject to change over short periods of time. Conversely, capital adequacy is a strategic vehicle banks are able to manage and improve over time with certain and quantifiable rewards in terms of confidence by the market. In the digital transformation era, investor sentiment appears to base itself increasingly on risk management and resilient capital rather than future growth prospects

4.3.3. Implications - Market Capitalization

The predicted outcomes for the market capitalization models have several key strategic and theoretical implications. In terms of model fit, the Fixed Effects specification achieves a within R^2 of 0.384 (adjusted 0.279), while the Random Effects model yields an overall R^2 of 0.287 (adjusted 0.278). These are statistics reflecting the finding that close to one-third of market capitalization variance is captured by fintech competition, regulatory resilience, and macroeconomic fundamentals.

In particular, the negative and statistically significant relationship between bank market capitalization and the number of fintech companies (as observed in the Random Effects model) provides empirical support to the disruptive innovation hypothesis. This result implies that the presence of many fintech companies in the financial system is perceived by investors as posing a threat to displace the traditional banking business model. Fintechs have the potential to challenge the competitive advantage of established banks through higher digital capabilities, lower expense bases, and a higher rate of innovation and hence weaken incumbent banks' market power. As a consequence, banks operating in fintech-saturated environments are systematically assigned lower valuations by the market.

However, this relationship loses statistical significance in the Fixed Effects model, indicating that the effect of fintech presence is not necessarily being driven by time-varying changes within individual banks, but by cross-sectional structural variations at the institutional and country levels. This would imply that valuation consequences are less related to whether and how a bank's exposure to fintech progresses with time and more to its location and its competitive and institutional environment.

The Capital Adequacy Ratio (CAR) is a consistently positive and significant predictor of market capitalization by either specification. This supports financial strength's central position to investor confidence. n particular, the market views a high CAR as evidence of prudent risk management by conformity with universal supervisory standards such as Basel III. At a strategic level, it further implies that capital adequacy is neither solely a regulatory constraint, but by its connection with risk management and risk-taking ability, can itself constitute a source of competitiveness to investors during periods of highest uncertainty. Banks that actively reinforce their capital positions may thus benefit from valuation premiums, even when operating in fintech-intense markets.

Another relevant implication concerns interaction among institutional response and fintech disruption. he presence of fintech variables only in the RE model suggests that market capitalization is less reactive to internal refinements and more reactive to external structural pressures. This is potentially a signal that banks' digitalization efforts are perceived by the market as less effective to neutralize fintech competition effects. Consequently, banks historically might need to complement digital strategies with explicit innovation capacity signalling and strategic partnerships to reinvent investor narratives and counteract devaluation threats.

Briefly, analysis of market capitalization reveals that fintech activity has measurable consequences for how well-established banks are worth, but these are conditional consequences. The broader implication is that digital competition and financial solidity are not opposing forces, but two interrelated elements of banks’ adaptive capacity. Institutions that succeed in combining credible innovation with regulatory strength are more likely to preserve or improve their valuation in a disrupted financial landscape.

The regression findings provide enough evidence to reject the null hypothesis. Specifically, fintech competition, capital adequacy, and GDP emerge as significant determinants of bank market capitalization, although the strength of these effects depends on the model specification (Random vs. Fixed Effects). Hence, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is supported.

4.4. Results - P/E Ratio

The second element of empirical analysis investigates whether fintech competition, regulatory capital strength, and macroeconomic trends are influencing price-to-earnings ratio of traditional banks. Like market capitalization, the P/E ratio is normalized through natural logarithm to correct for skewness and to allow for elasticity-based interpretation. The P/E ratio is a widely used metric that reflects investor expectations about a firm's future profitability and growth opportunities, therefore is a desirable complement for market capitalization in capturing various aspects of valuation. The analysis includes both a Random Effects model and a Fixed Effects model, applied to a panel of 48 banks over a ten-year period.

Before presenting the regression outcomes, the hypotheses tested for the market capitalization model are defined as follows:

- $\boldsymbol{H_0}$: Fintech competition, regulatory strength, and macroeconomic conditions have no statistically significant effect on the P/E ratio of traditional banks.

- $\boldsymbol{H_1}$: Fintech competition, regulatory strength, and macroeconomic conditions have a statistically significant effect on the P/E ratio of traditional banks.

4.4.1. Random Effects Model - P/E Ratio

The Random Effects specification estimated via panel regression investigates the determinants of banks' relative market valuation, operationalized through the natural logarithm of the price-to-earnings (P/E) ratio. Such modelling approach corrects for unobserved heterogeneity both at bank and country level via random intercepts for banks and for countries. In doing so, it captures structural variance attributable to time-invariant factors such as reputation, investor composition, corporate culture, or the legal system in which they operate, which may otherwise confound the relationship between observed variables and valuation outcomes.

```
Formula: log_pe ~ NUMBER_OF_FINTECH + NEW_FINTECH + ANNO + CAPITAL_RATIO +      GDP_STOCK + INTEREST_RATES + (1 | BANCA) + (1 | NAZIONE)
   Data: database_stock

REML criterion at convergence: 814.1

Scaled residuals:
    Min      1Q  Median      3Q     Max
-5.5936 -0.3919 -0.0736  0.2924  6.9513

Random effects:
 Groups   Name        Variance Std.Dev.
 BANCA    (Intercept) 0.04926  0.2219
 NAZIONE  (Intercept) 0.05022  0.2241
 Residual             0.33695  0.5805
Number of obs: 404, groups:  BANCA, 48; NAZIONE, 19

Fixed effects:
                    Estimate Std. Error t value
(Intercept)        1.396e+02  2.100e+02   0.665
NUMBER_OF_FINTECH -3.454e-05  1.314e-04  -0.263
NEW_FINTECH        1.847e-04  3.433e-04   0.538
ANNO              -6.786e-02  1.044e-01  -0.650
CAPITAL_RATIO     -1.187e-02  1.610e-02  -0.738
GDP_STOCK          1.664e-05  6.816e-05   0.244
INTEREST_RATES    -9.244e-01  5.167e+00  -0.179

Correlation of Fixed Effects:
            (Intr) NUMBER NEW_FI ANNO   CAPITA GDP_ST
NUMBER_OF_F  0.980
NEW_FINTECH -0.676 -0.682
ANNO        -1.000 -0.980  0.675
CAPITAL_RAT  0.096  0.044 -0.047 -0.097
GDP_STOCK    0.006  0.007  0.001 -0.006  0.084
INTEREST_RA  0.153  0.053  0.511 -0.154  0.021 -0.023
```

Figure 21. Output of Random Effects Model for P/E Ratio

Decomposition of variance reveals that between-bank (σ = 0.222) and between-country (σ = 0.224) heterogeneity moderately explain total variation and residual standard deviation is yet relatively high (σ = 0.581). This implies a large portion of P/E ratio variance is captured by within-entity dynamics or unobserved time-varying factors outside the scope of the model. Relative to the market capitalization consideration for which structural heterogeneity was a relatively more significant contributor factor, we observe that the P/E ratio is a more idiosyncratic and volatile measure likely to capture its responsiveness to future-looking expectations, earnings quality, and temporal fluctuation in market sentiment.

None of these models' explanatory variables are statistically significant. The coefficient associated with number of fintech firms (β= –0.000035,t= –0.263) is not significant and statistically equal to zero and aggregate presence by fintech competitors is accordingly not found to systemically affect incumbent banks' relative pricing of earnings. Similarly, new entries by fintech players (β = 0.000185, t = 0.538) fail to achieve significance and hence do not suggest that annual change in market entry makes any significant contribution to investors' perceptions about incumbent banks' earnings multiples. This is contradictory to findings for the market cap model, where fintech saturation significantly predicted reduced firm valuation at a statistical level. The suggestion is that whereas competition by fintech over the long term can reduce franchise value, it may not necessarily alter prices based on earnings over the short to medium term.

The time trend captured by the year variable (ANNO) is also not significant (β = –0.0679, t = –0.650), implying the absence of a consistent directional shift in P/E ratios across the observation period. This result may be interpreted as evidence of offsetting influences, such as increased digital adaptation by incumbents, ongoing margin compression, evolving regulatory expectations, and shifting investor outlooks, all of which may collectively neutralize time-specific valuation effects.

Interestingly, the Capital Adequacy Ratio (CAR) which was a consistently significant variable in the models of absolute market value, fails to turn out to be a statistically significant predictor of the P/E ratio (β = –0.0119, t = –0.738). This suggests that while higher capital buffers make investors more confident about a bank's stability, they may have little influence upon how relative earnings are priced by the market. In the P/E ratio case, for instance, investors can become concerned with signals for growth prospects or prospects for profitability and these are not reflected by measures of capital.

Macroeconomic variables, such as real GDP (β = 0.000017, t = 0.244) and interest rates (β = –0.924, t = –0.179), also fail to demonstrate statistical significance. The result highlights the negligible contribution of national-level circumstances in determining bank-level relative valuation measures when structural heterogeneity is controlled for. This aligns with prior literature emphasizing the often behavioural dimension of relative pricing mechanisms such as the P/E ratio.

In terms of model fit, the Random Effects specification yields an overall R^2 of 0.218 (adjusted 0.209). This relatively poor explanatory power supports the finding that very few percent of dispersion in earnings-based multiples is captured by fintech intensity, regulatory capital, or economic fundamentals. It is consistent with the very forward-looking and sentiment-driven nature of P/E multiples, which are less explainable with structural indicators compared to absolute measures like market capitalization.

Overall, these findings show the failure of typical structural and regulatory controls to explain relative valuation results. The failure to find significant effects for all regressors implies that P/E measures are driven by less visible and variable elements like investor expectations on future growth potential, industry conditions, qualitative signals from strategic communication

or market positioning. These intangibles, while difficult to quantify, might take centre stage when it comes to framing how the market perceives the future income prospects of incumbents.

From a strategic viewpoint, the research suggests that banks with hopes to sustain or enhance relative valuation multiples can neither rely exclusively upon strength of capital nor upon macro-financial conditions. They must instead focus upon developing a credible long-term strategy, demonstrating visible progress in digital transformation, and engaging in investor communications that signal agility and sustainable profitability. As the world transition towards an increasingly competitive and disintermediated financial landscape, narrative construction and signalling mechanisms can potentially contribute as much to shaping relative valuation outcomes as can balance-sheet fundamentals.

4.4.2. Fixed Effects Model – P/E Ratio

The Fixed Effects model provides tighter estimation framework by isolating within-bank variation in the logarithm of the price-to-earnings (P/E) ratio over time, while eliminating all time-invariant unobserved heterogeneity across institutions. Such specification takes into consideration long-lasting structural features that would otherwise impact the relationship between explanatory variables and valuation indicators. With a sole focus on intra-institutional interactions, the model permits added precision in ascertaining whether over-time changes in fintech exposure, regulatory strength, and macro fundamentals are represented in relative valuation changes across markets. The estimation is based on 404 observations from 48 banks, and it achieves a within R^2 of 0.324 and an adjusted R^2 of 0.208, indicating modest explanatory power. The F-statistic ($p < 0.001$) confirms overall model significance.

```
plm(formula = log_pe ~ NUMBER_OF_FINTECH + NEW_FINTECH + ANNO +
    CAPITAL_RATIO + GDP_STOCK + INTEREST_RATES, data = pdata,
    model = "within")

Unbalanced Panel: n = 48, T = 3-10, N = 404

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-2.784588 -0.216070 -0.013121  0.174089  3.717600

Coefficients: (2 dropped because of singularities)
                    Estimate  Std. Error t-value Pr(>|t|)
NUMBER_OF_FINTECH -0.00024639  0.00025399 -0.9701  0.33268
NEW_FINTECH       -0.00060683  0.00159634 -0.3801  0.70408
ANNO2016           0.06539050  0.45475747  0.1438  0.88575
ANNO2017           0.35726165  0.93018378  0.3841  0.70116
ANNO2018           0.52588149  1.22631067  0.4288  0.66831
ANNO2019           0.40935464  1.12499961  0.3639  0.71618
ANNO2020           1.15107352  1.13998707  1.0097  0.31334
ANNO2021           0.48062696  1.24865416  0.3849  0.70054
ANNO2022           0.19585192  0.54241874  0.3611  0.71827
CAPITAL_RATIO     -0.03932294  0.01872121 -2.1004  0.03642 *
GDP_STOCK          0.00043494  0.00045728  0.9511  0.34220
INTEREST_RATES     4.28480917 19.07187486  0.2247  0.82237
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    154.87
Residual Sum of Squares: 104.67
R-Squared:      0.32415
Adj. R-Squared: 0.20823
F-statistic: 13.749 on 12 and 344 DF, p-value: < 2.22e-16
```

Figure 22. Output of Fixed Effects Model for P/E Ratio

The estimated coefficients reveal that most variables fail to exhibit statistical significance. Neither the number of active fintech firms (β = –0.000246, p = 0.333) nor the number of newly established fintech entities (β = –0.000607, p = 0.704) is associated with significant variation in the P/E ratio. This suggests that changes in fintech competition over time within the same jurisdiction do not materially influence how the market prices incumbent banks' earnings. In contrast to the findings for market capitalization, where fintech density had a pronounced impact, these results reinforce the notion that P/E ratios are less sensitive to external structural competition and more reflective of forward-looking and institution-specific expectations.

The time dummies for the years between 2016 up until 2022 are also statistically insignificant, indicating that there is no particular year for the sample duration that is associated with a systemic alteration in P/E valuation relative to the base year It may be due to the counter-balancing effect of regulatory adaptation, digital investment cycles, shifts in monetary policy, and sectoral normalization following the post-crisis reform phase. The lack of time significance reinforces the argument that relative valuation patterns are not driven by common macro patterns, but rather firm-level signals.

Among the considered regressors, the Capital Adequacy Ratio (CAR) is the only variable that that meets conventional statistical significance levels (β = –0.0393, p = 0.036). The coefficient is, nonetheless, negative, opposite to the universal positive connection observed in the market capitalization estimations. This negative correlation suggests that, with time-invariant bank

fundamentals, higher regulatory capital is associated with lower P/E multiples. An explanation could be that higher capital buffers are perceived as signalling lower risk appetite or regulatory constraint on distributable profits and thus tightening valuation multiples against earnings.
It emphasizes the differential investor perception of capital strength in relative and absolute terms: whereas robust capitalization is positively reinforced in total firm value, it may simultaneously imply restricted upside potential in earnings growth.

The macroeconomic control variables are not statistically significant. GDP stock exhibits a positive but non-significant effect ($\beta = 0.000435$, $p = 0.342$), while interest rates, despite a large point estimate ($\beta = 4.285$), show no statistical reliability ($p = 0.822$). That reinforces the case that the P/E multiple, as inherently forward-looking as much as sentiment-sensitive, is not significantly motivated by macro-financial factors. Instead, it appears far more susceptible to intangible factors such as growth potential, narrative drivers of investors, and perceived ability to innovate; all of which are not directly quantifiable in quantitative equations.

Overall, the Fixed Effects specification estimates suggest that relative market valuation drivers in the banking sector are significantly different from absolute firm value drivers. Whereas fintech penetration and capital strength significantly contribute to total market value, their explanatory value is significantly reduced as valuation is evaluated relative to earnings. The significant and negative effect of CAR also highlights the centrality of context in interpreting prudential indicators: what signals strength in one paradigm may signal constraint in another. Strategically, what these conclusions mean is that relative valuation multiples must go beyond regulatory for banks. They must actively drive investors' expectations through credible growth narratives and physical changes in digitisation transformation initiatives that convey profitability and long-term strategic intent.

4.4.3. Implications – P/E Ratio

The explanatory power of the P/E models remains lower than in the market capitalization analysis. The Fixed Effects specification achieves a within R^2 of 0.324 and an adjusted R^2 of 0.208, while the Random Effects specification yields an overall R^2 of 0.218 (adjusted 0.209). Such values indicate only a moderate amount of earnings multiples variation is explainable in terms of fintech penetration, capital adequacy, or macro fundamentals. The evidence reinforces the notion that P/E multiples are less forecastable through structural drivers than are absolute

valuation indicators, consistent with their relatively greater sensitivity to transitory patterns of earnings and future-oriented market sentiment.

Even if the regression of the logarithm of P/E ratio produces less statistically significant outcomes, it is rich in informative conclusions about investors' perception of the profitability prospect of traditional banks in the light of disruption caused by fintech. The most prominent observation is the non-significance of fintech variables, both in Random and Fixed Effects specifications, in explaining banks' price-to-earnings variation. This absence of statistical association can itself be considered a meaningful outcome: it suggests that the presence or emergence of fintech competitors does not uniformly alter investors' expectations about banks' future earnings per share.

Another possible way to see this result is that the P/E ratio, relative to market cap, is less responsive to structural change in the market and more driven by firm-specific fundamentals. Investor perceptions of future profitability may depend more heavily on internal elements, such as cost efficiency, revenue prospects, return on equity, or digital capabilities, rather than on the level of fintech competition in a given country or year. That is, as fintech activity may generate valuation concerns or doubts about strategic fit (as seen in market cap), it doesn't automatically lead investors to adjust downward their own estimates about the future earnings possibilities of a bank.

The only variable that consistently shows a statistically significant effect in the Fixed Effects model is the Capital Adequacy Ratio, which exhibits a negative relationship with the P/E ratio ($\beta = -0.0393$, $p < 0.05$). This result points to a classic trade-off in banking: while high capital ratios increase solvency and therefore reduce risk, they can also reduce leverage, constrain growth, and ultimately dampen earnings per share. Investors may therefore view overcapitalised banks as less able to create strong profit growth, particularly in a low-interest-rate environment. This indicates that earnings performance and regulatory compliance are not necessarily concurrent in valuation models of investors, and banks need to balance these in a strategic manner.

The limited explanatory power of the models reinforces the idea that the P/E ratio is driven largely by idiosyncratic and unobserved factors. These could include intangible elements such as managerial quality, digital execution ability, brand perception, or the success of specific

product lines, variables that are difficult to quantify but influential in shaping expectations about future profitability. This interpretation is supported by the fact that even macroeconomic indicators like GDP size and interest rates do not exhibit a meaningful impact on P/E ratios in either model.

Strategically, this implies that banks cannot rely solely on external signals, such as capital buffers or fintech partnerships, to influence how their earnings prospects are perceived. Instead, they must demonstrate internal performance discipline and narrative clarity regarding how they intend to sustain profitability in a digital and regulated environment. The insignificant impact of fintech variables also suggests that disruption is not being priced through earnings multiples, but rather through broader valuation metrics like market capitalization. This distinction is important: it indicates that investors may differentiate between structural threats to the business model and actual threats to earnings delivery.

For the P/E ratio model, the regression results do not provide sufficient evidence to reject the null hypothesis (H_0). The absence of consistent significance among fintech, capital adequacy, and macroeconomic variables suggests that valuation multiples are more strongly shaped by short-term earnings dynamics and investor expectations, rather than by structural competitive or regulatory conditions. Hence, the null hypothesis (H_0) is retained for this specification.

Overall, the regression proof for the P/E measure highlights the degree of external explanatory variables' failure to mirror investor expectations about bank profitability. While fintechs reshape the banking horizon, their presence is not immediately transformed into changes in earnings-based valuation. The negative effect of CAR adds complexity, suggesting that while stability is valued, profitability remains the primary driver of P/E multiples. This reinforces the notion that traditional banks must find a balance between regulatory prudence and earnings momentum to maintain favourable investor perceptions in the evolving financial ecosystem.

4.5. Comparison between the models - Hausman Test

An initial and very important step for the analysis of panel data is the selection of the estimator that produces the most desirable specification for the panel. The two principal approaches, Fixed Effects (FE) and Random Effects (RE), differ in their treatment of unobserved heterogeneity. FE estimation assumes that bank-specific effects might be correlated to the explanatory variables and therefore controls for all time-constant characteristics within banks.

RE estimation, however, assumes orthogonality between heterogeneity and the regressors and benefits from efficiency gains using both between-bank as well as within-bank variation. The Hausman test (Hausman, 1978) is the official statistical tool for choosing between the specifications.

The null hypothesis (H_0) of the test posits that the Random Effects estimator is consistent and efficient, while the alternative hypothesis (H_1) states that only the Fixed Effects estimator is consistent due to correlation between unobserved heterogeneity and the regressors. Rejection of the null therefore implies that RE is inconsistent and that FE must be adopted as the preferred specification.

- $\boldsymbol{H_0}$: Random Effects (RE) is appropriate.

- $\boldsymbol{H_1}$: Random Effects (RE) is not appropriate.

In the present study, the Hausman test was conducted separately for the models explaining market capitalization and the P/E ratio.

```
        Hausman Test

data:  log_mc ~ NUMBER_OF_FINTECH + NEW_FINTECH + CAPITAL_RATIO + GDP_STOCK +  ...
chisq = 0.45837, df = 3, p-value = 0.9279
alternative hypothesis: one model is inconsistent
```

Figure 23. Output of the Hausman Test comparing Fixed Effects and Random Effects specifications for the market capitalization model.

```
        Hausman Test

data:  log_pe ~ NUMBER_OF_FINTECH + NEW_FINTECH + CAPITAL_RATIO + GDP_STOCK +  ...
chisq = 1.3064, df = 3, p-value = 0.7276
alternative hypothesis: one model is inconsistent
```

Figure 24. Output of the Hausman Test comparing Fixed Effects and Random Effects specifications for the P/E ratio model.

For market capitalization, the test gave χ^2 value of 0.458 with 3 degrees of freedom ($p = 0.928$), while the P/E ratio model gave χ^2 value of 1.306 with 3 degrees of freedom ($p = 0.728$). n both cases, p-values are much greater than conventional significance levels and so the null hypothesis is not rejectable. his is indicative of the existence of unobserved bank heterogeneity, e.g. ownership model, system of governance, reputation or capital market access, that is not significantly and systemically related with the explanatory variables. Consequently, the null

hypothesis (H_0) cannot be rejected as the Random Effects specification is statistically appropriate and preferable in efficiency terms for both dependent variables.

At the same time, Fixed Effects specifications are also reported. Even if it is not justified as the preferred specification by the Hausman test, there are available FE models providing a stricter estimation framework that eliminates over-time variation internal to banks. hey increase the robustness of the analysis and avoid principal conclusions depending on one econometric model. This double specification enriches the interpretation: RE models capture broader structural relationships between institutions and across nations, while FE models focus on over-time dynamics internal to each bank.

The comparison of the results between the two valuation measures helps to further emphasize the value of the selection of the model. Market capitalization models, FE and RE, produced comparable and statistically significant results, where fintech and regulatory variables exert clear effects on long-term valuations. This implies that investors react to digital adaptation signs, such as technology partnerships, customer interface innovations, or strategic repositioning. Market capitalization therefore appears to internalize the structural threat of fintech competition and translate it into lower valuations where incumbents are perceived as strategically vulnerable.

In contrast, specifications of the P/E ratio disclosed weaker and largely insignificant fintech and regulatory effects. This would suggest that short-term earnings estimates, as embodied in the P/E multiple, are not systemically driven by fintech intensity throughout the sample horizon. There are numerous reasons that might explain this decoupling. First, the majority of incumbent banks have diversified revenue pools protecting profitability against direct disruption by fintech. Second, financial regulations such as capital adequacy standards, deposit insurance, and preferential access to central bank facilities allow short-term gains to remain stable as pressures become strategically mounted. Third, e differential speed of fintech adoption across European markets produces cross-country heterogeneity that dilutes the overall effect on P/E multiples. Finally, the very volatility of the P/E measure as it reflects changes in sentiment, macro expectations, and transitory earnings shocks makes it a less responsive indicator of gradual structural imbalances.

The specification for market capitalization achieved a fairly robust explanatory power, indicating bank-specific and country-wide determinants account for a substantial share of variance in long-run valuations. In contrast, the P/E ratio model indicated relatively weak explanatory power, indicating less predictable short-run earnings-based valuation with structural drivers.

Overall, these findings establish an existential imbalance between the impact of fintech disruption throughout financial markets. Market capitalization captures a long-term reassessment of banks' strategic positioning, while the P/E ratio remains relatively inert in the face of structural change. For an investor, that would mean the threat of fintech is already factored into a rethinking of the long-term future of banks even if actual near-term profitability is not yet systemically eroded. For traditional banks, the implication is clear: signalling innovation capacity and adaptability is crucial for sustaining market value, regardless of the temporary stability in earnings.

4.6. Robustness Analysis

Even though the Fixed and Random Effects models provide fascinating insights into the interaction among bank valuation and fintech competition, the strength of regulation, and the macroeconomic environment; panel data regressions can suffer from violations of the standard error structure assumptions.

In particular, heteroskedasticity and serial correlation of banks over time may lead to bias in standard errors and overconfident inference. In order to increase the robustness of the inferences, we performed a robustness check and re-estimated the Fixed Effects estimates using cluster-robust standard errors at the bank level. This technique allows error-term correlation between each bank and over time, producing more conservative significance levels and hypothesis testing of whether observed relationships from the past are retained under stricter assumptions.

```
t test of coefficients:

                     Estimate  Std. Error t value Pr(>|t|)
NUMBER_OF_FINTECH -8.7262e-05  9.0415e-05 -0.9651 0.335161
NEW_FINTECH       -1.2330e-03  4.9551e-04 -2.4883 0.013307 *
ANNO2016           9.9309e-02  1.4763e-01  0.6727 0.501608
ANNO2017           5.3277e-01  3.0420e-01  1.7514 0.080774 .
ANNO2018           3.1033e-01  4.0449e-01  0.7672 0.443477
ANNO2019           2.0782e-01  3.8547e-01  0.5392 0.590131
ANNO2020          -3.3012e-02  3.8034e-01 -0.0868 0.930884
ANNO2021           2.6679e-01  4.1934e-01  0.6362 0.525053
ANNO2022          -5.0370e-02  1.8462e-01 -0.2728 0.785144
CAPITAL_RATIO      6.1798e-02  2.3471e-02  2.6329 0.008847 **
GDP_STOCK          2.2218e-04  2.3747e-04  0.9356 0.350118
INTEREST_RATES    -1.5684e+00  6.9669e+00 -0.2251 0.822014
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure 25. Output of the t-test of coefficients for the Fixed Effects model of Market Capitalization.

The robustness-adjusted results for the market capitalization models confirm the stability of the central findings. The variable capturing new fintech entrants retains a negative and statistically significant effect ($p < 0.05$) and therefore reaffirms the conclusion that rising fintech competition unambiguously lowers the market valuation of established banks. More importantly, the Capital Adequacy Ratio (CAR) continues to be highly significant and positively associated with market capitalization ($p < 0.01$). This persistence across specifications indicates that capital strength is not only a regulatory requirement but also a robust determinant of market trust, consistently rewarded by investors.

GDP remains somewhat significant and thus substantiates the assertion that scale at the macro level helps bank valuation. Overall, robustness check supports the indication that fintech disruption and regulatory strength are structural drivers of bank market capitalization and are resistant to increasingly conservative estimation techniques.

```
t test of coefficients:

                     Estimate  Std. Error t value Pr(>|t|)
NUMBER_OF_FINTECH -0.00024639  0.00015934 -1.5463  0.12295
NEW_FINTECH       -0.00060683  0.00097803 -0.6205  0.53536
ANNO2016           0.06539050  0.24906932  0.2625  0.79306
ANNO2017           0.35726165  0.49863815  0.7165  0.47418
ANNO2018           0.52588149  0.67394472  0.7803  0.43575
ANNO2019           0.40935464  0.59157793  0.6920  0.48942
ANNO2020           1.15107352  0.67757656  1.6988  0.09026 .
ANNO2021           0.48062696  0.70273905  0.6839  0.49448
ANNO2022           0.19585192  0.30618903  0.6396  0.52283
CAPITAL_RATIO     -0.03932294  0.02763844 -1.4228  0.15571
GDP_STOCK          0.00043494  0.00069955  0.6217  0.53453
INTEREST_RATES     4.28480917  8.72073170  0.4913  0.62350
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure 26. Output of the t-test of coefficients for the Fixed Effects model for P/E ratio.

On the other hand, the robustness analysis of the P/E ratio specifications produces less stable estimates. In cluster-robust errors, the explanatory fintech competition, GDP, and capital adequacy coefficients become statistically non-significant. The partial exception is the observation pertaining to the year 2020, indicating a weak impact consistent with unprecedented COVID-19 pandemic effects on banks' valuation multiples and earnings expectations. The significance loss overall means that the P/E ratio is a bank performance measure that is more volatile and circumstance specific. Unlike market capitalization, reflecting structural investor sentiments, the P/E ratio appears very sensitive to transitory and one-time shocks, sentiments, and idiosyncratic changes in earnings. The robustness is, therefore, limited as an indicator of the systematic effect of fintech disruption and regulation on traditional banks' valuation.

The robustness checks reinforce two main insights. They first establish the main thesis conclusions: competition from fintech negatively and quantifiably impacts bank valuations, and capital adequacy boosts investor confidence. These conclusions hold even after applying more conservative estimates of variance, supporting belief in their empirical significance Secondly, differential performance between market capitalization and P/E multiples highlights the value of valuation indicators in empirical research. Market capitalisation emerges as a strong structurally indicator, while P/E ratios are less reliable, indicating transitory effects that vanish as soon as refinements in methodology are made.
Both from a theoretical and a strategic perspective, it would mean that investors should think of capitalization-based indicators as being more legitimate indicators of adaptive capacity in the fintech disruption times.

4.7. Strategic Adaptation Trajectories for Traditional Banks

The findings presented in this thesis point to a structural challenge for traditional banks operating in increasingly fintech-dense environments. Even though there are financial corporations who manage to preserve market valuation and profitability margins despite rising digital competition, the sustainability of such resilience is subject to the extent and nature of the strategic response each bank is willing and able to deploy. The rise and rapid expansion of fintech entrants have not merely watered down some revenue streams but rewritten customer expectations in the financial services value chain. In such a case, adaptation is no longer definable as a marginal adjustment; it must be perceived as an existential transformation covering strategic intent, organizational designs, technological competencies, and cost

structures. The following are four divergent yet complementary adaptation trajectories available to mature banks: strategic repositioning, fintech acquisition, institutional strength-based differentiation, and cost restructurings. Each of the trajectories addresses a different competitive renewal domain, and the banks that are capable of building these into a logical strategic architecture will be better equipped to remain relevant over the next few years.

Strategic repositioning here implies a general reshaping of mission, scope, and positioning of the bank in the market. Most of the European banks in the past adopted the universal banking strategy, taking retail, commercial, and investments services under the same institutional umbrella simultaneously. Even though this approach offered economies of scale and cross-selling advantages earlier, it is no longer adequate in an environment of fintech specialisation and verticalization via the internet and smartphones. Repositioning strategically thus challenges banks to make choices regarding where they will compete and match their resources accordingly. Some will do so under platform logic, by offering core banking infrastructure under Banking-as-a-Service (BaaS) business models, to external actors. Others might favour reinforcing trusted relationships under high-touch services, such as private banking.
All these strategies share a movement away from generic strategies and toward specific models founded on distinctive customer segments and long-horizon strategic consensus. Repositioning success often includes not only redefining product definitions but divesting business lines and redeploying capital in favour of the new direction.

While repositioning challenges where the bank is competing, fintech acquisition is concerning how it enhances the bank's competitiveness. In the past decade, an increasingly large number of banks lost the illusions that fintech innovation cycles are feasible to catch up with using internal R&D. Bureaucratic inertia, outdated IT infrastructures, and siloed organizational structures continue to hinder internal transformation efforts. As a result, fintech acquisition was one of the major methods of adaptation, through which the bank was able to externalize the source of innovation and internalize it thereafter in a selective fashion. With fintech acquisition, the bank is capable of tapping instantly into cutting-edge technologies such as blockchain infrastructure, credit modelling based on artificial intelligence, electronic verification of identity, or analytics platforms in real-time. Moreover, they inherit cultures of lean and innovation that, if merged in an efficient manner, can generate organizational renewal from within. These acquisitions are not merely defensive moves aimed at neutralizing competition, but instead, strategic ones which may reposition the bank as a hybrid organization combining

regulatory maturity with entrepreneurial agility. That said, acquisition is a double-edged sword. The difficult thing is maintaining the acquired fintech's innovation capability and integrating it into a highly regulated and risk-averse institutional environment. Best practices include creating "innovation enclaves" within the bank, maintaining separate brand identities, and implementing lightweight governance mechanisms that combine speed and compliance. Fintech M&A, when well-executed, does not just add capabilities, it catalyses cultural transformation.

However, acquisition is only one possible response. Indeed, many incumbent banks will be better off committing to strategic differentiation, emphasizing what fintechs cannot easily replicate. While fintechs shine in digital user experience (UX), speed, and cost-effectiveness, they suffer from a lack of regulatory credibility, institutional trust, systemic stability, and competence in managing complex client relationships. Strategic differentiation means building upon these intangible assets rather than imitating fintech front ends. It may involve offering hybrid services, which strike a compromise between digital ease of use and human judgment, marrying, for instance, robo-advisory and personalized wealth consultations It can equally involve integrating ESG principles into lending, hence aligning with social values valued by customers and regulators alike. Furthermore, in an era of rising concern over data privacy, misinformation, and algorithmic opacity, traditional banks can reassert their value as custodians of financial integrity. Differentiation, then, is not resistance to innovation, but a long-term commitment to strategic reassertion of institutional identity through channels structurally unavailable to fintechs. In this sense, differentiation is a long-term commitment, not a marketing tactic.

However, no strategy, whether of repositioning, acquisition, or differentiation, will be successful if at its root the cost structure of the bank is inflexible. Traditional banks continue to be weighed down by legacy costs of physical branch networks, old IT infrastructure, compliance cost, and bureaucratic levels of management. Such structural inefficiency creates a resource drag, restricting the resources available for spending on innovation and keep up with the competition. Cost restructuring at deeper levels is therefore not a short-term tactical necessity, but a strategic imperative. This does not simply mean cutting costs for the sake of quarterly earnings. It means radically transforming how the bank operates: migrating to cloud-based systems to ensure scalability and interoperability; automating routine processes in various corporate's functions; and shifting from vertical department-based systems to agile cross-functional teams that reduce time-to-market for new products. In parallel, workforce

transformation must occur, not through indiscriminate layoffs, but through strategic upskilling and talent reallocation. Employees need to be equipped with competencies in data science or cybersecurity for example, if they are to add value in a digitally native financial environment. Moreover, cost transformation reinforces investor confidence. Lean and flexible operating model is not only cheaper, but it shows strategic alignment and institutional resilience in unpredictable times.

Taken together, these four trajectories of adaptation (strategic repositioning, fintech acquisition, differentiation, and cost restructuring) form the essential set of strategic instruments available to traditional banks in the fintech disruption era. Each respond to a different dimension of competitive pressure: repositioning addresses market focus; acquisition accelerates capability building; differentiation protects institutional distinctiveness; and cost restructuring ensures operational sustainability. These strategies are not mutually exclusive. On the contrary, they are most effective when deployed in a coordinated manner. While the window for adaptation remains open, it is rapidly narrowing. Inaction, fragmentation, or superficial transformation will likely render many incumbents obsolete. Conversely, banks that act decisively will emerge not just as survivors, but as leaders in a redefined financial landscape; one that is more digital, more modular, more customer-centric, and ultimately more adaptive.

Conclusion

European banking evidence provides sufficient strength to support the claim that fintech competition significantly influences bank valuations, though asymmetrically regarding the metric considered. Market capitalization is systematically and negatively affected by fintech density, supporting the disruptive innovation hypothesis, while the Capital Adequacy Ratio (CAR) emerges as consistently positive across all specifications, showing that prudential buffers are rewarded by investors. GDP also demonstrates a positive influence, reinforcing the idea that larger national economies create more favourable conditions for bank valuation. By contrast, interest rates did not register any systematic significance, reflecting their heterogeneous effects across different balance sheet structures.

At the same time, the P/E ratio analysis did not provide enough statistical evidence to reject the null hypothesis. The finding highlights that relative earnings multiples are more driven by investor sentiment and bank-specific factors than by structural disruption. The only exception is a negative link between CAR and P/E ratios, suggesting that while strong capitalization enhances solvency and absolute valuations, it may also compress relative earning expectations due to lower leverage and risk-taking capacity.

This misalignment between valuation measures reflects what has already been observed in the literature: market capitalization captures long-term structural trends, while earnings multiples are more sensitive to short-term dynamics and narratives. The quantitative analysis further supports the literature on the subject. The fintech presence seems to pose a threat on traditional banks valuation, as these companies, even if with less resources, are challenging established institutions. A logic that is aligned to the disruptive innovation theory. The statistical significance of the Capital Adequacy Ratio confirms the evidence from prior literature that suggests that bank capital is positively related to bank profitability. While for the macroeconomic variables, the significance of the GDP stock on banks' valuation supports the cyclicality of the banking market, highlighting higher profitability and valuations when the general economic conditions are good.

Even though the evidence from economics is robust, the analysis comes with implicit limitations. The dataset, though comprehensive, is geographically restricted to Europe, and bank-level measures of internal digital transformation were not available. Future research

would benefit from incorporating direct measures of banks' digitalization efforts as they would allow a more precise distinction between the external pressure of fintech entrants and the internal capacity of incumbents to innovate.

From a strategic perspective, the findings emphasize that pure digital adaptation is not enough for banks to preserve their market value in fintech-dense environments. Instead, successful adaptation depends on combining credible digital strategies with some structural shifts of the business model. For regulators, the findings highlight that capital requirements not only safeguard financial stability but also serve as a market-recognized anchor of credibility.

To sum up, the evolution of banking in the age of fintech represents an adaptive equilibrium shaped by the interplay of technological entrants, prudential regulation and the expectations of both investors and consumers. For this reason, the thesis closes with a discussion of adaptation strategies that banks may adopt to mitigate the disruptive effects of fintech competition and preserve long-term competitiveness.

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