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The influence of Fintech innovations on bank competition and performance in South Africa

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Abstract: In recent years, the South African banking sector has undergone rapid transformations due to innovations in financial technology (Fintech). Regulated by the South African Reserve Bank (SARB), banks are essential for economic growth through capital provision, risk management, and transaction facilitation. Recent Fintech advancements offer more efficient, personalised, and cost-effective solutions, challenging traditional banking models. Against this background, the current study explores the impact of Fintech innovations on banking sector competition and performance, focusing on banks listed on the Johannesburg Stock Exchange (JSE) from 2000 to 2023. Using a panel regression approach, the findings reveal that Fintech enhances competition, particularly through mobile transactions. However, Fintech does not significantly improve bank performance indicators, suggesting traditional structures remain at play. These findings have significant implications for stakeholders in the South African banking sector.

Keywords: banking sector; competition; fintech; Johannesburg Stock Exchange; performance.

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1. Introduction

The banking sector in South Africa is not merely a cornerstone of financial transactions but a vital component of socio-economic development, contributing significantly to the nation's stability and prosperity. Banks in South Africa foster economic growth by channelling financial capital into businesses and encouraging individual savings (Moyo, 2018). Their role extends beyond mere transaction facilitation to enhancing the country's financial infrastructure by mitigating risks, adhering to international standards, and supporting economic growth (Van Deventer & Redda, 2023). On the other hand, instability within the sector can have far-reaching consequences, such as reduced credit availability and tighter lending criteria that could stifle economic growth (Cowling, 2023). Additionally, instability may result in investors demanding higher returns to compensate for perceived risks, leading to increased interest rates (Vucinic, 2020). A decline in consumer confidence could further exacerbate the situation, as consumers might shift their savings and investments away from traditional banking, impacting the broader economy (Furi, 2022). Therefore, it is of primary importance to understand which factors influence the competitive and performance nature of the banking sector in South Africa.

Recent disruptions to the banking sector's competition and performance can be argued that they have increasingly been attributed to advancements in financial technology or Fintech. Vucinic (2020) defines Fintech as technological innovations in financial services that produce new business models, applications, procedures, or products that significantly

impact financial markets, institutions, and service providers. These Fintech innovations could impact bank competitiveness by delivering innovative solutions and satisfying changing consumer expectations, while on the other hand, Fintech's user-centric and flexible strategy can boost banks' competitiveness (Dwivedi et al., 2021). For example, in South Africa, banks are leveraging innovative solutions like mobile banking innovations such as M-Pesa, FNB's eWallet, or Absa's CashSend to gather data on mobile transactions, airtime purchases, and bill payments (Chigada & Hirschfelder, 2017). Conversely, the challenge with Fintech could be designing an effective policy framework for Fintech, as it would be crucial to balance its benefits with risks like operational issues, market integrity, and privacy concerns (Takundwa, 2020; KPMG International, 2024). The Fintech innovations alone could impact banks by enabling them to analyse and manage risk better (Gomber et al., 2018). This can reduce banks' exposure to bad debt and help them make better lending decisions (Rengasamy, 2019). For example, the sector naturally has access to a rich source of data through consumer transactions. On the other hand, assuring banks can successfully use cutting-edge technology while adhering to regulatory constraints presents a challenge (Takundwa, 2020).

In recent years, existing research on Fintech and the banking sector, particularly when observing bank competition and performance, has produced mixed results. For example, Dwivedi et al. (2021) emphasised the benefits of adopting Fintech on bank competition while, on the other hand, studies of Bejar et al. (2022) and Song et al. (2023) found negative effects on competition. Similar negative effects on bank performance are documented in research by Phan et al. (2020) and Mugabe (2022), with Mugabe also pointing to negative effects on long-term return on equity. On the other hand, Fintech implementation was positively correlated with improved performance, according to Dwivedi et al. (2021). These contradictory results pose a challenge to banking sector policymakers' ability to formulate effective strategies to ensure sustainable competition and performance within the banking sector. Therefore, a comprehensive investigation into Fintech's impact on South African banking is essential for developing informed regulatory policies that support a robust financial ecosystem.

Arguably, the impact of Fintech on banking dynamics has been a topic of interest, but a comprehensive understanding of its effects is still lacking. The study contributes to existing literature in several ways. Firstly, previous research has often focused on one specific aspect of the bank dynamics. This study aims to fill this gap by examining a broader range of bank dynamics, specifically competitiveness and performance. Secondly, the existing literature also presents contradictory findings regarding Fintechs' effects, with some studies highlighting positive influences on competition while others report negative effects. The same is documented when looking at performance results. Therefore, this study synthesises these conflicting results, providing a clearer perspective on Fintech's impact on various banking facets. Thirdly, unlike traditional ratios like the ROA, NIM and ROE, in this paper, the Capital Adequacy Ratio (CAR) is used to model bank performance, as it is essential for evaluating fundamental stability and risk management. The paper's contributions extend beyond academic inquiry, enabling South African banking stakeholders to make informed decisions and contribute to the ongoing discussion about Fintech trends in emerging economies.

The paper is outlined as follows: Section 2 reviews existing literature. Section 3 discusses the data and methodology. Section 4 presents the results. Section 5 concludes the study.

2. Literature Review

2.1. Theoretical Framework

This paper starts off by examining the theoretical framework of two important theories linking Fintech and the banking sector. The Disruptive Innovation Theory, introduced by Clayton Christensen in 1997, explains how new, simpler, and affordable

products or services in the form of Fintech can disrupt existing markets. The theory identifies two main types of innovations: sustaining and disruptive. Sustaining innovations aim to improve existing products or services, while disruptive innovations target niche markets or underserved customers with simpler, more affordable solutions (Christensen et al., 2024). Fintech innovations, for example, target underbanked populations and customers who are dissatisfied with traditional banking services. These innovations prioritise competition and performance, forcing traditional banks to adapt or risk losing customers. However, the theory further suggests that threats to the banking sector's competitiveness and performance may arise from the quick adoption of new technologies or the absence of laws around Fintech businesses (Gomber et al., 2018).

Second, the Creative Destruction Theory, popularised by Joseph Schumpeter in 1942, describes how new innovations replace outdated ideas and technologies, driving economic progress and transformation. Schumpeter adapted this concept from Karl Marx's writings, emphasising innovation as the primary driver of economic growth (Schumpeter, 1942). Innovations challenge the status quo, create opportunities for new entrants and foster competition. Fintech innovations embody creative destruction, disrupting traditional banking offerings by introducing innovative financial products and services through streamlined processes and user-friendly applications (Schumpeter, 1942; Adler, 2019). This pressure often leads to cost-cutting, product diversification, and a focus on customer experience. The theory further suggests that widespread Fintech adoption could pose risks to the banking sector if regulatory frameworks are not adapted. However, collaboration between banks and Fintech can foster a more robust and inclusive financial ecosystem, combining regulatory compliance and trust with Fintech's agility (Castleman, 2018).

2.2. Review of empirical studies on Fintech and bank competition

Recent studies have explored the complex link between Fintech and banking competitiveness, focusing on its impact on traditional banking models, market competitiveness, and incumbent banks' strategic reactions. Dwivedi et al. (2021) conducted a study on the UAE banking industry, finding that Fintech innovations enhanced competition by offering alternative financial services that challenged traditional banking models. This enhanced competition was believed to drive improvements in the overall performance of the UAE banking sector. In contrast to the findings of Dwivedi et al. (2021), Bejar et al. (2022) explored the early effects of Fintech in Latin America and the Caribbean (LAC), finding that the growing presence of Fintech prompted traditional financial institutions to take on more risks. The paper found that the entry of Fintech into the market was associated with reduced Net Interest Margins (NIMs), suggesting that Fintech competition forced banks to lower prices, potentially reducing profitability. Furthermore, Song et al. (2023) examined the effects of competition and technology spillover on commercial banks' profitability in relation to Fintech, finding that the competition effect outweighed the technology spillover effect in the early phases of Fintech development. Lakshmi and Yashwanth (2024) investigated the impact of Fintech innovations on traditional banking models, finding that traditional banks' adoption of Fintech innovations increased their competitiveness, aligning with the earlier findings of Dwivedi et al. (2021). Lastly, Peón et al. (2024) investigated the competitive dynamics of traditional banks and Fintech start-ups in Spain, finding that traditional banks use their Fintech ventures primarily to compete with independent firms rather than to collaborate. These findings support the findings of Dwivedi et al. (2021) and Lakshmi and Yashwanth (2024). The research covered above shows that Fintech has transformed traditional banking models, increased competition and disrupted traditional structures. Despite variations, there is consensus on providing a clearer perspective on Fintech's impact on various banking facets, especially in South Africa, where there is limited research on the effects of Fintech on the banking sector.

2.3. Review of empirical studies on Fintech and bank performance

Recent research highlights the profound impact of Fintech on traditional banking performance, with mixed findings depending on regional contexts, financial metrics, and specific Fintech innovations. For instance, Phan et al. (2018) analysed the impact of Fintech on Indonesian banks, revealing that Fintech expansion negatively impacted performance metrics such as Net Interest Margins (NIM), Return on Equity (ROE), Return on Assets (ROA), and Yield on Earning Assets (YEA). Similarly, Kumar (2020) found a negative association between Fintech, measured through mobile payment transactions, and the financial performance of Indian banks. However, both studies acknowledged the positive influence of GDP growth on bank performance. In contrast, Ky et al. (2024) demonstrated a positive relationship between mobile money adoption and bank performance in East Africa, emphasising its role in boosting profitability in regions with limited banking infrastructure. Mugabe (2022) found similar results in South Africa, where Fintech presence enhanced banking performance metrics, although long-term effects on ROE were negative. These studies aligned on the positive role of GDP growth but differed on inflation's effects, with Ky et al. (2024) observing a positive relationship and Mugabe (2022) identifying a negative impact.

Zhao et al. (2022) used the CAMEL framework to examine Chinese banks and found that while Fintech improved capital adequacy and managerial efficiency, it negatively affected asset quality and profitability. The study emphasised the need for collaboration between banks and Fintech firms to navigate these challenges. Similarly, Naceur et al. (2023) observed that intensified competition from Fintech reduced profitability in traditional banks. Tarawneh et al. (2024) examined Malaysian banks, finding mixed effects of Fintech. Bank-level technology-driven innovations enhanced NIM, but broader Fintech development negatively impacted profitability due to competition from digital payment systems. Pham et al. (2024) explored Vietnamese banks and concluded that Fintech positively influenced profitability, highlighting the potential of collaboration between banks and Fintech firms to improve market competitiveness. Overall, while Fintech often challenges traditional banking performance through increased competition, specific innovations such as mobile money show promise for enhancing profitability, particularly in developing regions. However, further research is needed to confirm the effect of Fintech innovations on the banking sector in South Africa.

3. Data and Methodology

3.1. Data sample

This paper focuses on the South African banking sector, focusing on publicly traded banks listed on the Johannesburg Stock Exchange. The selected banks include African Bank, FirstRand, Standard Bank, Capitec Bank, Investec Bank Limited, Absa Group, Nedbank Group, and Finbond Group. The study uses an annual data frequency to ensure consistency and comparability across financial metrics. The sample period is from 2000 to 2023, chosen for its strategic significance and the rapid expansion of Fintech in South Africa. This extensive period allows for a thorough analysis of long-term trends and behaviours in the South African banking sector, capturing trends and patterns that may not be evident in shorter intervals.

3.2. Construction of variables

In line with Masangwana (2021) and Liao (2023), Fintech is measured by (i) the natural logarithm of the total Automated Teller Machines per 100,000 adults in year t, and (ii) the value of mobile transactions, which refers to the total monetary value of transactions conducted through mobile payment systems. This study evaluates banking performance and competition using key metrics such as the Lerner Index, which aligns with the practices established by Moyo (2018) and Bajar et al. (2022) and Capital Adequacy Ratio (CAR) following the study by Kumar et al. (2017) to gauge bank performance. The Lerner Index measures bank competition by the difference between the price (interest

rates) charged by banks and their marginal cost, divided by the price. The marginal cost refers to the additional cost incurred by a bank to produce one more unit of output, typically measured as total assets. By employing a Translog cost function, a flexible, functional form that allows for the estimation of cost-output relationships without imposing restrictive assumptions about returns to scale or substitution patterns among inputs (Koetter et al., 2008; Vilakazi, 2021).

In a highly competitive market, banks are less able to charge high margins, meaning the Lerner Index will be lower. Conversely, in less competitive markets with fewer banks or greater barriers to entry, banks have more market power and can charge higher margins, resulting in a higher Lerner Index. Therefore, the variable offers benefits for bank competition as it is widely used by banks as a standardized metric, facilitating comparisons across different studies and banking sectors. As noted by Moyo (2018) and Shaffer and Spierdijk (2020), the Lerner Index effectively measures the degree of market power held by banks by calculating the difference between price and marginal cost as a proportion of the price. The Index captures how far banks are able to deviate from marginal cost pricing, which naturally decreases as competition increases. Thus, a higher Lerner Index reflects less competition and greater market power, while a lower Lerner Index indicates stronger competition and less pricing power (Igan et al., 2021). This methodological simplicity enables its application using readily available bank-level data on prices and costs. Additionally, Mlambo and Ncube (2011) and Igan et al. (2021) highlight that, unlike other metrics that focus primarily on market concentration, the Lerner Index provides valuable insights into the pricing behaviour of individual banks.

At the same time, the CAR compares a bank's capital to risk-weighted assets. Abusharb et al. (2013) and Alnajjar & Abdullah Othman (2021) state that one of the key advantages of using the CAR as a measure of bank performance is its role in effective risk management. Beyond risk management, CAR is a fundamental component of banking regulations, including the Basel Accords, which require banks to maintain a minimum level of capital to prevent financial instability and systemic risks (Noor & Rosyid, 2018). Given its regulatory significance, CAR is a widely accepted proxy for bank resilience and long-term sustainability, distinguishing it from other performance measures such as Return on Assets (ROA) and Return on Equity (ROE), which focus more on short-term profitability rather than financial stability.

The data for the dependent variables of the Lerner Index and Capital Adequacy Ratio were collected using the Bloomberg terminal for the years 2000 – 2023. Risk-Weighted Assets (RWA) in this study follows the methodology used by Abusharba et al. (2013) and Noor & Rosyid (2018), which derives its calculations from bank regulatory filings and Basel III capital adequacy frameworks. RWA is computed by assigning a risk weight to each asset class based on its risk profile, as outlined in Basel III regulations. For example, cash and government securities are assigned a 0% risk weight, as they carry minimal risk, while residential mortgages typically have a 35% risk weight due to their secured nature. In contrast, unsecured consumer loans, such as credit card debt, carry a 100% risk weight, reflecting their higher risk exposure.

The control variables of GDP, inflation, and bank concentration were collected using the World Bank's World Development Indicators (WDI) database. Economic growth directly affects banking profitability, competition, and innovation adoption. For instance, during economic expansion, banks experience higher lending activity and profitability, which may encourage fintech collaboration (Booyens, Nayagar & Le Roux, 2018; & Phan et al., 2020; Mugabe, 2022). Conversely, in periods of low or negative GDP growth, banks may face financial constraints, making them more or less likely to adopt fintech innovations (Wexler, 2021; Mugabe, 2022; Apau & Sibindi, 2023). On the other hand, inflation affects bank interest rate spreads, profitability, and operational costs, all of which impact competition and performance. Higher inflation can lead to reduced real returns on savings, influencing consumer preferences for fintech alternatives (Phan et al., 2020). Furthermore, a highly concentrated banking sector may experience lower competition

and slower fintech adoption, as dominant banks face less pressure to innovate. Conversely, in a more competitive market, banks may actively adopt fintech to maintain their competitive edge (Naceur et al., 2023). Moreover, control variables, including tier 1 and tier capital, are collected from the Bloomberg terminal. Table 1 provides a summary of the variables used in this study.

Table 1. Summary of the variables used in this paper

Dependent variables	Description	Measurements/proxies used	Data source
Lerner index (LI)	Measures bank competition by Price minus Marginal cost all over price.	Index: The difference between the price (interest rates) charged by banks and their marginal cost, divided by the price.	Author's Computation using data from the Bloomberg terminal
Capital Adequacy Ratio (CAR)	Measures the financial health of a bank by comparing its capital (Tier 1 and Tier 2) to its risk-weighted assets.	Ratio: Tier 1 + Tier 2 capital / Risk-weighted assets.	Author's Computation using data from the Bloomberg terminal
Explanatory variables			
Fintech (ATM)	Denotes the penetration of ATMs in South Africa, representing access to financial technology.	Number of ATMs per 100,000 adults	World Bank – World Development Indicators
Value of mobile transactions (VMT)	Measures the monetary value of transactions conducted through mobile payment systems	Amount: The total value of mobile transactions is measured in South African Rand (ZAR).	World Bank – World Development Indicators
Control Variables			
Gross Domestic Product (GDP)	Represents the overall economic output of a country and is often used to gauge the economic environment for banks.	Percentage: The annual growth rate of GDP, expressed as a percentage	World Bank – World Development Indicators
Inflation	Indicates the rate of increase in the price level of goods and services in the economy.	Percentage: The annual inflation rate, expressed as a percentage.	World Bank – World Development Indicators
Bank Concentration	Measures the degree of concentration in the banking sector, with a higher percentage indicating more dominance by the top banks.	Percentage: The total assets held by the five largest banks in the country as a percentage of total industry assets.	World Bank – World Development Indicators
Tier 1 Capital	A bank's primary financial protection consists of core equity (common shares and retained earnings) and various perpetual instruments.	Ratio: Tier 1 Capital / Risk-Weighted Assets.	Author's Computation using data from the Bloomberg terminal
Tier 2 Capital	Additional financial resources that support a bank's overall financial health and serve as a buffer in addition to Tier 1 capital.	Formula: Tier 2 Capital = Subordinated Debt + Hybrid Instruments + Undisclosed Reserves + General Loan-Loss Provisions	Author's Computation using data from the Bloomberg terminal

3.3. Methodology

The study extends the simple panel regression model to factor in control variables as follows:

$$\Upsilon_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \sum_{j=1}^{j} \beta_3 X_{3it} + \varepsilon_{it} \quad (1)$$

Equation (1) represents a linear panel regression model used to explain the dependent variable, Υ_{it}. The coefficients of β_1 and β_2 measure the effect of the main independent variables, X_{1it} and X_{2it}, which are the Fintech proxies, respectively. $\Sigma_{j=1}\beta_3 X_{3it}$ captures the influence of J control variables, with each control variable having its own coefficient, β_3. Finally, ε_{it} refers to the error term, capturing random, unexplained variations in Υ_{it} that are not accounted for by the model. To determine the optimal panel regression model, the Hausman test is used to select between fixed and random effects models for each dependent variable and to assess the adequacy of various model specifications.

4. Results and Discussion

4.1. Preliminary results

Table 2 presents a summary of the descriptive statistics for the variables used in this study. The dataset consists of 192 observations, with the Lerner Index (LI) showing a mean value of 0.68, indicating high market power. However, there is variability among banks in pricing power, with some exhibiting more or less market power. The Capital Adequacy Ratio (CAR) shows consistent capital adequacy across banks, with most performing near or below the mean. The South African banking sector has seen moderate growth in Fintech adoption, with ATM adoption ranging from 23.98 to 67.88. However, there is significant variation in adoption rates, with a negative skewness indicating a higher concentration of banks with fewer ATMs. Mobile transaction values are low but concentrated among a few players, indicating uneven digital adoption. Bank concentration is dominated by a few major players, while GDP growth ranges widely. Inflation rates are relatively balanced, and Tier 1 and Tier 2 Capital reflect consistent core capital adequacy.

Table 2. Descriptive statistics

Statistic	LI	CAR	ATM	VMT	BNK	GDP	INF	Tier 1 Capital	Tier 2 Capital
Mean	0.68	1.68	51.81	6.73	80.36	2.28	5.29	10.63	8.90
Minimum	-1.01	1.43	23.98	3.18	75.98	-5.96	-0.69	6.95	5.19
Maximum	0.87	2.22	67.88	7.61	99.54	5.60	10.74	12.31	10.39
SD	0.18	0.10	13.04	0.80	5.90	2.46	2.15	0.81	0.76
Skewness	-5.12	0.61	-0.87	-3.53	2.41	-1.42	-0.28	-1.72	-1.98
Kurtosis	41.06	6.17	2.81	16.67	7.69	5.99	4.46	9.21	9.93
Observations	192	192	192	192	192	192	192	192	192

Table 3 presents the correlation matrix for the variable used in the study. In particular, the positive correlation between LI and ATM suggests that higher competition in the banking sector is associated with greater ATM availability, which may incentivise banks to invest more in ATM infrastructures to improve accessibility. In addition, the negative and significant correlation between ATMs and BNK suggests that a higher number of ATMs is linked to less concentrated banking markets, possibly because ATMs make banking services more accessible and competitive. The correlation between ATM and GDP is also negative, which may indicate that in periods of economic expansion, banks and consumers may increasingly adopt other financial solutions like digital financial solutions, reducing reliance on ATM transactions. Inflation may increase ATM usage and possibly may reflect adjustments in banking sector cash-handling behaviour rather than a direct preference for cash transactions, accounting for the significant positive correlation between INF and ATM. Mobile transactions also show a strong positive correlation with GDP, suggesting an increase in mobile transactions as the economy

grows. Tier 1 Capital shows a positive correlation with ATM usage, indicating that banks with stronger capital reserves may be more inclined to invest in technology-driven services like ATMs. Tier 2 Capital is positively correlated with the Lerner Index, suggesting that banks with higher supplementary capital may possess greater market power due to enhanced risk-taking capacity and operational flexibility. Tier 1 Capital is positively correlated with the CAR, by construction, Tier 1 capital is a key component of CAR, so a strong positive correlation is expected.

Table 3. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LI (1)	1								
CAR (2)	-0.05	1							
ATM (3)	0.22***	-0.06	1						
VMT (4)	-0.07	-0.01	0.03	1					
BNK (5)	-0.14**	-0.03	-0.59***	0.02	1				
GDP (6)	-0.26**	0.04	-0.59***	0.58***	0.40***	1			
INF (7)	0.05	0.05	0.27***	0.23***	-0.58**	-0.08	1		
TIER 1 CAPITAL (8)	0.37***	-0.29**	0.14**	0.01	-0.22***	-0.02	-0.07	1	
TIER 2 CAPITAL (9)	0.23***	0.41***	0.02	0.01	-0.009	0.004	0.0027	0.56***	1

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

4.2. Baseline results

4.2.1. The effect of Fintech on bank competition

The study uses the Lerner index to analyse the impact of Fintech innovations on the South African banking sector. It focuses on two proxy variables for Fintech: ATM and VMT. Unreported Hausman test results suggest that the random effects model is appropriate, and the results are presented in Table 4. The findings show that higher mobile transaction values (VMT) are associated with reduced market power (LI), indicating increased competition given the significant negative relationship between these two variables. This suggests that mobile Fintech products disrupt traditional banking services by offering convenient and cost-effective alternatives, forcing banks to compete more aggressively. Fintech innovations, particularly VMT, initially gained traction by targeting underbanked or underserved populations, which aligned with Christensen's (1997) idea of disruptive innovation that starts with niche markets. Furthermore, according to Schumpeter's (1942) theory of creative destruction, traditional banks must innovate to include Fintech products or risk losing market share as Fintech transforms the banking industry.

Table 4. Regression Analysis of Fintech on Bank Competition

	Random Effects	**Robust**	**GMM**
		Dependent Variable	
	Lerner Index	**Lerner Index**	**Lerner Index**
ATM	-0.009	-0.009	0.031
VMT	-0.68***	-0.68***	-0.6694**
BNK	0.0967	0.0244	0.0125
GDP	0.1278*	0.1278**	0.034
INF	0.0887	0.0886	-0.033
Constant	-2.2657	-2.2657	0.599*
Lerner_Index Lag.			0.080

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

The negative relationship between VMT and the Lerner Index supports the view that mobile transactions have disrupted traditional banking by increasing competition. The South African banking sector is leveraging mobile financial services to improve user convenience and attract a broader customer base, moving beyond niche adoption to challenge mainstream banking. Banks that successfully adapt to or integrate mobile transaction services into their operations are positioned to capitalise on this trend, gaining competitive advantages by retaining customers who prioritise digital convenience and accessibility. The findings align with previous studies of Bejar et al. (2022) and Song et al. (2023), suggesting that embracing mobile transactions as a competitive tool offers opportunities for growth and sustained relevance. Interestingly, the number of ATMs (ATMs) does not significantly influence competition within the South African banking sector. Furthermore, the results show that higher GDP is associated with an increase in the Lerner Index, suggesting that economic growth improves market power and reduces competition, aligning with Bejar et al.'s (2022) research.

4.2.2. The effect of Fintech on bank performance

The paper used the CAR to model bank performance and investigate the impact of Fintech innovations on the South African banking sector's performance. Unreported Hausman test results suggest that the random effects model is appropriate, and the results are presented in Table 5. The results show no significant effects of Fintech on bank performance, suggesting that digital channels and technologies are not yet fully integrated into banks' financial performance. The Tier 1 and Tier 2 Capital coefficients show strong relationships with CAR, indicating that traditional banking factors, such as a bank's capital structure, are still the primary drivers of capital adequacy and relative performance. A negative coefficient suggests that banks with more Tier 1 Capital may engage in more aggressive risk-taking strategies. In contrast, a positive coefficient suggests that increasing Tier 2 Capital strengthens the CAR by increasing the available capital buffer for banks. This suggests that Tier 2 Capital provides a more stable foundation for managing risk, particularly in volatile markets. The findings align with previous research by Conlon et al. (2020) that Tier 1 capital can hinder risk reduction capacity, potentially increasing risk-taking behaviours, suggesting that the risk reduction capacity of Tier 1 capital can be hindered by certain components. In comparison, Shaik and Sharma (2021) found a positive correlation.

Table 5. Regression Analysis of Fintech on Bank Performance

	Random Effects	**Robust Random Effects**
	Dependent Variable	
	CAR	**CAR**
ATM	0.0016	0.0016
VMT	-0.0052	-0.0052
BNK	0.0003	0.0003
GDP	0.0019	0.0019
INF	-0.0014	-0.0014
Tier 1 Capital	-0.0423***	-0.0423***
Tier 2 Capital	0.0410***	0.0410***
Constant	0.5386***	0.5386***

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

4.3. Further analysis

4.3.1. The effect of Fintech on bank competition

The random effects model's robustness is enhanced by accounting for within-group correlations, such as those within banks. This approach ensures accurate standard errors

and reliable inferences and handles difficulties like heteroscedasticity. The study employs autocorrelation-consistent coefficients to account for potential correlations, and the results are presented under the 'robust model' in Table 4. The robust regression analysis reveals a positive and statistically significant coefficient for GDP, indicating an increase in the Lerner Index. Furthermore, the robust regression analysis supports the baseline analysis of VMT, indicating a positive and statistically significant coefficient. In addition, the paper uses a one-step system GMM estimation to evaluate the effects of Fintech on the Lerner Index in the South African banking sector, and the results are presented under the 'GMM' model in Table 4. Results show a positive but insignificant relationship between past market power and current market power. Mobile Fintech products disrupt traditional banking by providing cost-effective alternatives, compelling banks to compete more aggressively, further confirming the baseline findings.

4.3.2. The effect of Fintech on bank performance

The paper uses robustness to account for within-bank correlation and autocorrelation to account for potential correlations, and the results are presented under the 'robust' model in Table 5. The robust model suggests no significant influence of Fintech on bank performance, as both proxies for Fintech (ATM and VMT) are insignificant, confirming the findings of baseline results. However, the robust cluster model shows a negative coefficient for Tier 1 Capital, suggesting that more capital increases riskier investments and reduces short-term capital ratio (CAR). The coefficient for Tier 2 Capital is positive and statistically significant, indicating that a rise in capital leads to a rise in CAR. The paper tested for endogeneity in the CAR variable, ensuring no bias or inconsistent relationships. The CAR was found to be exogenous and not correlated with the error term. Thus, the random effects model is preferred for analysis in this case, as it is more efficient and reliable than the GMM model which was omitted for this analysis.

5. Conclusion

The banking industry in South Africa is crucial for economic growth and financial transactions. However, the emergence of Fintech has disrupted the traditional banking model, offering more personalised, cost-effective, and efficient financial services. This paper investigated the multidimensional impact of Fintech on the banking sector, focusing on its impact on competition and performance. The paper found that increased mobile transaction engagement correlates with higher market power, as banks leverage Fintech to attract a larger customer base and improve service convenience. This challenges traditional banking models, necessitating ongoing investment in technology and customer-centric services. Banks that resist these changes risk losing market share and experiencing reduced pricing power as customers increasingly gravitate towards more efficient and innovative digital offerings. Economic growth drives competitive dynamics in the banking sector, with Fintech innovations strengthening bank market power. Fintech's impact on bank performance was not statistically significant, indicating that Fintech is not yet a key factor in financial stability or solvency for banks. Traditional factors, such as Tier 1 and Tier 2 capital, significantly influence banks' performance, with Tier 1 capital having a negative relationship with CAR, while Tier 2 capital shows a positive correlation with CAR, reflecting its role as a stable buffer against potential losses.

From a policy perspective, the findings underscore the necessity of developing regulatory frameworks that foster Fintech innovation while preserving the competition, performance, and integrity of the banking sector. Targeted investments in digital infrastructure and the promotion of customer-centric services are essential to remain competitive in a rapidly embracing digitalisation market. However, future studies should consider a wider range of Fintech innovations beyond mobile transactions and ATMs, including digital banking platforms, peer-to-peer lending, blockchain technology, and artificial intelligence in banking operations. Comparative studies with other emerging

markets or developed economies can provide context for understanding the unique challenges and opportunities within the South African banking sector.

Author Contributions: This section is mandatory. The papers with more than one author should specify the individual contributions of particular authors. Authorship should be limited to those with a substantial contribution to the work. The contributions should be summarised using the following statements: "Conceptualization, N.M., D.K., and P.M.; methodology, N.M.; software, N.M.; validation, D.K. and P.M.; formal analysis, N.M.; investigation, N.M.; resources, D.K. and P.M.; data curation, N.M.; writing—original draft preparation, N.M.; writing—review and editing, N.M., D.K. and P.M.; visualisation, N.M., D.K. and P.M.; supervision, D.K. and P.M.; project administration, N.M. All authors have read and agreed to the published version of the manuscript.

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References

Abusharba, M.T., Triyuwono, I., Ismail, M. and Rahman, A.F., (2013). Determinants of capital adequacy ratio (CAR) in Indonesian Islamic commercial banks. *Global Review of Accounting and Finance*, 4(1), 159-170.

Adler, D. (2019). Schumpeter's Theory of Creative Destruction - Engineering and Public Policy - College of Engineering - Carnegie Mellon University. [online] Available at: https://www.cmu.edu/epp/irle/irle-blog-pages/schumpeters-theory-of-creative-destruction.html (accessed on 08 May 2024).

Apau, R., Sibindi, A., & Jeke, L., (2023). Effect of macroeconomic dynamics on bank asset quality under different market conditions: Evidence from Ghana. *Risks*, 11(9), 158. https://doi.org/10.3390/risks11090158

Arner, D.W., Barberis, J., & Buckley, R.P., (2015). The evolution of Fintech: A new post-crisis paradigm. *Georgetown Journal of Internationa* Law, 47, 1271. https://doi.org/10.2139/ssrn.2676553

Bejar, P. et al. (2022). Can Fintech foster competition in the banking system in Latin America and the Caribbean? *Latin American Journal of Central Banking*, 3(2), 100061. https://doi.org/10.1016/j.latcb.2022.100061

Booyens, M., Nayagar, K., & Le Roux, C.L. (2018) An Empirical Analysis of South African Bank profitability, 4th 2018 Academy of Business and Emerging Markets (ABEM) Conference. Winnipeg, Canada: Academy of Business and Emerging Markets (ABEM). Available at: https://www.researchgate.net/profile/Mohammad-Hossain-125/publication/348555592_4_th_2018_Academy_of_Business_and_Emerging_Markets_ABEM_Conference/links/60040525a6fdccdcb85c4965/4-th-2018-Academy-of-Business-and-Emerging-Markets-ABEM-Conference.pdf#page=76 (Accessed: 11 February 2025).

Castleman, R.L., (2018). The role of dynamic capabilities in the strategic management of payment disruption in the South African banking industry (Doctoral dissertation).

Chigada, J. and Hirschfelder, B., (2017). Mobile banking in South Africa: A review and directions for future research. *South African Journal of Information Management*, 19(1), 1-9. https://doi.org/10.4102/sajim.v19i1.789

Christensen, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Harvard Business Review Press.

Christensen, C., Raynor, M., & McDonald, R. (2024). What is disruptive innovation? *Harvard Business Review*. Available at: https://hbr.org/2015/12/what-is-disruptive-innovation (Accessed: 23 February 2024).

Cowling, N. (2023). South Africa: Banking assets as GDP share, Statista. Available at: https://www.statista.com/statistics/1349337/bank-assets-as-share-of-gdp-in-south-africa/ (Accessed: 27 February 2024).

Dwivedi, P., Alabdooli, J.I., & Dwivedi, R. (2021). Role of Fintech Adoption for Competitiveness and Performance of the Bank: A Study of the Banking industry in UAE. *International Journal of Global Business and Competitiveness*, 16(2), 130-138. https://doi.org/10.1007/s42943-021-00033-9

Financial Sector Conduct Authority (FSCA) (2021). Digital Banking Research Document. Financial Sector Conduct Authority. Available at: https://www.fsca.co.za/Regulatory%20Frameworks/FintechDocuments/Digital%20Banking%20Research%20Document.pdf (Accessed: 5 October 2024).

Furi, T. (2022). Determinants of financial instability in selected East and Southern African countries. *International Journal of Economics, Finance and Management Sciences*. https://doi.org/10.11648/j.ijefm.20221002.11

Gomber, P. et al. (2018). On the fintech revolution: interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of Management Information Systems*, 35(1), 220-265. https://doi.org/10.1080/07421222.2018.1440766

IFWG. (2023). Fintech Scoping in South Africa Report. [online] Available at: https://www.ifwg.co.za/IFWG%20Documents/Fintech_Scoping_in_SA_Report.pdf [Accessed 5 September 2024].

Igan, D., Pería, M.S.M., Pierri, N., & Presbitero, A. (2021) When they go low, we go high? Measuring bank market power in a low-for-long environment. Washington, DC: International Monetary Fund. https://doi.org/10.5089/9781513573526.001

Koetter, M., Kolari, J.W., & Spierdijk, L., (2008). Efficient Competition? Testing the 'quiet life' of US banks with adjusted Lerner indices. In Proceedings of the 44th' Bank structure and competition' conference, Federal Reserve Bank of Chicago.

KPMG International. (2024). Southern Africa Banking Survey: Vision 2030 [PDF]. [https://assets.kpmg.com/content/dam/kpmg/za/pdf/2024/Southern%20Africa%20Banking%20Survey_Vision%202030%20final.pdf] (Accessed on 05 September 2024)

Ky, S.S., Rugemintwari, C. and Sauviat, A., (2024). Is fintech good for bank performance? The case of mobile money in the East African Community. *International Journal of Finance & Economics*. Advance online publication. https://doi.org/10.1002/ijfe.3100

Lakshmi, T.V., & Yashwanth, M.M., (2024). The impact of fintech innovations on traditional banking models. *International Research Journal on Advanced Engineering and Management*, 2(05), 1751-1754. https://doi.org/10.47392/IRJAEM.2024.0258

McKinsey & Company, (2020). Fintech in Africa: The End of the Beginning. McKinsey & Company. Available at: https://www.mckinsey.com/industries/financial-services/our-insights/Fintech-in-africa-the-end-of-the-beginning [Accessed 30 August 2024].

Mlambo, K., & Ncube, M., (2011). Competition and efficiency in the banking sector in South Africa. *African Development Review*, 23(1), 4-15. https://doi.org/10.1111/j.1467-8268.2010.00268.x

Moyo, B. (2018). An analysis of competition, efficiency, and soundness in the South African banking sector. *South African Journal of Economic and Management Sciences*, 21(1). https://doi.org/10.4102/sajems.v21i1.2291

Mugabe, L.M. (2022). The Effect of Fintech on Banking Performance in South Africa. [online] The Development Finance Centre (DEFIC). Available at: open.uct.ac.za [Accessed 07 March. 2024].

Naceur, S. B., Candelon, B., Elekdag, M. S. A., Elekdag, S., & Emrullahu, D. (2023). Is FinTech eating the bank's lunch? IMF Working Papers No. WP/23/239. https://www.imf.org/en/Publications/WP/Issues/2023/11/18/Is-FinTech-Eating-the-Bank-s-Lunch-540817

Noor, M.I., & Rosyid, P.I., (2018). Effect of capital adequacy ratio (CAR), loan to deposit ratio (LDR), and return on equity (ROE) on share price PT Bank Danamon Indonesia, TBK. *International Journal of Business and Applied Social Science*, 4, 81-101.

Peón, D., Antelo, M., & Sun, Y., (2024). Market competition and strategic interaction in the Spanish Fintech industry. Research in International Business and Finance, 70, 102365. https://doi.org/10.1016/j.ribaf.2024.102365

Pham, P.T., Tran, B.T., Huynh, T.H., Popesko, B., & Hoang, D.S., (2024). Impact of fintech's development on bank performance: An empirical study from Vietnam. *Gadjah Mada International Journal of Business*, 26 (1), 1-22. https://doi.org/10.22146/gamaijb.71040

Phan, D. H. B., Narayan, P. K., Rahman, R. E., & Hutabarat, A. R. (2020). Do financial technology firms influence bank performance? *Pacific-Basin Finance Journal*, 62, 101210. https://doi.org/10.1016/j.pacfin.2019.101210

Philippon, T., (2016). The Fintech opportunity (No. w22476). National Bureau of Economic Research. https://doi.org/10.3386/w22476

Rengasamy, D. (2019). The need to evaluate bank performance - news and events - Curtin University, Sarawak Malaysia, News and Events. Available at: https://news.curtin.edu.my/insight/2012-2/the-need-to-evaluate-bank-performance/ (Accessed: 29 January 2024).

Shaffer, S., & Spierdijk, L., (2020). Measuring multi-product banks' market power using the Lerner index. *Journal of Banking & Finance*, 117, 105859. https://doi.org/10.1016/j.jbankfin.2020.105859

Song et al. European Central Bank (ECB). (2009). The determinants of banks' liquidity buffers. [Online] Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1096.pdf [Accessed 30 Nov. 2024].

Sweezy, P.M., (1943). Professor Schumpeter's theory of innovation. *The Review of Economics and Statistics*, 25(1), 93-96. https://doi.org/10.2307/1924551

Takundwa, S. (2020). Fintech Regulation in SA. Unpublished Masters Thesis, University of Cape Town, South Africa.

Tarawneh, A., Abdul-Rahman, A., Mohd Amin, S.I., & Ghazali, M.F., (2024). A Systematic Review of Fintech and Banking Profitability. *International Journal of Financial Studies*, 12(1), 3. https://doi.org/10.3390/ijfs12010003

Van Deventer, M., & Redda, E.H. (2023). Customer loyalty and trust in South African retail banking. *Innovative Marketing*, 19(2), 211-222. https://doi.org/10.21511/im.19(2).2023.17

Vilakazi, M. (2021). An analysis of bank competition and financial stability: Evidence from the South African banking sector A research dissertation submitted in fulfilment of the requirements for the degree Master of Commerce (Economics). [online] Available at: https://researchspace.ukzn.ac.za/server/api/core/bitstreams/95e74977-ca41-4454-a5ed-528a14cf4097/content. (Accessed: 10 April 2024).

Virasamy, D., (2021). Exploring the relationship between Fintech and Financial Service Providers in South Africa. Unpublished Masters Thesis, University of Witwatersrand, South Africa.

Vucinic, M. (2020). Fintech and Financial Stability Potential Influence of Fintech. *Journal of Central Banking Theory and Practice*, 2, 43-66. https://doi.org/10.2478/jcbtp-2020-0013

Wexler, M.N., & Oberlander, J., (2021). Robo-advisors (RAs): the programmed self-service market for professional advice. *Journal of Service Theory and Practice*, 31(3), 351-365. https://doi.org/10.1108/JSTP-07-2020-0153

Zhao, J., Li, X., Yu, C.H., Chen, S., & Lee, C.C., (2022). Riding the FinTech innovation wave: FinTech, patents and bank performance. *Journal of International Money and Finance*, 122, 102552. https://doi.org/10.1016/j.jimonfin.2021.102552