South African Reserve Bank

Working Paper Series

WP/24/17

The effects of Basel III capital and liquidity requirements on the growth of banking functions performed by non-bank financial institutions and fintech platforms in South Africa

Chimwemwe Chipeta and Lerato Mapela

Authorised for publication by Konstantin Makrelov

8 November 2024

SOUTH AFRICAN RESERVE BANK

South African Reserve Bank Working Papers are written by staff members of the South African Reserve Bank and, on occasion, by consultants under the auspices of the South African Reserve Bank. The papers deal with topical issues and describe preliminary research findings and develop new analytical or empirical approaches in their analyses. They are solely intended to elicit comments and stimulate debate.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the South African Reserve Bank or South African Reserve Bank policy. While every precaution is taken to ensure the accuracy of information, the South African Reserve Bank shall not be liable to any person for inaccurate information, omissions or opinions contained herein.

South African Reserve Bank Working Papers are externally refereed.

Information on South African Reserve Bank Working Papers can be found at
https://www.resbank.co.za/en/home/publications/Papers/working-papers.

Enquiries relating to the Working Paper Series can be addressed to:
Head: Economic Research Department
South African Reserve Bank
P O Box 427
Pretoria 0001

Tel. +27 12 313 3911

The effects of Basel III capital and liquidity requirements on the growth of banking functions performed by non-bank financial institutions and fintech platforms in South Africa

Chimwemwe Chipeta* and Lerato Mapela†

Abstract

We examine the effects of the implementation of the Basel III accord on the growth of non-bank financial institutions and fintech platforms in South Africa. Using a *difference-in-difference* estimation procedure, we find evidence of regulatory arbitrage, suggesting that the imposition of minimum capital requirements results in the growth of deposit-taking non-bank financial institutions. Our results are robust to alternative event windows and falsification tests. In contrast, country-level estimations show that tighter minimum capital restrictions constrain the growth of fintech platforms in South Africa, while innovation plays a crucial role in driving the growth and funding of fintech ventures in select African economies. Our results highlight the need for targeted policies that enable and sustain a vibrant fintech ecosystem.

JEL classification

E58, G23, G28

Keywords

Basel III, non-bank financial institutions, fintech, innovation, venture capital funding

* Corresponding author. School of Economics and Finance, University of the Witwatersrand, Johannesburg, South Africa. Email: Chimwemwe.Chipeta@wits.ac.za

† School of Economics and Finance, University of the Witwatersrand. Lerato.Mapela@wits.ac.za

1. Introduction

As regulatory developments and disruptive financial technologies cause transformative shifts to the financial landscape, the ascent of non-banking financial institutions, or shadow banking, has emerged as a compelling focal point for scholarly inquiry. Non-bank financial institutions typically replicate functions of the traditional banking system, with similar risk exposure but less capital (Meeks, Nelson and Alessandri 2013). The Financial Stability Board (2011) defines shadow banking as "the system of credit intermediation involving entities and activities (fully or partly) outside of the regular banking system". This definition is widely accepted and specifically refers to non-banking entities performing activities otherwise performed by traditional banks. As with any other registered company in South Africa conducting financial activities, non-bank financial institutions must adhere to the requirements of the Financial Sector Conduct Authority, the National Credit Regulator and other applicable legislation. This segment of the market is thus not completely excused from mandatory financial law, but it is not subject to Basel regulatory requirements. The tighter capital and liquidity requirements faced by traditional banks may result in *regulatory arbitrage* and an opportunity for entities to conduct bank-like activities at a lower cost of capital. In line with this argument, the International Monetary Fund (IMF) (2014) notes that the tightening of bank capital and liquidity requirements positively influences the growth of shadow banking activities. The rise of shadow bank activities may thus be attributed to the stringent regulatory requirements (such as the Basel accords) faced by traditional banks.

Likewise, financial innovation has created new ways of conducting business, and fintech platforms play a major role in providing 'banking' functions such as payment services and the provision of credit. The growth in fintech activities in Africa is unprecedented, and South Africa has become a significant player in the fintech market, accounting for 40% of African fintech revenues (BDO 2022). In 2021 foreign investment in fintech platforms in Africa grew to $1.6 billion, representing a staggering 50% increase from 2020 (KPMG 2022). Given these developments, there is a need to examine regulation's role in enabling and sustaining a vibrant fintech ecosystem in Africa.

Our paper contributes to the literature in several ways. Firstly, we depart from the traditional literature on the effects of Basel regulations on the performance of traditional banks (see De Bandt et al. (2022); Ejoh and Iwara (2014); Ezike and Oke (2013); Giordana and Schumacher (2017); Ikpefan (2013); Lee and Hsieh (2013)). Instead, we focus on the under-researched link between Basel regulations and the growth of non-bank financial institutions in South Africa. Understanding this relationship is pivotal for evaluating how Basel regulations, which are meticulously designed to ensure the stability of traditional banking, may inadvertently affect the expansion and behaviour of non-bank financial institutions. This insight is crucial for assessing potential regulatory gaps and the broader stability of the South African financial sector. Non-bank financial institutions, which operate beyond the confines of traditional regulatory frameworks, may present avenues for circumventing Basel regulations, thereby raising the question of the effectiveness of the regulatory regime.

Secondly, we highlight the channels through which Basel regulations are linked to the growth of non-bank financial services. We conjecture that tighter capital restrictions could present opportunities for non-bank financial firms not subject to Basel regulations to provide traditional banking services. We further argue that more bank capital regulations could promote the stability of the overall banking system and boost investor confidence in the economy. We also posit that a well-capitalised banking sector promotes access to credit for the non-bank financial sector, ultimately boosting investment.

Lastly, we highlight the channels through which country-level innovation is associated with the growth of the fintech sector and the funding of fintech platforms. We contend that innovation lowers operational and transaction costs while boosting the efficiency of financial services. A culture of innovation also provides avenues for fintech entrepreneurs to develop and scale their businesses and is more likely to attract venture capital funding and other strategic investors into the fintech industry. Our understanding of these critical linkages should present opportunities for the development and implementation of effective policy responses that foster a vibrant and sustainable fintech ecosystem.

We document several findings of empirical and policy significance. Firstly, we show that higher minimum capital requirements result in the growth of core non-bank financial institutions. Our results are robust to the specification of alternative event windows and falsification tests. Secondly, we find that tighter capital restrictions constrain the growth of fintech platforms in South Africa. Fintech ventures are often perceived as high risk due to their innovative and disruptive nature, which may reduce interest and support from risk-averse traditional banks. Thirdly, we highlight the important role of innovation in facilitating growth and investments in fintech platforms. Specifically, innovation serves as a catalyst for the development of cutting-edge financial technologies and ultimately attracts funding from venture capitalists, who are more likely to invest in high-risk initiatives. Finally, we show that funding for fintech investments is significantly curtailed in countries with a higher risk premium. These findings highlight the need for policy interventions targeted at a regulatory environment that supports the growth of both traditional and innovative financial institutions while managing associated risks.

The rest of this paper is organised as follows: section 2 covers the theoretical context and hypothesis development, section 3 discusses the data and methodology, section 4 presents and discusses the results, and section 5 concludes with recommendations.

2. Theoretical context and hypothesis development

Our first hypothesis reinforces the link between Basel III minimum capital requirements and the growth of shadow banking or non-bank financial institutions. As traditional banks are subject to regulatory requirements – that is, strict capital requirements that limit the credit activity of commercial banks – non-bank financial institutions and fintech platforms partially fill the gap created when a bank is unable to issue more loans than its required capital-to-assets ratio. The increased regulatory burden faced by traditional banks and the advances in technology thus influence the growth of non-bank financial institutions and fintech lenders. More specifically, regulatory requirements limit how traditional banks can provide financial products to consumers, which causes them to lose market share to alternative lenders. Buchak et al. (2018) compared traditional lending and shadow banking activity in the United States to examine whether increased regulation can explain the decrease in traditional mortgage banking. They

found that shadow banks are more likely to cater to markets subject to larger regulatory constraints – lower-income and riskier clients in minority populations. Moreover, the market share for shadow banking mortgage origination in the United States increased from 30% in 2007 to 50% in 2017. The study attributes 60% of the increased market share to increases in bank regulatory costs and 30% to technological advances. These results indicate that the timing of regulatory changes is closely linked to the rise and growth of non-bank financial institutions and fintech platforms. We thus formulate and test the following two hypotheses:

> ***Hypothesis 1A****: There is a significant and positive relationship between Basel III minimum capital requirements and the growth of non-bank financial firms.*

> ***Hypothesis 1B:*** *There is a significant and positive relationship between Basel III liquidity requirements and the growth of non-bank financial firms.*

Our second hypothesis is motivated by the role regulation plays in advancing the growth and funding of fintech platforms in South Africa. In particular, the stringent liquidity requirements imposed on traditional banks constrain their lending capacity and can drive borrowers to non-bank and fintech institutions. As banks are required to hold more liquid assets, they may reduce their lending activities or increase their borrowing rates, which is ultimately costly to the consumer. The advancement of technology and digitisation of financial services are core drivers of the rise of shadow banking activities: fintech institutions can easily create a platform through which a party with available funds can lend to another party in need of these funds with minimal transaction fees, making peer-to-peer lending attractive to consumers. This short-term migration of consumers from traditional banking to fintech platforms can be linked to liquidity regulation.

However, this sort of lending is risky because of the limited intermediation and regulation in the field. Dömötör, Illés and Ölvedi (2023) suggest that peer-to-peer lending represents high-risk loans that traditional banks are unable to provide financing for. Peer-to-peer lenders are also prone to greater risk, as their investment is unsecured and the deposits are not guaranteed by the central bank or banking

authority. This indicates a need for regulation that protects consumers and promotes the stability of the broader financial system. However, the rise of shadow banking and fintech platforms may be attributable to the lack of such regulation, so implementation thereof might hinder the growth of these platforms and non-bank financial institutions.

Another reason for the growth in fintech is fintech platforms' ability to process alternative sources of credit data, particularly for customers and businesses with little credit history. This capability offers such customers and businesses the opportunity to access the deposit and lending market. While banks could use similar methods, Stulz (2019) argues that banks are more focused on their existing products and are less inclined and slower to innovate relative to the rapid innovative business nature of fintech firms. This slow innovation by banks is partly attributable to regulation. The disruption of fintech in both developed and developing countries has forced financial companies to expand their offerings and serve populations that cannot access traditional banking services. Jagtiani and Lemieux (2018) find that fintech lenders penetrate markets that are underserved by traditional banks – in markets where bank branches are declining. This shows that the shadow banking system benefits emerging economies by providing improved access to credit when conventional banks grant fewer loans because of liquidity requirements. While the risks may be concerning, shadow banking activities by non-bank financial institutions and fintech platforms likely contribute to the overall economy and could improve financial system stability rather than disrupt it. Given the above, we formulate and test the following hypothesis:

> ***Hypothesis 2:*** *There is a significant and positive relationship between Basel III requirements and the growth of and investment in fintech platforms.*

Our last hypothesis is premised on the role of innovation in facilitating the establishment of fintech firms in Africa. There is a strong link between technological advancements and innovation (see Chun, Kim and Lee (2015); Koellinger (2008); Mithas and Rust (2016)). Most importantly, an emerging strand of literature highlights the importance of technology in driving fintech activities. For instance, Haddad and Hornuf (2019) show that fintech ventures thrive in environments characterised by the availability of cutting-edge technologies. Laidroo and Avarmaa (2020) posit that fintech

activity is largely driven by technological expertise and the provision of competitive information and communication technology services. Another strand of literature emphasises the direct link between innovation and fintech adoption. For instance, Huarng and Yu (2022) find that a culture of innovation and technological advancement drives the adoption of fintech, while Kowalewski and Pisany (2023) show that country-level innovation is a primary driver of the establishment of fintech across the world. We argue that innovation drives fintech activities via the following channels: firstly, innovation creates a conducive environment for the development of cutting-edge financial technologies, thereby facilitating growth of and investment in fintech initiatives. Secondly, a supportive ecosystem for innovation is more likely to attract venture capital funding and other strategic investors into the fintech industry. Thus, we hypothesise that:

Hypothesis 3: *There is a significant and positive association between innovation and the growth of and investment in fintech platforms in Africa*

3. Data and methodology

3.1 Data

We examined a sample of 31 non-bank financial institutions in South Africa for the period 2009 to 2017, which covers five-year (2011 to 2015), seven-year (2010 to 2016) and nine-year (2009 to 2017) event windows. This translates to 103, 148 and 192 firm-year observations respectively. To explore the effects of Basel regulations on the growth of fintech platforms in South Africa, we used country-level data on the growth and venture capital funding of fintech companies. To facilitate comparison and ensure that our country-level sample is adequate, we incorporated additional data for Kenya, Nigeria and Egypt, resulting in 43 observations. Our choice of countries was limited by the number of applicable country-level observations on fintech platforms. The fintech variables are available for the years 2009 to 2022 for South Africa, 2010 to 2022 for Kenya, 2011 to 2022 for Nigeria, and 2014 to 2022 for Egypt. Our firm- and country-level data sources are reported in Table 1.

Table 1: Description of variables and data sources

Variable notation	Variable name	Definition	Source
ASSETS	Size	Natural logarithm of the total assets for firm *i* in year *t*.	Bloomberg
FINTECH	Proportion of fintech firms	Ratio of fintech companies to total number of fintech companies for country *j* in year *t*.	Crunchbase
VC FUNDING	VC funding	Natural logarithm of total venture capital funding for country *j* in year *t*.	Crunchbase
CAR	Capital adequacy ratio	Ratio of bank capital and reserves to total assets for country *j* in year *t*.	World Bank
LCR	Liquidity coverage ratio	Ratio of cash and balances with central bank to deposits and short-term funding for country *j* in year *t*.	World Bank
TOBQ	Tobin's Q	Ratio of market value of a company to asset replacement cost for firm *i* in year *t*.	Bloomberg
TREATED	Core non-banking financial institutions	Equals 1 for core non-bank financial institutions and 0 otherwise. Core non-bank financial institutions exclude insurance firms.	Authors' calculation
POST	Post-Basel III	Equals 1 for the period after the implementation of Basel III and 0 otherwise.	Authors' calculation
NIM	Net interest margin	Ratio of net interest revenue to average earning assets for firm *i* in year *t*.	IRESS
PROFIT	Profitability	Ratio of earnings before interest and taxes to total assets for firm *i* in year *t*.	IRESS
LEV	Leverage	Ratio of total liabilities to total assets for firm *i* in year *t*.	IRESS
NPL	Non-performing loans	Ratio of aggregate bank non-performing loans to total loans for firm *i* in year *t*.	World Bank
RISK	Loan risk exposure	Ratio of long-term loans plus investments to total assets for firm *i* in year *t*.	Authors' calculation
GDPG	GDP growth	Annual percentage growth rate of gross domestic product (GDP) at market prices based on constant local currency for country *j* in year *t*.	World Bank
STOCKSGDP	Stocks traded	Total value of all listed shares in a stock market as a percentage of GDP for country *j* in year *t*.	World Bank
PSCGDP	Private sector credit	Financial resources provided to the private sector by financial corporations as a percentage of GDP for country *j* in year *t*.	World Bank
INSTQ	Institutional quality	Index of economic freedom for country *j* in year *t*.	Heritage Foundation
INNOV	Innovation	Measures country-level innovation by rank. This is calculated as the inverse of rank divided by the total number of countries for country *j* in year *t*.	World Intellectual Property Organisation
RISKP	Country risk premium	Measures the interest rate charged by banks on loans to the private sector minus the 'risk-free' treasury bill interest rate for country *j* in year *t*.	World Bank
COVID	Covid-19	Equals 1 for the years 2020 and 2021 and 0 otherwise	Authors' calculation

3.2 Model specification

To investigate the association between Basel III regulations and the growth of non-bank financial institutions, we employed a *difference-in-difference* approach in conjunction with the system generalised method of moments (GMM) estimator. The integration of system GMM addresses potential endogeneity concerns inherent in dynamic panel data models (see Liao et al. (2023)). We estimate the following regression model:

$$Y_{i,t=} B_0 + B_1 Treated_{i,t} * Post_t + B_2 Treated_{i,t} + B_3 Post_t + B_4 Controls'_{i,t} + B_5 Y_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is the dependent variable capturing the growth of non-bank financial institutions for firm i at time t. B_0 is a constant and $B_0 \ldots . B_5$ are coefficients of the estimated variables. $Treated_{i,t} * Post_t$ measures the treatment effect of Basel III implementation on the growth of non-bank financial institutions for firm i at time t. $Treated_{i,t}$ is the experimental group of firms identified as non-bank financial institutions other than insurance companies. $Post_t$ is a time dummy that equals 1 for the period after the implementation of Basel III and 0 otherwise. $B_4 Controls'_{i,t}$ is a vector of firm-specific controls for firm i at time t. $B_5 Y_{i,t-1}$ is the lagged dependent variable and $\varepsilon_{i,t}$ is the error term. These variables are defined in Table 1.

To examine the effect of Basel regulations on the growth and funding of fintech platforms in South Africa, we estimate a panel regression for four African countries – South Africa, Egypt, Nigeria and Kenya.[1] The choice of countries was determined by data availability of aggregate data on fintech activity in Africa. We specify the following system GMM estimation:

$$Y_{j,t=} B_0 + B_1 CAR_{j,t} * RSA_t + B_2 LCR_{j,t} + B_3 Post_t + B_4 Controls'_{j,t} + B_5 Y_{j,t-1} + \varepsilon_{j,t} \quad (2)$$

[1] The inclusion of other African countries increases our sample size to yield reliable estimates for our variable of interest.

where $Y_{j,t}$ is the dependent variable capturing the growth of fintech platforms and venture capital funding for country j at time t. B_0 is a constant and $B_0 \ldots . B_5$ are coefficients of the estimated variables. Our variable of interest is the estimated coefficient of the interaction term $CAR_{j,t} * RSA_{j,t}$ (B_1), which measures the influence of Basel III minimum capital requirements on fintech dynamics in South Africa. The term captures the unique effect of one of the pillars of Basel regulation in the South African context, where *RSA* is a dummy variable indicating whether the observation pertains to South Africa.

$LCR_{j,t}$ is the aggregate measure of liquidity in country j at time t, and $Post_t$ is a time dummy capturing the post-implementation phase of Basel III. $Controls'_{j,t}$ is a vector of country-specific macroeconomic variables. $Y_{j,t-1}$ is the lagged dependent variable and $\varepsilon_{j,t}$ is the error term. To mitigate the effect of outliers, our variables are winsorised at the 1st and 99th percentile.

4. Results

4.1 Basic results

In this section, we examine whether regulatory-specific variables explain the growth of non-bank financial institutions. Table 2 reports the summary of descriptive statistics of each of the variables. Tables 3a and 3b report the Pearson correlation matrix. A total of 31 non-bank financial institutions, including insurance firms, in South Africa are included in the model. The Basel III variables in panel B show that, on average, the minimum capital requirement and liquidity coverage ratios are 14.99% and 7.42% respectively over a period of close to 20 years.

Table 2: Summary of descriptive statistics

Panel A					
Variable	**Obs.**	**Mean**	**Std. dev.**	**Min.**	**Max.**
FINTECH	48	0.0828	0.0600	0.0080	0.2258
VC FUNDING	48	7.2935	1.0246	4.4771	8.7976
CAR	48	0.0875	0.0332	0.0301	0.1390
LCR	48	0.2183	0.2054	0.0314	0.6905
STGDP	48	0.6159	0.6794	0.0037	2.9263
PSCGDP	48	0.3439	0.1914	0.1017	0.6694
REAL INT	47	0.0496	0.0395	-0.0875	0.1359
RISKP	47	0.0420	0.0346	-0.0417	0.1201
GDPGROWTH	48	0.0318	0.0268	-0.0634	0.0805
INSTQ	48	0.5716	0.0343	0.4910	0.6380
INNOV	48	1.6420	0.5083	1.0313	3.0697
Panel B					
Variable	**Obs.**	**Mean**	**Std. dev.**	**Min.**	**Max.**
SIZE	435	6.9113	1.0779	3.9432	8.9749
CAR	409	0.1499	0.0149	0.1230	0.1749
LCR	432	0.0742	0.1294	0.0411	0.7800
NPL	342	0.0346	0.0123	0.0110	0.0590
STLR	435	0.0641	0.0157	0.0378	0.1080
NIM	435	-0.0322	0.5764	-4.1463	1.0000
PROFIT	435	0.0260	0.1655	-1.0352	0.4152
TOBQ	435	2.6796	0.5285	1.2377	4.0229
LEV	433	0.5976	0.6528	2.10e-06	5.4431
RISK	435	0.5086	0.3239	0.0003	1.4820

The average risk ratio is 50.86%, measured as the sum of total loans and investments as a percentage of total assets. This risk exposure indicates that half of the firms' asset base is committed to loan extensions and investments. The mean net interest margin of -3.22% suggests that, on average, interest expenses exceed their interest income; a consistently negative net interest margin can threaten the financial stability of the institution. This also indicates that the non-bank financial institutions are not managing their interest rate risk, effectively meaning that borrowing costs are increasing even as the earning assets do not generate sufficient interest and investment income.

Table 3a: Pearson correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) *FINTECH*	1.0000												
(2) *VCFUND*	0.4526*	1.0000											
(3) *CAR*	-0.3786*	-0.4102*	1.0000										
(4) *LCR*	0.3829*	0.5589*	-0.4015*	1.0000									
(5) *POST*	0.0625	-0.3155*	-0.1603	-0.4774*	1.0000								
(6) *STGDP*	-0.1780	-0.3276*	0.4451*	-0.6359*	0.1591	1.0000							
(7) *PSCGDP*	-0.1223	-0.3705*	-0.1838	-0.7265*	0.7096*	0.3267*	1.0000						
(8) *REALINT*	-0.2437	-0.2517	0.5897*	-0.2484	-0.1905	0.3202*	-0.2412	1.0000					
(9) *RISK*	-0.1598	-0.4849*	0.5779*	-0.0445	-0.1458	0.3460*	-0.2737	0.5568*	1.0000				
(10) *GDPGROWTH*	-0.1341	0.1702	0.1534	0.0973	-0.4280*	0.1292	-0.3612*	0.1896	-0.0491	1.0000			
(11) *INSTQ*	-0.1370	-0.4459*	-0.0414	-0.5034*	0.5330*	0.1977	0.6791*	0.0314	0.2059	-0.4651*	1.0000		
(12) *INNOV*	-0.1454	-0.4141*	-0.1419	-0.7192*	0.6321*	0.3080*	0.9503*	-0.1923	-0.1580	-0.3631*	0.7463*	1.0000	
(13) *COVID*	0.4237*	0.1177	-0.1679	0.1536	0.0412	-0.0979	-0.0443	-0.1014	-0.0107	-0.2246	-0.0635	-0.0739	1.0000

Note: The * denotes statistical significance at the 1% or 5% level.

Table 3b: Pearson correlation matrix

	1	2	3	4	5	6	7	8	9	10
(1) *SIZE*	1.0000									
(2) *CAR*	0.2097*	1.0000								
(3) *LCR*	-0.1436*	-0.1821*	1.0000							
(4) *NPL*	0.0392	0.2321*	-0.2920*	1.0000						
(5) *STLR*	-0.0643	-0.3918*	0.0720	-0.0791	1.0000					
(6) *NIM*	0.1156*	-0.0203	0.0267	0.0446	0.0080	1.0000				
(7) *PROFIT*	0.2418*	-0.0196	-0.1927*	-0.0646	-0.1026	0.0440	1.0000			
(8) *TOBQ*	-0.4621*	-0.1549*	0.1227*	-0.1131*	-0.0487	-0.0565	-0.0353	1.0000		
(9) *LEV*	-0.0826	-0.0207	0.1805*	-0.0314	0.0304	0.0145	-0.2537*	0.0142	1.0000	
(10) *RISK*	0.1861*	-0.0283	0.0260	-0.0178	0.0427	0.1434*	0.1996*	0.2017*	0.1222*	1.0000

Note: The * denotes statistical significance at the 1% or 5% level.

4.2 Empirical results

Table 4 reports the GMM regression results. Panel A reports the DID-system GMM regression results for our sample of South African non-bank financial institutions. Models 1 to 3 report the regression coefficients for the five-, seven- and nine-year event windows respectively. Our main variable of interest is *Treated*Post*, which captures the differences in the growth dynamics of our treated sample relative to the control group following the introduction of Basel III regulations. We find that the coefficient on this variable is positive and statistically significant for all three models. Consistent with *Hypothesis 1A* and the existing literature (see Gebauer and Mazelis (2023); Hachem (2018)), we show that the implementation of Basel III regulation is associated with growth of core non-bank financial institutions relative to our sample of insurance companies. A well-capitalised banking system serves as a catalyst for the growth of non-bank financial institutions by providing credit and other financial services to these firms. In turn, these spillover effects benefit the operations of non-bank financial institutions. A well-capitalised banking system also boosts overall investor confidence in the economy, thereby providing avenues for the allocation of capital to non-bank financial institutions. However, the effects of liquidity requirements on the growth of the banking sector are muted, so *Hypothesis 1B* is rejected. To ensure that our results are robust to omitted variable bias and other misspecification problems, we incorporated a falsification variable in our estimations for each of the event windows. The outcomes of this analysis are shown in Table A1 in the Annexure. Notably, the insignificance of the coefficient associated with the falsification variable lends support to the validity of our models.[2]

The results on our control variables are as expected. The coefficient on the leverage and risk variables is negative and statistically significant. In the case of leverage, excessive debt may serve as a proxy for financial constraints, thereby hindering the growth of non-bank financial institutions. In the case of risk, non-bank financial institutions whose assets are exposed to higher levels of risk experience a significant

[2] We also conducted a falsification test for model 1 in the country-level analysis and found similar results. We restricted this to model 1, as it is the model that yielded a significant coefficient on the main variable of interest.

reduction in their growth. We also find that profitable non-bank financial institutions experience significant growth. However, we show a negative and significant *Tobin's Q* coefficient, implying that market overvaluation translates to the lower asset growth.

Table 4: Regression results

Panel A	**DID-SYSGMM regressions**			**Panel B**	**SYS GMM regressions**	
	Event window					
	Model 1	**Model 2**	**Model 3**		**Model 1**	**Model 2**
	5 years	**7 years**	**9 years**		**Fintech**	**VC funding**
	(*t-2 to t+2*)	**(*t-3 to t+3*)**	**(*t-4 to t+4*)**			
*TREATED*POST*	0.0016***	0.0015**	0.0019***	*CAR*RSA*	-0.9701***	-0.1907
	(0.0005)	(0.0006)	(0.0007)		(0.3548)	(0.1331)
TREATED	-0.0021	-0.0014	-0.0018	*CAR*	-0.0954	0.0083
	(0.0026)	(0.0017)	(0.0016)		(0.4517)	(0.1565)
POST DUMMY	-0.0007	-0.0007	-0.0009	*LCR*	0.0164	0.0673***
	(0.0007)	(0.0733)	(0.0007)		(0.0775)	(0.0245)
CAR	0.0216	0.0101	0.0263	*POST*	0.0342***	0.0277***
	(0.0495)	(0.0250)	(0.0222)		(0.0108)	(0.0050)
LCR	0.0566	0.0255	0.0391	*STOCKSGDP*	0.0001	0.0031
	(0.0278)	(0.0252)	(0.0447)		(0.0087)	(0.0021)
NIM	-0.0012	-0.0003	-0.0006	*REALINT*	-0.0811	0.0901***
	(0.0014)	(0.0010)	(0.0006)		(0.1973)	(0.0318)
LEVERAGE	-0.0010*	-0.0015***	-0.0007**	*RISKP*	-0.2188	-0.2289**
	(0.0005)	(0.0004)	(0.0004)		(0.4979)	(0.0996)
RISK	-0.0033**	-0.0025**	-0.0032**	*GDPGROWTH*	0.0202	-0.1088
	(0.0013)	(0.0010)	(0.0013)		(0.2127)	(0.0811)
PROFIT	0.0029**	0.0044***	0.0024**	*INNOV*	1.2873**	0.0326***
	(0.0013)	(0.0005)	(0.0011)		(0.5663)	(0.0113)
TOBQ	-0.0030**	-0.0023***	-0.0035***	*COVID*	-0.0041	0.0045***
	(0.0014)	(0.0008)	(0.0012)		(0.0244)	(0.0001)
LAGDEP	0.7866***	0.8070***	0.7324***	*LAGDEP*	0.1735	-0.3322
	(0.0760)	(0.0536)	(0.0540)		(0.1849)	(0.2863)
Constant	0.0249	0.0225***	0.0265***	*Constant*	-0.6472*	0.1030
	(0.0167)	(0.0073)	(0.0056)		(0.3653)	(0.0337)
Observations	103	148	192		43	43
(Wald)P>Chi2	0.0000	0.0000	0.0000		0.0000	0.0000
Correlation 1	0.0850	0.0688	0.0580		0.0085	0.0669
Correlation 2	0.1787	0.4520	0.5618		0.9148	0.2692

Sargan P>Chi2	0.7628	0.5359	0.0001		0.8313	0.7120
Year effects	Yes	Yes	Yes		Yes	Yes
Country effects	N/A	N/A	N/A		Yes	Yes

Note: *,** and ***denote statistical significance at the 10%, 5% and 1% levels respectively. Standard errors (in parentheses) are robust to panel-specific heteroscedasticity.

Next, we examine the effects of Basel regulation on the growth and venture capital funding of fintech platforms in Africa. The results are presented in panel B of Table 4. Our main variable of interest is the estimated coefficient of the interaction term *CAR*RSA,* which captures the relationship between Basel regulations and fintech dynamics in South Africa. The variables *PSCGDP* and *INSTQ* are dropped, as they are highly correlated with our innovation proxy.[3] In model 1, we find a negative and statistically significant relationship between tighter capital requirements and the growth of fintech platforms in South Africa.

However, this relationship is muted for model 2, which captures venture capital funding. Our results are inconsistent with *Hypothesis 2,* implying that more stringent capital requirements imposed on banks slow the growth of fintech platforms in South Africa. One plausible explanation for this finding is that fintech ventures are often perceived as high risk due to their innovative and disruptive nature. The perceived risk associated with fintech firms may be further heightened by the implementation of Basel III reforms. Specifically, these reforms impose more stringent capital requirements on traditional banks. When complied with, these requirements may lead to more conservative lending practices and a reduction in the extension of credit to fintech companies. Likewise, investors observing the cautious lending environment may perceive fintech ventures as riskier investment propositions than more traditional investments. Consequently, fintechs may face a reduced supply of finance from risk-averse traditional banks and venture capital investors. However, we show that, on average, liquidity enhances the funding of fintech platforms in Africa. Our intuition is that excess liquidity in the banking system results in banks seeking alternative ways to

[3] The high collinearity between these variables is expected, as sophisticated and well-developed financial markets and quality institutions are likely to foster innovation.

deploy their capital to generate returns. This also provides banks with the flexibility to make strategic investments in venture capital initiatives.

In line with *Hypothesis 3* and the literature (see Huarng and Yu (2022); Kowalewski and Pisany (2023)), we show that innovation plays a crucial role in the growth dynamics of fintech platforms. Consequently, the coefficient on the innovation proxy is both economically and statistically significant. We thus argue that innovation fosters the growth of fintech startups in the following ways: firstly, innovation creates a conducive environment for the development of cutting-edge financial technologies, thereby facilitating growth of and investment in fintech initiatives. Secondly, a supportive ecosystem for innovation is more likely to attract venture capital funding and other strategic investors to the fintech industry. We further consider the role of innovation in cushioning the negative effects of the country risk premium on fintech activity. Accordingly, we interact the *innovation* and *risk premium* variables. Although the sign on the coefficient on the interaction term changes, it is insignificant.[4] We conclude that although innovation plays an important role in driving fintech activity, it is insufficient to mitigate the negative effects of country risk on fintech growth and funding. There is therefore a need to identify other policy interventions aimed at reducing the overall cost of capital in the funding of private sector investments.

Consistent with our expectations, we find a positive and significant association between real interest rates and the funding of fintech platforms. Intuitively, investments gravitate to markets where real rates of return are highest. Thus, it is plausible to argue that such investment flows are likely to spill over to fintech ventures. Moreover, our findings reveal a negative and statistically significant coefficient associated with the *risk premium* variable. A heightened country risk premium corresponds to an elevated cost of capital for entrepreneurial initiatives, more so for fintech ventures, which are inherently risky. We infer that an increasing cost of capital acts as a binding constraint on the funding prospects for fintech ventures.

[4] The results are available on request.

Overall, our results reinforce the notion of *regulatory arbitrage* within the financial system and indicate that the implementation of the Basel III framework is linked to a reduction in the growth of fintech firms. Nonetheless, country-level innovation is seen as an important driver of a vibrant fintech ecosystem.

5. Conclusions and policy recommendations

This paper examines the effects of the implementation of Basel III minimum capital regulation on the growth of non-bank financial institutions and fintech platforms in South Africa. Using *difference-in-difference* estimations, we find evidence suggesting that the imposition of minimum capital requirements results in the growth of deposit-taking non-bank financial institutions. Our results are robust to alternative event windows and falsification tests. Further analyses shows that tighter capital restrictions constrain the growth of fintech platforms in South Africa, while innovation plays a crucial role in driving the growth and funding of fintech ventures in select African economies.

Our results highlight the need for several policy-related interventions. Firstly, policymakers should explore regulatory frameworks that balance risk mitigation with the imperative to foster innovation. Pursuant to this, encouraging collaboration between traditional banks and fintech ventures could enhance support for the latter. Secondly, recognising the critical role of innovation in facilitating the growth and funding of fintech, policies should be formulated that encourage research and development, foster a culture of innovation and provide incentives for partnerships between traditional financial institutions and fintech innovators. Finally, addressing the significant curtailment of fintech funding in countries with higher risk premiums requires a strategic policy focus. Policymakers should thus consider initiatives to reduce inherent risks in funding fintech initiatives and to attract venture capital by creating a supportive ecosystem.

Annexure

Table A1: Falsification tests

Panel A	DID-SYSGMM regressions			Panel B	SYS GMM regression
	Event window				FINTECH
	5 years	7 years	9 years		
	(*t-2 to t+2*)	(*t-3 to t+3*)	(*t-4 to t+4*)		
FALSIFICATION	-0.0012	-0.0006	-0.0006	***FALSIFICATION***	-0.0064
	(0.0009)	(0.0005)	(0.0004)		(0.0157)
TREATED	-0.0014	-0.0004	-0.0006	***CAR***	0.0246
	(0.0028)	(0.0018)	(0.0017)		(0.5359)
POST	0.0004	0.0003	0.0004	***LCR***	0.0482
	(0.0005)	(0.0003)	(0.0004)		(0.0810)
NIM	-0.0014	-0.0004	-0.0006	***POST***	0.0230*
	(0.0014)	(0.0010)	(0.0007)		(0.0126)
LEV	-0.0009*	-0.0015***	-0.0008**	***STOCKSGDP***	-0.0028
	(0.0005)	(0.0004)	(0.0004)		(0.0101)
PROFIT	0.0033***	0.0048***	0.0028***	***REALINT***	-0.0518
	(0.0012)	(0.0007)	(0.0011)		(0.1707)
TOBQ	-0.0031***	-0.0022***	-0.0035***	***RISKP***	-0.0595
	(0.0015)	(0.0009)	(0.0013)		(0.5539)
RISK	-0.0032***	-0.0023**	-0.0030**	***GDPGROWTH***	0.0163
	(0.0010)	(0.0010)	(0.0013)		(0.2163)
CAR	-0.0175	0.0089	0.0260	***INNOV***	1.0946*
	(0.0515)	(0.0255)	(0.0227)		(0.5705)
LCR	0.0481	0.0054	0.0181	***COVID***	-0.0039
	(0.0316)	(0.0258)	(0.0445)		(0.0242)
LAGDEP	0.7822***	0.8135***	0.7393***	***LAGDEP***	0.1966
	(0.0834)	(0.0596)	(0.0526)		(0.3108)
CONSTANT	0.0399	0.0254	0.0282***	***CONSTANT***	-0.5300
	(0.0171)	(0.0079)	(0.0060)		(0.3599)
Observations	103	148	192		43
P>Chi2	0.0000	0.0000	0.0000		0.0113
Correlation 1	0.0850	0.0688	0.0580		0.077
Correlation 2	0.1787	0.4520	0.5618		0.8767
Sargan	0.7628	0.5359	0.0001		0.5123
Year effects	Yes	Yes	Yes		Yes
Country effects	N/A	N/A	N/A		Yes

References

BDO. 2022. ‘The exciting future of fintech’. https://www.bdo.co.za/en-za/insights/2022/financial-services/the-exciting-future-of-fintech-64e8d0776e7df9d7dbe385fe563bc81b (accessed 14 November 2023).

Buchak, G, Matvos, G, Piskorski, T and Seru, A. 2018. ‘Fintech, regulatory arbitrage, and the rise of shadow banks’. *Journal of Financial Economics* 130(3): 453–483.

Chun, H, Kim, J W and Lee, J. 2015. ‘How does information technology improve aggregate productivity? A new channel of productivity dispersion and reallocation’. *Research Policy* 44(5): 999–1016.

De Bandt, O, Durdu, C B, Hibiki, I, Mimir, Y, Mohimont, J, Nikolov, K and Straughan, M. 2022. ‘Assessing the impact of Basel III: evidence from structural macroeconomic models’. Banque de France Working Paper no. 864.

Dömötör, B, Illés, F and Ölvedi, T. 2023. ‘Peer-to-peer lending: legal loan sharking or altruistic investment? Analyzing platform investments from a credit risk perspective’. *Journal of International Financial Markets, Institutions and Money* 86: 101801.

Ejoh, N O and Iwara, U U. 2014. ‘The impact of capital adequacy on deposit money banks’ profitability in Nigeria’. *Research Journal of Finance and Accounting* 5(12): 7–15.

Ezike, J E and Oke, M O. 2013. ‘Capital adequacy standards, Basle Accord and bank performance: the Nigerian experience (a case study of selected banks in Nigeria)’. *Asian Economic and Financial Review* 3(2): 146–159.

Financial Stability Board (FSB). 2011. ‘Celebrating 20 years! FSB annual report 2011’. https://www.fsca.co.za/Annual%20Reports/FSB%20Annual%20Report%202011.pdf

FSB, International Monetary Fund (IMF) and BIS. 2011. 'Macroprudential policy tools and frameworks: update to G20 finance ministers and central bank governors'. https://www.imf.org/external/np/g20/pdf/021411.pdf

Gebauer, S and Mazelis, F. 2023. 'Macroprudential regulation and leakage to the shadow banking sector'. *European Economic Review* 154: 104404.

Giordana, G A and Schumacher, I. 2017. 'An empirical study on the impact of Basel III standards on banks' default risk: the case of Luxembourg'. *Journal of Risk and Financial Management* 10(2): 8.

Hachem, K. 2018. 'Shadow banking in China'. *Annual Review of Financial Economics* 10: 287–308.

Haddad, C and Hornuf, L. 2019. 'The emergence of the global fintech market: economic and technological determinants'. *Small Business Economics 53*(1): 81–105.

Huarng, K and Yu, T H. 2022. 'Causal complexity analysis for fintech adoption at the country level'. *Journal of Business Research* 153: 228–234.

Ikpefan, O A. 2013. 'Capital adequacy, management and performance in the Nigerian commercial bank (1986–2006)'. *African Journal of Business Management* 7(30): 2 938 – 2 950.

IMF. 2014. 'Annual report: from stabilization to sustainable growth'. https://www.imf.org/~/media/Websites/IMF/imported-flagship

Jagtiani, J and Lemieux, C. 2018. 'Do fintech lenders penetrate areas that are underserved by traditional banks?' *Journal of Economics and Business* 100: 43–54.

Koellinger, P. 2008. 'The relationship between technology, innovation, and firm performance: empirical evidence from e-business in Europe'. *Research Policy* 37(8): 137–1328.

Kowalewski, O and Pisany, P. 2023. ‘The rise of fintech: a cross-country perspective’. *Technovation* 122: 102642.

KPMG. 2022. ‘Pulse of fintech H2 ’21’. https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2022/02/pulse-of-fintech-h2-21.pdf (accessed on 14 November 2023).

Laidroo, L and Avarmaa, M. 2020. ‘The role of location in Fintech formation’. *Entrepreneurship and Regional Development* 32 (7–8): 555–572.

Lee, C C and Hsieh, M F. 2013. ‘The impact of bank capital on profitability and risk in Asian banking’. *Journal of International Money and Finance* 32: 251–281.

Liao, X, Wang, J, Wang, T and Li, M. 2023. ‘Green credit guideline influencing enterprises’ green transformation in China’. *Sustainability* 15(15): 12094.

Meeks, R, Nelson, B and Alessandri, P. 2013. ‘Shadow banks and macroeconomic instability’. *Bank of Italy Temi di Discussione* (Working Paper) no. 939.

Mithas, S and Rust, R T. 2016. ‘How information technology strategy and investments influence firm performance: conjecture and empirical evidence’. *MIS Quarterly* 40(1): 223–245.

Stulz, R M. 2019. ‘Fintech, bigtech, and the future of banks’. *Journal of Applied Corporate Finance* 31(4): 86–97.