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The impact of digital evolution and FinTech on banking performance: A cross-country analysis

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ABSTRACT

Amidst the intricate web of economic dynamics, the significance of banking performance resonates deeply, serving as a linchpin for a nation's financial equilibrium and economic prosperity. The imperative of vigilantly tracking the trajectory of banks' performance emerges as this vigilance underpins the stabilization and fortification of credit institutions. In the contemporary milieu, a landscape characterized by rapid transformations and economic nuances, the digital sphere is propelling a substantial metamorphosis, thus catalyzing an imperative for the assimilation of financial technology (FinTech) within financial services, particularly within banking institutions. This empirical study embarks upon a discerning journey, harnessing a cross-country lens and a panel dataset encompassing five prominent nations spanning the years 2017 to 2019. The central inquiry pertains to the nuanced interplay between the digital milieu, FinTech deployment, and the fabric of banking performance. The empirical analysis reveals a noteworthy confluence: the utilization of digital platforms and FinTech solutions bears a detrimental association with the performance of banking entities categorized as high-performing. Moreover, this inquiry unveils a nexus between FinTech variables, including solidity, inflation informer, and total productivity factors, with an adverse impact on Banks' Performance. However, a silver lining emerges as the study highlights the augmentation of bank financial performance through the confluence of liquidity, Gross Domestic Product (GDP), and FinTech credit infusion. Emanating from these insights, the implications cascade expansively. For bank custodians and stakeholders, an enriched comprehension of the intricate interplay between FinTech and performance crystallizes, thereby fortifying the resilience of financial institutions against adversities through performance augmentation.

1. Introduction

The susceptibility of the banking system to financial crises since 2008 has been accentuated by a frail institutional and financial landscape. Within a competitive contextual framework, significant metamorphoses have unfurled in the banking domain, driven by the implementation of novel regulations and ethical frameworks. These shifts have engendered a corresponding response from financial institutions, which are aligning themselves with these transformations driven by the relentless progression of technological frontiers. The longevity of this trajectory remains an open question, with its ultimate trajectory yet to fully manifest. Within this paradigm, an intriguing development unfolds, wherein individuals and enterprises are empowered to secure funding without traversing the traditional banking route, facilitated by the advent of Peer-to-Peer (P2P) lending. This novel landscape capitalizes on dedicated online platforms, serving as conduits for soliciting funds. Consequently, an array of financing modalities is rendered accessible to the populace, with Crowdfunding emerging as a prominently recognized avenue, undergoing a remarkable surge across diverse global jurisdictions. Termed FinTech, this nomenclature inherently denotes financial technology, encapsulating the infusion of nascent technological paradigms into the financial sphere, notably within the precincts of the banking domain. This phenomenon encapsulates a transformative integration that has the potential to reshape the very contours of the financial and banking sectors, engendering a confluence of

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technological advancements and financial dynamics (Varma et al., 2022; Barroso and Laborda, 2022; Basdekis et al., 2022). The Funding for FinTech has grown exponentially in recent years. Therefore, the use of new technologies in the financial and banking sectors is because of various factors such as the financial and economic crises, environmental instability, regulatory constraints, and the great digital revolution, which affects most sectors. FinTech is based mainly and primarily on significant players who want to develop financial services, diversify financial products, and facilitate digital applications to save time and reduce costs. Thanks to the Digital revolution, Internet financing impacted banks' performance, forcing traditional banks to innovate their business models and improve their overall operational efficiency. FinTech can effectively reduce transaction costs, promote, and improve market competition, and solve information asymmetry in financial activities. Therefore, it is essential to discover and understand what causes and explains the development of Internet funding. Furthermore, banks' performance represents a critical element of financial development, economic prosperity, and even a country's social prosperity. Therefore, the impact of FinTech on banking performance has been the subject of studies by several researchers in different contexts.

Previous studies have been conducted to examine the impact of FinTech on banks' performance. However, academic, and empirical research has reported conflicting findings regarding this relationship (Puschmann et al., 2020; An et al., 2022; Gomber et al., 2018; Iannotta et al.,2007; Naceur and Omran, 2011; Lee and Shin, 2018). Some researchers have found a positive relationship between FinTech and performing the banking sector, and others have found a negative relationship (Mehran and Thakor, 2011; Naceur and Omran, 2011; Berger and Bouwman, 2013). While other studies find a negative relationship between FinTech and bank performance (Demir et al., 2022; Hsieh and Lee, 2021). In contrast, Dietrich and Wanzenried (2014) discovered an insignificant relationship, who rely on the assumption of the cost of bankruptcy to explain the ratio between capital and banks' profits. Finally, Thai et al. (2021) found that the impact of FinTech on performing Indonesian banks is negative.

The results are mixed, even contradictory. The researchers explain this because the determinants differ from one context to another, from one country to another, from one period to another, and from one prudential regulation of one banking sector to another. Hence the importance of updating the study of the determinants of banking performance. With digitalization, banks face a range of threats and challenges: In terms of payment, the emergence of alternative means of payment that compete directly with traditional payment cards and related revenues and losing customer contact if they allow themselves to be intermediaries by new solutions that integrate their means of payment into broader solutions. Regarding credits, the development of peer-to-peer (P2P) platforms landed both vis-à-vis individuals and companies. Banking is not the steel industry of tomorrow. Still, it is a field of opportunities for a whole set of non-bank players: FinTech startups and retail behemoths that want to capture the payment flows of their customers and offer them essential banking services, not to mention companies looking to diversify their source of financing. All this leads to a profound rethinking of the banking model, its organization, and its functioning so that banks can adapt to these new technologies and consumer challenges.

Before the COVID-19 pandemic, the venture capital services of the big banks were busy buying FinTech and promising young startups. With the recovery, this trend is expected to speed up for FinTech with rock-solid resilience, innovative products, and technology as a critical competitive advantage. The big traditional banks undoubtedly know they must collaborate and cooperate more widely with FinTech to offer their customers valuable digitalized services and more autonomy and transparency.

The COVID-19 pandemic has highlighted the importance of Digital ecosystems and companies to find innovative solutions to their problems and create new models adapted to new realities. FinTech will play a leading role in this new economy of meaning and the transformation of financial services, thanks to a new way of collaboration to invent and innovate with Financial Institutions. The problem of this paper is to test the impact of FinTech on performing banks in different countries. To answer our problem, we construct our model in panel data from a sample of the world's five countries from 2017 to 2019. The reason for choosing this period is the data availability and the remarkable evolution of Financial Technologies in recent years.

Regressions are made using the E-views-9 software, which provides certain advantages (because of the use of annual series, panel analysis, and data quality, compared to the situation in the methods used to separate, this software allows greater flexibility and speed compared to other software.

2. Data and methodology

2.1. Data

This study used a sample of panel data from 2017 to 2019. This sample covers five significant countries in the world, namely China, France, the United States, Poland, and Japan. The used data are included in Table 1.

2.2. Measurement of variables

Within this study, the evaluation of pertinent variables assumes paramount significance. The primary focus is on the performance metric denoted as Performance (PER), which stands as the

dependent variable under consideration. In this context, Performance (PER) is elucidated as the intrinsic capability of a financial institution to effectively harness its operational milieu, thereby optimizing the utilization of finite resources at its disposal.

Table 1: Study variables

Variable	Description	Source
PER	Performance of a country's banks	Data stream
FINTECH	A country's FinTech index	Data stream
LTD	Liquidity of a country's banks	Database financial structure
SOL	Soundness of a country's banks	Data stream
TFP	Total productivity factor of a country	Data stream
FINC	Number of FinTech credits granted	Database financial structure
DINF	Country's inflation deflator	World bank
GDP	Growth of a country's gross domestic product	World bank

Of equal significance is the variable labeled as Financial Technology (FINTECH), which occupies a central explanatory role. Notably, FINTECH embodies an innovative process of exceptional merit, characterized by the adept incorporation of emerging technologies in redefining the landscape of banking services. The underlying measurement encompasses the FINTECH index for a given nation 'i' during a specific time frame 't'. The said index comprises developmental indicators spanning 't' years. A further variable of import is Total Productivity Factor (TFP), which affords insights into the comprehensive productivity quotient of a nation 'i' during the temporal juncture of 't'. The magnitude of TFP above unity signifies a noteworthy enhancement in productivity vis-à-vis the preceding year, whereas a value below unity signifies a decrement in relation to the antecedent year. The scenario wherein TFP equals unity indicates a parity with the preceding year's performance level. In the realm of economic nomenclature, Liquidity (LTD) assumes salience as a descriptor for immediate disposable assets. Given the immediate accessibility of LTD, it emerges as a pivotal determinant significantly shaping the performance dynamics of banks. The nomenclature of FinTech Credit (FINC) encompasses credit activities facilitated through platforms that directly connect borrowers with investors, with certain instances of platforms extending proprietary credit avenues. The purview of FinTech credit spans diverse credit modalities, including those aimed at consumer segments. Furthermore, noteworthy variations exist within the creditor base of FinTech credit platforms. The disbursement of loans within the FinTech domain plays a discernibly pivotal role in influencing the operational efficacy of banks.

Lastly, the metric denominated as Solidity (SOL) gains prominence as a barometer gauging a bank's capacity to effectively navigate the spectrum of risks entailed by its activities. Such risks encompass prospective defaults on disbursed credits or potential erosions in the valuation of the institution's assets. SOL provides a nuanced assessment of the fiscal robustness and stability characterizing a nation's financial establishments.

2.3. Macroeconomic variables

This section describes the econometric specification used and then discusses the expected signs on the coefficients of the explanatory variables.

GDP growth (GDP): This variable refers to the evolution of the gross domestic product from one year to another. Indeed, economic growth will increase investment and improve citizens' purchasing power, stimulating the demand for credit, and improving banks' profitability.

The inflation informer (DINF): Abreu and Mendes (2001) found that the relationship between inflation and bank profitability depends mainly on the speed of change of the bank's revenues compared to its costs. Gross domestic product (GDP) growth rate and inflation (INF) All data are annual from 2017 to 2019.

2.4. Econometric model

This study used panel data regression to investigate the relationship between dependent and independent variables. The proxies that are used for FINTECH as independent variables are FinTech (FINTECH), total productivity factor (TFP), Liquidity (LTD), FinTech credit (FINC), and Solidity (SOL). The control variables are GDP growth (GDP) and the inflation informer (DINF). Following PeiZhi and Ramzan (2020), our model is recovering in the following way.

$$PER_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 DFIN_{it} + \alpha_3 FINTECH_{it} + \alpha_4 LTD_{it} + \alpha_5 GDP_{it} + \alpha_6 SOL_{it} + \alpha_7 TFP_{it} + \alpha_8 \varepsilon_{it} \quad (1)$$

where, index i denotes the country while index t represents the period considered. Then the model is written as follows.

3. Results and discussions

3.1. Summary statistics

Table 2 presents the descriptive statistics associated with the study variables. These include the mean, median, maximum, minimum, kurtosis, skewness, probability, and the Jarque-Bera (JB) test of nonnormality.

The results of the descriptive statistics revealed that the PER variable has an average equal to 80,412, a minimum equal to 55.167750, and a maximum equal to 88,923. The FinTech index represents an average equal to 0.1446, a minimum equal to 0.02, and a maximum equal to 0.26. These values tell us that Internet financing can impact the banking system and banks' operating models—the importance of FinTech in banks' performance (Gonzalez and Loureiro, 2014).

Table 2: Summary statistics of the study's variables

Variable	Mean	Max.	Min.	Skewness	Kurtosis	J-Bera
PER	80.413	88.924	55.168	-1.345	2.997	4.519
FINC	0.145	0.260	0.020	0.013	2.029	0.590
DINF	26.929	70.170	11.830	1.378	3.115	4.755
FINTECH	8.915	28.000	4.490	2.050	6.713	19.115
LTD	114.534	656.860	1.860	1.647	4.011	7.415
GDP	1.006	1.050	0.983	0.476	2.461	0.748
SOL	1.630	4.233	-0.229	0.355	1.799	1.215
TFP	3.371	6.947	0.323	1.626	5.083	9.319

An annual number of loans granted with a FinTech average of 114,534, which is a large number, shows that there is an evolution of Digital at the level of bank loans. The FINC variable has a minimum and a maximum equal to 1.86 and 656.86, respectively. Funding for FinTech has grown exponentially in recent years.

The TFP variable has an average value of 1.006, a minimum equal to 0.982, and a maximum equal to 1.058. The increase in TPF depends on the innovation creation rate, and the increase in performance leads to a higher TFP. The strength of a bank has an average equal to 8.914667, a minimum equal to 4.49, and a maximum equal to 28.

The variable LTD has an average of 26.9287; its extreme values range between 11.83 and 70.17. Most authors believe that liquidity harms banks' performance. Low liquidity, a high risk of illiquidity, means larger margins to offset this risk. The DINF variable, which represents the deflator of the inflation rate, varies between a Min. and a Max equal to 1.630496 and -0.228786, respectively, with an average equal to 4.232. GDP growth averages 6.947 and varies between a minimum equal to 0.323207 and a maximum equal to 6.94720.

The skewness, Kurtosis, and Jarque Bera statistics allow us to test the normality of the series studied. Indeed, the Kurtosis coefficient is a coefficient that measures the degree of flattening of the distribution. When it is equal to 3, the distribution follows the normal distribution. A coefficient less than 3 indicates that the distribution is more flattened than the normal distribution (platykurtic), while a Kurtosis coefficient greater than 3 indicates that the distribution is sharp (leptokurtic). The Skewness coefficient is a coefficient that measures the degree of asymmetry of the distribution. When this coefficient is negative, the distribution is asymmetric to the left; when it is positive, it is asymmetric to the right. When it is zero, it means that the distribution is symmetric and follows the normal distribution. Also, the Jarque-Bera test is a test of the normality of the distribution whose null hypothesis is the normality of the data. A high value of the test statistic (calculated value more significant than the tabulated value of Khi-deux) makes it possible to reject this hypothesis.

From Table 2, it can be seen that the variables studied show fluctuations over time. The Kurtosis flattening coefficient is greater than 3. This implies a high probability of extreme points and that the variables studied have tails thicker than the normal distribution. The Skewness coefficient, which is non-zero, indicates the presence of asymmetry, which contradicts the criterion of a Gaussian linear distribution. The Jarque-Bera statistic has a high value, which confirms the non-normality of the data studied. The Skewness and Kurtosis coefficients confirm the hypothesis of the non-normality of the series studied. And consequently, conformity with the economic reality of the financial market and the banking sector. Table 3 presents the correlation coefficients of the critical variables for the sample.

Table 3: Correlation matrix

Variable	PER	FinCredit	DINF	FINTECH	LTD	GPIB	SOL	TFP
PER	1							
FINC	0.412	1						
DINF	-0.447	0.346	1					
FINTECH	-0.390	-0.201	0.057	1				
LTD	-0.068	-0.360	-0.538	0.390	1			
GDP	-0.687	0.198	0.725	0.188	-0.417	1		
SOL	0.110	-0.289	-0.647	0.171	0.935	-0.549	1	
TFP	0.497	0.926	0.169	-0.381	-0.264	0.062	-0.157	1

The correlation coefficient for each variable is shown in Table 3. We see that the variables are almost less than 0.7, so we see that there is not a big problem with multicollinearity.

3.2. Regression results

Table 4 shows that the coefficient associated with the FINTECH variable is negative and statistically significant at the 1% threshold for our model. So, our hypothesis that capital FinTech negatively influences the company's performance is confirmed. The FinTech variable has a t-Statistics equal to -35.62975. Indeed, a 1% decrease in FinTech will improve the performance of banks by 10.28311%. This result is consistent with Lee and Shin (2018). When there are technological transformations, Scott and Arias (2011) argued that it is the small institutions and companies that are best able to adapt to external changes related and new technologies, so perhaps it is the large size of banks that generates a negative impact, so the institutions

of developed countries as our sample is made up of China, France, Japan, the United States and Poland have to bear much higher costs to reorganize. Cull et al. (2017) argued that inefficient operations and low quality of intermediation due to the high agency costs that characterize state-owned banks reduce their competitiveness.

The coefficient associated with the variable LTD is positive and statistically significant at the threshold of 1%. Liquidity positively influences the performance of banks is confirmed. Indeed, a 1% increase in a bank's liquidity will improve the profitability and performance of banks by 1.65.

Table 4: Regression results

Variable	Coefficient	Probability	Standard error	T-statistic
FINTECH	-10.28311	0.0008	0.288610	-35.62975
DINF	-0.415545	0.0012	0.014485	-28.68816
FINC	0.014007	0.0008	0.000385	36.35289
LTD	1.654404	0.0001	0.018209	90.85772
GDP	1.587425	0.0002	0.023457	67.67408
SOL	2.086331	0.0009	0.063503	32.85385
TFP	-6.482552	0.1869	3.281651	-1.975393
Constant	85.93223	0.0017	3.577569	24.01972
R-squared			0.999999	
F-statistic			0.000006	
Durbin Watson			3.670477	

The coefficient associated with the DINF variable is negative and statistically significant at the 1% threshold. Therefore, one might support that the inflation deflator negatively influences the performance of banks. For example, the Inflation Deflator Rate (DINF) variable has a t-Statistics equal to -28,688. So, the DINF exerts a negative and significant effect on performance at the 1% threshold. This negative link can be explained by the poor management of banks, i.e., a bank that cannot predict and anticipate the rise in inflation. This result aligns with Noman et al. (2015).

The coefficient associated with the GDP variable is positive and statistically significant at the 1% threshold for our model. So, GDP growth has a positive influence on banks' performance. The GDP variable has a t-statistic equal to 67.67. These results are consistent with the results of Iannotta et al. (2007), Dietrich and Wanzenried (2014), Matousek and Xiang (2021), Köster and Pelster (2017), and Talavera et al. (2018).

For the FINC variable, the model results have a positive and significant effect at the 1% threshold. This result is consistent with that found by Naceur (2003). The mastery of the credit policy allows the bank to improve its performance. The FinTech-Credit variable has a t-Statistics equal to 36.35289. Moreover, the interest received on FinTech loans granted by the bank represents a significant part of its net banking income. As a result, an increase in FinTech loans means increased interest received. FinTech credit is an alternative source of financing for companies and households; it could improve access to credit for some underserved segments. It could also enhance the effectiveness of financial intermediation. This is why FinTech credit is a relatively cheaper and more practical solution.

The SOL variable has a positive and statistically significant coefficient on the performance of banks. The SOL variable has a t-Statistics equal to 32.85. As for the TFP variable, it was non-significant and negatively affected the performance of banks. The TFP variable has a t-Statistics equal to -1.975393. Therefore, innovation performance has a significant negative relationship with TFP, as demonstrated in Kijek and Matras-Bolibok (2019).

The R-squared coefficient of determination is equal to 0.999, reflecting the model's good linear fit quality. Fisher's statistics are less than 1%; our model is significant. Durbin Watson indicates a value equal to 3.670477, implying negative autocorrelation.

4. Conclusion

In summation, the outcomes discerned through this comprehensive inquiry underscore a noteworthy array of dynamics. It becomes evident that a set of FinTech variables, namely solidity, inflation informer, and total productivity factors, wield an adverse impact on the performance trajectory of banking institutions. Conversely, the salutary influences of liquidity, GDP, and the integration of FinTech credit are unequivocally established as pivotal stimulants, fostering an augmentation in the financial performance of banks.

Intriguingly, the imprint of FinTech reverberates across diverse financial sectors, with the banking domain, in particular, serving as a nexus of rapid innovation. This sector, in its ceaseless endeavor to cultivate optimal practices and technological applications, has embraced FinTech as a central preoccupation. In light of these revelations, it is imperative for banking establishments to take proactive strides in facilitating enhanced access to financial services, thereby engendering heightened operational efficiency while concurrently effecting a reduction in costs.

Amidst a mosaic of sometimes contradictory empirical studies, a resounding consensus among global regulators resonates - that the astute harnessing of FinTech is poised to catalyze an amelioration in overall performance. This clarion call extends its echoes toward the custodians and workforce of banking institutions. The import of comprehending the intricate interplay between

FinTech and performance is germane, as it constitutes a pivotal pillar in fortifying the resilience of financial entities against potential adversities. This study's findings, therefore, proffer not merely insights but a strategic compass, galvanizing the potential of financial institutions to not only endure but flourish in the face of shocks through heightened performance. As the landscape of financial services continues to evolve, the symbiosis between technological innovation and robust performance is poised to ascend to unprecedented prominence.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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