

## The Impact Of Internet Banking On Financial Performance: The Case Of French Banks

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### Abstract:

The financial sector has known profound changes since the 1980s with the development of technologies and the massive adoption of the internet and mobile phones. In this research paper, we investigate to examine the impact of internet banking on bank performance in France. To reach this objective, we used as a regression estimation method for panel data and the Hausman test (1978). We have highlighted the effect of control and specific variables related to banks on the return on assets and the return on equity. Our sample is composed of 31 commercial banks during the period 2008-2019. The results confirm the majority of our hypotheses which demonstrate the positive effect of digitization and internet banking on the performance of banks.

**Keywords:** Internet Banking , Bank Performance, Return On Asset, Return On Equity.

### 1. GENERAL INTRODUCTION

The financial sector is one of the engines of economic growth in all countries. Internet technology is driving fundamental changes in banking by transforming the way customers access financial services (PwC, March 2016). As a result, financial institutions offer their services mainly online, knowing that the pace of digital infusion in the banking sector is very rapid, forcing them to update their information and communication technologies to meet customer needs

As a result, following changes in customer behaviour towards digitalisation, the majority of banks have adopted the internet to offer their services to customers in order to save time, money and meet the expectations of new types of customers known as digital service customers.

For previous studies, the adoption of the Internet by banks has a significant effect on their performance because digital technology contributes to the drastic reduction of administrative services which reduces costs and increases profits. In this context, Aral and Weill (2007), Beccalli (2007) and Wang (2010) concluded that there is a positive relationship between IT investment and business performance. Furthermore, previous research generally confirms the positive contribution of investment in R&D to the performance of the company and its value on the market (Griliches, M. cockbrun, 1981).

According to the report entitled "banking and innovation" published by the French banking federation, over 80% of French people prefer to carry out their transactions via digital channels, which makes contact between customers and advisers quicker and less complex. In fact, technology is first and foremost an intermediary between the bank and its customers.

A worldwide upheaval linked to digital technology is leading to major changes in the economic landscape. Digitalisation is leading to an increase in productivity and the creation of new job opportunities, although there is a percentage risk of job loss.

In France, which is a developed country, we have seen an upheaval in banking services in recent years, incorporating modern techniques such as electronic payment cards, ATMs and account consultation via websites and mobile applications.

As such, this paper describes the current state of the economy in the digital age and discusses the effect of digitalisation on the banking sector in France. More specifically, it seeks to examine the impact of internet banking on the performance of French banks.

Thus, our research question is as follows:

- What is the impact of internet banking on the financial performance of French banks?

Interest, purpose and choice of subject :

Digitalisation is a topical issue. The choice of the banking sector as the subject of our research is not by chance, as it has undergone many changes in the way banking services are provided, and this has a direct influence on customer behaviour. Consequently, to answer our research question, we put forward the following four hypotheses:

- ✧ **H1:** There is a positive and significant relationship between the number of years of experience in offering services over the internet and return on assets (ROA) and return on equity (ROE).
- ✧ **H2:** There is a positive and significant relationship between loans and the ROA and ROE.
- ✧ **H3:** There is a positive and significant relationship between deposits and the ROA and ROE.
- ✧ **H4:** There is a positive and significant relationship between the size variable and the independent variables.

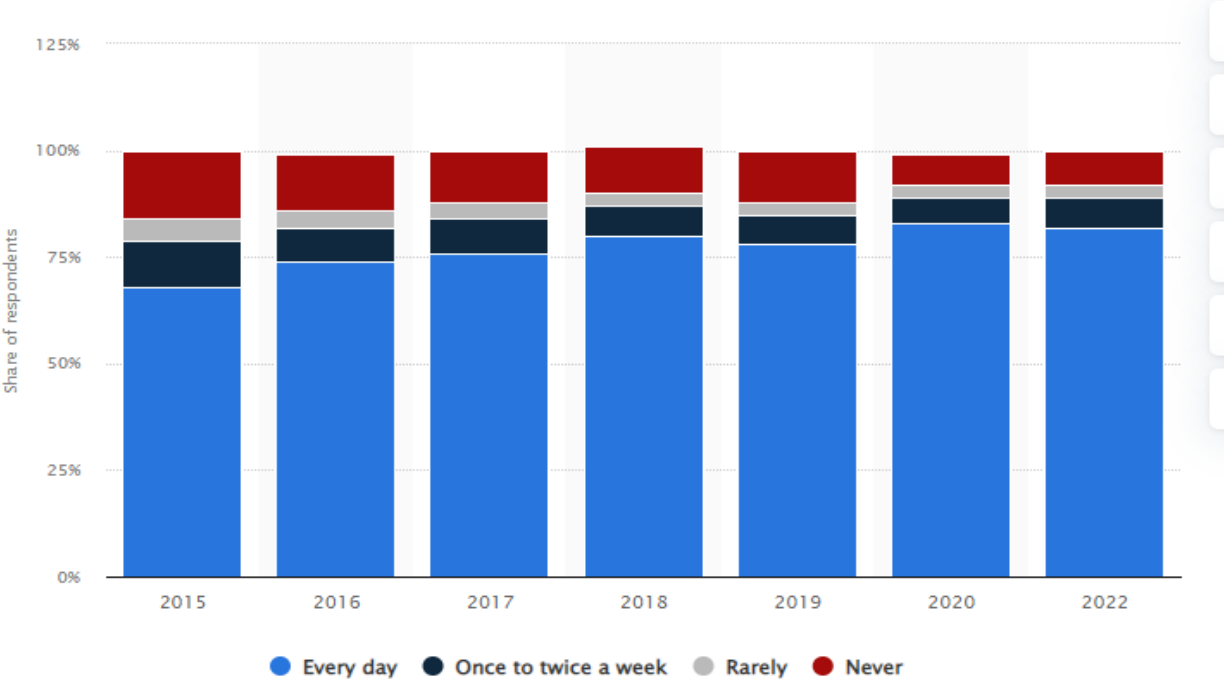
**1. LITERATURE REVIEW**

**2.2. Overview of the banking sector in France**

Banking is one of the most sectors affected by the digital transformation of business. Indeed, the beginnings of the digital revolution were built on an accumulation of technological innovations, and it is probably the rise of mobile phones and the internet.

**2.2. The French population connected to the Internet**

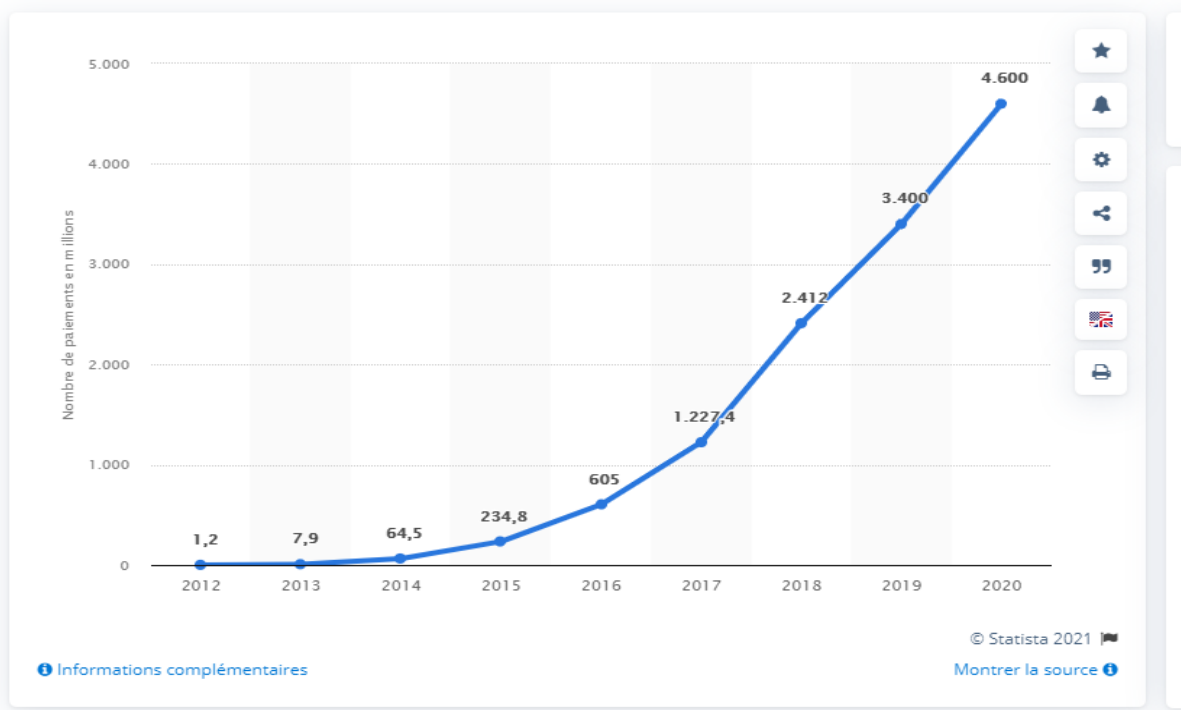
The number of people using the internet every day in France increased by 24% between 2015 and 2022. The share of people who have never used the internet fell from 16% in 2015 to 8% in 2022.



Source : Statista.com

**Figure 1:** Frequency of Internet use by the French population from 2015 to 2022

According to the French banking federation, more than 20% of French people visited their bank branch several times a month in 2016, compared with 52% in 2010. The statistic below shows the volume of payments made with contactless cards in France between 2012 and 2020. In 2013, there were around 7.9 million payments made with contactless cards, compared with 4.6 million in 2020.

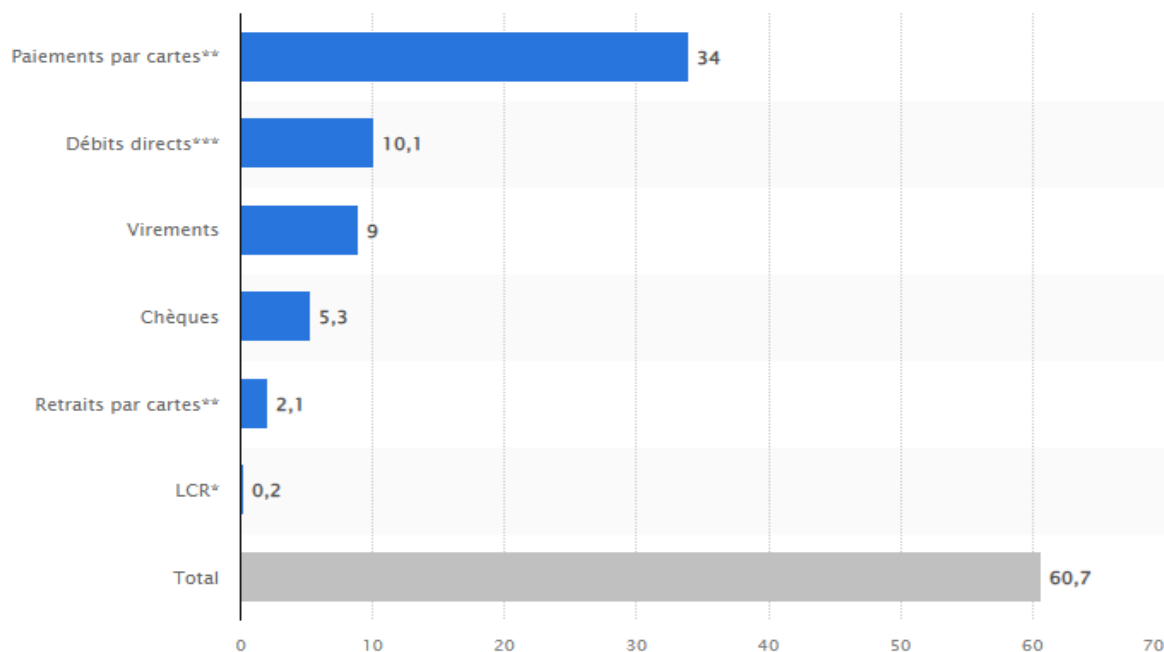


Source : Statista.com

**Figure 2: Volume of contactless card payments in France**

### 2.3.Payment methods

This statistic shows the number of payment transactions (by payment method) carried out daily in France in 2018. Therefore, we note that France has seen over 60 million payment transactions per day in 2018.



Source : Statista.com

**Figure 3: Number of daily payment transactions by payment method in France in 2018.**

We can note that from one French citizens prefer internet banking services because of their flexibility.

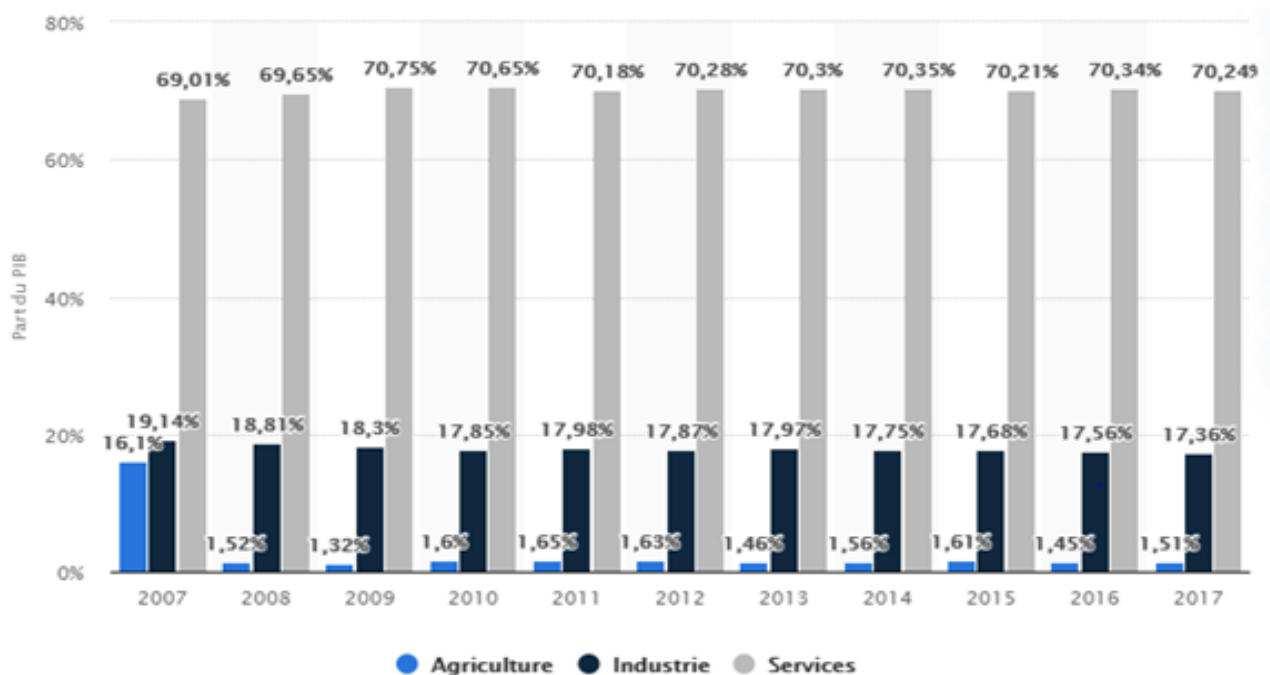
### 2.4. The French banking market

The French banking market is one of the most important markets in Europe and is characterized by a high level of competition, a diversity of players and a strong presence of national and foreign banks. It

is highly competitive, with over 300 banks operating in the country. This competition has driven down margins and forced banks to innovate and differentiate themselves in order to attract and retain customers.

This banking market is characterized by a wide diversity of players, including large international banks, national banks and specialized banks. This diversity has led to offering a variety of products and services to customers and contributed to the overall dynamism of the market. In fact, statistics shows that over 60% of French population have a bank account and 47.8% of households held at least one loan in 2017.

Indeed, the French expect banks to simplify their daily lives by developing new services such as payment by bank card via smartphone. In France, 52 contactless payments were recorded every second in 2019. This development is linked to the growth of Fintech companies. This statistic shows the distribution of GDP between French economic sectors from 2007 to 2017. It shows that the services sector is the largest, representing 70.24% of GDP in 2017. Industry represented approximately 17.36% of GDP from France.



Source : Statista.com

**Figure 4:** Breakdown of GDP by economic sector in France between 2007 and 2017.

The number of Fintech start-ups around the world has grown at a significant rate in recent years, it remains a major player in the European Fintech industry. As a result, the development of the banking sector is contributing to GDP growth.

### 3. METHODOLOGY AND DATA COLLECTION

#### 3.1. Theoretical framework

Internet banking, also known as online banking or e-banking, refers to the provision of banking services and transactions through the internet. It allows customers to perform various financial activities remotely, such as account balance inquiries, fund transfers, bill payments, and online loan applications. Internet banking has become increasingly popular due to its convenience, accessibility, and time-saving features. refers to systems that allow bank customers to access their accounts and general information on products and services through the use of websites or a mobile application (Panida and Sunsern2012). For their part England et al. (1998) conducted a major study, which estimated the number of US banks offering internet banking services and analysed the characteristics of the banks' performance structure. However, they found no evidence of differences in the performance of the group of banks offering internet banking compared to those not offering it in terms of profitability, efficiency and credit. In addition, Furst et al.(2002) found that banks offering internet banking were more profitable than those not offering internet banking.

Sana Haider Sumra, (2011), they estimate that e-banking has increased the profitability of banks and allows them to cover their costs and make profits even in a short period of time, customer illiteracy is not seen as a major obstacle.

For his part, Batutunaya,(2015), he studied the interaction between performance and internet banking. Two important financial indicators used to assess the performance and profitability of banks are Return on Assets (ROA) and Return on Equity (ROE). Indeed, he demonstrated that there is a strong and significant relationship between internet banking and the performance of banks in Europe. In this context, Magaret mateka, (2016) , examined the effect of digitalisation on the performance of commercial banks in Kenya. The conclusion of the study revealed that bank digitalisation has a positive influence on bank revenues, operating costs, loan portfolio and customer deposits.

Technological change therefore has an impact on bank performance (Beck 2001, Foster 2001). In this respect, Dyoung (2005) analysed the performance of 36 American banks using the Internet and showed that the effect of start-ups is available.

Nieto (2007) studied the impact of the internet on the financial performance of banks, and showed that the adoption of the internet as a distribution channel has a positive impact on bank profitability. Mutua (2010) concluded that there was a weak positive relationship between mobile banking and the financial performance of commercial banks in Kenya. In fact, the difference from the above finding is explained by the diversity of variables and sampling methods.

Several studies have been carried out on the commercial value of investments in digitalisation. The first studies focused mainly on the link between these investments and productivity. This debate was mainly popularised by Solow (1987) and is known as the IT profitability paradox.

For Robert Gordon, it was a cyclical acceleration in productivity growth and there was no ICT effect. However, for other economists ICTs had profoundly changed economics, especially in the USA, and permanently increased growth prospects.

Agarwal, R., & Prasad, J. (1998) in his article contributes to underline personal innovation in the context of information technology adoption. It provides a conceptual framework that can be applied to analyze the adoption of internet banking by individuals and banks.

Empirical findings on the link between digitisation efforts and performance are mixed. Hitt and Brynjolfsson (1996) present empirical results on a sample of 370 American companies during the period 1988-1992. the results indicate a link with productivity. On the other hand, Wang (2010) finds no empirical evidence of an improvement in financial performance in the short term, although there could be positive effects in the long term.

In contrast, Mithas et al (2012) find a clear and strong impact on performance. Kohli et al (2012) find that investment in digitalisation does not increase ROA but does increase the market value of the company.

Gupta, A., & Chauhan, S. (2016) investigate the relationship between internet banking adoption and bank performance in India. They employ a quantitative approach to analyze data from Indian banks and examine how internet banking influences profitability, cost efficiency, and risk management.

Gupta, A., & Kumar, V. (2019) proposes an integrated model that combines trust, risk perception, and the technology acceptance model to explain internet banking adoption. The study's insights can be utilized to assess the impact of internet banking on bank performance and risk.

### **3.2. Empirical framework : Methodology**

The objective of this article is to examine the impact of internet banking on the banking performance of French banks.

Various factors have been provided by financial management theories to measure control variables. Accounting ratios are used to calculate size, deposits and loans.

The evidence needed to test the hypotheses of this study is based on published statistics and annual reports. Therefore, the data used in this study is quantitative.

The reasoning of this study is deductive because hypotheses were derived from existing theory and then data were collected to confirm or refute the hypotheses. Sample selection, data sources, the procedure for collecting and quantifying variables and the method of data analysis are described below:

#### **◆ Types of data collection**

The financial figures and relevant information have been collected from the annual reports of French banks. The data from 2008 to 2019 reflect the banks' explanatory variables.

The final sample consists of 31 banks giving us 372 of the bank-year observations.

◆ **Specification of the analysis model**

✧ **Search model**

To assess the influence of digital banking on performance levels, we propose the following analysis model.

Our model is as follows:

$$ROA = f(\text{INB}, \text{control variables}).$$

$$ROE = f(\text{INB}, \text{control variables}).$$

In other words, our two models can be summarised as follows:

$$ROA_{it} = \alpha_0 + \beta_1 \text{INB}_{it} + \beta_2 \text{Loans}_{it} + \beta_4 \text{deposits}_{it} + \beta_5 \text{size}_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \alpha_0 + \beta_1 \text{INB}_{it} + \beta_2 \text{Loans}_{it} + \beta_4 \text{deposits}_{it} + \beta_5 \text{size}_{it} + \varepsilon_{it} \quad (2)$$

i : The number of the bank

t : The number of years

$y_{it}$  : ROA

$y_{it}$  : ROE

❖ Summary of variables

Variables	Measure
<b>Dependent variables</b>	
<b>ROA</b>	The ratio of bank's earnings to total assets
<b>ROE</b>	The ratio of earnings to equity holders
<b>Independent variables</b>	
<b>INB</b>	Bank's experience in offering internet banking services
<b>LOANS</b>	The ratio of total loans to total assets .
<b>DEPOSITS</b>	The ratio of total deposits to total assets
<b>SIZE</b>	The natural logarithm of total assets

Source : Authors

Therefore, to answer our research questions, we put forward the following four hypotheses:

- **H1**: There is a positive and significant relationship between the INB, return on assets (ROA) and return on equity (ROE).
- **H2**: There is a positive and significant relationship between the loans and the variable to be explained.
- **H3**: There is a positive and significant relationship between deposits and the variable to be explained.
- **H4**: There is a positive and significant relationship between the size variable and the dependent variable.

**3.3. The statistical approach**

The aim of our study is to examine the effect of internet banking on financial and economic performance. To achieve these objectives, we will follow a three-stage statistical approach: descriptive analysis, bivariate analysis and multivariate analysis.

**3.3.1. Descriptive analysis**

Descriptive analysis will give an idea of the characteristics of the variables to be explained and the explanatory variables. This stage consists of determining the general trend of the data (max, min, mean) and also seeing whether or not there is dispersion by determining the standard deviation.

### 3.3.2. Bivariate analysis

This analysis is used to detect the intensity and direction of the relationship between each explanatory variable and the variable to be explained.

The tests to be used depend on the nature of the variables. There are tests that are applied when the two variables are quantitative: Pearson's parametric test

### 3.4. Multivariate analysis

Multivariate analysis will enable us to test our hypotheses and determine the variables that explain banking performance as a function of the control variables of French banks.

#### 3.4.1. Estimation methods

##### ◆ Regression on panel data

##### ◇ The fixed effect model

This model assumes the existence of a fixed effect specific to each bank, it is assumed that there is no difference in the relationships between the independent variables and the dependent variable.

The limitations of this estimator lie in the fact that inter-individual variability is not exploited to estimate the structural parameters of the model, and the impact of time-invariant factors cannot be identified.

##### ◇ The random effect model

Representing an extension of the fixed effects model, it assumes that the specificity is in random form. The random individual term specific to individual  $i$  is formed by a fixed component and an individual-specific component in order to control for individual heterogeneity. Assumptions about this structure generally relate to residuals.

We may face a heterogeneity problem because our data are panel data. To avoid this type of problem, we have to choose between two panel data models, a fixed-effect model or a random model, and then apply the Hausman test to choose one of the two models.

The Hausman test (1978) is used to test whether or not there is a correlation between the specific effects and the explanatory variables in the model. This test determines whether the individual effects are fixed or random.

With the null hypothesis stipulating independence between the bank's individual characteristics and the explanatory variables. If the null hypothesis is not verified, the fixed-effect model is obtained, if not, the random-effect model is chosen (Kangni KPODAR 2007).

#### 3.4.2. Empirical Results:

##### ◆ Descriptive statistics table

The descriptive statistics are presented in the table 1 : the average, minimum and maximum of the variables ROA, ROE, INB, loans, deposits and size.

**Table 1: Descriptive statistical result**

Variables	observations	Mean	Std dev	Min	Max
ROA	372	0,0641854	0,2967762	-2,850413	2,586074
ROE	372	0,1353289	0,9291138	-4,993211	11,10566
INB	372	9,978495	4,472687	1	21
Loans	372	0,0637631	0,0605787	0,0001464	0,5484278
Deposits	372	0,0048267	0,0023167	0,000265	0,035498
Size	372	17,37493	2,236206	9,798127	21,64762

- ✧ Concerning the variable ROA varies between -2.85 and 2.58 indicates an average value of 0.064.
- ✧ ROE varies between a minimum of -4.99 and a maximum of 11.10, with an average value of 0.135.
- ✧ The INB shows an average value of 9.97 and varies between 1 and 21.
- ✧ The variable bank loans indicates an average of 0.063 and varies between 0.0001 and 0.548.
- ✧ The deposits variable varies between 0.0002 and 0.035 and indicates a mean value of 0.0023.
- ✧ The size variable varies between 9.79 and 21.64 and indicates an average of 17.37.

✧ **Correlation matrix table**

**Table 2: Correlation matrix**

	INB	Loans	Deposits	Size
INB	1			
Loans	0,0301 0,5632	1		
Deposits	0,0721 0,1651	-0,2589 0,0000	1	
Size	-0,0205 0,6941	-0,1022 0,0489	-0,0091 0,8604	1

Source : Stata 14 software

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The purpose of the correlation matrix is to check that there is no multi-collinearity problem between the variables introduced into the model. The table shows that there is no significant correlation between the different explanatory variables. The correlation coefficients vary between -0.2589 and 0.0721. From these results, the correlation values are low, which suggests the absence of the multi-collinearity problem in our models.

✧ **ROA regression model :**

**Table 3: Results obtained using the ordinary least squares (OLS) method**

ROA	Coefficient	Std Err	T	p
INB	0,0047253	0,0034381	6,37	0,000
Loans	-0,3693699	0,2636186	-4,40	0,002
Deposits	3,916923	6,872692	2,57	0,019
Size	0,0122563	0,0068907	1,99	0,076
Constante	-0,1912729	0,1342175	-2,43	0,005
<b>F( 4, 367) = 2,11</b>				
<b>Prob&gt; F = 0,0787</b>				
<b>R-squared = 0,7673</b>				

Source : Stata 14 software

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Table 3 above shows that: R-squared = 0.7673



this coefficient explains the strength of the relationship between the independent variables and the dependant variables . In our case the R-squared indicates a good determination of the model variables.

**F( 4, 367) = 2.11**

**Prob> F = 0,0787**

we can conclude in terms of overall significance, our model is significant at 10% with a Fisher value of 2.11.

**Table 4: Fixed-effects model Result (ROA)**

ROA	Coefficient	Std Err	T	P
<b>INB</b>	0,0044736	0,0043092	6,04	0,000
<b>Loans</b>	-0,406503	0,4814421	-2,84	0,039
<b>Deposits</b>	4,403507	7,862392	0,56	0,576
<b>Size</b>	0,0102061	0,0100322	1,02	0,310
<b>Constante</b>	-0,1531188	0,1961476	-0,78	0,436
<b>F(30, 337) = 2,19 Prob=0.0005</b>				

Source : Stata 14 software

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**Table 5: Random-effects panel model result (ROA)**

ROA	Coefficient	Std Err	Z	P
<b>INB</b>	0,0046433	0,0037677	1,23	0,218
<b>Loans</b>	-0,3792216	0,3301979	-1,15	0,251
<b>Deposits</b>	4,186263	7,185805	0,58	0,560
<b>Size</b>	0,01143	0,0080614	1,42	0,156
<b>Constante</b>	-0,1767674	0,1583485	-1,12	0,264
<b>chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)</b>				
<b>= 0,06</b>				
<b>Prob&gt;chi2 = 0,9995</b>				

Source : Stata 14 software

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#### ✧ Hausman Test

From Table 5, the probability of Hausman's test (p-value=0.9995) is greater than 5%, so the random effect model is preferable.

According to this table, we can see that in terms of overall significance, our model is significant, with a Fisher value equal to  $F(30,337) = 2.19$  .

#### ✧ Discussion of results (ROA):

Concerning the expected signs of the estimated coefficients of the explanatory variables (INB, loans, deposits and size ), the table compares the expected signs of the variables with regard to our objective with the signs obtained following the estimation of the parameters of our model.

Thus :

The bank's INB, it is clear that the coefficient ( $\alpha_1 = 0.004$ ,  $p=0.000$ ) associated with the INB variable is positive and significant at the 1% threshold. We can therefore confirm the existence of a relationship between ROA and INB. So the first Hypothesis is confirmed.

A negative and significant relationship ( $\alpha_2 = -0.36$ ,  $p=0.005$ ) at the 1% threshold appears between the loans variable and ROA. We can therefore conclude that loans have a negative and significant effect on ROA. This allows to invalidate hypothesis H2.

The results of the regression model show that there is a positive and significant association ( $\alpha_3 = 3.91$ ,  $p=0.019$ ) at the 5% threshold, between the deposit and ROA, so the effect of the deposit on ROA is a positive and highly significant e, which implies acceptance of hypothesis H3.

The coefficient associated with the size variable ( $\alpha_4=0.012$ ,  $p=0.076$ ) is positive and significant at the 10% threshold. Therefore we can confirm the existence of a positive relationship between the size variable and the ROA. This confirms hypothesis H4.

❖ **ROE regression model**

**Tableau 6: Ordinary least squares (OLS) results**

ROE	Coefficients	Std Err	T	P
<b>INB</b>	0,0361002	0,0105203	3,43	0,001
<b>Loans</b>	2,292378	0,8066469	2,84	0,005
<b>Deposits</b>	1.141789	1.02975	1,98	0,040
<b>Size</b>	0,0200304	0,0210849	2,95	0,023
<b>_cons</b>	0,1515539	0,4106923	2,37	0,012
<b>F( 4, 367) = 6,51</b>				
<b>Prob&gt; F = 0,0000</b>				
<b>R-squared = 0,6623</b>				

Source : Stata 14 software

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**Table 7: Results of fixed-effect panel model (ROE)**

ROE	Coefficient	Std Err	T	P
<b>INB</b>	-0,0347828	0,0119383	-2,91	0,004
<b>Loans</b>	-0,6644001	1,333799	-0,5	0,619
<b>Deposits</b>	-4,93924	21,78217	-0,23	0,821
<b>Size</b>	-0,0023353	0,0277934	-0,08	0,933
<b>Constante</b>	0,5891884	0,5434123	1,08	0,279
<b>F(30,337)=</b>			5,14	Prob=0.0000

Source : Stata 14 software

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**Table 8: Results and interpretation of the random effect panel model (ROE)**

ROE	Coefficient	Std Err	Z	P
<b>INB</b>	-0,0340241	0,0111996	-3,04	0,002
<b>Loans</b>	0,7849826	1,080859	0,73	0,468
<b>Deposits</b>	-13,20162	20,89196	-0,63	0,527
<b>Size</b>	0,0037827	0,0248944	0,15	0,879
<b>Constante</b>	0,4227805	0,4937282	0,86	0,392
<b>chi2(4) = (b-B)[(V_b-V_B)^(-1)](b-B)</b>				

	=	5,3
<b>Prob&gt;chi2</b>	=	0,2582

Source : Stata 14 software

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#### ✧ Hausman Test

From Table 8, we can conclude that the probability of Hausman test (p-value = 0.2582) exceeds 5%, so the random effects model is preferable. In terms of overall significance, our model is significant, with a Fisher value equal to  $F(30.337) = 5.14$ .

#### ✧ Discussion of results (ROE):

Concerning the expected signs of the estimated coefficients of the explanatory variables, we note that all the variables are statistically significant and positively correlated with the ROE.

It is clear that the coefficient ( $\alpha_1 = 0.036$ ,  $p = 0.001$ ) associated with the INB variable is positive and significant at the 1% threshold. We can therefore confirm the existence of a positive relationship between ROE and INB.

Hypothesis H1 is therefore confirmed.

- ✧ A positive and significant relationship ( $\alpha_2 = 2.29$ ,  $p = 0.005$ ) at the 1% threshold appears between the loans variable and ROE. We can therefore conclude that loans have a positive and significant effect on ROE. This allows us to confirm hypothesis H2.
- ✧ It appears from the results of the regression model that there is a positive and significant association ( $\alpha_3 = 1.14$ ,  $p = 0.040$ ) at the 5% threshold, between the deposit and ROE, whereas the effect of the deposit on ROA is positive and highly significant, which implies that hypothesis H3 is accepted.
- ✧ The coefficient associated with the size variable is positive and significant ( $\alpha_4 = 0.020$ ,  $p = 0.023$ ) at the 5% threshold. We can therefore confirm the existence of a positive relationship between the size variable and ROE which confirms hypothesis H4.

## 5. CONCLUSION

One of the key advantages of internet banking is its accessibility. Customers can access their accounts and perform transactions at any time and from anywhere with an internet connection. This eliminates the need to visit a bank branch during working hours, saving time and effort. Internet banking also offers a wide range of services, including checking account balances, transferring funds between accounts, paying bills, applying for loans, and managing investments. These services are available 24/7, providing customers with flexibility and control over their finances.

Internet banking has transformed the way people manage their finances by providing convenient, accessible and secure banking services over the Internet. It offers a wide range of services, improves accessibility, promotes savings and empowers individuals to take control of their financial well-being. However, it is crucial that banks and customers remain vigilant about security risks and bridge the digital divide to ensure that internet banking benefits everyone.

This study is an attempt to present the current state of Internet banking services in France and its effects on financial performance. An empirical analysis on a sample of 31 French banks during the period 2008-2019 reveals that there is a positive and significant relationship between the dependent variables (INB, size, loans, deposits) and the financial performance (ROA and ROE). banks who offer Internet banking services are the most efficient.

The results of our study based on previous work from J.M Kapadia and P.S Voghela (2018), J. Kriebel and J Deberner (2020), demonstrate that the impact of the digitalization of banking services on financial performance (ROA and ROE ) of the bank is positive and significant. Furthermore, this importance increases with the number of years of experience of the bank, since banks with more experience in digitalization show a higher performance rate.

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