

# The Impact of Digital Banking on the Brazilian Banking System

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Abstract: This study examines the impact of major digital banks on the Brazilian Banking System, focusing on financial inclusion and market growth through customer base and transaction volumes. The literature highlights advancements in digital banking and financial inclusion. Insights from this study can aid policymakers and regulators in understanding digital financial services' rapid growth, delivery, and benefits. The research analyzes the influence of customer and transaction volumes on financial metrics such as Net Worth, Total Assets, Borrowings, and Classified Credit Portfolio. Data from the top nine digital banks in Brazil, spanning 2018 to 2020, were collected via the Central Bank's IF data system. Two linear regression models were developed using Stata® software, applying robustness tests for heteroscedasticity. Results indicate that digital banks contribute to financial inclusion and banking market growth through their financial performance. Future studies should explore their impact on financial stability, focusing on reference and risk-weighted assets.

Key words: digital banks, customers, digital inclusion, Brazilian banking system, transactions JEL codes: G21, O16, O33

## 1. Introduction

The World Bank and the G20 group since 2010 have led the initiative for greater digital financial inclusion in the development of countries with emerging economies, with the aim of helping to reduce social inequality and provide global economic growth (Ozili, 2018).

The study by Ozili (2018) assumes that increases in the quantities of digital banks are contributing to financial inclusion and economic growth, and for this reason are attracting the attention of traditional, financial market banks largely because they provide easier access to banking services for their customers. For this reason, these services may become a better option for individuals, businesses, governments, and the economies of countries.

There are studies that explore digital banking more comprehensively, such as the research Manyika, Lund, Singer, White, and Berry (2016) e Scott, Reenen, and Zachariadis (2017), digital banking and financial inclusion

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have several benefits, such as: facilitating access to banking service, reducing the cost of financial intermediation, increasing competitiveness in the financial market, direct access to credit, capillarity in the provision of banking service, increasing the customer base for users of financial services, users of banking services, governments, and in the economy.

Ozilli (2018) highlights that digital banks and Fintechs can promote economic growth by increasing the volume of financial transactions in the financial system, although he does not know whether their activities can aggravate economic crises during the market stress scenario.

Thus, this study aims to investigate whether the main digital banks impact the Brazilian Banking System, mainly in the financial inclusion of their customers, considering the quantities of customers and transactions carried out. Considering digital banks and fintechs in the financial segment, this research explores the impacts of the quantities of customers and transactions carried out by the main digital banks in the Brazilian market, with effect through financial data such as Net Worth, Total Assets, Amount of Funding, Classified Credit Portfolio on digital inclusion and growth of the banking system - a study that has been little addressed in the literature.

This research aims to contribute to the ongoing debate that digital banking facilitates banking inclusion in Brazil. Insights from this study can provide national economic policy makers and financial market regulators with an understanding of the issues associated with the rapid development and management of digital financial services, their delivery to individuals, and the benefits involved in digital financial inclusion.

Furthermore, it intends to contribute to the academic field, as this study adds to the literature an understanding of what digital inclusion providers are trying to offer solutions to achieve sustainable financial inclusion, particularly in the Brazilian economy. This research suggests further research on this topic to better understand about the impact of digital banking on the banking system, as well as the risks and perspectives in this area. This debate also contributes to the few studies that examine the role of financial innovation for the banking and financial system.

As result, it is expected that according to Ozilli's (2018) research that the amounts of customers and transactions performed by digital banks, by impacting the banking system with their financial results contribute to digital inclusion and growth of the banking market.

Digital banks already have a relevant role in the Brazilian banking market, because, they have optimized through new technologies the financial processes, with less bureaucracy and seek to offer products and services with a higher quality and speed to their customers, generating a positive impact on all market gentlemen (Andrade, 2019).

In relation to the banking industry, the increase in technology has fostered a discussion about the positive impact of digital banks in all sectors of the market. Currently, digital banks and fintechs are seeking ways to offer greater ease and convenience to their customers, seeking a greater positioning in the banking market, and within this scenario, are the digital banks that have brought new technologies and innovations to financial services this is reflected in benefits such as: access to banking service for new customers, new experiences in the use of banking service, increase in the speed of financial transactions, among others (Andrade, 2019).

The general objective of this study is to analyze and investigate the impacts of the main digital banks on financial inclusion and economic growth in the Brazilian banking system, between the years 2018 and 2020. Given the above, this research seeks to answer the following question: Do digital banks contribute to financial inclusion and economic growth in the Brazilian banking system?

The present research resembles that of Ozili (2018) which addresses the impact of digital finance on financial inclusion and stability in emerging countries. That said, this research is justified in three aspects: (1) the first motivation is attributed to the initiative to disseminate a wider range of information related to this topic and market segment; (2) the scientific motivation was due to the few amounts of research related to this topic in the literature; (3) the collective motivation due to the need to disseminate information about digital banks, contributing to digital inclusion.

## 2. Literature Review

#### 2.1 Origin and Concepts of Digital Banking

Law No. 12,865/2013 regulates the digital document in the National Financial System. This regulation was the milestone for the creation of Digital Banks, offering customers a digital relationship, without the need for the user to go to a bank branch. Another effect on the enactment of this law was to make it possible for the Central Bank to regulate the process of creating digital payment accounts Marques (2019).

Based on these competitive advantages and flexibility that payment institutions have over traditional banks, they have been commercially called Digital Banks by customers. This fact is in line with the information that Fintechs, among them Digital Banks, have filled the market gaps created by customers dissatisfied with traditional financial institutions, but that until then did not have the option to leave them (Pinheiro, 2017).

Petrova, Kuznetsova, Eremina, and Kalachev (2020) analyzed the digital transformation in the banking industry in Russia and indicated that digital technologies open new opportunities for the development of the banking industry. It is also added that the studies of the aforementioned researchers define the term "digitalization" as the conversion of information into digital format.

According to Furtado (2020) digital banking is a financial institution that offers its products and services primarily online, through a modern infrastructure, without the need to go to a branch to perform services, in which many times the customer is exempt from bank fees, credit card with no annuity, and account with no maintenance fees.

Digital banking is a bank that provides products and services in digital form through an online branch of the financial institution. In fact, digital communication channel become a unified platform of all other forms of communication: mobile (via Internet) and physical (at the banking facility), i.e., your customers communicate daily with the bank mainly through digital channels. This is the essence of the bank's digital transformation implying fast and real-time decision-making Petrova, Kuznetsova, Eremina, and Kalachev, 2020).

In study on the topic in the Brazilian market, Marques (2019) analyzed the implications of digital transformation, and consequently the emergence of Digital Banks, in the Brazilian banking industry. The author argues that the digital bank was created with different purposes than the traditional banking market, making available to its customers products and services through digital channels, which previously could only be accessed in person. In this sense, it seeks to facilitate and improve customer service.

In the definition presented by Miranda (2017), digital banks have emerged, performing and providing all the services offered by traditional banks, but now performed over the internet or through apps on computers, cell phones, and tablets, through which customers of these digital banks can control the services offered, such as, for example, the credit card limit, financing credits, opening accounts, and other services also offered by traditional banks.

Digital banks have business models supported by innovative technology using electronic channels to relate with customers, serving niches left by traditional banks, operating with a different dynamic. The relationship with the customer is only remote and usually linked to better conditions and competitive advantages in relation to costs, more accessible services, and customer demands. The results and evolution of digital banks are being monitored by the Central Bank, measuring the efficiency of the financial market in terms of access, cost and competition for users (BACEN. Central Bank of Brazil, 2020b).

## 2.2 Benefits of Digital Banking

Regarding the benefits of digital banking, Furtado (2020) reports that these institutions are starting to gain the preference of customers in Brazil. Consumer preference and the degree of satisfaction of financial institutions that offer cell phone banking services and the cost of the products offered is higher than that of traditional banks, according to a survey prepared by the consultancy (Mamona, 2019).

Digital banking has a number of benefits. For example, they can lead to greater financial inclusion, expansion of financial services to non-financial sectors, and the expansion of basic financial products and services to people who did not have access to these services, since 79.1% of households in Brazil have internet and 99.2% of households people use a cell phone to access the internet (Brazilian Institute of Geography and Statistics [IBGE], 2020).

With a different approach, a study by the Central Bank of Brazil (2020a) cites that digital banks and Fintechs are taking up more space in the banking market, offering products and services that are more accessible, secure, and geared to meet customers' needs. Among the solutions and platforms offered are the automation of financial transactions, digital accounts, payment reconciliations, transfer services and verification of receipts, seeking to target their services and products according to specific demographic markers, with accessibility to various audiences (BACEN, 2020a).

Ozili (2018) highlights that digital finance promises to boost the gross domestic product (GDP) market of digital economies by providing efficient access to various financial products and services (and credit facilities) for individuals as well as small, medium, and large enterprises, which can drive aggregate spending thereby improving GDP levels in emerging countries. Digital banks can also bring greater economic stability and financial intermediation, both to customers and to the economy where they and their families reside.

Corroborating with this idea, for Manyika et al. (2016) digital banks also benefit governments by providing a platform to facilitate an increase in aggregate spending that consequently generates higher tax revenues from increased financial transaction volumes.

Also in this context, Ozili (2018) further argues that digital banking brings benefits for the financial market and regulators in the sense that digital transactions, on a large scale, significantly reduce the circulation of (currency) money. Other benefits of digital transactions primarily for customers include greater control of personal finances, support for quick financial decision-making, and the ability to make and receive payments in seconds.

As regards the relationship between customer demands and digital banks, they occur due to the low degree of formalization and bureaucracy, greater dynamism in opening accounts and contracting services, and by providing a differentiated service to their customers, such as individuals, legal entities and micro-entrepreneurs. (BACEN, 2020b).

### 2.3 Fintechs

Fintechs, are companies that operate by applying technology in the financial market, recent in Brazil, gaining

space in the national financial market with their innovations, consumer facilities and low cost (Lamb, 2019; Nakashima, 2018).

Second Lamb (2019), in Brazil fintechs arrived in 2013, with innovative models, and with fully digital distribution, increasing competition in financial markets, by providing services that traditional financial institutions do with less efficiency, and broaden the range of users of their services, with new features of social interactions, characteristics of postmodernity, especially with regard to the interaction between economy and technology, generates a new paradigm of demand and interests of the digital consumer, a reflection of the advancement of technology and telecommunications.

For Costa and Gassi (2017) Fintechs are startups that operate and use technology in the financial market with ease, modernization, convenience of consumption and low cost. Fintech is a term of English origin: financial and technology, so they are model of companies that with the use of technology provide financial services (Andrade, 2019).

In the study by Katori (2017) in finance, these transformations are represented by the emergence of what is identified as Fintech, or Finantial Technology, demonstrating that traditional banks are not immune to change. The emergence of Fintech is transforming the global financial landscape.

The concept of Fintech may not be new, but over time, the term Fintech has come to have another connotation, while retaining fundamental elements of its conception, technology and its connection with finance, as characterized by Schueffel (2016).

Thus, the sectors in which Fintechs operate are extensive and multiple, demonstrating a rapid pace of evolution. With this, several articles have appeared, showing Fintech with a wide range of connotations for new segments in such a way that there is no concern in the way the term Fintech is used, making its conviction confusing and it is up to the listener of the message to understand the concept to which it refers. However, pointing out that this lack of understanding does not occur only in the Portuguese language Schueffel (2016) analyzes in his study that in several languages can be found several concepts for the term.

In short, for Vianna (2019) points out that Fintechs present innovative and disruptive methods presented by these companies, which are unlike anything seen before in the banking market, that this modern service delivery presents itself to the insight of the transformations that are occurring and may yet occur in the financial market.

#### 2.4 Digital Banking System

A society based on the digital world requires increasingly fast and innovative processes. Seeking stimulus, and customer engagement through a different service. With all this innovation, the laws and regulations that govern the national financial system have been adjusted and modernized. With the modernization of the legislation that regulates the performance of banks, there has been an increase in banking transactions through mobile devices (Rolli, 2018).

With the advance of digital banks, resolutions were created with the intention of making the transactions that these institutions can offer secure. However, with the advancement of technology, people's behavior has been changing due to the ease of access, causing the resolutions to undergo changes and even being revoked, in order to modernize in a safe way the access of people, having technology as priority (Nogueira Neto & Araujo, 2020).

Among the challenges for digital banks are: the ability to develop more complex data analysis in order to extract relevant customer information; a broad view of the customer relationship; simplification of processes; and informative and proactive actions. Traditional banks, on the other hand, benefit from interacting with digital banks

in order to accelerate technological innovation and enter the digital transformation era, introducing disruptive technologies in their products and services (BACEN, 2020a).

It can be noticed that in this new technological scenario, there was an oxygenation in the Brazilian banking system. With the arrival of digital solutions, driven by technology and the opening of the market promoted by the Central Bank of Brazil, associated with the dissatisfaction on the part of users of banking services provided by traditional banks, the market has awakened the need to reinvent itself and make available technological products and services of better quality, in order to remain competitive (Nogueira Neto & Araujo, 2020).

## 2.5 Digital Inclusion

According to the Central Bank of Brazil, financial inclusion is the state in which all individuals have effective access to financial services: credit, investments, payments, pensions, insurance and savings (BACEN, n.d.).

To reinforce the importance of financial inclusion Wyman (2017) explains that, financial inclusion refers to the delivery of financial products and services to all segments of a population, regardless of their economic status. Given this background, the researcher found that digital financial solutions can play a significant role in closing gaps in financial inclusion.

According to a technical report on digital financial services financial inclusion is the sustainable provision of accessible financial services to the least advantaged population in the formal economy (United Nations, 2016).

In addition, digital innovation has the potential to profoundly change the offering of financial services to various segments of the population that did not have access to these financial products, as well as impacting the way traditional banks conduct their business. With this new reality, digital banks have brought the use of new technologies to make their services and products available: through cell phones and digital platforms, aiming to reach the financially excluded and people in rural areas without the need for physical bank branches; alternative digital information, such as biometric data, to verify customer identity for account opening and payment authorization; transactional data analysis to generate insights to improve customer segmentation and credit risk assessment (Wyman, 2017).

Thus, this new and robust system used by digital and Fintech banks through innovation and technological transformation in banking has developed in recent years. In the current competitive dynamics, it is noticeable that more and more Brazilians are using the banking services of digital banks without the need to physically attend a bank branch.

Figure 1 below shows the advancement of digital channels over the course of 2015, 2016 2017, 2018 and 2019, pointing to increasing growth, demonstrating that customers are having greater reliability. Transactions with financial movement through mobile banking increased 716% from 2015 to 2019, according to data surveyed by FEBRABAN (Mulinari & Biagini, 2020).



## Em bilhões de transações



In this regard, for the United Nations (2016) an inclusive system brings people opportunities, access to and movement of funds, increased capital, and decreased risk, and financial inclusion directly influences economic development and unemployment, bringing protection and security where disadvantaged people would be able to store and manage value wherever they are without the need to protect the money with speed and transparency, making digital payments have a more rigorous traceability in the payment process, and direct transfers without having to go to a bank branch.

For Allen, Demirguc-Kunt, Klapper, Soleda and Peria (2016) the use of digital tools in financial inclusion has positively contributed to and facilitated banking transactions, such as digital payments, accelerating the turnover of money and reducing default, in addition to providing ease in the payment history, through the confidentiality of customer information. This makes customers feel more confident and tranquil.

Given the challenges of financial inclusion, we can mention the positive benefits of providing growth and expansion of financial services through cell phones, which are the most accessible devices in society. As such, the services offered are more accessible, convenient, and secure, by performing banking transactions on digital platforms in a secure manner (Ozili, 2018).

There are several advantages to doing business with digital banks, reasons why users prefer digital banks for providing faster service, making access easier, and cutting red tape for less advantaged customers (Ozili, 2018). With this, digital banks have strived to serve their customers with speed, security, convenience and practicality,

because customer relationship digitally, is tied to innovation, becoming self-sufficient (Bunea, Kogan & Stolin, 2016).

In a competitive global marketplace, Wyman (2017) explains, that digital financial services have the potential to accelerate financial inclusion through their impact on existing business models, encouraging the development of digital financial services to increase digital and social inclusion.

Greater financial inclusion can also provide disadvantaged households with opportunities to save, make investments, and access credit (Ellis, Lemma & Rud, 2010).

Figure 2 shows the growth of transactions through internet banking and mobile banking and the decline of the other channels.



Figure 2 Composition of Banking Transactions per Channel Type Source: FEBRABAN Banking Technology 2020 Survey

The theoretical justification for the relationship between digital finance and financial inclusion are the principles that a huge part of the disadvantaged population owns (or has) a cell phone, and that the provision of financial services via cell phones and related devices can facilitate access to finance for the excluded population,

## 3. Methodology

This research aims to verify the effects of the main digital banks, considering the amounts of customers and operations performed impact the Brazilian Banking System, mainly on the financial inclusion of their customers.

#### 3.1 Data Presentation and Analysis

provided it has the connectivity of an accessible Internet (Rizzo, 2014).

The research sample is composed of financial data, collected daily from the 09 main digital banks in Brazil in the period 2018 to 2020, collected through the Central Bank's IF data system. Table 1 below shows the main banks and their number of customers and transactions.

Digital Banking	Customers	Transactions
Nubank	11,005,219	46,250,207
Inter Bank	1,403,528	1,729,550
Original Bank	500,646	1,813,609
Agibank Bank	634,114	1,279,579
BMG Bank	4,455,741	8,590,295
Pan Bank	5,104,144	11,264,408
C6 Bank	1,201,437	1,600,906
XP Investments	18,984	40,463
Secure payment	186,398	200,525

Table 1 Digital Banks and Their Number of Customers and Bank Transactions

Source: Central Bank - IF System, Dec. 2020.

The data collected covers a period of 3 (three) years between 2018 and 2020, with data analysis from the 1st quarter of 2018 to the 4th quarter of 2020. This temporality is justified by the fact that the main digital banks are created in this period.

To collect quarterly data on the number of clients and the number of operations of the main digital banks, which will be the dependent variables, a survey was conducted using the IF Data® system of the Brazilian Central Bank - BACEN. The information disclosed quarterly by the institutions that are in normal operation was collected, totaling 100 observations.

Besides this database, also used for the application of the independent variables were the quarterly information on Net Equity, Total Assets, Amount of Funding, Classified Credit Portfolio, and Number of Branches collected from the IF Data® system on the Central Bank website.

With the possibility of analyzing whether the number of customers and the number of operations of the main digital banks impact the Brazilian Banking System, especially on the financial inclusion of their customers.

3.1.1 Econometric Models and Variables

In this subsection, the econometric models and variables are presented, which aim to corroborate the understanding of the applied methodology, as well as to explain the relationship between the number of customers and transactions with financial inclusion and the growth of the Brazilian Banking System through digital banks. The dependent variables, as well as the independent variables and the control variables for the econometric models are presented in the table below.

To give consistency to this study and with the purpose of seeking statistical evidence to explain the relationship between the number of customers and transactions with financial inclusion and the growth of the Brazilian Banking System through digital banks, the linear regression method will be used.

To evaluate and measure the (effect of digital banks on digital inclusion and on the growth of the banking system) two linear regression models were created, represented by Equations (1) and (2), processed in the Stata® software. In order to verify the existence of a relationship between the variables under study, applying in the regression the robustness test to treat the possible presence of heteroscedasticity.

It is emphasized that the study is focused on the year 2018 to 2020, due to the availability of data from digital banks only for the period. Once this data was organized, Equation 1 was applied, which will indicate whether

there is a relationship between the amount of customers and digital inclusion.

 $QC_{BD} = \beta_0 + \beta_1 PATRI + \beta_2 ATIVO + \beta_3 CAPTA + \beta_4 CREDI + \beta_5 AGENC + \beta_6 SELIC + \epsilon$  (1) In which:

QCBD = Quantities of Digital Bank Customers in the Quarter.

 $\beta_0$  = is the intercept.

PATRI = Shareholders' Equity in the Quarter in millions of reais

ATIVO = Total Assets in the Quarter in billions of reais

CAPTA = Fundraising in the Quarter in millions of reais

CREDI = Loan Portfolio Classified in the Quarter in millions of reais

AGENC = Number of Branches

SELIC = Interest rate in the quarter in Brazil in percent

 $\epsilon = \text{error term of the regression}$ 

Subsequently, to verify if there is a significant relationship between the quantity of transactions and the growth of the Banking System. In this sense, apply Equation (2).

 $QO_{BD} = \beta_0 + \beta_1 PATRI + \beta_2 ATIVO + \beta_3 CAPTA + \beta_4 CREDI + \beta_5 AGENC + \beta_6 SELIC + \epsilon$  (2) In which:

QOBD = Quantity of Transactions of Digital Banks in the Quarter.

 $\beta_0$  = is the intercept.

PATRI = Shareholders' Equity in the Quarter in millions of reais

ATIVO = Total Assets in the Quarter in billions of reais

CAPTA = Fundraising in the Quarter in millions of reais

CREDI = Loan Portfolio Classified in the Quarter in millions of reais

AGENC = Number of Branches

SELIC = Interest rate in the quarter in Brazil in percent

 $\epsilon = error term of the regression$ 

## 4. Results

#### 4.1 Descriptive Statistics of the Models

Based on the research of Ozili (2018) that the amounts of customers and transactions performed by digital banks, by impacting the banking system with their financial results contribute to the digital inclusion and growth of the banking market and the methodology presented, in the model calculations, the central research question is resumed: do the main digital banks impact the Brazilian Banking System, mainly in the financial inclusion of their customers and the growth of the banking market.

The methodology used in this subsection begins with the presentation of the descriptive statistics of the model data. With the information of averages, standard deviation, and minimum and maximum calculations of the variables, of which 100 observations were collected.

Table 2 presents the descriptive analysis of the variables selected for the application of the models in this research. The first results portray that in the dependent variables of Shareholders' Equity, Total Assets, Funding and the Credit Card, on average are positive, i.e., digital banks had more positive results than negative ones in the banking market.

PANEL A - MODEL VARIABLES						
Variable	Note	Average	<b>Standard Deviation</b>	Min	Max	
QC <sub>BD</sub>	100	1968156	2544974	0	1.10	
QO <sub>BD</sub>	100	6212032	1.25	0	7.20	
PATRI	100	2450457	1980728	212043	84007507	
ATIVO	100	1.63	1.26	275556	6.63	
CAPTA	100	9022005	8230904	50137	3.89	
CREDI	100	6961938	72888347	0	2.89	
AGENC	100	10.53	12.98053	1	41	
SELIC	100	4.69	1.874106	1.9	6.4	

Table 2 Descriptive Statistics

Note from Table 2:  $QC_{BD}$ : Quantities of Digital Banks' Customers in the Quarter;  $QO_{BD}$ : Quantity of Transactions of Digital Banks in the Quarter; *PATRI*: Net Equity in the Quarter in millions of reais; *ATIVO*: Total Assets in the Quarter in millions of reais; *CAPTA*: Total Assets in the Quarter in millions of reais *CREDI*: Total Assets in the Quarter in millions of reais *AGENC*: Number of Branches *SELIC*: Interest rate in the quarter in Brazil in percentage.

The first results portray that in the dependent variables quantity of customers and the quantity of transactions of digital banks, on average are positive, that is, there were growths in both the quantity of customers and the quantity of transactions carried out by digital banks.

As far as the independent variables are concerned, it can be seen that the average Net Worth variable was (R\$2,450,457) million, and (R\$1.63) billion for the Total Assets variable, with the highest Total Assets being (R\$6.63) billion and the lowest (R\$275,556) million. The highest result observed for the Fund Raising variable was (R\$3.89) billion and the lowest was (R\$50,137) million. On the other hand, the average of the variable Classified Credit Portfolio was (R\$6,961,938) million. Thus, it can be inferred that on average, during the sample period, there were increases in the financial results of digital banks.

#### 4.2 Regression Results

#### 4.2.1 Empirical Results of the Models

The considered hypothesis of this research investigates whether the main digital banks, considering the amounts of customers and operations performed, impact the Brazilian banking system, especially in the financial inclusion of their customers and the growth of the banking market. We begin the analysis of Table 3 which describes the regressions performed of the econometric models of Equations (1) and (2). As a result of the analysis of the effect of the quantities of customers and operations/transactions of digital banks, with respect to their financial information of Equity, Total Assets, Fundraising and the Credit Card of digital banks, through the statistical tests, containing the test result, as well as its coefficients and p-value of interpretation. In addition to the inserted control variables.

Starting the analysis by the hypothesis of Equation (1), which states that the amounts of digital banks' customers positively affect the Brazilian banking system, mainly in the financial inclusion of their customers. The results of the estimations show that the independent variables Total Assets and the Credit Portfolio of digital banks were statistically significant, with p-value equal to 0.000, with 99% confidence with a significance level of 1%, with a positive coefficient, while the Net Equity and Fundraising had a negative coefficient with p-value equal to 0.000, with 99% confidence with a significance level of 1%. In relation to the control variables, the number of

branches had a p-value of 0.000, being statistically significant with a confidence level of 99% with a significance level of 1%. The control variable SELIC had a significance level of 95% with a significance level of 5%, considering the number of customers of digital banks. Therefore, the result of this study aligns with Ozilli's (2018) research that the quantities of customers realized by digital banks impact the banking system with their financial results contributing to digital inclusion.

Variables	Quantities of Digital	Quantities of Digital Bank Clients (QC <sub>BD</sub> )		Α	Quantities of Digital Bank Transactions (QO <sub>BD</sub> )		actions
	Coefficient	P> t		D	Coefficient	<b>P&gt;</b>  t	
PATRI	-0.6625546	0.000	***		-2.791985	0.000	***
ATIVO	0.2799302	0.000	***		1.057914	0.000	***
CAPTA	-0.4727566	0.000	***		-1.853742	0.000	***
CREDI	0.3746737	0.000	***		1.083115	0.000	***
AGENC	46111.74	0.000	***		24881.02	0.621	
SELIC	-96951.22	0.058	**		289136.7	0.532	
_cons	656992.4	0.004	***		3383961	0.008	***

Table 3 Regression Results

Note from Table 3:  $QC_{BD}$ : Quantities of Digital Banks' Customers in the Quarter;  $QO_{BD}$ : Quantity of Transactions of Digital Banks in the Quarter; *PATRI*Net Equity in the Quarter in millions of reais; *ATIVO*Total Assets in the Quarter in millions of reais; *CAPTA*Total Assets in the Quarter in millions of reais *CREDI*Total Assets in the Quarter in millions of reais *AGENC*: Number of Branches *SELIC*: Interest rate in the quarter in Brazil in percentage.

Further on in the discussion of results, there is Equation No. 02, which proposed that the amount of operations/transactions of digital banks affect the Brazilian banking system, especially in the growth of the banking market. The results of the estimations showed that the independent variables Total Assets and the Credit Portfolio of digital banks were statistically significant, with p-value equal to 0.000, with 99% confidence and with a significance level of 1%, with a positive coefficient, while the Net Equity and Fundraising had a negative coefficient with p-value equal to 0.000, with 99% confidence and a significance level of 1%. In relation to the control variables, the number of branches and the SELIC rate were not significant. Therefore, the result of this study also corroborates Ozilli's research (2018) that the quantities of transactions performed by digital banks, by impacting the banking system with their financial results, contribute to the growth of the banking market in Brazil. In summary, by examining the results found, it can be verified that the amounts of customers and of transactions carried out by digital banks, by impacting the banking market, respectively. In this sense, this research provides relevant information about the behavior of digital banks in the Brazilian banking system, both for the market and for future research on the subject. Finally, considering that all hypotheses linked to the objective of this study were statistically validated with (p-value < 0.01).

## 5. Summary of Positive and Negative Aspects

Table 4 demonstrates a summary with the pros and cons of digital financial services banks, observed by the results of this work.

Positives	Negatives			
Expansion of financial services to non-financial sectors.				
Convenient and secure banking services for digital service users.	Digital finance does not cater to individuals who do not have cel phones or mobile devices.			
Boosting the GDP of digitalized economies.	Overly relies on Internet connectivity, excludes individuals who do not have Internet connectivity.			
Reduce the circulation of counterfeit money.	Digital data security breaches are common and can diminish			
Greater control of the clients' personal finances.	customer confidence in digital financial platforms.			
Fast financial decision making.	Systemic risks, when they occur, can be fatal to digital financial services.			
Ability to make and receive payments in seconds.	The regulatory and social policy environments are still adapting to			
Revenue generation for digital financial service providers.	this new business model.			

Table 4 Positive and Negative Aspects of Digital Financial Services

#### 6. Conclusions

The present study aimed to investigate whether, the main digital banks, considering the amounts of customers and operations performed impact the Brazilian Banking System, mainly on the financial inclusion of their customers and on the growth of the banking market.

Quantitative research was conducted by surveying the number of customers and the number of transactions performed by digital banks, as well as the financial information of these banks from the 1st quarter of 2018 to the 4th quarter of 2020.

The conclusion is that there is evidence that the amounts of customers and of operations carried out by digital banks, impact considering their financial results, having a representativeness in the banking market in the light of the tests applied here, corroborating, the fact that these variables increase banking inclusion and, consequently, the growth of the banking system in Brazil, being in line with the research conducted by Ozili (2018) that the amounts of customers and transactions performed by digital banks, by impacting the banking system with their financial results contribute to digital inclusion and growth of the banking market in emerging countries.

This study can serve as a model for new researchers, who can deepen the analysis, including analyzing other banking markets in other countries, expanding the base of works that aim to demonstrate the impact of digital banks on the banking system, in other words, it ratifies the hypothesis that despite being recently created, digital banks contribute to the inclusion and to the Brazilian banking system. This paper suggests that future research should verify whether digital banks impact the financial stability of the financial market, especially considering the capital information (reference assets and risk-weighted assets) of digital banks.

And finally, the limitations of this study should be noted, such as the small number of digital banks in the Brazilian market, the information available on the market, and the use of a specific period to conduct the analysis. Thus, the results presented herein are not intended to provide an exhaustive analysis of the impact of digital banks on the banking market, but rather to bring back into discussion a topic of importance to the academic environment, but also to other participants in the financial system.

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