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THE PROBLEM OF MAINTAINING THE CHEQUE PAYMENT INSTRUMENT: REGULATORY FAILURES AND FORECASTING OF ITS USE

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ABSTRACT

This work seeks to investigate the issue of checks in the Brazilian market through the analysis of possible regulatory failures that involve it and the forecast of its use in the coming years. For this, monthly data from 2000 to 2020 made available by the Central Bank of Brazil, Febraban, Banco Execunte and Câmara Interbancária de Pagamentos are used and a Seasonal Autoregressive Integrated Moving Average - SARIMA model is used to project the quantities and values of checks from 2020 to 2030. The results show that, even with the insertion of a new, more technological payment instrument such as the PIX and the decrease in its use, the check will not cease to exist until 2030. Such results are useful for the literature that investigates payment instruments, for the agents of the economy in general and, mainly, for the policy makers of the financial market.

Keywords: Check. COMPE. Executing Bank. CIP, SARIMA.

SUMÁRIO

1. INTRODUCTION

The payments system is strategic for countries and has an impact on domestic and international economies, and is commonly controlled and regulated by governments. The main risks to which payment systems are exposed are financial, liquidity, credit and systemic (JOHNSON et al., 1997). The Brazilian Central Bank coordinated the implementation of changes to modernize the payment system in 2002.

The aim was to decentralize risks in the public sector by operating exclusively in financial settlement or trading systems in real time and with gross settlement for each operation, where transactions are only settled if there is a sufficient balance in the Bank Reserves account, thus concentrating risks in financial institutions. Until it was restructured, the risk inherent in the payment system fell entirely on the public sector, with large sums of public funds being spent on bailing out private banks and covering negative balances in Bank Reserves accounts.

Known as the Check Law, Law No. 7,357/1985 regulated the procedure for this form of credit and transfer of funds. Thus, the check had to be issued against a bank or financial institution that is equivalent to it and with the existence of a credit balance of the issuer in an account based on a bank deposit contract or opening of credit. According to the law, the check should contain certain requirements such as the name "check" inscribed in the context of the security and expressed in the language in which it is written, the unconditional order to pay a specific amount, the name of the financial institution that must pay (drawee), an indication of the place of payment, an indication of the date and place of issue and the signature of the issuer (drawer) or his agent with special powers (BRASIL, 1985).

With this in mind, this paper seeks to analyze possible regulatory failures and credit risks that financial institutions are exposed to in maintaining this means of payment, given that there is the possibility of transferring funds and payments at a lower cost to institutions and that they serve the end customer more quickly, as well as having other credit instruments with less risk. But first it's important to understand the possibilities for using checks in the coming years.

To do this, we used monthly economic and financial data on the payment instrument from 2000 to 2020 and used the Seasonal Autoregressive Integrated Moving Average (SARIMA) method to estimate a forecast model for the use of checks in the Brazilian economy up to 2030. The results show that, even with the numerous more modern means of payment that have a better cost-effectiveness, greater credibility and security, the check will continue to be used steadily during this period.

These findings are useful for the literature that investigates the financial system, since there are few studies on the subject, for economic agents in general and for policy makers, since with the decrease in the use of this means of payment and the legal and financial risks involved, as well as difficulties in preventing money laundering, it may be advantageous to disable it on a date defined in the most appropriate way for economic agents.

In addition to this introduction, the paper has four more sections. The second section presents the theoretical framework on the subject and the third describes the database and the method used. The fourth section reports the results obtained from the forecasts of the use of cheques and analyzes possible regulatory failures.

2. THEORETICAL FOUNDATIONS

There is no consensus, but some experts claim that the Romans invented the check around 352 BC, while others argue that it was created in Holland in the 16th century. In Amsterdam, around 1500, people used to deposit their money with cashiers, which was less risky than keeping it at home. The cashiers agreed to collect and cancel debts by means of written orders from the depositors (checks). In England, at the end of the 17th century, people began to make deposits with Goldsmiths, in which the Goldsmith gave or issued goldsmith notes in favor of his client. These simple handwritten notes contained a promise to pay the client or his order, while the client could also write to the goldsmith asking him to pay someone else (PORTAL DA EDUCAÇÃO, 2021).

It is believed that the first checks printed by Lawrence Childs in England date back to 1762, making him the first banker in the modern sense. But before this, in the same country, the use of the check had already begun to develop. Some checks received by bankers from different people, against different banks, had the inconvenience of obliging them to go to the drawee establishments to obtain payment. The banker would deposit the checks in his own bank and then collect them. He would then present the checks to the other banks, employing couriers who made countless trips a day. To reduce the number of journeys, they decided to meet in a tavern where they exchanged their bundles of checks (PORTAL DA EDUCAÇÃO, 2021).

Bankers initially resisted this system, but when they realized how useful it was, they adopted it, creating the Clearing Houses to which all checks delivered to one bank are taken against others. The first country to legislate on the check was France, with the Law of June 14, 1865. In England, where it spread more rapidly, specific legislation was only passed on August

18, 1882. In Brazil, the first reference to the check appeared in 1845 when the Banco Comercial da Bahia was founded, and it was called a cautela. It was only in 1893, in Law 149-B, that the first reference to the check appeared, in Article 16, letter a, and the institute was regulated by Decree 2.591 of 1912.

Law 7.357/1985, known as the Cheque Law, regulated the procedure for this type of credit instrument. Coelho (2007) states that a cheque is a linked model instrument, which can only be issued in a standardized document supplied in booklets by the drawee bank to the account holder. The entry of all the legal requirements in any other document does not constitute the issuance of a check and does not generate exchange effects. In economic terms, its definition is presented by the national financial system, governed by the Central Bank of Brazil (COSIF, 2010) as a cash payment order, bearer or nominative, made by an account holder of a banking establishment or credit cooperative, using a form standardized by the Central Bank of Brazil, based on an international convention signed by the Brazilian government (Decree 55.595/96).

Several studies related to the most diverse sectors of the economy have been carried out in order to demonstrate the impacts of the check on the economy. Azambuja (2017) demonstrated the positive and negative effects of the post-dated check in practice and in the legal sphere and identified three relevant aspects. The first is that the post-dated check as an instrument widely inserted in commercial uses and customs has no legal support, the second argues that the clear indication of jurisprudence in the civil liability of the bearer for the early presentation of the post-dated check can be called to answer for material or moral damage, and the third argues that there is no imputation of the crime of embezzlement to the issuer of the post-dated check, whose check was presented by the bearer to the drawee before the agreed date with the consequent lack of funds, a situation in which doctrine and case law have the same understanding.

Artes and Figueiredo (2008) stated that the evolution in the technology of Brazilian payment systems has been very effective in slowing down the use of the check, however, they proved through econometric models that the check would not disappear until 2018, with its use being considerable in both the physical and financial aspects. Carvalho (2007) concluded that, after taking all the precautions to model a time series, there are two models for adjusting the data from the series of cleared checks: the Double Smoothing model, in the case of non-parametric models, and SARIMA, as being the most suitable. Apte (2011) proposed a mathematical model using real operational data obtained from a Philadelphia-based bank and considered that check sorting and clearing operations are not limited to the banking sector, but are also the backbone of the US Postal Service operation.

Sadri, Jalili and Akbari (2014) analyzed major problems with bank checks in Persia - Asia, with low accuracy and the possibility of automated use and processing. The authors proposed as a solution a new structure in the handwritten check model that would facilitate systemic use with systemic precision readers. Santos (2018) analyzed the influence of technology as a mechanism for agility and precision in the clearing of checks by image in a credit union. It was concluded that the clearing of checks by image brought the cooperative more agility and security in the checking of checks, reduction of transport costs and optimization of processes with a significant reduction in the time taken to check the clearing, thus not having any negative aspects.

Thus, this paper seeks to contribute to the literature investigating means of payment by presenting an analysis of the problem of the use of checks by Brazilian financial institutions and discussing possible regulatory failures after forecasting the use of checks until the year 2030.

3. METHODOLOGY

3.1 Data

Economic and financial data related to the payment instrument checks in Brazil is used on a monthly basis for the period from 2000 to 2020. This data is provided by the Central Bank of Brazil with summary information from all financial institutions nationwide. This information shows a slowdown in the use of checks in recent years, both in terms of quantity and financial volume.

According to statistics provided by the centralized check clearing house, this payment instrument has fallen over two decades, compared to the other two instruments for transferring funds via national clearing. It should be noted that the Boleto de cobrança is no longer used by Compe nacional in 2005, becoming part of the clearing system of CIP - Câmara Interbancária de Pagamentos.

In order to verify the need to consider explanatory variables to understand the use of checks, we analyzed the possible impacts on checks of the launch of the PIX product in November 2020. According to information from the Brazilian Central Bank, PIX has reached 25% of Brazilians and has moved more than R$ 203 billion.

Figure 1 shows the trend in the use of TED, DOC, PIX and Cheque payment methods.

Figure 1 - Use of means of payment (in thousands of reais)
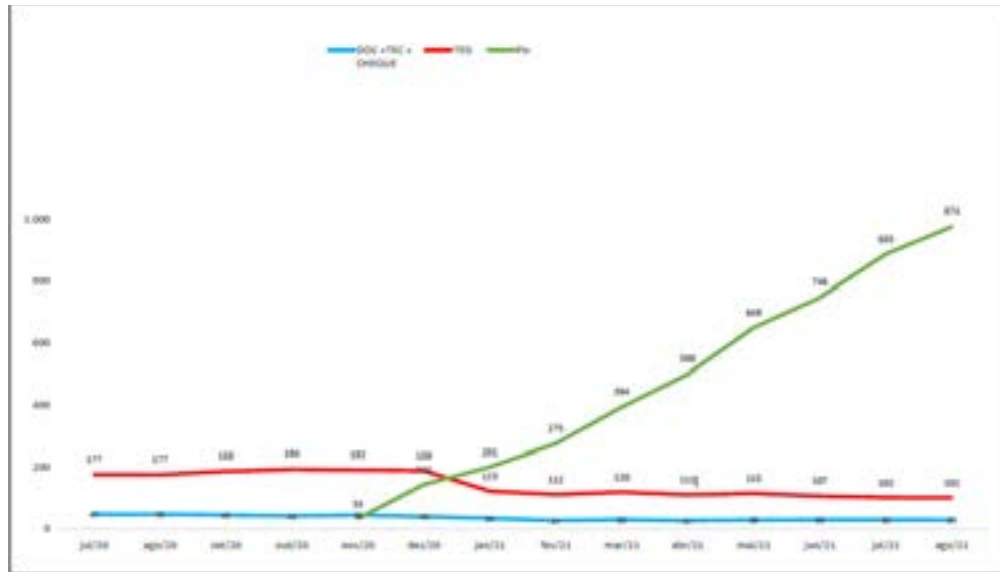
It can be seen that Pix has a high number of transactions and amounts transacted, TED is the means of payment with the highest volume of money transacted, and there is no change in the cash circulating in the country, while the other means of payment, including checks, remain stable.

Empirically, it is reported that the check product has a higher credit risk due to the fact that payment is not confirmed immediately. The analysis shows a continuous increase in the level of default on checks, as shown in Figure 2.

Figure 2 - Returned checks

According to the Consumer Indebtedness and Default Survey (PEIC) released in March 2021, 67.3% of Brazilian families say they are in debt. In addition to the increase in credit card debts, there was also growth in post-dated check debts, with 1.6% of debts coming from this payment method. In other words, more than 700,000 Brazilian families now have debts related to bad checks.

In order to make progress in the scenario projection analysis, it was also necessary to evaluate the 2020 period, as this was the period when the COVID-19 pandemic began, which led to economic changes in the country. The intention was to identify whether this period affected the transaction/movement of checks so that, if so, it could be dealt with. However, according to Figures 3 and 4, no significant changes were identified in the quantities and values of checks.

Figure 3 - Number of checks exchanged

Source: National Clearing House.

Figure 4 - Amounts of checks exchanged

Source: National Clearing House.

Due to the small changes perceived in the use of checks by Brazilians after PIX entered the market, as well as the impacts of the Covid-19 pandemic, a univariate model is suitable for projecting the use of checks in the economy until 2030. However, caution is needed in relation to variations in the use of checks at different times of the year, and seasonality components need to be taken into account. The method selected is the Seasonal Autoregressive Integrated Moving Average - SARIMA.

3.2 Seasonal Autoregressive Integrated Moving Average - SARIMA

Univariate models use only one variable to run and consist of explaining a given variable using its past values, the past values of shocks and the past values of errors or residuals (MATOS, 2000). Their principle is that future values of a given time series are highly dependent on past values, explaining each value by previous values in the series (PELLEGRINI, 2000).

The Seasonal ARIMA (SARIMA) model is formed by adding seasonal terms to the ARIMA model: SARIMA (p, d, q) (P, D, Q) [S], where p is a non-seasonal autoregressive order, P is a seasonal autoregressive order, q is a non-seasonal moving average order, Q is a seasonal autoregressive order, d and D are the order of common difference and seasonal difference (PEPPLE and HARRISON, 2017). Meanwhile, the methodology described by Box and Jenkins (1970) is one of the most widespread demand forecasting techniques. Some applications of this methodology are in the medical, environmental, financial, engineering and air quality forecasting fields (WERNER; RIBEIRO, 2003).

ARIMA models are the result of combining three main parameters: the autoregressive term (AR), the integration term (I) and the moving average term (MA). In order to model a given time series, either all three can be used, or only a subset of them (FAVA, 2000), depending on the particularities of the series being studied. Box and Jenkings (1976) summarize the equation formation processes of the ARIMA and SARIMA models. Starting with the AR(p) model, where the current value of the series is expressed as a linear aggregate of p previous values and a random noise, such as shown in Equation 1:

$$Z_t = \phi_1 Z_{t-1} + \phi_2 Z_{t-2} + ... + \phi_p Z_{t-p} + a_t \quad (1)$$

where p is the AR order, Z_t is the observed time series at time t, a_t is the random noise following a normal distribution with mean 0 and variance equal to 1, and $\phi_1, ..., \phi_p$ are the AR(p) parameters. When the lag operator B is introduced, defining $Z_{t-1} = BZ_t$ and, consequently, $Z_{t-p} = B^p Z_t$, Equation (1) can be rewritten as:

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$$\phi_p(B)Z_t = a_t \quad (2)$$

Where $\phi_p(B)$ is the AR(p) operator, defined as $\phi_p(B) = 1 - \phi_1 B - \phi_2 B^2 - \ldots - \phi_p B^p$.

On the other hand, the MA(q) model, which explores the autocorrelation structure of forecast residuals from the current period with those from earlier periods, is described by Equation 3:

$$Z_t = \alpha_t - \theta_1 \alpha_{(t-1)} - \theta_2 \alpha_{(t-2)} - \theta_q \alpha_{(t-q)} \quad (3)$$

And it can be rewritten as:

$$Z_t = \theta_q(B)a_t \quad (4)$$

Where q is the order of MA(q), $\theta_1, \ldots, \theta_q$ are the parameters of the MA(q) model, and $\theta_q(B)$ is defined as $\theta_q(B) = 1 - \theta_1 B - \theta_2 B^2 - \ldots - \theta_q B^q$.

When we combine Equations (2) and (4), we obtain the ARMA (p, q) model, representing mixed processes of AR(p) and MA(q). We have Equation 5:

$$\phi_p(B)Z_t = \theta_q a_t \quad (5)$$

The AR, MA and ARMA models are used when the series is stationary, i.e. its basic statistical properties, such as mean, variance and covariance, remain constant over time. However, when the series is non-stationary, it is transformed into a stationary series through the process of differentiating the data. Thus, in addition to the models previously described, the integration component I(d) is used, resulting in the ARIMA(p, q, d) model represented by Equation 6:

$$\phi_p(B)\Delta^d Z_t = \theta_q a_t \quad (6)$$

where $\Delta^d Z_t = (1-B)^d Z_t$ and d is the order of differentiation.

Many time series have repetitive patterns that appear regularly at each time interval. To deal with series that show seasonal autocorrelation, the multiplicative seasonal ARIMA model is used, known as SARIMA (p,d,q)(P,D,Q), represented by Equation 7:

$$\phi_p(B)\ \Phi_p(B^S)\ \Delta^d \Delta_S^D Z_t = \theta_q(B)\ \Theta_Q(B^S)\alpha_t \quad (7)$$

Where $\Delta_S^D Z_t = (1 - B^S)^D Z_t$, D is the order of seasonal differencing, $\Phi_p(B^S)$ is the seasonal AR(p) operator defined as $\Phi_p(B^S) = 1 - \Phi_1 B^S - \Phi_2 (B^{2S}) - \ldots - \Phi_p (B^{PS})$; $\Theta_Q(B^S)$ is the seasonal MA(q) operator defined as $\Theta_Q(B^S) = 1 - \Theta_1 B^S - \Theta_2 (B^{2S}) - \ldots - \Theta_q (B^{QS})$, and $\Phi_1 \ldots \Phi_p$ are the parameters of the seasonal AR(p) model, and $\Theta_1 \ldots \Theta_Q$ are the parameters of the seasonal MA(q) model.

4. RESULTS

4.1 Unit root tests

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As determined by the SARIMA methodology, the time series must be stationary; if not, it must be differentiated sequentially, seasonally or both to make it stationary. To do this, the ADF, DF-GLS, KPSS and Phillips & Perron (PP) tests were carried out. The results are shown in Table 1.

Table 1 - Unit Root Tests

Series	ADF (1)	DF-GLS (2)	KPSS (3)	PP
Checks	-1,1883	-1.012	4.8199***	-120.68***
ΔChecks	-7.5904***	-8.122***	0.078711	-328.99
Value	-3,0687	0,425	2.9914***	-45.244***
ΔValue	-5.5873***	-4.617***	0.1001	-339.26***
Notes: The series are in logarithm. ***p < 0.01; **p < 0.05; *p < 0.1. Δ represents the first difference of the series. (1) Applied to test equations with intercept and trend. (2) Applied to test equations with intercept and trend. (3) The KPSS test has the null hypothesis that the series is stationary.				

Source: Prepared by the authors.

The seasonal index was calculated to identify the seasonal pattern, demonstrating that the hypothesis of a reduction in checks exists and that there is seasonality in their behavior. Decomposed graphs were used to identify the components of the time series, seasonal, trend, cyclical and random components in the data over time. When a time series is influenced by seasonal factors there is a seasonal pattern. The initial tests showed that there is a trend, annual seasonality and the presence of a unit root, accepting the null hypothesis with a P-value of 0.906.

To deal with this, it was necessary to apply a non-linear transformation to the original series, with a logarithmic transformation. After treatment, it can be seen that the series still contains seasonality, which leads to the use of the SARIMA method.

4.2 Estimation results

The model used to forecast the series is SARIMA (2, 0, 1) (2, 0, 3) [12]. Table 2 shows the results of the estimations.

Table 2 - Estimation results								
Ar1	Ar2	Ma1	Sar1	Sar2	Sma1	Sma2	Sma3	Intercept
-0.7465	-0.5759	-0.5839	1.7575	-0.7689	-1.4743	0.1902	0.4205	-0.0087
*0.0756	*0.0701	*0.0812	*0.1210	*0.1210	*0.2740	*0.2353	*0.1431	*0.0026
Notes: AIC = -714.73; * represents the deviations.								

Source: Prepared by the authors.

Based on the history of the use of checks from 2000 to 2020, its reduction is undeniable. However, with the forecast indicated by the estimated model, the volume of checks will tend to zero, but without touching the x-axis, denoting an asymptotic behavior. Figure 5 illustrates the forecast for checks from 2021 to 2030.
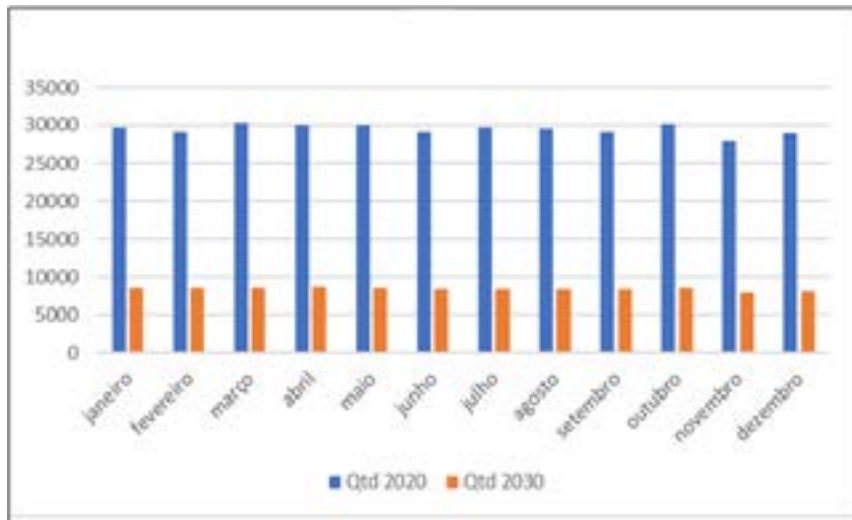
Figure 5 - Forecast of Cleared Checks (in thousands)
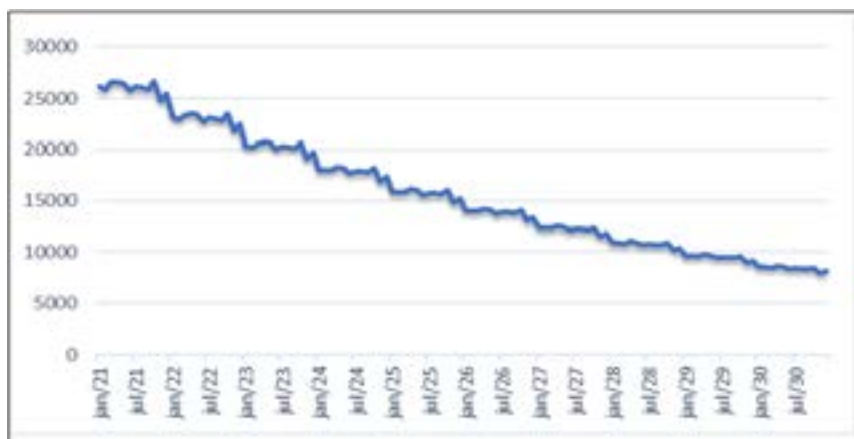
Source: Prepared by the authors.

In the absence of new regulatory measures or significant technological shocks in the payments market during the forecast period, there is no indication that the check could disappear in the period, remaining at a monthly average of more than 8 million checks cleared in 2030, totaling more than 100 million checks per year. This level is 65% lower than that recorded in 2020, but not enough to characterize the disappearance of checks in the Brazilian market. Figure 6 shows a comparison of the use of checks in the months of 2020 and the forecast for the months of 2030.
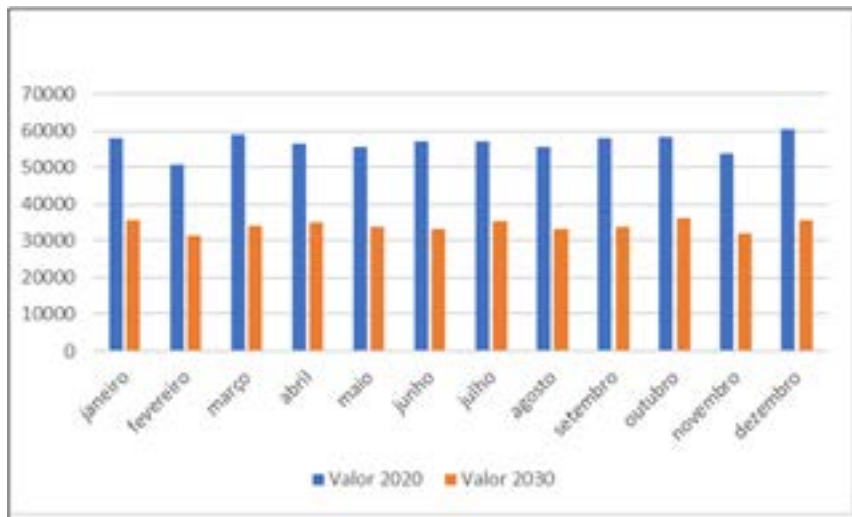
Figure 6 - Comparison of checks 2020 versus 2030 (in thousands)

Source: Prepared by the authors.

Similarly to what was done in the model above, forecasts were also made for the evolution of the use of values. Figure 7 shows a comparison of the amount used in 2020 with the amount forecast for 2030.

Figure 7 - Comparison of amounts transacted via checks (in thousands)

Source: Prepared by the authors.

As with the quantity evolution model, the analysis of the figure above also suggests that, in the absence of regulatory measures or significant technological shocks in the payments market during the forecast period, there is no indication that the check could disappear in the coming years. The financial volume is expected to be around R$410 million in 2030. This level is 39% lower than that recorded in 2020, but also insufficient to characterize the disappearance of the

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cheque in the Brazilian market.

Possible explanations for this could involve characteristics such as the age - for example - of the payment system's users. In the survey of information on PIX available on the Central Bank's website, it was reported that half of PIX users are in the Southeast of the country and that almost 70% of users are between 20 and 39 years old, while less than 5% of PIX users are over 60.

As only 7% of consumers currently use checks, according to the survey "Brazilians and their Relationship with Money" carried out by the Central Bank in 2018, and with the great growth of the PIX tool among young people, a possible explanation could be that due to a lack of familiarity with electronic means of payment, people still use checks, like older people. To test this assumption, we analyzed a sample of 37,000 customers of a Brazilian bank, aged between 18 and 102, who issued a check in 2020. We found that only 9% of users were under 40, 46% were aged 41 to 50 and 43% were over 60.

4.3 Possible Regulatory Failures

The functioning of the economy, in principle, does not need government intervention. This is the main characteristic of the idea that the state should intervene as little as possible in economic relations. According to Adam Smith, one of the forerunners of economic liberalism, the state has only three duties: to carry out public works, as long as these cannot be carried out by private initiative, to defend society against external enemies and to protect individuals against mutual offenses.

Dallari (1991) states that the modern state was born absolutist and for some centuries all the effects and virtues of the absolute monarch were confused with the qualities of the state. This explains why, as early as the 18th century, public power was seen as an enemy of individual freedom, and any restriction on the individual in favor of the collective was seen as illegitimate. This was the individualist root of the liberal state. At the same time, the bourgeoisie

The wealthy, who already had economic power, advocated minimal state intervention in social life, considering freedom of contract a natural right of the individual.

Regulation is generally inspired by neoclassical economic theory and is a response to market failures, which consist of discrepancies with the ideal of a competitive market, especially in public goods sectors. Interestingly, regulation is also subject to failures, known as government failures. The relationship between government and the market, directly or indirectly,

is related to various economic activities.

As Nelson (2002) points out, it is a mistake to believe that there are structures governed essentially by the market. However, before a government intervention, it is assumed that the market has not been sufficient to solve the problem. But after all, what market failure existed so that, in 1985, the federal government needed to publish the Federal Law to deal with the check payment method? Given that the other means of payment are exclusively regulated by the Central Bank's supervisory and control body?

Noting that the Check Law, No. 7,357/1985, was the landmark for its regulation, it has currently proved to be an allocative inefficiency. Dollery and Wallis (1997) argue that it is possible to identify three forms of government failure: legislative failure, rent-seeking and bureaucratic failure, the latter of which is more similar to this issue. This failure ensures that policies will not be implemented efficiently, since the civil service lacks the incentives to conduct the policy efficiently.

Today, because the check is regulated by Federal Law, the product suffers from a lack of improvement in the regulatory sphere, where the Central Bank itself is judged incapable of regulating a situation that the law covered in an archaic way at the time of its creation and has not yet been improved. Legislators could be more attentive to social issues, and it would be up to the entity with greater control, such as the Central Bank, to regulate and conduct the process.

4.3.1 Comp code

When checks are made, there are several fields to be filled in as a security argument, both by the customer and by the financial institution, and they involve the check number, branch and current account, and even so it is a document that suffers from criminal action through the cloning of the cards. For this reason, the Brazilian Federation of Banks has asked the Central Bank to change the rule so that the Comp code - a field on the check that denotes the number 018 and which currently has no function - can be used by financial institutions to create yet another control mechanism with numbers or letters to make the check more secure. The rule has not been changed and banks are unable to make the change without such a change, as it comes under the national clearing rule and the executing bank may not comply with it.

4.3.2 Prevention of Money Laundering - PLD

In January 2020, Central Bank of Brazil Circular 3,978 was published with the aim of preventing the use of the financial system to commit crimes of laundering or concealing assets, rights and values. There is a consensus that checks, due to regulatory flaws, contribute to the difficulty in identifying the real depositary of the security.

The Rule of Endorsement, according to legal provisions, states that the bearer of the check can transfer his credit rights to any third party, provided that the rule of endorsement to the beneficiary is respected. Endorsement is a process in which the beneficiary transfers the ownership and credit rights of a check to a third party, identifying the action in the document itself.

According to article 17 of the Check Law, checks are payable to a named person, with or without an express demand clause, and are transferable by endorsement. These rules create regulatory gaps so that the Central Bank and other control bodies can identify the origin of the funds. Until the publication of this circular in 2020, banks did not keep information on checks that were not issued by their institution. In other words, Bank X had a client who issued check A to client B of Bank Y. When Bank X was questioned by the Central Bank and other control bodies about who customer B was to receive the funds, there was no such information.

In compliance with BCB Circular 3,517 of 2010, in 2012 the functionality of electronic exchange of information on CPF and CNPJ of drawee and depositary accounts regarding the transfer of values by means of checks was added, in addition to the electronic exchange of information on Financial System clients through the Financial System Client Information System (ICF) processed by Banco do Brasil.

Considering the implementation of the Financial System Customer Information System for the electronic exchange of bank customer information since 2006, the physical exchange of said information is no longer permitted. The Financial Institution's participation in the System was mandatory and it had to have an active code number (number provided by the Central Bank of Brazil). This file exchange only provided for the exchange of information when requested, in other words, the systems have not been categorized to carry out such automatic processing (PORTAL FEBRABAN).

In compliance with BCB Circular 4.005 of 2020, as of 2020, the ICF file will process the functionality of 100% electronic exchange of CPF and CNPJ information between the financial institutions of drawee and depository accounts. The ICF Project has made the clearing of checks even more costly for institutions and, even so, has not solved the problem of discovering the use of the instrument due to the Check Law, which has not changed the endorsement rules.

4.3.3 Mobile Application Compensation

The digitization law, Law 12.682 of 2012, provides for the preparation and archiving of documents on electromagnetic media. It was created to give legal certainty to documents scanned by means of certification in the digitization process, with the aim of putting documents scanned with certification on a par with original documents, saving resources and physical space. However, articles 2, 5 and 7 were vetoed by the President of the Republic at the time. As a result, scanned documents, even with digital certification, were not put on the same footing as originals, and their disposal with digitization was not authorized.

With the publication of this law, if the document is produced entirely in electronic form, with the signatures of the parties, including in electronic form, it is possible that there will be no physical storage of the document, since it will be entirely electronic. It should be noted that the scanning of a physical document and the production of a document electronically are different acts, and only in the latter case is there no need to keep the documents in physical form.

Because of the vetoes, the destruction of the original checks was prevented and banks were unable to move forward with the study to issue the customer with a certified copy of the reason for the check's return and to create an integration file with the registry offices for the protest of checks. Therefore, it is still necessary to apply the stamp with the reason for return on the check, including for checks deposited by mobile. In other words, the customer has opted for the convenience of depositing the check by cell phone, but if the check is returned they will have to go to the branch in person to apply the stamp, which is not possible with Banco Digital.

As a result, the law has not made the progress it was supposed to, which was to provide greater legal certainty for digitized documents. Even without the publication of the law, institutions in general, and especially digital banks, have started accepting check deposits by image. However, through this activity, financial institutions are at risk of fraud due to the lack of regulations to protect them.

4.3.4 300DPI image compensation

Central Bank Resolution 4,474 establishes procedures for the production and management of digitized documents relating to operations and transactions carried out by financial institutions and other institutions authorized to operate by the Central Bank of Brazil, as well as for the disposal of the physical matrices of digitized and electronically stored documents.

Through this resolution, it was agreed that the check, after being scanned, can only be discarded sixty days after it has been settled. Banks are obliged, even after image clearing, to keep them in their physical storage.

Circular 3.789, also from the Central Bank, establishes the technical requirements to be observed in the digitization process. For checks, the obligation was introduced to back up the scanned document to the minimum technical image resolution standard of 300 dots per inch (dpi) in grayscale. Grayscale is emphasized because it has the greatest impact on the size of the image.

However, once again the regulator has created a rule that is impossible to comply with, because even though digitizing machines are capable of capturing the image with such perfection, transmission via the clearing system would be extremely slow. Currently, all the banks participating in COMPE only send images in black and white and 200 dpi, without damaging the images in their transmission, making their own regulations and all of them not complying with the standard.

As a result, it was found that in addition to the regulatory flaws due to the payment instrument being regulated by an old law, new rules are failing to guide the subjectivity of this payment instrument by bringing greater risks related to the prevention of money laundering, in addition to requiring a great deal of effort from the teams responsible at financial institutions to manage their six systems and the exchange of various files on the schedules required by the executing bank.

Even with regulatory failures - given that the payment instrument is regulated by a 1985 Federal Law - and with great difficulty in updating, financial institutions take on great risks when working with this product due to the systematic difficulties it requires. Even after a year of PIX's operation, the checks have not suffered a significant impact on their quantity and value in the market and, according to the trajectory of use seen from 2000 to 2020, the end of the check is not in sight until 2030.

5. Conclusion

The Brazilian economy has advanced in the control and creation of various means of payment in the economic system. The Central Bank's progress in creating new payment instruments using technological tools that are easy to process and cost less supports the questioning of the continuity of the check payment method in the market. It requires greater control on the

part of financial institutions due to the difficulty of assessing the formalities of the cartula, as required by law, and has less credibility in the market due to its credit risk.

This work addressed various characteristics related to the current scenario of checks in the Brazilian payment system: what its regulatory failures are; systemic difficulties related to the product in its initial formation; measurement of the high percentage of returned checks that increase credit risk; difficulty in relation to the Prevention of Money Laundering; possible impacts of PIX on its use and the projection of the number of checks and their values until 2030.

It was found that even in the face of regulatory failures - given that the payment instrument is regulated by Federal Law dating back to 1985 - and with great difficulty in updating, financial institutions take great risks when working with this product due to the systematic difficulties it requires. Furthermore, it was noted that even with the creation of the PIX, the check has not suffered a significant impact in terms of quantity and value and that the end of the check is not in sight until 2030.

The results of the study suggest that, if it is in the public interest, the means of payment should become increasingly digital and that, rather than waiting for the check to fall into disuse, it would be more advantageous to remove it from the market by regulating its extinction. This way, as the costs of checks are no longer borne by financial institutions, the value of other products can become more attractive. This measure also contributes to better monitoring of anti-money laundering controls, directing the population towards digital payment instruments that are more closely monitored.

As a suggestion for future research, we suggest including explanatory variables to see if there would be significant gains in predicting the use of the check.

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