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Uncertainty in Banorte's overdue credit card portfolio and its effect on the minimum wage

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Abstract

One of the most affected sectors during the pandemic was banking, specifically, the levels of overdue credit card portfolios. The objective of this study is to calculate the probability of overdue levels on a credit card portfolio. In addition, based on CNBV's information, a gamma distribution is fitted to estimate the overdue percentages. The results show that with a probability of 11%, the overdue portfolio percentage might return to its average levels before the pandemic, that is, 6.3% which is equivalent to 2,593 million Mexican pesos. Although the likelihood is small, as the acquisition of credits grows and the number of restructured credits decreases, this probability will increase. This analysis is a starting point for forecasting the overdue portfolio percentage; however, we do not consider some factors such as the regulatory framework, internal policies in credit models, and growth strategies in the banking sector. All these factors could lead to a more precise probability as the credit card portfolio begins to mature in times of non-pandemic. On the other hand, involving minimum wages could be an adequate strategy to predict or control the overdue portfolio; though its coefficient of determination is not close to 1, the analysis developed shows that the higher the minimum wage is, the overdue portfolio decreases.

Key Words

Banking, unemployment, cardholders. JEL reference: E-24, E-51, E-58.

Introduction

It is a fact that cash is the preferred payment method between a high number of consumers and goods and services establishments around the country (INEGI 2021), however, other payment methods like credit cards have acquired great acclaim in the last few years.

Mexico has had an accelerated growth in the current credit cards, according to Banxico (2021) by the end of June 2021 there was a total of 27,639,863 active credit cards. In the last survey of INEGI's (2018) "Nacional de Inclusión Financiera" the credit card is the most formal

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loan product people have contracted, nevertheless, one of the major concerns for the banking sector is the loans Mexicans are acquiring with the different loan products the finance system offers, with data from the Encuesta Nacional Sobre Finanzas de los Hogares 2019 (ENFIH, 2019) 56.9% of the households have a loan, whether it's a mortgage, credit cards, nominee credit, or personal loans, the credit card represents 11.6% of the Mexican loan. Therefore, banks have a diversity of intern indexes to measure the different loan's behavior, including the past-due portfolio index, it's calculated by dividing the value of the past-due portfolio, in other words, the portfolio where the borrower can't make up to the obligations of their loan in its totality, after more than 90 days, between the total value of the portfolio. With that said, the past-due portfolio index, for Banorte by the end of 2021 is 3.4% vs. 3.4% compared to the total of Mexico's banks. (CNBV 2022)

The recent COVID-19 financial crisis brought different measures on behalf of Mexico's banks due to the businesses and people's difficulties in fulfilling their liabilities, among which Banorte (2020) announced support for their clients to diminish the negative impacts on the economy. Banorte had to take control of the default risk for their index not to be damaged, including the past-due portfolio index, which broke the ceiling during the pandemic of 6.8%, the all-time high of May 2018, reaching a new ATH with 9.5%. This paper, over the default risk, shows that with a low likelihood, the past-due portfolio index could return to its average levels from before the pandemic.

Mexico's economic activity can boost when the wages improve with labor productivity and the objective inflation rates. Consequently, based on the results, if the labor productivity increases, the default levels decrease

This paper structure consists of the first section with the literature review. In the second section, the gamma distribution methodology it is discussed. The third section shows the data and results, and finally, the discussion and conclusion of the results.

1. Literature Review

The use of credit cards in Mexico during the pandemic has grown due to online shopping. Acebrón and Pedreira (2012) talk about how the application development has facilitated online shopping through streaming platforms, audiovisual books, and online sales channels. Further to the diversity of policies and models of credit cards, banks are looking for a way for their clients to keep paying their loans, accordingly Castellanos and Garrido (2010) mention that this payment can get boosted by seeking rewards programs or traditional discounts or payable revenue transfers.

Having that said, through COVID-19 times, the Asociación de Bancos de México looked for a way to help their clients, achieving a support program that consisted in postponing their credit card payments for as four months for those clients that were on time with their loans (El

economista 2020), this help came just at the right time since many people lost their job or stopped receiving income at the beginning of the pandemic, bringing within a significant growth in the unemployment rate. On the matter, García (2017) says that a key factor in the decline of unemployment is the incitement of effective demand. In other words, the recovery goes with a consumption rise, if people do shopping, more production will be needed, leading to a decrease in the unemployment rates.

However, the finance culture in Mexico indeed has many areas of opportunities, Mexican knowledge, and daily practices in our income and expenses administration, such as the correct use of financial products or financial services, consumerism has also brought credit cards to clients and the make of unnecessary purchases, engaging in a misuse that can cause debts for the clients, as losses for the financial entity (Romero, 2016).

Banorte has different strategies for behavior portfolio measurement, where the past-due portfolio index, can help quantify the portfolio default rates. During the pandemic, credit card default rates increased by 62%, generating a significant debt among Mexicans (Díaz, 2019), because of the misuse of cards and the drop-off in consumer´s income, besides the loss of employment being the principal reasons of default in our country. In addition, not only an economic issue is caused by debt but the emotional crisis of high anxiety and financial stress for people and families.

The past-due portfolio index is of good relevancy in the decision-making for the Banorte risk team. Hernández and López (2001) mention that those bank indexes are fundamental for explaining their behavior. Moreover, this index has statistically significant relations with default risk, adding macroeconomic variables like interest rates, inflation rates, exchange rate, and minimum wages, among others (Sagner, 2012).

This article analyzes the relationship between the minimum wage and the past-due portfolio index due to the relevance of this economic variable. The minimum wage is the established income employers pay their workers, yet Kaplan and Novaro (2006) mention that the Instituto Mexicano del Seguro Social (IMSS) registers display changes on the minimum wage have a negative impact on labor income changes for all salary groups.

Despite this, González (2005) advises a clear ongoing tendency on wage inequality in Mexico, principally derived from changes in occupational structures that promote employment creation for directives and professionals. On the other side, forecasts suggest an increase in the worker's supply, to say, the labor market with higher education reduces the wage inequality in the middle part of the distribution and the performance of that sort of grade.

In a general context, many factors influence the labor market, GDP, Consumer Price Index (CPI), population growth, productivity, and minimum wages, among others, which provoke imbalances and generally reflect unemployment rate movements. Since the COVID-19

emergence, a slowdown has appeared along with an unemployment rate growth and informal employment.

That is why there's an upcoming necessity to have more precise models for predicting default clients, considering the probability of default in their liabilities, the models are being constructed and competing along the traditional ones are considering data from alternative sources besides the credit bureau, Nava (2009) recalls that a proper model can help optimize bank decision-making around uncertainty scenarios. Even though in COVID-19 times, restrictions increased over originating models for credit cards, pausing them from being developed for a while.

The past-due portfolio index has become a significant variable that can impact the bank's rentability (Chavarín,2015), for Banorte controlling this index has been fundamental in reducing the losses in rentability. Undoubtedly, the implementation of this action was prompt, as Contreras and Rodríguez (2019) mention, institutional efficiency is decisive in the credit market performance for developed countries as in developing countries.

Methodology

The distribution used in this work is gamma with parameters (α, β), Wackerly and Richard (2009) mention that if an aleatory variable Y has a gamma distribution with parameters $\alpha > 0$ and $\beta > 0$ only if the density function of Y is

$$f(y) = \begin{cases} \dfrac{y^{\alpha-1}e^{-y/\beta}}{\beta^{\alpha}\Gamma(\alpha)}, & 0 \leq y < \infty \\ 0\,, \quad at\ any\ other\ point \end{cases}$$

additionally,

$$\mu = E(Y) = \alpha\beta$$

$$\sigma^2 = V(Y) = \alpha\beta^2$$

Consequently, we can find probabilities like,

$$P(Y > y) = 1 - P(Y \leq y)$$

Furthermore, based on CONASAMI (2022), the real minimum wage is calculated with the minimum wage weighted with the Consumer Price Index from the Instituto Nacional de Estadística y Geografía, according to the following formula

$$SMG_m^{real} = \frac{\text{SMGp} * 100}{INPC_m}$$

Where SMG_m^{real} is the minimum wage for the m month, SMGp is the general weighted minimum wage for the year and $INPC_m$ is the Consumer Price Index for the m month.

Analysis and Results

Based on the monthly data published by CNBV from multiple banks' investing portfolios, figure 1 shows the credit card distribution by default probability to the end of April 2022 for Grupo Financiero Banorte. We can notice that it can have an apparent gamma distribution.

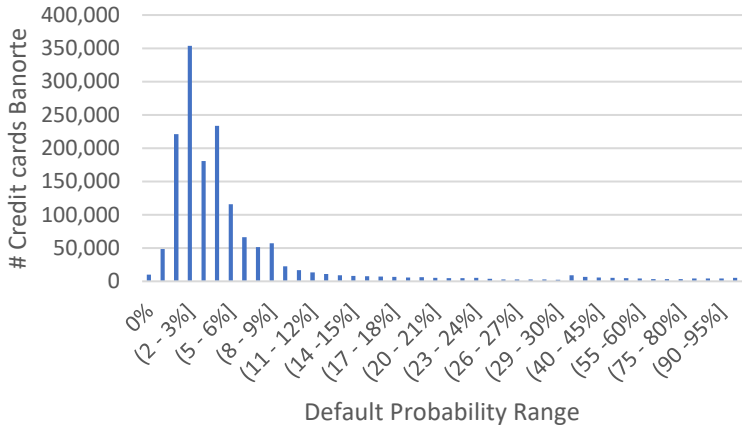

Figure 1. Credit card distribution of default probability to the end of April 2022.
Source: Prepared by the author based on information supplied by CNBV (2022).

Complementary, figure 2 shows the past-due portfolio index behavior of the credit card portfolio of Grupo Financiero Banorte from June 2017 to April 2022, which displays that the past-due portfolio index lost stability thanks to the COVID-19 pandemic.

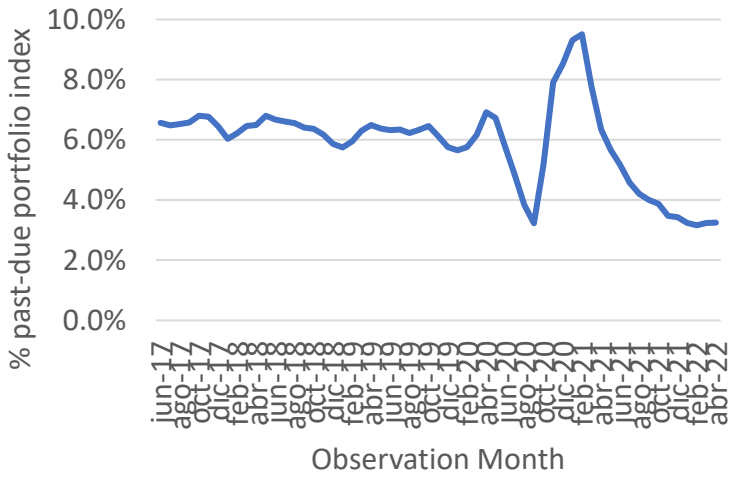

Figure 2. past-due credit card portfolio index. Source: Prepared by the author based on information supplied by CNBV (2022).

The goal is to estimate the likelihood of reaching the average past-due portfolio index level of 6.3% it had before the pandemic (CNBV, 2021).

Based on information supplied by CNBV in figure 3, we can simulate the default probability distribution for Banorte's credit card portfolio.

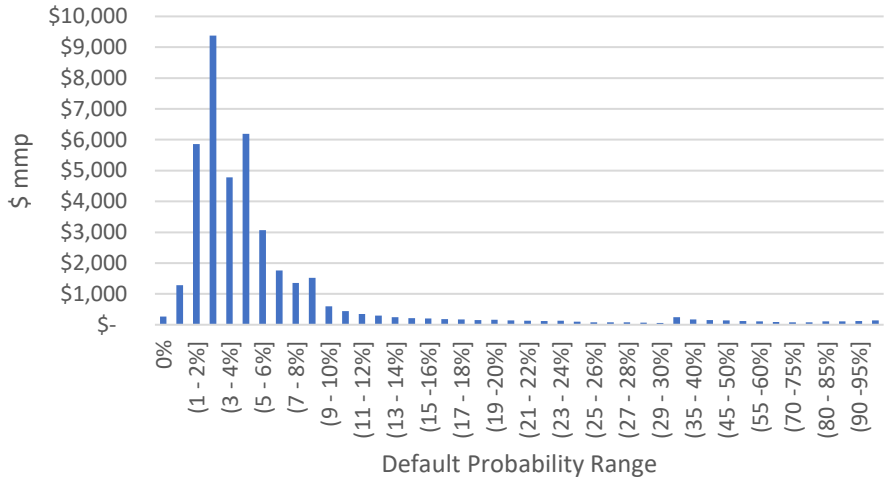

Figure 3. Credit card portfolio distribution by default probability ($million Mexican pesos).
Source: Prepared by the author based on information supplied by CNBV (2022).

In this way, being Y the value ($million Mexican pesos) of the credit card portfolio and by the gamma distribution form, we obtain the following data (CNBV 2022)

Mean	$ 935.63
Deviation	$ 1,957.27
Variance	$ 3,830,897.45

Meaning,

$$\mu = \alpha\beta = 935.63$$

$$\sigma^2 = \alpha\beta^2 = 3{,}830{,}897$$

By equation system, we get α and β values

β	4,094
α	0.2285

By gamma distribution

$$Y \sim \Gamma(0.2285\ , 4094)$$

$$\Rightarrow P(Y > 2{,}593) = 1 - .89 = .11$$

Based on information supplied by CNBV (2022), at the end of April 2022, Banorte's credit card portfolio is of $41,168mdp, therefore, results demonstrate that with an 11% likelihood, the past-due portfolio index can return to the average rate before the pandemic, in other words, the index of 6.3% represents $2,593mmp of past-due portfolio.

$$\$41{,}168mmp * 6.3\% = \$2{,}593mmp$$

Although the likelihood is small, as the acquisition of credits grows and the number of restructured credits decreases, this probability will increase.

Furthermore, the pandemic disturbed other economic variables in the country, among them the real minimum wage, which, based on figure 4, before 2020, the average annual growth was 23%, afterwards the average annual growth lowered to 14%

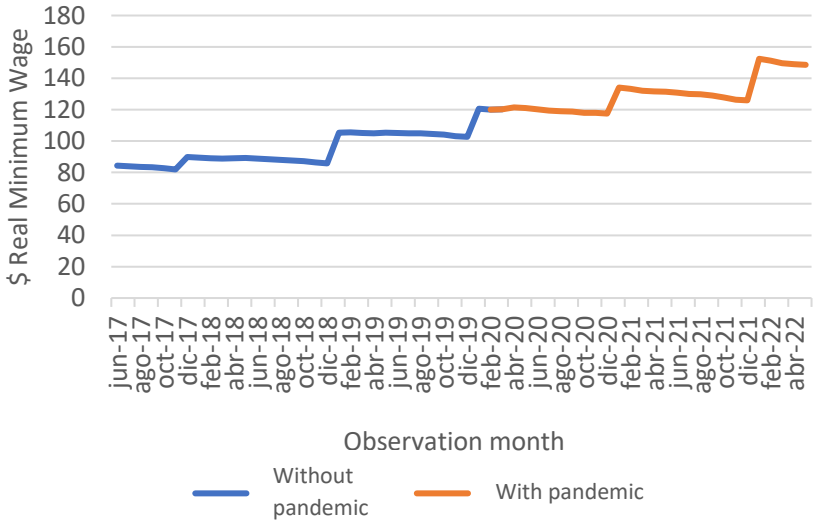

Figure 4. Real Minimum Wage in Mexico. Source: Prepared by the author based on information supplied by CONASAMI (2022).

If we analyze the real minimum wage with Banorte's past-due portfolio, we observe in figure 5 the relationship between these two variables, even though it does not present a determination coefficient near 1, we can notice the tendency is greater than the minimum wage and the past-due portfolio index is small with a $p = 0$

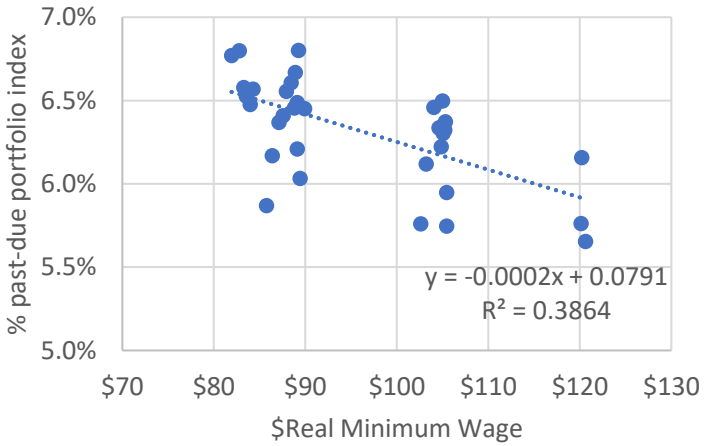

Figure 5. Minimum wage scatter plot vs past-due portfolio index. Source: Prepared by the author based on information supplied by CONASAMI (2022).

Discussions and conclusions

This analysis mentions past-due portfolio index measures the loan behavior a bank places. After presenting a past-due portfolio index all-time high value, Banorte announced help for their clients to diminish the negative impacts. Therefore, this work applied a gamma distribution to defaults for measuring with what probability the past-due portfolio index can return to its average levels.

Based on Banorte's last report, the bank keeps low default levels (Milenio 2021), so, the 11% probability of reaching a 6.3% in past-due portfolio index, in other words, $\$2{,}593\ mexican\ Million\ pesos$ of the past-due portfolio, even if it's low, it allows the bank to release stocks and drive utilities significantly, Banorte (2021) mentions it's ready to increase credit card placements in the coming trimester, which will increase this likelihood.

Financial entities, under their criteria, adjust macroeconomic variables in their loan payment models, therefore, the analysis falls short due to missing considerations of Banorte's growth strategies, the use of macroeconomic variables like the real minimum wage can improve the probability's precision, additionally, the determination coefficient is not near 1, so future works will look forward to involving minimum wages in the gamma distribution, which can be a starting point for measuring and controlling the past-due portfolio index.

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