

Microfinance in the face of COVID-19: The case of Peru

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Abstract: *The COVID-19 pandemic, which began between late 2019 and early 2020, severely impacted the Peruvian economy, especially microenterprises. This context highlighted the need to analyse the effects of the health crisis on microfinance institutions, the main sources of financing for the country's micro and small businesses. According to the Ministry of Production, this segment represents more than 95% of Peruvian businesses and plays a key role in national economic growth. This research employs financial ratios proposed by the Peruvian supervisory authority and bankruptcy prediction tools widely used in the financial risk literature. Based on the analysis of financial statements, risk indicators, and insolvency probabilities, the study quantitatively evaluates the impact of the pandemic on the microfinance sector. The results paint a worrying picture, and therefore, significant government intervention is recommended to strengthen and support the sector during the country's economic recovery.*

Keywords: Bankruptcy, COVID-19, credit risk, microfinance.

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Introduction

Although it often operates informally and with limited regulation, microfinance in Latin America is a key mechanism for boosting the real economy. This sector represents one of the most vulnerable links in the economy, due to its heavy reliance on a constant flow of income and payments to ensure its sustainability. In the region, Peru stands out as the country with the most developed microfinance system, surpassing Bolivia, El Salvador, Colombia, and Ecuador (Tauro et al., 2020). A significant slowdown in this sector could have serious economic consequences, especially for micro and small enterprises, considered the most vulnerable segment of the productive structure. As of December 2020, the Superintendence of Banking, Insurance, and Pension Funds (SBS) registered 12 municipal savings banks, 7 rural savings banks (down from 10 in 2010), 9 micro and small enterprise development companies (EDPYMEs), and 435 savings and credit cooperatives (CoopACs), reflecting the relevance and scope of the Peruvian microfinance system.

The global outbreak of COVID-19 in early 2020 triggered an economic crisis that many did not immediately recognize, but which affected the lives and work of hundreds of millions of people across five continents. Furthermore, due to the lockdowns many governments ordered to completely halt most economic activity, workers suddenly found themselves unemployed. This had repercussions in the microfinance sector, where investments in sole proprietorships, small businesses, and microenterprises slowed or stopped altogether as a result of the drastic reduction in trade. Consequently, 2020 was a year of losses for Peru across various sectors, with the economy experiencing a 12% decline (Varona and Gonzales, 2021). Peru's Gross Domestic Product (GDP) in the first quarter of 2020 (at constant 2007 prices) registered a decrease of 3.7% compared to the same quarter of the previous year, 30.0% in the second quarter, 9.0% in the third quarter, and 1.7% in the fourth quarter. The total decrease for 2020 was 11.1% compared to 2019 (INEI, 2021). In response to this situation, Del Cerro Martínez et al. (2023) propose a model of generational integration in digital transformation processes, highlighting a strategic challenge for a socially inclusive digital economy, which could open the door to cautious optimism for the coming years.

Financial Risk

2.1.1. Credit risk

Basel III (2017:4) defines credit risk as “the risk of incurring a loss if a borrower is unable to repay a debt in full or in part.” For this reason, financial institutions have sought solutions and strategies to help manage the risk inherent in their operations. Furthermore, “credit risk assessment is as old as commerce itself” (Srikanth & Kishore, 2014:752); and it constitutes a primary management tool, since poorly managed credit risk can lead to institution's bankruptcy. Thus, this phenomenon tends to be systemic, meaning that the collapse of one financial institution produces a domino effect on others; consequently, “the social cost of failure can be greater than the private cost” (Goodhart, 2005:120). Therefore, to cope with these unexpected situations, financial institutions need regulatory capital, the minimum level of which is determined by calculating risk-weighted assets. All financial assets possess inherent risks, which are weighted to determine their impact on the organization. It is therefore necessary to reduce these high-risk assets to proportionally decrease credit risk (Moudud-Ul-Huq et al., 2020).

The Basel III reforms (2017) present two methods for calculating risk-weighted assets: (i) the standardized approach, which is the most widely used by banks, where supervisors set the risk weight that banks then apply to the value of their assets (exposures); and (ii) the internal ratings-based approach, which has some restrictions imposed by the 2017 reforms because there are certain incentives to minimize the risk weights assigned to each asset. While capital absorbs losses, a higher level of regulatory capital generally provides better conditions for financing credit growth. However, Godlewski (2006:196) notes that “higher regulatory capital can lead to excessive risk-taking, as the additional capital requires extra effort in terms of profitability, which can be achieved by increasing the risk taken.” In this case, if Basel III has provided mechanisms to protect financial systems, it is time for these systems to prove their management and performance capacity in the current crisis that threatens to defeat them, since the risk of granting loans is very high, due to the little or non-existent certainty that the borrower will fulfil their financial obligation within the agreed time.

2.1.2. Liquidity Risk

Liquidity risk is the possibility that an entity will fail to meet its short-term obligations due to insufficient liquidity. The Basel III framework addresses this through Liquidity Risk Assessment. Liquidity Coverage Ratio (LCR), which requires maintaining sufficient high-quality liquid assets to withstand a 30-day stress scenario (BCBS, 2013:9). During COVID-19, this risk intensified in Peruvian microfinance: the drop in collections, withdrawals from savings, and loan restructurings put pressure on the cash reserves of microfinance institutions (MFIs). International evidence shows that 14% of MFIs had less than three months of liquidity (rising to 25% when considering operating expenses and debt service), revealing the fragility of liquidity buffers (Center for Financial Inclusion, 2021:8). In savings and credit cooperatives, fundamental and operational management failures exacerbated portfolio deterioration and liquidity pressures (Paucar-Escobar, 2022:5–6). Furthermore, in the Peruvian case, a higher credit risk has been documented that reduces the profitability of short-term deposits, increasing funding costs and reinforcing liquidity tensions in systemic shocks (Virgilio et al., 2022:18–19).

2.1.3. Systemic risk

Systemic risk refers to the possibility that the collapse of one or more institutions will affect the entire financial system due to interconnectedness and contagion (IMF, 2010:1). In Peru, where Micro and Small Enterprises (MSMEs) represent approximately 95% of the business sector, a common shock simultaneously affecting multiple MFIs can generate sectorial systemic risk with macroeconomic impacts through employment and investment (COMEXPERÚ, 2020:1). Integrating credit, liquidity, and systemic risks into the review allows to capture their interdependencies and justifies prudential tools (e.g., LCR) and coordinated support (guarantees and emergency liquidity) to preserve the stability and continuity of financing for MSMEs (BCBS, 2013; IFC, 2021; IMF, 2010).

2.2. Microfinance in Peru

Microfinance is designed to target entrepreneurs at the bottom of the economic pyramid who are unable to access credit from mainstream banks (Newman et al., 2017), providing them with capital to enter the business world (Shahriar & Garg, 2017); thereby contributing to regional economic development (Chen et al., 2017) and alleviating global poverty (Fouzia & Sumaira, 2016; Galak et al., 2011). However, the role that microfinance should play is not yet entirely clear. Thus, some research suggests that microfinance institutions are not having a significant impact on the growth and development of small businesses (Field

et al., 2013), nor are they financing entrepreneurial and business innovation activities that drive economic growth.

According to the Economist Intelligence Unit (2020), Peru ranks among the top countries with the best environment for microfinance, owing to a thriving micro-enterprise sector. In fact, micro and small enterprises account for 42% of the national Gross Domestic Product and employ 74% of the economically active population (Pait, 2009). Furthermore, with the regulations and supervisory measures in place, investor confidence is boosted; consequently, “the combination of robust regulation and the economy’s strong performance has made Peru the darling of private microfinance investment funds” (Conger et al., 2010, p.15).

The origins of microfinance in Peru date back to the 1950s, but its growth in the private sector began in 1990, supported by new economic liberalisation policies based on the theory of the Peruvian economist Hernando de Soto (De Soto, 2000), which argued that the economic activities of the poor needed to be formalised to ensure their access to financial services (Chen, 2017). However, this was no longer necessary because, by the time this theory was published in 2000, microfinance was already growing worldwide; guarantees were no longer essential for granting loans. Instead of formalising the poor, lending institutions adapted to the actual circumstances to do business with those at the base of the economic pyramid (Conger et al., 2010). This result is a testament to the efforts of all those involved and the various initiatives taken to launch this scheme. The diversity within this sector is striking, and this is also a crucial factor for the development of Peru’s microfinance system, as the three main lending institutions account for just 38% of all loans. This creates scope for other institutions to emerge with the same ability to attract customers. Furthermore, whilst the methodologies used by each microfinance institution differ, none is left behind. Thus, Los Olivos, a district of Lima, now has its own ‘Wall Street’: 18 institutions located along three blocks, dedicated to providing financial opportunities to the low-income population (Conger et al., 2010), thereby encouraging them to take charge of their own development.

According to Law No. 26702, financial institutions are divided into six distinct legal structures, defined as follows (translation by the authors).

- Banking company: an entity whose principal business consists of receiving money from the public in the form of deposits or under any other contractual arrangement, and of using that money, its own capital and funds obtained from other sources of financing to grant loans of various types, or to invest them in operations subject to market risks.
- Financial company: a company that raises funds from the public and specialises in facilitating the placement of initial public offerings, trading in securities and providing financial advice.
- Rural Savings and Credit Cooperative: an institution that raises funds from the public and specialises in providing financing primarily to small, medium and micro-enterprises in rural areas.
- Municipal Savings and Credit Cooperative: an institution that raises funds from the public and specialises in providing financing primarily to small and micro-enterprises
- Small and Micro Enterprise Development Company (Edpymes): an entity specialising in providing financing primarily to small and micro-enterprise entrepreneurs” (Law No. 26702, Art. 282). Edpymes, like Rural Savings and Credit Cooperatives, raise their capital through members’ contributions, whether in the form of goods or services. In contrast, a Municipal Credit Union is constituted by a contribution from a Provincial Municipality in cash and assets (sole shareholder).

Furthermore, the main source of funding for Edpymes is loans from financial institutions and Credit Unions, both Rural and Municipal, followed by members' deposits (Arana et al., 2017).

- Savings and Credit Cooperative: an institution not authorised to raise funds from the public (only from its members) as referred to in Article 289 of Law No. 26702, as amended by Law No. N.º 30822.

The regulations and structure of the Peruvian banking system, in particular Law No. 26702, pursue two fundamental objectives: the protection of savers and the protection of the banking system itself from systemic risk. These are the principles that should guide the interpretation of every regulation and action adopted by the SBS, the body responsible for the supervision and regulation of the various banking institutions in Peru. To explain the existence of each type of financial institution within the Peruvian financial system, it is important to bear these objectives in mind, as they define the conditions imposed by the regulations and the SBS regarding the requirements for the granting of the relevant licence, the capital adequacy requirements, the required level of solvency, legal limits, the type of business and the products they will offer (in the case of banks, their activity falls within the scope of so-called universal banking), amongst other factors.

Thus, banks (which are the main financial institutions accepting deposits in Peru) are subject to the highest standards in accordance with the rules set out in the minimum capital requirement (Article 16 of Law No. 26702), whilst rural savings and credit unions and savings and credit cooperatives are required to meet a much lower standard (only 4.6% of what is required of the former). Another distinguishing factor is their geographical scope of operation, as well as the market and segment in which each type of institution specialises. Banks are not obliged to maintain a specific geographical presence; by contrast, municipal savings banks and rural savings banks must operate within the jurisdiction of the administrative authority that regulates them. For their part, credit companies are not authorised to take deposits from the public and must operate with the capital contributed by their members. In the case of savings and credit cooperatives (which were the last to come under the supervision of the SBS), they may only accept deposits from their cooperative members.

Banking institutions are not analysed below, as they do not engage in microfinance activities. Furthermore, data on cooperatives are not available for the period under review due to a change in the supervisory authority and the transition from indirect to direct supervision, which led to a grace period during which the SBS did not request financial information.

2.3. Microfinance in the face of COVID-19

The microfinance sector has been affected by COVID-19 in many countries around the world. Murugan et al. (2023) state that in India the sector has suffered the most from the pandemic, and the World Bank (2020) estimated that 1.76 million jobs were at risk in Cambodia. High unemployment leads to loan defaults and, in turn, to failure of financial institutions (Bricknell et al., 2020). This view is also shared by Lee et al. (2025), who highlight that MFIs have been affected more than other financial institutions, while Zheng and Zhang (2021), after analysing data from 11 Asian countries, conclude that the pandemic has had a significant impact on MFIs, leading to a reduction in their efficiency. Research conducted in Pakistan (Malik et al., 2020) reveals that only 23% to 30% of the sample reported was able to repay their MFI loans, and Onuka and Oroboghae (2022) observe a greater impact in rural or semi-urban areas than in urban areas of Nigeria. Faced with the dramatic circumstances created by the pandemic, microfinance institutions were forced to reconsider their business practices. Dobrowska et al. (2020) observe that

European MFIs, which are not permitted to collect deposits, showed more resilience than institutions in Latin America, Asia, and Africa, which rely more on personal relationships and direct contact. Countries such as Peru, Mexico, and Brazil declared a moratorium, temporarily freezing repayments on short-term loans (Meagher, 2020). Shreshta (2020) notes that, although Nepal's MFIs have been severely impacted by the pandemic, appropriate policy measures implemented by the Central Bank helped to mitigate the impact of lockdown measures.

Materials and Methods

Before January 1, 2019, most Peruvian cooperatives were supervised by the Federation of Savings and Credit Cooperatives. Subsequently, this function was transferred to the SBS (Superintendence of Banking, Insurance and Private Pension Fund Administrators). Following the change, cooperatives were given a grace period to comply with the SBS's stricter regulations. As a result, only some of them published financial statements during this period, although this obligation will become permanent once the grace period ends. Consequently, to ensure a consistent analysis of financial results before and during the pandemic, this research limits its study to municipal savings banks, rural savings banks, microfinance institutions (EDPYMEs), and finance companies. Excluding cooperatives, there are 38 microfinance institutions registered with the SBS, all of which publish monthly financial statements available on the SBS website (www.sbs.gob.pe). The study analyses monthly financial information from 2016–2019 and compares it with 2020 data by constructing and evaluating monthly financial indicators and ratios.

3.1. Financial ratios

The financial ratios were selected based on SBS Resolution No. 12321 of October 4, 2010, as they are the most appropriate for analysing the long-term sustainability of financial institutions. The ratios, derived from the institutions' financial statements, are as follows.

- Liquidity ratios
 - Current financial assets/Current financial liabilities
 - Available funds/Deposits
 - Available funds/Total assets
 - Liquid assets/(Short-term liabilities+10% contribution)
- Credit risk
 - Past due portfolio/Gross loan portfolio
 - Provisions/Past-due accounts
 - Provisions/Gross loan portfolio
- Solvency and indebtedness
 - (Capital+additional capital)/Deposits
 - (Capital+additional capital)/total assets
 - Reserves/Total assets
 - Reserves/Capital
 - Total liabilities/Total assets
 - Total liabilities/Net worth
 - Total assets/Net worth
 - (High-risk portfolio - provisions)/Net worth
- Activity

- Fixed assets/Net worth
- Profitability
 - Financial contribution margin
 - Return on equity (ROE)
 - Return on assets (ROA)
- Efficiency
 - Administrative expenses/Total assets
 - Administrative expenses/Financial income
 - Management expenses/Financial income

Another set of financial tools consists of bankruptcy predictors, which are described below.

3.2. Beaver Model

This bankruptcy prediction model analyses the variation over time of the following ratios: a) Operating free cash flow/total debt; b) Net profit after taxes/total debt and; c) Total debt/total assets (Beaver, 1966; Bellovary et al., 2007; Rahimipoor, 2013).

3.3. Bathory Model

This bankruptcy prediction model calculates five ratios during the observation period and averages them, giving each a weight of 20%. These ratios are: X1 = Gross cash flow/current debt; X2 = Profit before tax/capital employed; X3 = Equity/current liabilities; X4 = Tangible net worth/total liabilities; and X5 = Working capital/total assets (Bathory, 1987; Day, 2009). Although this model has been criticized for assigning equal weight to all of its factors, it has been included in the evaluation as an additional comparison with the other tools.

3.4. Z-score

The Z-score model also calculates five financial ratios: X1= Working capital/Total assets; X2= Retained earnings/Total assets; X3= Profit before income tax/Total assets; X4= Book value of equity/Book value of debt; and X5= Sales/Total assets (Altman et al., 2014; Bellovary et al., 2007). For the evaluation of private companies, such as all microfinance institutions in Peru, an adaptation of the model proposes replacing the market value of shares with their book value. The Z-score formula then becomes:

$$Puntaje Z = 0.717 * X1 + 0.847 * X2 + 3.107 * X3 + 0.420 * X4 + 0.998 * X5 \quad (1)$$

Financially secure companies show Z scores above 2.9, and a lower limit of 1.23 indicates a risk of bankruptcy and uncertainty between the two marks.

3.5. Zmijewski Model

Zmijewski model is an effective tool for assessing the probability of corporate bankruptcy. It has also been used to evaluate financial institutions. It is calculated using the following formula:

$$X = -4.336 - 4.513 * (Net\ benefit / Totales\ assets) + 5.679 * (Total\ liabilities / Total\ assets) + 0.04 * (Current\ assets / Current\ liabilities) \quad (2)$$

The model was originally developed in Zmijewski (1983) and Zmijewski (1984). The higher the index, the greater the probability of bankruptcy. The Zmijewski model has been widely

adopted in numerous research articles and reports (Marsenne et al., 2024; Usmansyah & Pudjiastuty, 2023; Utama & Hamidah, 2024, and others).

3.6. Springate Analysis

This bankruptcy assessment model uses a combination of four ratios: $X1$ = Working capital/Total assets; $X2$ = Net profit before interest and taxes/Total assets; $X3$ = Net profit before taxes/Current liabilities; and $X4$ = Sales/Total assets (Bellovary et al., 2007, Day, 2009). The formula for evaluating bankruptcy is:

$$S = 1.03 * X1 + 3.07 * X2 + 0.66 * X3 + 0.4 * X4 \quad (3)$$

where results below 0.862 suggest business failure.

3.7. H-factor model

The H-factor bankruptcy prediction model takes the form of a sum of nine ratios multiplied by coefficients. The ratios are: $X1$ = Retained earnings/Total assets, $X2$ = Sales/Total assets, $X3$ = EBIT/Equity, $X4$ = Cash flow/Total debt, $X5$ = Total debt/Total assets, $X6$ = Current liabilities/Total assets, $X7$ = Natural logarithm of total tangible assets, $X8$ = Working capital/Total debt, and $X9$ = Log EBIT/Interest (Mohammad & Sharjana, 2021; Rahimipoor, 2013). The H-value results from the formula:

$$H = 5.528 * X1 + 0.212 * X2 + 0.073 * X3 + 1.27 * X4 - 0.12 * X5 + 2.335 * X6 + 0.575 * X7 + 1.083 * X8 + 0.984 * X9 - 6.075 \quad (4)$$

where values above zero suggest financially sound companies or, otherwise, companies in bankruptcy. Within academia, there is a diversity of opinion regarding the value of these indicators and their applicability to the financial sector. The decision was made to use some of the most well-known among the many that exist. Samanhyia et al. (2016) consider Altman's Z-Score appropriate for predicting bankruptcy risk in the financial sector; Kurniawati and Kholis (2015) and Sakinah et al. (2025) consider the Springate and Altman models to provide adequate predictions for this sector, while Husein and Pambekti (2014) believe the Zmijewski model is the best. All the models adopted have advantages and disadvantages, and, given the current state of knowledge in bankruptcy prediction, no single model achieves a clearly superior consensus. Therefore, a wide selection of models was used to present diversified analyses with the aim of arriving at a well-balanced conclusion.

Results

The comparison of financial ratios and bankruptcy prediction models in the financial statements of the four institutions observed in 2020 with respect to the period 2016-2019 is summarized in table 1. For each ratio used in the study, the regression of the dependent variable (the value of the ratio in 2020) versus the independent variable (the month of 2020) has been calculated and compared with the average value of the same regression (ratio versus month) in the years 2016-2019. ε_i represents the stochastic error term.

$$(Datos\ 2020)_i = \beta_0 + \beta_1(month)_i + \varepsilon_i \quad (5)$$

$$(Average\ of\ 2016 - 2019\ data)_i = \beta_0 + \beta_1(month)_i + \varepsilon_i \quad (6)$$

<Table 1 about here>

Next, the null hypothesis of equality between the result of equation (5) and equation (6) was evaluated. It is important to consider that the results obtained for 2020 occurred within a context of some regulatory changes, such as loan moratoria and adjustments to provisions implemented in response to the COVID-19 pandemic. These changes may have influenced key indicators such as delinquency rates, profitability, and solvency of the institutions under analysis. However, while these regulatory changes limit direct comparability with previous years, they also reflect the exceptional conditions of the period and the policy responses implemented to mitigate the pandemic's impact on the financial system.

4.1. Financial ratios

4.1.1. Liquidity Ratios

Current financial assets/Current financial liabilities. This indicator showed a considerable decline in 2020 compared to its historical average growth, mainly due to the increase in current liabilities and the significant rise in accounts payable. While this factor improved cash flow, it negatively impacted the ratio. Table 2 presents the accounts payable data.

<Table 2 about here>

Available funds/Deposits. This indicator grew in 2020 above the historical average for the 2016–2019 period in municipal savings banks, rural savings banks, and finance companies. In the case of EDPYMEs, this figure was not included because they do not receive public deposits (table 3).

<Table 3 about here>

Available funds/Total assets. This ratio increased significantly in 2020 for financial companies and rural savings banks, compared to the historical average for 2016–2019, due to the growth in available funds. Meanwhile, municipal savings banks and EDPYMEs maintained the average growth observed between 2016 and 2019 (table 4).

<Table 4 about here>

Liquid assets/(Short-term liabilities+10% contribution). This indicator, as of the end of 2020, shows a performance close to the average observed during the 2016–2019 period for microfinance institutions, municipal savings banks, and financial companies. However, rural savings banks began to show significant growth starting in November, due to an increase in available funds (table 5).

<Table 5 about here>

4.1.2. Credit risk

Past due portfolio/Gross loan portfolio. Regarding this indicator, both EDPYMEs and finance companies showed significantly higher growth in 2020 than in the previous four years, due to a reduction in their gross loan portfolio and an increase in their non-performing loan portfolio. Rural savings banks, for their part, registered an increase in 2020 compared to the 2016–2019 average, but within the expected growth trend. Despite this, municipal savings banks experienced a significant reduction in 2020 compared to the historical 2016–2019 average, stemming from the growth in their gross loan portfolio (table 6).

<Table 6 about here>

Provisions/past-due accounts. Provisions are cash reserves that financial institutions set aside to address potential problems in recovering outstanding loans. Table 7 shows that this indicator grew during 2020 above the average for the 2016-2019 period in rural and municipal savings banks. In the former, this was due to an increase in the number of provisions, and in the latter, to an increase in provisions combined with a reduction in non-performing loans. In both cases, this indicator reflects prudent management practices by EDPYMEs. For EDPYMEs and financial companies, this ratio shows an increase within the growth trend.

<Table 7 about here>

Provisions/gross loan portfolio. Table 8 shows that the growth of this indicator in 2020 was above the average and historical levels reached during the previous 4 years. previous, both in EDPYMEs as in rural savings banks and financial companies saw an increase in loan loss provisions and a decrease in their gross loan portfolios. Meanwhile, municipal savings banks experienced growth in this ratio, but within the expected trend.

<Table 8 about here>

4.1.3. Solvency and indebtedness

(Capital+additional capital)/Deposits. Municipal savings banks showed a better indicator (table 9), as their deposits increased by approximately 1.5 million soles in the second half of the year; this contributed to the lower indicator. However, capital also showed a slight increase. This means that 27.65% of capital is committed to cover any potential issues with depositors' funds. EDPYMEs are not authorized to accept public deposits, and therefore this ratio does not apply to them.

<Table 9 about here>

Capital+additional capital)/Total assets. The measurement for the second half of 2020 shows an increase in total assets of approximately 4.4 million soles compared to the first quarter, primarily due to 1.2 million soles in investments and 3.2 million soles in loans granted. This performance explains the significant reduction in the indicator compared to previous years (table 10).

<Table 10 about here>

On the other hand, for financial companies, the measurement shows a certain stability in the behaviour of this indicator; as in previous years, no significant variations were recorded. However, from July 2020 to December, total assets decreased by 1.77 million soles, which led to an increase in the indicator, and it performed better than other institutions.

Reserves/total assets. Table 11 shows that financial companies performed best in the second half of 2020 at 2.35%, due to a decrease in their total assets of 1.7 million soles in the last four months. This improved the indicator's performance. However, the table also shows municipal savings banks with an indicator of 2.21%, due to an increase in their total assets of 2.4 million soles. In percentage terms, financial companies showed a better indicator.

<Table 11 about here>

Reserves/Capital. All institutions recorded a slight better performance in the second half of 2020 compared to 2019, both in reserves and in share capital (although rural savings banks saw a decrease in the indicator value compared to the three preceding years). Table 12 shows the results for this indicator.

<Table 12 about here>

Total liabilities/Total assets. In 2020, the liabilities of municipal savings banks and financial

companies (due to increased customer savings) grew more than their assets. This caused the indicator to rise significantly compared to the previous four years. Overall, this indicator demonstrates that EDPYMEs have sufficient borrowing capacity due to their proven solvency (table 13).

<Table 13 about here>

Total liabilities/Net worth. Table 14 shows that the indicator ranges from 3.46 (EDPYME) to 7.78 (municipal savings banks). This result is not surprising in the context of these financial institutions, since their purpose is to obtain resources from third parties to grant loans.

<Table 14 about here>

Total assets/Net worth. This relationship indicates that microfinance institutions show better performance, as the indicators reflect growth (only EDPYMEs show stability). This is because the asset-to-equity ratio is between 6 and 9 times the equity-to-equity ratio. Furthermore, it is interpreted that the benefits maintained by the institution have been primarily driven by third-party financing (table 15).

<Table 15 about here>

(High-risk portfolio – provisions)/Net worth. This indicator shows that EDPYMEs have better coverage against a potential high-risk contingency, as their provisions are better managed against portfolio risks, with a -2.36%. This also indicates that the level of equity commitment is low in the event of a debt portfolio contingency (table 16).

<Table 16 about here>

4.1.4. Activity

Fixed assets/Net worth. This indicator shows a more positive result in 2020 compared to the average (municipal savings banks and EDPYMEs), maintaining growth in fixed assets and net worth. Financial companies experienced a considerable decrease in their equity between June and November 2020, increasing this index compared to the average for the 2016-2019 period. On the other hand, rural savings banks saw an increase in their fixed assets relative to their equity compared to the years prior to 2019 (table 17).

<Table 17 about here>

4.1.5. Profitability

Financial contribution margin. The financial contribution margin for municipal savings banks and EDPYMEs in 2020 was lower compared to the average for the 2016-2019 period, due to increased financial expenses, resulting in a reduction of the funds available to cover their other costs and obligations. Conversely, for rural savings banks and finance companies, the decrease in their expenses made the difference, giving them a stronger financial position to deduct their other costs arising from financial activities (table 18).

<Table 18 about here>

Return On Equity (ROE). This ratio measures the institution's ability to generate profits for shareholders, that is, how well it invests funds to provide returns to contributors. However, the performance in 2020 for all institutions, with the exception of EDPYMEs, was unfavourable, as their profits fell below the average for the 2016-2019 period. Rural savings banks, for example, posted negative results starting in March. Financial companies also followed this trend, with their profits declining from May to losses from September to December 2020 (table 19).

<Table 19 about here>

Return On Assets (ROA). This indicator measures the efficiency of assets in generating profits. In this

case, all institutions, except for EDPYMEs, saw a reduction in their profitability relative to assets, not due to a decrease in profitability itself, but rather due to a reduction in profits during this period, even resulting in negative figures for rural savings banks and finance companies (table 20).

<Table 20 about here>

4.1.6. Efficiency

These ratios (Administrative expenses/Total assets, Administrative expenses/Financial income, and Management expenses/Financial income) show improvement for all institutions during 2020, as administrative and management expenses decreased relative to income. The only exception is the Management expense/Financial income ratio for EDPYMEs, which showed a slight increase in management expenses in 2020 compared to the average of previous years. Table 21 presents the change in management expenses for EDPYMEs.

<Table 21 about here>

4.2. Beaver Model

Operating cash flow/total debt. Operating cash flows at the end of each of the observed years (2016-2020) are shown in table 22. This indicator shows better results in 2020 than the historical average for all institutions, except for EDPYMEs, because total debt increased at a slower rate than operating cash flow (for EDPYMEs, it is slightly worse than the average). In 2020, most microfinance institutions did not experience cash flow problems.

<Table 22 about here>

Net profit/total debt. The relationship involving net income presents a very different picture. With the exception of EDPYMEs (whose results are in line with the 2016-2019 average), net income shows a marked and even dramatic downward trend for several months in 2020 (table 23). This highlights a serious problem in the management of microfinance businesses.

<Table 23 about here>

Total debt/total assets. For savings banks, this indicator decreased in 2020, which is good news, as it reflects a significant increase in the denominator against a slightly rising numerator (as is the case for municipal savings banks) or stable total assets against a decreasing total debt (for rural savings banks). EDPYMEs showed a 2020 result in line with the historical average, while finance companies performed less optimally. Table 24 presents the results for each entity analysed.

<Table 24 about here>

4.3. Bathory Model

Table 25 shows that municipal savings banks and finance companies perform unfavourably in the Bathory model, suggesting a higher risk of bankruptcy. In addition to the sharp reduction in net income already noted, another significant negative factor affecting the Bathory model is the capital-to-current-liabilities ratio, where the numerator grew more slowly than the denominator in 2020. Rural savings banks generally show better results, but these declined in the second half of the year as the effects of the pandemic were felt. The finance company model shows a better result at the beginning of 2020 compared to the historical average, improving until June, but declining towards the end of the year, with an overall ratio lower than the historical average. On the other hand, EDPYMEs show results in line with previous years, and the rural savings bank's performance is better than the historical average.

<Table 25 about here>

4.4. Z-Score Model

Table 26 shows that EDPYMEs exhibit a fairly stable historical average Z-score, while rural savings banks deviate from the historical average, trending towards the positive side. The only microfinance institutions showing poor financial performance in 2020 are municipal savings banks and finance companies, where the most critical parameters are net profit, profit before tax, and sales. The first two accounting items were even negative for finance companies only in the second half of 2020.

<Table 26 about here>

4.5. Model Zmijewski

The Zmijewski model shows significant differences between the 2020 results and those in the 2016-2019 period for savings banks and EDPYMEs, confirming the difficult situation observed by other indicators. The only exception is financial companies, which suffered relatively less than other institutions, as also shown by all other predictors of bankruptcy. In particular, the ratios Current financial assets/Current financial liabilities and Total liabilities/Total assets show a strong impact in 2020 due to COVID-19. Table 27 shows the negative net profit results for all the institutions studied.

<Table 27 about here>

4.6. Springate Model

The Springate model for 2020 yielded negative results for municipal savings banks and finance companies (in both cases during the second half of the year), while results were in line with the average for EDPYMEs and slightly better than the historical average for rural savings banks. Although the Working capital/Total assets ratio improved slightly in 2020 compared to the historical average for both types of institutions, the overall result was negatively impacted by lower-than-average earnings before interest and taxes (EBIT), lower-than-average earnings before tax (EBT), and a reduction in sales. Table 28 presents the results of this model.

<Table 28 about here>

4.7. H-factor model

Table 29 shows that only municipal savings banks exhibit an unfavourable H-factor, primarily due to a decrease in sales, earnings before interest and taxes, and retained earnings. Rural savings banks show better performance than the average of previous years, while the other two institutions exhibit fairly stable behaviour. Again, the improved Working capital/Total debt ratio does not necessarily signify good news. Working capital includes cash and other liquid assets, the primary asset microfinance institutions possess to manage their businesses. If loans are not granted, either because borrowers are less creditworthy during the pandemic or because they are not applying for loans, the microfinance business slows down, and overall performance will suffer.

<Table 29 about here>

4.8 Critical synthesis of the results

The results obtained present a mixed picture. Some indicators, such as liquidity and efficiency ratios, show improvements in 2020 compared to the 2016–2019 average. However, these improvements are temporary and, in many cases, reflect cyclical factors stemming from the health emergency, such as a temporary increase in deposits or a reduction in operating expenses. In contrast, the fundamental indicators related to solvency, profitability, and credit risk show a significant deterioration, reflecting a deeper structural impact. This weakening is confirmed by the results of bankruptcy prediction models, which warn of greater financial vulnerability in various institutional categories, especially municipal savings

banks and finance companies. In this sense, the assertion that ‘the results are alarming’ is justified by the sustained negative impact on the key pillars of the sector's financial stability. The improvements observed are not sufficient to offset the overall deterioration of the system, which faces significant risks to its medium-term sustainability.

Discussion

5.1. Country-level Overview

The previous section describes all the financial indicators in detail. It is important to note that the information derived from these indicators is consistent, although some of them show better performance during 2020 compared to previous years, and trends are not always consistent across different microfinance institutions. However, it is possible to identify some characteristic patterns from the pandemic period and derive some recommended policies. Financial income has been affected for two main reasons: (a) fewer loans requested and (b) an increase in late payments, both factors resulting from the reduction in economic activity at both the national and global levels. Overall, municipal savings banks experienced a 9% decrease in their income in 2020 compared to the previous year, while rural savings banks and finance companies suffered a sales reduction of approximately 15%. Microfinance institutions show a slightly better performance and a sales decrease of 'only' 6.2%.

With the sole exception of municipal savings banks, all other microfinance institutions experienced an increase in non-performing loans in 2020 compared to 2019: rural savings banks +7.6%, microfinance institutions +36%, and finance companies +126%. Even more concerning is that this reduction in income occurred in a year when lending rates were significantly lowered to attract borrowers. Although microenterprise activity has not ceased entirely, it has experienced a significant reduction in absolute terms. These figures negatively impacted the microfinance sector, drastically increasing indicators of projected bankruptcies.

Microfinance institutions have significantly increased their provisions, implicitly acknowledging a challenging year and allocating resources to address financial difficulties. Among the reasons for this prudent behaviour, the supervision of the SBS is easily identified, generating optimistic expectations for the future of the country's banking and insurance sector. The positive role of the SBS cannot be overstated; its ongoing supervision enabled the entire sector (including banks, cooperatives, and other institutions not discussed in this paper) to navigate a difficult year with prudence and transparency, and to look at the future with reasonable prospects. In general, microfinance institutions cannot be faulted for acting carelessly; they have worked to accumulate reserves (wasting less than in previous years); they have reduced administrative costs (in several cases, by reducing administrative staff); and they have managed cash flows prudently. This allowed most of them to emerge relatively safely from a dramatic year and be ready to restart, provided the pandemic was resolved thanks to the intensive nationwide vaccination campaign. However, what may be acceptable for one year may not be tolerable in the medium term of two or more fiscal years. The importance of the microfinance sector has been highlighted in section 2.2, and it seems likely that the country cannot afford the bankruptcy of a large number of microfinance institutions without entering a deep crisis. As discussed earlier in this article, the individual and microenterprise sector is vital to the long-term sustainability of the Peruvian economy and must be adequately supported, both during the emergency and the recovery period. Close and continuous monitoring of the microfinance sector's performance by the authorities is a task whose importance should

not be overlooked. When the country is ready to reactivate its economy, the lack of financing could become an insurmountable obstacle for many individual businesses or microenterprises that managed to survive in 2020 but may not withstand the challenge of re-entering the market. Once the pandemic is behind us, financing must be available to support the recovery, as a lack of it, due to the widespread collapse of microfinance institutions, would be a grave mistake that would be paid for by the current generation as well as future generations.

5.2. Limitations of the study

This study presents some limitations that should be considered when interpreting the results: (a) the regulatory changes implemented in 2020 in response to the pandemic may affect the comparability of the financial indicators with the 2016-2019 period, given that no specific adjustments were made for these variations; (b) the study focuses on the initial impact of the pandemic (2020), so subsequent effects would require an extended analysis over time.

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Table 1. Comparison of financial ratios and bankruptcy indicators in 2020 compared to the period 2016-2019. The asterisks (*, ** or ***) indicate the significance level at 10 %, 5% and 1%, respectively. The null hypothesis states that the financial ratios in the two periods are equal. The significance level is not calculated for the EDPYMEs in correspondence with the variable Deposits since these entities are not authorized to accept deposits.

	MUNICIPAL SAVINGS BANKS	RURAL SAVINGS BANKS	EDPYMES	FINANCIAL COMPANIES
LIQUIDITY RATIOS				
Current financial assets/Current financial liabilities	-9.357***	-6.694***	0.782	-8.439***
Available funds/Deposits	0.786	1.148		1,664
Available funds/Total assets	-0.961	2.511**	0.435	2.269**
Liquid assets/ (Short-term liabilities+10% contribution)	-1.125	2.264	0.498	2,067**
CREDIT RISK				
Past-due portfolio/Gross loan portfolio	-8.207***	-1.368	8,245**	5,457***
Provisions/Past-due accounts	17,958***	7,862***	-1.154	0.524
Provisions/Gross loan portfolio	1,914*	8,586***	14.107***	23.624***
SOLVENCY AND INDEBTEDNESS				
(Capital+additional capital)/Deposits	-0.936	-5.646***		2,679**
(Capital+additional capital)/Total assets	-7.143***	-3.166**	2.269**	7,818***
Reserves/Total assets	-1.143	6.612***	4,691**	6,596***
Reserves/Capital	7,380***	12,567***	4,894**	1,695
Total liabilities/Total assets	7,760***	4,847***	0.367	7.287***
Total liabilities/Net worth	7,882***	4,695***	0.228	7,359***
Total assets/Net worth	7,882***	4,695***	0.228	7,359***
(High-risk portfolio provisions)/Net worth	-27.575***	-15.205***	-0.298	-4.302***
ACTIVITY				
Fixed assets /Net worth	18,684***	20.739***	1,564	9,300***
PROFITABILITY				
Financial contribution margin	-4.347***	-16.592***	-2.942*	-11.105***

Return on Equity (ROE)	-30.343***	-8,798***	-1.826*	-10,760***
Return on Assets (ROA)	-30,190***	-10,695***	-1.8	-11.549***
EFFICIENCY				
Administrative expenses/Total assets	-14.751***	-4,698***	-28.334***	-4.243***
Administrative expenses)/Financial income	-1,181	-2,100**	-8.085**	3,796***
Management expenses/Financial income	-17.589***	15.276***	3.315**	-10,933***
BANKRUPTCY PREDICTIONS				
Operating cash flow/Total debt	3.604**	9.547***	-1.560	5,689***
Net profit/Total debt	-30.446***	-9.684***	-1.766	-11.631***
Total Debt/Total Assets	-7.412***	-5.916***	-1.291	2,553**
Bathory	-7.983***	-3.198***	-0.314	-6.404***
Z-score	-6.906***	-3.226***	-1.04	-6.058***
Zmijewski	11.152***	5,928***	1.206	14,930***
Springate	-3.541***	-3.354***	0.224	-4.106***
Factor H	-2.784**	20.288***	0.419	1.309

Source: Own elaboration

Table 2. Accounts payable

Accounts payable	2016	2017	2018	2019	2020
Municipal savings banks	364,629	366,817	293,445	482,437	2,750,630
Rural savings banks	13,853	26,698	44,824	72,095	371,197
EDPYMEs	93,677	133,790	92,743	106,007	122,526
Financial companies	206,644	221,508	282,085	366,128	528,520

Source: Own elaboration

Table 3. Relationship available / deposits

Available funds/deposits ratio	2016	2017	2018	2019	2020
Municipal savings banks	21.67 %	19.64 %	22.85 %	23.48 %	24.80 %
Rural savings banks	29.58 %	22.53 %	22.76 %	20.67 %	32.11 %
Financial companies	25.62 %	22.00 %	19.92 %	19.97 %	28.80 %

Source: Own elaboration

Table 4. Available / Total Assets

Available/Total Assets	2016	2017	2018	2019	2020
Municipal savings banks	16.93%	15.37%	18.18%	18.49%	18.06%
Rural savings banks	13.47%	13.81%	15.77%	12.63%	19.06%
EDPYMEs	6.32%	9.68%	6.56%	5.47%	7.19%
Financial companies	11.88%	10.98%	10.01%	9.82%	15.62%

Source: Own elaboration

Table 5. Liquid assets / short- term liabilities

Liquid assets/short-term liabilities	2016	2017	2018	2019	2020
Municipal savings banks	19.74%	17.84%	20.99%	21.36%	20.50%
Rural savings banks	16.34%	16.11%	18.53%	15.45%	22.55%
EDPYMEs	8.61%	12.59%	8.80%	7.23%	9.41%
Financial companies	15.98%	14.87%	13.62%	13.20%	19.11%

Source: Own elaboration

Table 6. Past due portfolio and gross loan portfolio

Past due portfolio and gross loan portfolio	2016	2017	2018	2019	2020
Municipal savings banks					
Overdue portfolio	940,259	1,066,850	1,389,017	1,634,083	1,343,608
Gross loan portfolio	15,872,996	18,207,242	19,525,306	21,479,286	23,874,427
Rural savings banks					
Overdue portfolio	53,804	63,133	107,658	188,210	202,466
Gross loan portfolio	995,440	1,367,353	1,447,315	2,152,114	1,966,164
EDPYMEs					
Overdue portfolio	63,332	79,778	95,830	107,565	146,327
Gross loan portfolio	1,512,289	1,860,496	2,078,065	2,459,094	2,295,461
Financial companies					
Overdue portfolio	555,742	613,979	691,459	638,011	1,440,245
Gross loan portfolio	9,167,618	10,251,334	11,699,167	12,702,254	10,710,713

Source: Own elaboration

Table 7. Provisions

Provisions	2016	2017	2018	2019	2020
Municipal savings banks	424,907	573,870	753,540	777,407	988,117
Rural savings banks	25,999	36,336	58,257	261,041	286,777
EDPYMEs	73,503	103,031	83,058	83,156	100,053
Financial companies	748,166	878,862	1,005,986	1,199,135	1,861,236

Source: Own elaboration

Table 8. Provisions/ gross loan portfolio

Provisions/Gross loan portfolio	2016	2017	2018	2019	2020
Municipal savings banks	7.44%	7.37%	8.43%	8.67%	9.45%
Rural savings banks	6.30%	5.75%	7.33%	10.21%	17.55%
EDPYMEs	6.46%	6.48%	6.59%	6.48%	9.37%
Financial companies	8.52%	8.78%	8.92%	8.08%	18.86%

Source: Own elaboration

Table 9. (Capital+additional capital)/deposits

Capital + Additional capital/Deposits	2016	2017	2018	2019	2020
Municipal savings banks	29.29%	28.96%	28.09%	28.70%	27.6%
Rural savings banks	78.27%	48.19%	44.07%	60.20%	55.9%
Financial companies	31.09%	28.79%	28.45%	28.71%	29.2%

Source: Own elaboration

Table 10. (Capital+additional capital)/total assets

Capital + additional capital / total assets	2016	2017	2018	2019
Municipal savings banks	22.88%	22.65%	22.34%	22.61%
Rural savings banks	35.66%	29.54%	30.54%	36.79%
EDPYMEs	50.04%	43.35%	46.05%	42.46%
Financial companies	14.41%	14.37%	14.30%	14.11%

Source: Own elaboration

Table 11. Reserves/total assets

Reserves/total assets	2016	2017	2018	2019	2020
Municipal savings banks	2.36%	2.37%	2.28%	2.30%	2.21%
Rural savings banks	0.58%	0.45%	0.45%	0.34%	0.40%
EDPYMEs	0.38%	0.38%	0.45%	0.69%	0.96%
Financial companies	1.34%	1.42%	1.51%	1.71%	2.35%

Source: Own elaboration

Table 12. Reserves/share capital

Reserves/share capital	2016	2017	2018	2019	2020
Municipal savings banks	17.19%	17.78%	17.49%	17.60%	19.40%
Rural savings banks	3.34%	3.23%	3.15%	1.92%	2.68%
EDPYMEs	1.61%	1.79%	1.95%	3.08%	4.31%
Financial companies	9.60%	10.38%	10.82%	12.34%	15.50%

Source: Own elaboration

Table 13. Total liabilities / total assets

Total liabilities/total assets	2016	2017	2018	2019	2020
Municipal savings banks	86.29%	86.65%	86.96%	86.92%	88.61%
Rural savings banks	82.67%	86.10%	85.85%	82.21%	85.04%
EDPYMEs	76.16%	78.92%	76.89%	77.60%	77.62%
Financial companies	82.06%	81.63%	81.13%	80.65%	83.15%

Source: Own elaboration

Table 14. Total liabilities / net worth

Total liabilities/net worth	2016	2017	2018	2019	2020
Municipal savings banks	6.29	6.48	6.66	6.64	7.78
Rural savings banks	4.77	6.19	6.06	4.62	5.68
EDPYMEs	3.19	3.74	3.32	3.46	3.46
Financial companies	4.57	4.44	4.29	4.16	4.93

Source: Own elaboration

Table 15. Total assets/net worth

Total assets/net worth	2016	2017	2018	2019	2020
Municipal savings banks	7.29	7.48	7.66	7.64	8.77
Rural savings banks	5.77	7.19	7.06	5.62	6.68
EDPYMEs	4.19	4.74	4.32	4.46	4.46
Financial companies	5.57	5.44	5.3	5.16	5.93

Source: Own elaboration

Table 16. (High-risk portfolio–provisions)/net worth

(High-risk portfolio – provisions)/ net worth	2016	2017	2018	2019	2020
Municipal savings banks	-2.07%	0.88%	2.28%	0.73%	-13.96%
Rural savings banks	0.89%	5.02%	12.79%	-0.05%	-33.68%
EDPYMEs	-6.70%	-7.80%	-6.80%	-0.90%	-2.36%

Financial companies	-5.50%	-3.70%	4.10%	-5.00%	-19.84%
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Source: Own elaboration

Table 17. Asset fixed assets / net worth

Net worth	2016	2017	2018	2019	2020
Municipal savings banks	2,940,445	3,221,689	3,484,999	3,884,976	3,976,157
Rural savings banks	237,235	248,385	271,878	516,406	448,760
EDPYMEs	429,594	481,370	574,264	652,274	640,593
Financial companies	2,149,489	2,450,774	2,798,038	3,126,536	2,602,793

Source: Own elaboration

Table 18. Financial contribution margin

Financial contribution margin	2016	2017	2018	2019
Municipal savings banks	77.26%	75.42%	75.41%	75.18%
Rural savings banks	73.67%	71.43%	72.76%	81.46%
EDPYMEs	69.60%	69.44%	69.43%	69.00%
Financial companies	79.61%	80.76%	82.33%	83.64%

Source: Own elaboration

Table 19. Return On Equity

Return on Equity	2016	2017	2018	2019	2020
Municipal savings banks	13.51%	12.31%	10.70%	11.50%	2.10%
Rural savings banks	-2.66%	-1.98%	2.45%	-0.18%	-11.22%
EDPYMEs	-0.29%	2.01%	12.70%	12.89%	2.25%
Financial companies	13.79%	13.10%	16.99%	18.31%	-9.67%

Source: Own elaboration

Table 20. Return on Assets

Return on Assets	2016	2017	2018	2019	2020
Municipal savings banks	1.85%	1.64%	1.40%	1.50%	0.24%
Rural savings banks	-0.46%	-0.28%	0.35%	-0.03%	-1.68%
EDPYMEs	-0.07%	0.42%	2.94%	2.89%	0.50%
Financial companies	2.47%	2.41%	3.21%	3.54%	-1.63%

Source: Own elaboration

Table 21. Management expenses of the EDPYMEs

Management expenses	2016	2017	2018	2019	2020
Municipal savings banks	2,783	3,320	4,635	4,409	3,735
Rural savings banks	1,066	1,466	1,657	1,699	1,333
EDPYMEs	1,017	826	912	1,194	1,216
Financial companies	2,913	2,725	3,760	4,438	2,681

Source: Own elaboration

Table 22. Operating cash flow

Operating cash flow	2016	2017	2018	2019	2020
Municipal savings banks	1,427,816	1,640,567	1,965,641	2,311,454	3,995,598
Rural savings banks	30,515	96,311	168,833	488,325	786,110
EDPYMEs	215,012	214,395	80,068	158,659	166,577
Financial companies	1,734,760	1,960,378	2,336,194	2,658,752	3,360,436

Source: Own elaboration

Table 23. Net profit

Net profit	2016	2017	2018	2019	2020
Municipal savings banks	397,340	396,650	372,928	446,918	83,642
Rural savings banks	-6,307	-4,919	6,665	-909	-50,340
EDPYMEs	-1,227	9,699	72,957	84,066	14,411
Financial companies	296,358	321,025	475,282	572,352	-251,680

Source: Own elaboration

Table 24. Total debt/assets totals

Total debt/Total assets	2016	2017	2018	2019	2020
Municipal savings banks	86.29%	86.65%	86.96%	86.92%	88.61%
Rural savings banks	82.67%	86.10%	85.85%	82.21%	85.04%
EDPYMEs	76.16%	78.92%	76.89%	77.60%	77.62%
Financial companies	82.06%	81.63%	81.13%	80.65%	83.15%

Source: Own elaboration

Table 25. Bathory Model

Bathory Model	2016	2017	2018	2019	2020
Municipal savings banks					
Equity/Current Liabilities	0.16	0.155	0.151	0.151	0.129
Heritage	2,940,445	3,221,689	3,484,999	3,884,976	3,976,158

Current liabilities	18,383,982	20,784,720	23,132,734	25,710,740	30,775,300
Rural savings banks					
Equity/Current Liabilities	0.21	0.16	0.17	0.22	0.18
Heritage	237,235	248,385	271,878	516,406	448,760
Current liabilities	1,126,852	1,531,140	1,637,252	2,371,568	2,535,119
EDPYMEs					
Equity/Current Liabilities	0.32	0.27	0.31	0.3	0.29
Heritage	429,594	481,370	574,264	652,274	640,593
Current liabilities	1,321,956	1,753,172	1,850,906	2,202,560	2,183,705
Financial companies					
Equity/Current Liabilities	0.223	0.23	0.238	0.245	0.206
Heritage	2,149,489	2,450,774	2,798,038	3,126,536	2,602,793
Current liabilities	9,504,407	10,625,921	11,741,170	13,753,196	12,616,237

Source: Own elaboration

Table 26. Z- Score Model

Z-Score Model	2016	2017	2018	2019	2020
Municipal savings banks					
Retained earnings/total assets	0.018	0.016	0.014	0.015	0.002
Profit before tax/total assets	0.026	0.024	0.021	0.022	0.004
Sales/Total Assets	0.159	0.164	0.164	0.16	0.124
Rural savings banks					
Retained earnings/total assets	-0.005	-0.003	0.003	-0.0003	-0.02
Profit before taxes/total assets	-0.004	-0.002	0.007	0.002	-0.02
Sales/Total Assets	0.19	0.18	0.19	0.25	0.21
EDPYMEs					
Retained earnings/total assets	-0.0007	0.004	0.03	0.03	0.005
Profit before taxes/total assets	0.002	0.01	0.04	0.04	0.01
Sales/Total Assets	0.2	0.2	0.21	0.20	0.19
Financial companies					
Retained earnings/total assets	0.025	0.022	0.032	0.035	-0.016
Profit before taxes/total assets	0.035	0.032	0.046	0.051	-0.022
Sales/Total Assets	0.255	0.234	0.251	0.256	0.228

Source: Own elaboration

Table 27. Net profit

Net Profit	2016	2017	2018	2019	2020
Municipal savings banks	397,340	396,650	372,928	446,918	83,642
Rural savings banks	-6,307	-4,919	6,665	-909	-50,340
EDPYMEs	-1,227	9,699	72,957	84,066	14,411
Financial companies	296,358	321,025	475,282	572,352	-251,680

Source: Own elaboration

Table 28. Springate model

Springate model	2016	2017	2018	2019	2020
Municipal savings banks					
Net profit before interest and taxes	454,685	453,426	422,186	490,674	-11,997
Net profit before taxes	552,503	576,009	560,185	653,870	141,040
Sales	3,414,581	3,949,874	4,389,238	4,743,633	4,313,676
Rural savings banks					
Net profit before interest and taxes	-4,582	-6,496	7,300	-50,351	-96,677
Net profit before taxes	-6,109	-4,118	14,190	5,456	-65,836
Sales	257,827	327,492	372,594	737,205	625,927
EDPYMEs					
Net profit before interest and taxes	-236	15,782	93,166	82,893	17,844
Net profit before taxes	3,575	26,545	109,356	118,360	34,019
Sales	400,510	493,671	523,793	586,410	550,036
Financial companies					
Net profit before interest and taxes	228,305	247,309	304,134	361,887	-672,634
Net profit before taxes	421,367	472,121	689,309	823,307	-345,149
Sales	3,053,943	3,362,270	3,720,830	4,132,983	3,529,047

Source: Own elaboration

Table 29. H -factor model

H-factor model	2016	2017	2018	2019	2020
Municipal savings banks					

Net profit before interest and taxes	454,685	453,426	422,186	490,674	-11,997
Retained earnings	397,340	396,650	372,928	446,918	83,642
Sales	3,414,581	3,949,874	4,389,238	4,743,633	4,313,676
Rural savings banks					
Net profit before interest and taxes	-4,582	-6,496	7,300	-50,351	-96,677
Retained earnings	-6,307	-4,919	6,665	-909	-50,340
Sales	257,827	327,492	372,594	737,205	625,927
EDPYMEs					
Net profit before interest and taxes	-236	15,782	93,166	82,893	17,844
Retained earnings	-1,227	9,699	72,957	84,066	14,411
Sales	400,510	493,671	523,793	586,410	550,036
Financial companies					
Net profit before interest and taxes	228,305	247,309	304,134	361,887	-672,634
Retained earnings	296,358	321,025	475,282	572,352	-251,680
Sales	3,053,943	3,362,270	3,720,829	4,132,983	3,529,047

Source: Own elaboration