Box 1: Decomposition of the Performance of Credit Vintages

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The cohort of credits that are originated in a particular period (generally one month) and are related to each other as they have been originated by credit institutions (CIs) under particular allocation conditions, risk appetite of the institutions, and economic situation[1] is called vintage. Generally, the evolution of the non-performing loans indicator (NPL), which is defined as the percentage of loan portfolio in default over gross loan portfolio, is used to evaluate the payment trend of debtors who obtained credits in each of these vintages and to anticipate the future performance of the aggregate indicator. In this context, the analysis of vintages is a tool that could produce early warnings that would support the making of possible decisions for the activation of prudential measures by local financial authorities[2].

The *Financial Stability Report* for the first half of 2024 mentioned a deterioration in the credit risk indicators of the consumer and microcredit loan portfolio, which were the credit modalities that registered the highest NPLs of all loan portfolios (8.4% and 10.1%, in their order); even for the microcredit loan portfolio this indicator has been the highest observed in its history. This box seeks to identify the determinants of the deterioration of these types of loans, through the decomposition of the NPL into factors that can help to understand their performance; in this way, it is possible to observe whether the dynamics of the NPL that have been observed in recent months are due to a particular factor or if it is an aggregation of different determinants, which can help financial authorities to better understand the dynamics of the indicator and take targeted measures to reduce the materialization of credit risk.

1. Methodology

The test is carried out using the methodology of decomposition of the NPL of vintages proposed by Gamba *et al.* (2021), based on three components[3]: age, period, and cohort or vintage, as follows:

$$ICM_{i,n,t} = \mu + \alpha_i + \beta_t + \gamma_n + \varepsilon_{i,n,t}$$

Where the coefficient associated with age, , α_i, corresponds to the time that has passed since the origin of the vintage, and can be interpreted as the expected deterioration of the loans of the modality of analysis given their age[4]; the coefficient associated with the period, β_t, corresponds to the common factor that affects all vintages in a particular month, regardless of how much time has passed since their origination, and therefore this factor may be associated with the state of the economy: for example, if inflation increases, some customers may find it difficult to cover their previously acquired expenses and financial obligations. Finally, γ_n it is the specific factor associated with each vintage, that is, it represents the impact of

1* The authors are part of the Financial Stability Department. The opinions do not commit *Banco de la República* or its Board of Directors.

1 This box provides an aggregate analysis of the type of loans of all CIs, since with the available information it is not possible to disaggregate the loans assigned by the type or the granting entity.

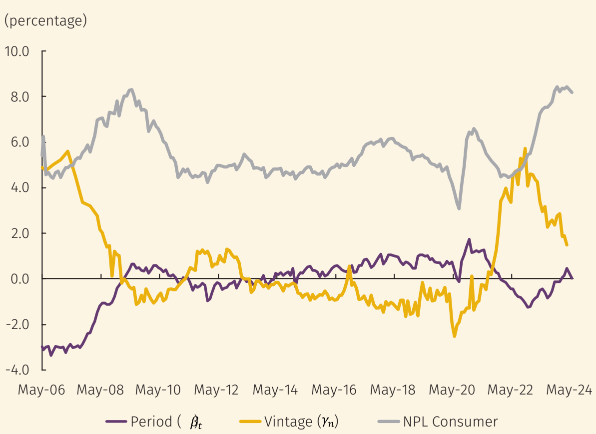
2 This monitoring in previous periods allowed, for example, to timely detect a deterioration in consumer loans, which is why the Financial Superintendency of Colombia issued External Circular 26 of 2022, which increased provisions for this type of loan as a macroprudential measure.

3 Note that there are no interactions between these components, so the effect derived from the performance of the economy in which each vintage originated individually is not considered.

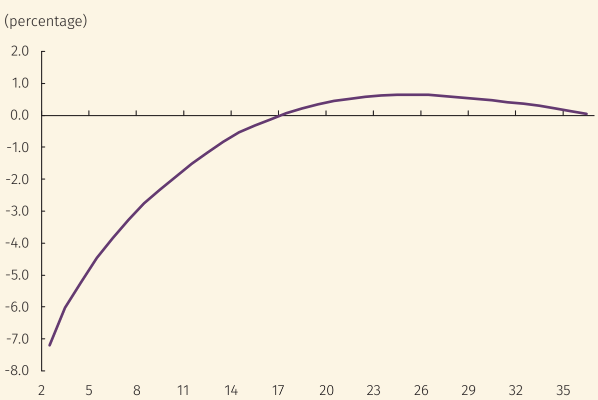
4 It is also known as vintage height.

Graph B1.1
Breakdown of the NPL of the Consumer Loan Portfolio

A. NPL and Period, and Vintage Factors



B. Age Factor



Source: Financial Superintendency of Colombia (SFC); calculations by *Banco de la República.*

the economic context of the origination, as well as the conditions of credit allocation and risk appetite of the institutions under which the loans belonging to this cohort were originated; for example, in search of greater credit origination, CIs could have lowered the score[5] from which loans of a particular type of loan are granted. For the analysis, only the dynamics of the period and vintage (cohort) components are used, since the age component represents the average observed deterioration of all vintages given their height and, therefore, their performance is invariable over time.

2. Results

When analyzing the vintages of the consumer loans following this methodology, it is observed that the vintage component γ_n, was the one that contributed the most to the NPL, which, after reaching a peak in mid-2022, has shown a decreasing trend (Graph B1.1). This could indicate that after the credit boom that occurred since 2022 and part of 2023, driven by an increase in demand and a relaxation of credit allocation conditions, institutions increased the requirements in this type of loan, considering the high materialization of credit risk that was observed at the end of last year. This increase in requirements was observed in the June 2024 Report on the Credit Situation, where the indicator reached levels below -80.0%[6] during 2023.

The reduction in the contribution of the vintage component could be a result of these dynamics and would indicate which loans from the most recent vintages are being granted to customers with better risk profiles. On the other hand, the period component, which had made negative contributions over the past two years, began to contribute positively in recent months. This performance could indicate that customers of this type of loan that had been benefiting from good local macroeconomic conditions are beginning to face the effects of the adjustment that the Colombian economy has presented (which can be seen in more detail in Chapter 1 of this *Report*) and that the improvements in the labor market have not yet materialized for these customers.

For the sub-modalities of free investment (30.2% of the total consumer loans) and vehicles (9.9% of the total consumer loans), a similar performance is observed to that of the aggregate: the relaxation of credit conditions drove positive peaks in the vintage component towards the second part of 2022, which lost importance in favor of the period component in the face of stricter credit allocation conditions. Regarding credit cards (18.2% of the consumer loans), it is observed that, in the case of loans for high-income customers, the dynamics are similar to those described above; in contrast, for low-income customers, the vintage component did not reach such a high contribution and was surpassed by the period component months before this performance occurred for high-income customers, which could indicate that the CIs took a more conservative position when allocating credit to this type of customer. In the case of payroll credits (37.4% of the total), although there is a peak in the vintage component in mid-2022, since the beginning of 2023 the period component has contributed positively, while

5 A credit score is a measure that results from a statistical model that uses multiple factors, which is usually used by CIs to determine which customers are viable for granting loans; generally, those with a lower score indicate a higher probability of default.

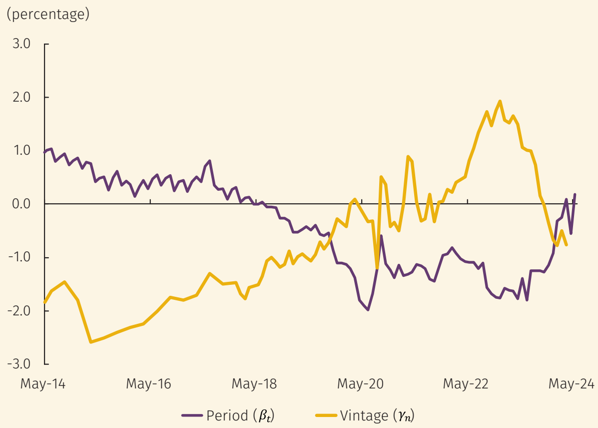
6 In this indicator, negative values indicate greater restrictions in the granting of loans.

the vintage component has done so in the opposite direction, which could be explained by a better selection of customers for these credits and, possibly due to a faster transmission of labor market conditions, given the nature of these credits.

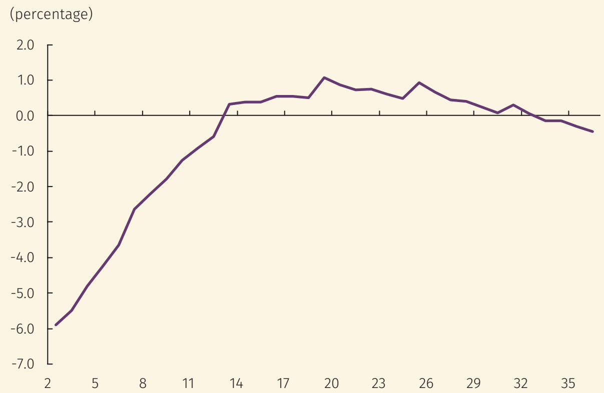
In turn, for the low-value microcredit loans,[7] it is evident that the vintage component has made a greater contribution to the NPL since 2020. However, as of February 2024, the period component was the one that predominated, and its contribution began to be positive (Graph B1.2, panel A). This could indicate a recent tightening of conditions for accessing this type of loan. For high-value loans of this type of loan, a similar performance is observed, although, in this case, the period component has been contributing positively more strongly and for a longer time (Graph B1.2, panel C). These differences could indicate that customers with high-value loans have been more affected by the economic adjustment process.

Graph B1.2
Breakdown of Vintages by Loan Amounts from the Microcredit Loan Portfolio

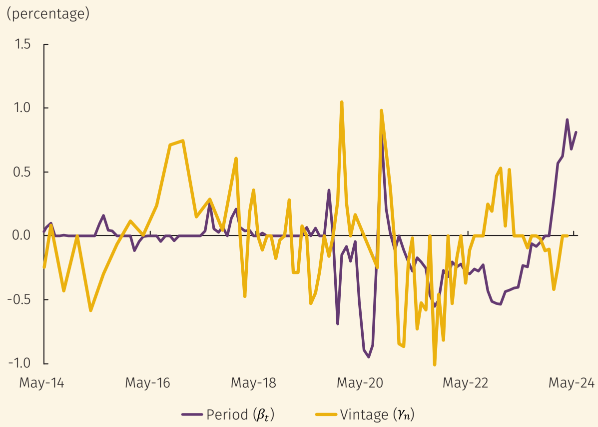
A. Factors for Low-Value Microcredit NPL



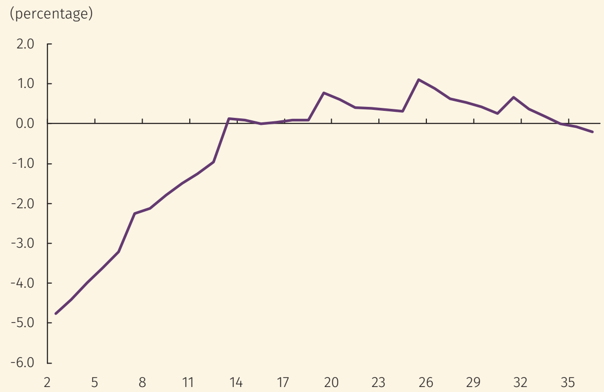
B. Age Factor for Low-Value Microcredit NPL



C. Factors for High-Value Microcredit NPL



D. Age Factor for High-Value Microcredit NPL



Note: Some periods in 2020 that show positive and negative peaks are excluded from the graphs that are considered extreme points caused by particular situations that do not contribute to the analysis.
Source: Financial Superintendency of Colombia (SFC); calculations by *Banco de la República*.

3. Conclusions

In the type of loans analyzed, consumer and microcredit, the component that had contributed the most in the recent past to the NPL was the vintage component (Table B1.1), which means that until a few months ago the performance of the indicator was explained by the conditions in which the credits were originated, such as the risk appetite of the institutions,

7 In the case of the microcredit loan, there are no aggregate data, but only on its sub-modalities.

Table B1.1
Contribution of Period and Vintage Components to the NPL

Product	Peak Vintage Factor	Peak Duration	Contribution Component Period	Contribution Vintage Component	NPL
Total consumer	**Sept.-21 to today**	**31**	**0.03**	**1.50**	**7.71**
Free investment	Nov.-21 to Feb.-24	28	0.89	0.74	11.93
Revolving	Sept.-21 to today	29	-4.47	3.34	7.65
Low-income card	Sept.-21 to Feb.-23	18	2.77	-1.39	8.22
High-income card	April-21 to Oct.-23	31	0.99	-0.26	8.22
Payroll	April-22 to Dec.-22	9	1.57	-1.22	3.18
Vehicle	Nov.-21 to Oct.-23	24	1.18	0.00	9.96
Microcredit high amount	May-22 – Sep.-23	17	0.81	0.00	9.81
Microcredit low amount	June-20 to Dec.-23	43	0.19	-0.77	9.81

Notes: 1. For credit card and microcredit products, the NPL values are taken in an aggregate form considering the available information. 2. Peak vintage factor refers to the most recent period in which the vintage factor was greater than the period factor. 3. Peak duration is the number of months in which this performance occurred.
Source: Financial Superintendency of Colombia (SFC); calculations by *Banco de la República*.

the performance of the economy at that time, and the inflation and unemployment conditions in which these customers were at the time of origination. However, its contribution has decreased (after reaching historical highs in part of 2022 and in 2023), while the contribution of the period component has increased, which may be influenced by current macroeconomic conditions and affecting all active credits in the economy. These conditions include inflation, economic growth, interest rate performance, unemployment, among others.

This performance is possibly explained by increases in the credit allocation requirements of the CIs, which were relaxed in 2022 and part of 2023, but which in the recent past have become more restrictive; In addition, this dynamic may also be explained by the adjustment process that the economy has faced, and the labor market dynamics faced by customers of these types of loans.

It is also observed that the vintage factor, obtained using the above methodology, tends to anticipate increases in the aggregate NPL, which is why it could be used as an early warning indicator by the authorities to activate macroprudential measures aimed at reducing a greater materialization of credit risk. In this way, the financial stability risks that could arise from this materialization could be contained in a more timely manner.

References

Gamba, S.; Melo, L.; Orozco, C. (2021). "What Can Credit Vintages Tell Us About Non-Performing Loans?" Working Papers on Economics, *Banco de la República*, available at: https://doi.org/10.32468/be.1154

Rodríguez-Novoa, D.; Rozada, A.; Roa, J. D. (2024). *Report on the credit situation in Colombia*, June, *Banco de la República*, available at: https://www.banrep.gov.co/es/publicaciones-investigaciones/reporte-situacion-credito-colombia