

Potential for Post-Pandemic Recovery: Bank Credit by Productive Sectors in Latin America and the Caribbean

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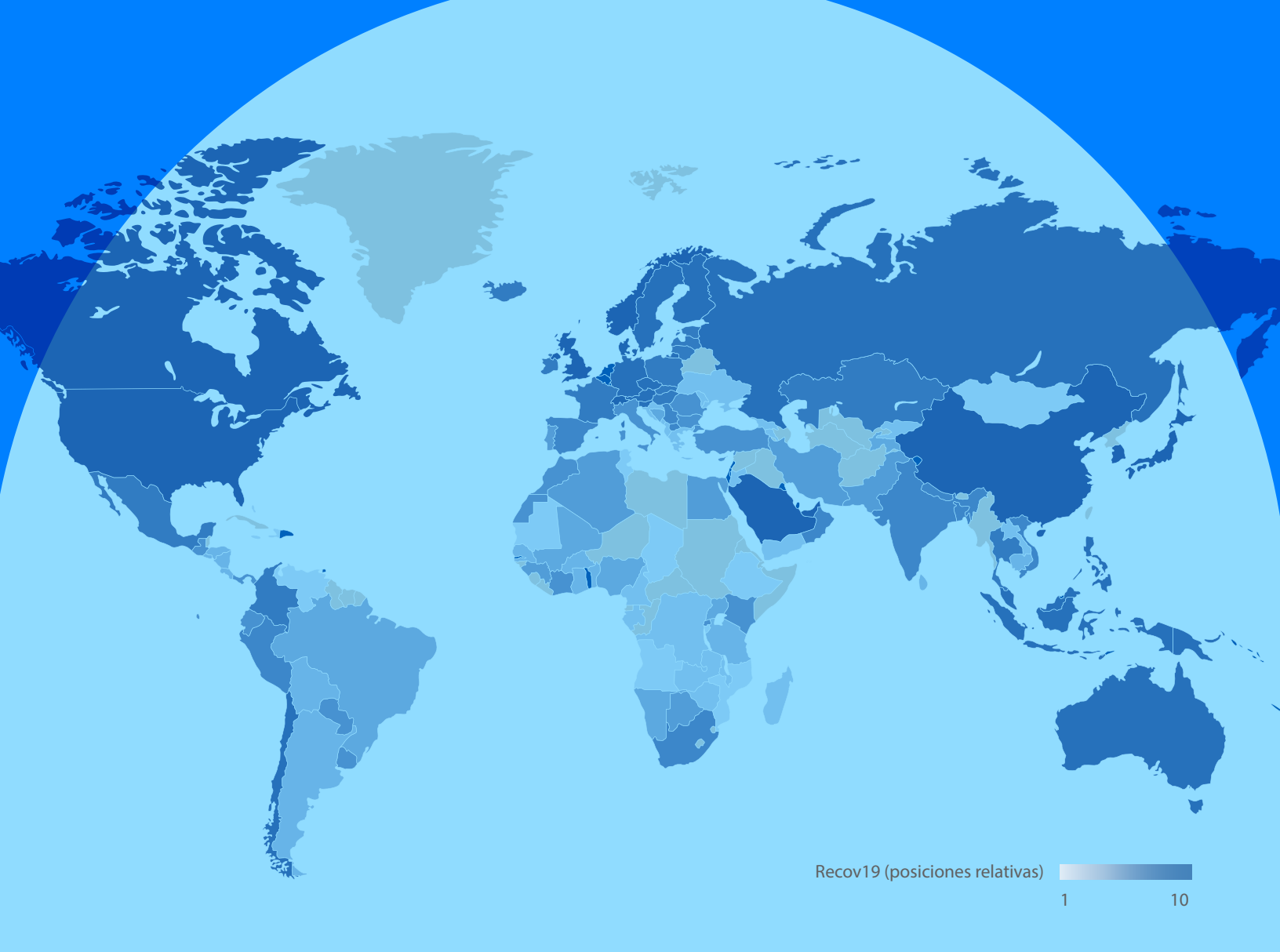
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 | **Technical note**

Potential for Post-Pandemic Recovery

Bank Credit by Productive Sectors in Latin
America and the Caribbean

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Alejandro **Támola**



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Abstract

Productive credit can play an important role in the recovery conditions after the crisis caused by the pandemic. Understanding how credit has performed in the region and the factors that influence its performance by sector is essential to guide policymakers on sectors' recovery capacity and the alternatives for targeting efforts and supporting specific sectors. This technical note develops an analytical framework focused on the recovery of bank credit at the sector level, formulating a specific index of potential recovery that can be used to improve public policies to support credit recovery by productive sectors. This study confirms that there are better recovery conditions for industries with greater access to prior credit (measured by their leverage), lower participation in the commercial banking portfolio before the pandemic, and better productive performance during the pandemic. These recovery conditions are based on characteristics supported by empirical evidence of relevant factors that affect bank credit. The two sectors with the greatest potential for bank credit recovery in the region, based on pre-pandemic limitations and on their position during the pandemic, are the agriculture, forestry, and fishing sectors, followed by the real estate sector; conversely, the sectors with the least potential for autonomous credit recovery are commerce and manufacturing industries. Alternatives are suggested regarding the design of targeting and support policies for specific sectors in a context of scarce information, fiscal restrictions, and limited budgetary resources.

JEL codes: G10, G20, C43

Keywords: potential recovery, post-pandemic, COVID-19, credit, productive sectors, financial conditions, Latin America, indexes

Introduction



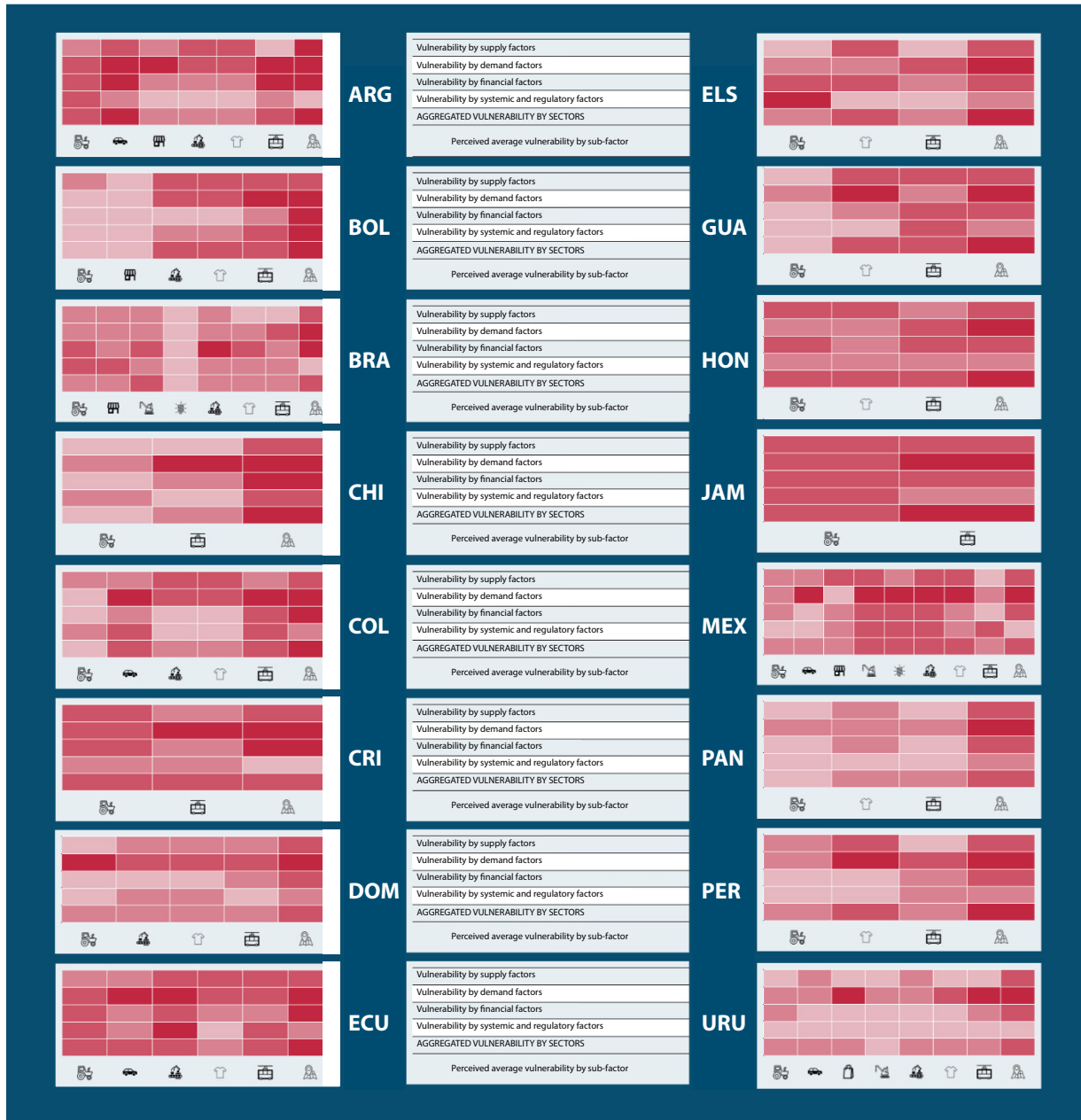
The COVID-19 pandemic has caused very important negative effects at the economic, financial, and social levels in all countries; however, not all have been affected in the same way or have similar prospects for recovery. The economic contraction, measured as the average variation in economic growth for 2020 in relation to the growth expected for said year before the pandemic, was -6.4 percent (-11 percent average for countries with contractions below the first quintile distribution and -3.6 percent for those in the top quintile).¹

In relation to economic recovery expectations, there is also an increase in the dispersion in the expected growth relative to the pre-COVID-19 expectation. The distribution of economic impacts, however, is not random nor is it entirely determined by the severity of the spread of the virus, since the countries presented different fundamental conditions and implemented different support policies of varying magnitudes in response to the crisis. Fernández Díez et al. (2020) collect the results of an analysis based on surveys of sector experts during the first months of the pandemic, identifying that the expected vulnerability varied significantly and systematically between sectors (which, in turn, resulted in differences in vulnerability at the country level).² This analysis showed a marked heterogeneity in the channels that mediated the effect of the pandemic, with the relative importance of supply, demand, financial and equity, and institutional factors, which vary according to the sector under consideration, as can be seen in Figure 1. Based on the vulnerability analysis results, Támara and Fernández Díez (2020) extend the analytical framework based on the identification of supply, demand, financial, and policy factors to explore the distribution of conditions for recovery after COVID-19. Among other aspects, the results of this study showed that the Latin American and Caribbean (LAC) region is lagging in relation to the pre-existing conditions for recovery, which is determined by the rigidity of the factors on the supply side and lag in financial factors.

¹ The values indicated correspond to the contraction observed with respect to the expected values for 2020 based on 2019 information, adjusted for the presence of extreme values and prediction errors. More precisely, it is the difference between the observed value for 2020 real GDP growth using 2021 data minus the projected value of growth for 2020 with 2019 data. The calculations exclude countries for which the 2019 growth projection errors were greater than 1.5 +/- the interquartile range.

² For example, the tourism sector presented, on average, a relatively high level of vulnerability, while the agricultural sector, on average, expected a relatively low vulnerability.

Figure 1. Heatmap of Sectoral Vulnerability to COVID-19



Source: Fernández Díez et al. (2020).

- | | | |
|-------------------------|---------------------|------------------|
| Agriculture | Textile and Apparel | Construction |
| Automotive | Transport* | Energy |
| Retail | Tourism | General Commerce |
| Machinery and Equipment | | |

* Transport includes the added situation for passenger and freight transport.

Given that the region has a relatively small margin for implementing recovery support policies, it is important to design cost-effective measures based on analyses of the conditions that lead to factor lag and financial conditions by sector. Thus, the objective of this technical note is to explore in greater depth the heterogeneity of the credit behavior by sector and the determinants of bank credit to the private sector in LAC countries. To this end, a new monthly and quarterly financial and real data base was compiled for productive sectors, covering 16 countries of the region for the period 2007–20. Through an econometric analysis, the most relevant factors were identified to forecast the evolution of credit, the results of which were used to define a credit recovery rating by country. The formulated index identifies, on the basis of retrospective information, sectors that potentially have better conditions to observe an autonomous recovery of credit in each economy. The results, while intuitive, provide evidence of differences, by country and by sector, in recovery after the crisis caused by the pandemic, and serve as the basis for making well-informed decisions regarding targeting and support for specific sectors given fiscal constraints and limited budgets.

Therefore, the results obtained must be analyzed in the context of a comprehensive response to support the recovery process. In this technical note, the agricultural and real estate sectors are identified as those with the greatest potential for “autonomous” recovery of credit at the regional level (Table 1). At the same time, it is found that the sectors with the least potential for credit recovery are manufacturing and commerce.

The results open a range of possibilities to support the sectors. Thus, on the one hand, in some economies it would be justified for economic policy to decide to strengthen the recovery process by further facilitating credit to this sector, given the export potential and the ability of the agricultural sector to generate foreign exchange. On the other hand, given the importance of the commerce sector in generating employment, it is also possible to rationalize an approach where support policies are directed toward this sector with the goal of achieving a recovery with lower social costs due to unemployment during the adjustment period. In other words, although the calculated credit recovery index, by itself, does not identify which sectors should be supported and which should not be supported by more active policies, it does establish autonomous capacities to focus on recovery. Additional studies are required to identify the behavior of other relevant variables (for example, employment, productivity, revenue, etc.) by sector and to specify economic policy preferences according to the objectives of the economies.

Table 1. Private Credit Sector Recovery Index (0–10) in the Post-Pandemic Setting (regional situation)

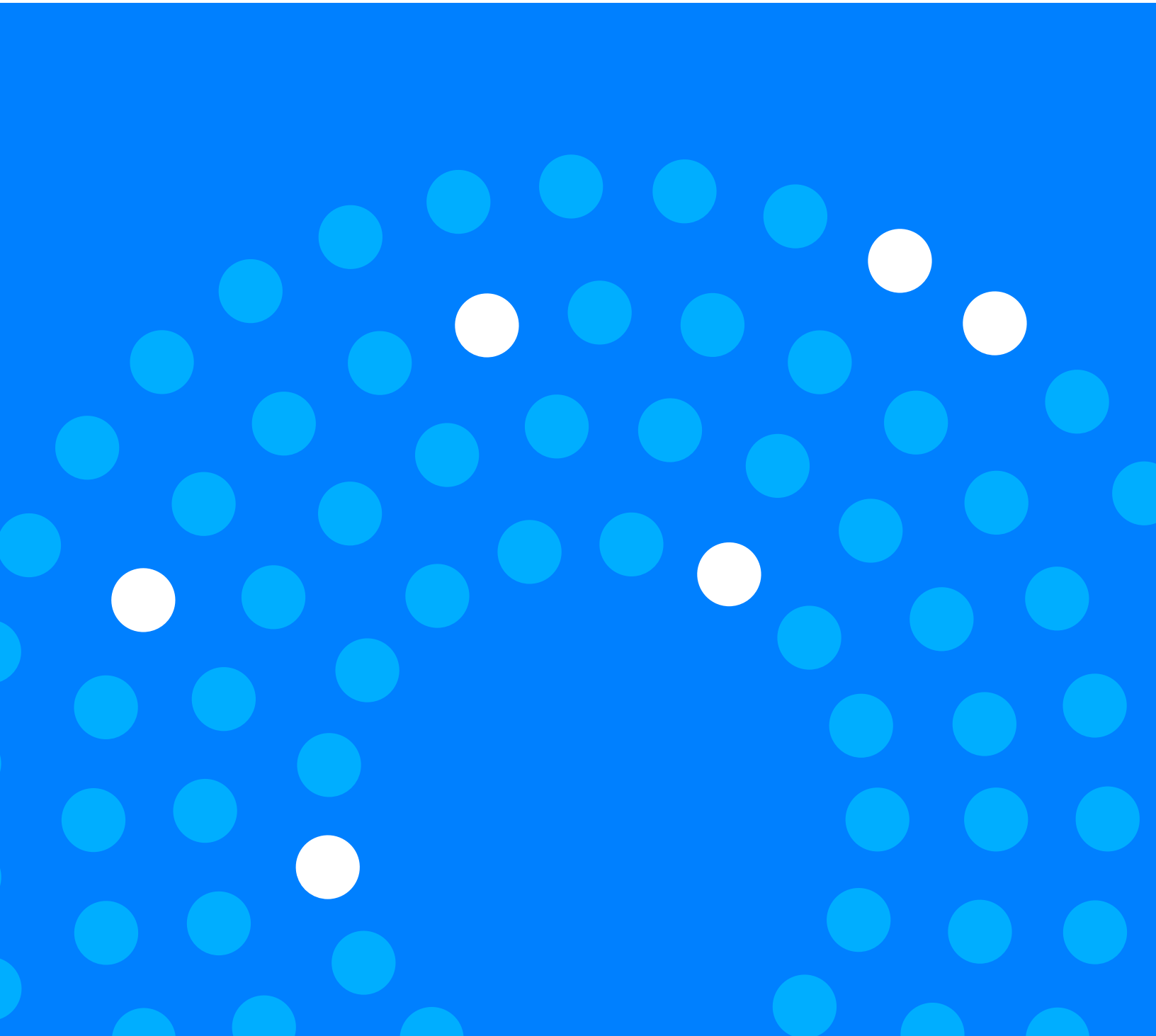
	Median	Avg.	Max.	Min.	Stand. Dev.	CV
Agriculture/forestry/fishing	6,7	6,5	8,0	4,0	0,9	0,1
Real estate activities	6,5	6,2	7,0	5,0	0,8	0,1
Transportation, storage, information, and communications	5,7	5,5	7,0	4,3	0,8	0,1
Construction	5,3	5,4	7,3	4,0	1,1	0,2
Exploitation of mines and quarries	5,3	5,8	7,3	4,0	1,1	0,2
Accommodation and food activities	4,8	5,2	8,0	4,0	1,3	0,2
Commerce	4,7	4,5	6,0	3,3	0,8	0,2
Manufacturing industries	4,5	4,7	6,3	3,0	0,9	0,2

Source: Authors' calculations based on econometric estimates and data for sector product and credit.

Note: The countries considered include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Uruguay. The number of sectors considered varies according to data availability.

This note is organized as follows: Section 1 presents the conceptual framework and a review of the literature related to the general aspects of the credit markets and the banking sector given their importance in LAC. Section 2 presents a quantitative analysis with retrospective information that provides empirical support for building the potential recovery index of bank credit by productive sectors, considering the relevant factors associated with credit growth. Section 3 describes the development of the recovery index, presents descriptive statistics regarding its distribution in the region, and discusses its interpretation. Section 4 concludes with comments and recommendations regarding the usefulness of the index for public policy decisions.

1. Conceptual Framework and Literature Review



1.1. Importance and Determinants of Credit Growth

The relationship between financial development and economic growth has been widely studied in the literature. The association between financial development and growth is considered an accepted fact (Ang, 2008). Levine, Loayza, and Beck (2000) analyze the relationship econometrically and conclude that there is causality between financial development and growth. Levine (2005) carries out an extensive analysis of the mechanisms and evidence and points out that the relaxation of external financial constraints on companies is a crucial channel for driving causal effects on growth. Calderón and Liu (2003) extend the quantitative exploration of the relationship and determine that financial development causes (in the Granger sense) economic growth through capital accumulation, and more accelerated productivity growth (effects that are relevant in developing countries). Christopoulos and Tsionas (2004) explore the relationship more specifically for developing economies and conclude that the causal relationship runs from financial development to growth. Apergis, Filippidis, and Economidou (2007) examine the relationship in a sample that is more expansive geographically and temporally and reconfirm the presence of an equilibrium relationship, but highlight the existence of causal relationships in both directions. Lastly, Durusu-Ciftci, Serdar Ispir, and Yetkiner (2017) specifically model the role of credit markets in a growth model and again extend the econometric analysis to a different sample of countries and periods, confirming the presence of evidence regarding a causal relationship between credit development and growth.

Once the empirical causal relationship from financial development to growth has been demonstrated, the question arises about the determinants of credit expansion. Credit expansions and contractions are complex due to the nature of credit markets and information limitations. As in other markets, the amounts traded may vary due to supply or demand factors. Furthermore, certain characteristic aspects of credit markets add complexity: (i) information, (ii) strategic behavior in non-competitive conditions, and (iii) instability and the presence of multiple equilibria. Information, particularly the asymmetric distribution of information among market participants, can create the possibility that prices (interest rates) do not balance supply and demand, leading to rationing processes. At the same time, elements of a technical nature—high sunk costs, network effects, and product differentiation—do not favor the development of a competitive market, exacerbating the effects of strategic behaviors. Lastly, in part as a result of the interaction of informational asymmetries and strategic behaviors under non-competitive conditions, credit markets exhibit a relatively high degree of instability (with possible multiple equilibria) and volatility. As a consequence of these characteristics, the analysis must extend beyond the normal characterization of supply and demand factors and include measures of factors that affect the creation and distribution of information (such as credit bureaus), strategic behaviors (regulation, enforceability), and changes in equilibria (expectations and uncertainty).

The factors that affect credit markets can be classified into external and domestic factors and, within the latter, into macro and institutional factors and sector conditions. Box 1 details these categories of factors and their relevance in the literature.

Box 1. External and Internal Factors in the Expansion of Credit Demand

External factors can have a considerable effect on the evolution of domestic credit, particularly in small economies and developing markets. Movements in interest rates in central economies can affect domestic rates and consequently credit levels (Uribe and Yue, 2006). The response to external conditions is also conditioned by the exchange rate regime, with fixed exchange rates that amplify the domestic effects of external changes (Ben Zeev, 2019); other channels through which external conditions permeate are capital flows, global liquidity conditions, and the growth of trading partners (Cesa-Bianchi, Ferrero, and Rebucci, 2018; Morais et al., 2019; Palmén, 2020; Bakker and Gulde, 2010; Borio, McCauley, and McGuire, 2011; Elekdag and Wu, 2013; Magud, Reinhart, and Vesperoni, 2014). Domestic factors complement external factors (Elekdag and Han, 2015; Lane and McQuade, 2014). Within domestic factors, at the macro level, there are, first, monetary policy, consistently identified in the literature as a relevant factor (Nelson, Pinter, and Theodoridis, 2018; Gozgor, 2014; Stepanyan and Guo, 2011; Jiménez et al., 2012; Drechsler, Savov, and Schnabl, 2017; Agenor, Alper, and Pereira da Silva, 2013; Aiyar, Calomiris, and Wieladek, 2016), and, second, the evolution of GDP (Takáts, 2010; Stepanyan and Guo, 2011; Sharma and Gounder, 2012; Gozgor, 2018). Third, on the supply side, competition, cost structures, and contract compliance mechanisms have been identified as important in terms of credit evolution (Fraisse, Hombert, and Lé, 2018; Hughes and Mester, 2013; Leroy, 2014; Chu, 2018; Rodano, Serrano-Velarde, and Tarantino, 2016). Lastly, information and expectations have been quantified as relevant factors for the evolution of credit, to the extent that improvements in the creation and distribution of information generate higher levels of intermediation (Giannetti and Jentzsch, 2013; De Janvry, McIntosh, and Sadoulet, 2010), while increases in uncertainty have a negative effect on intermediation or lower growth rates (Valencia, 2017; Gozgor et al., 2019; Gozgor, 2018; Barraza and Civelli, 2020; Danisman, Ersan, and Demir, 2020; Demir and Danisman, 2021).

In summary, the literature shows that both external and domestic factors are relevant to the evolution of credit, and that the relative importance of different factors varies between countries and over time. Thus, this conclusion justifies emphasizing the importance of certain factors at the sector level for LAC countries. More precisely, given the preponderance of the banking sector in the region's financial markets, the following section discusses the most relevant factors regarding the growth of bank credit to the private sector.

1.2. Determinants of Bank Credit to the Private Sector: Aggregate and by Sector

This section reviews previous theory and evidence regarding the determinants of bank credit to the private sector, first at the aggregate level and then by activity sector. The key variables identified by the literature that explain the evolution of bank credit are bank capital, liquidity, funding, profitability, economic growth, risk, uncertainty, interest rates, presence and behavior of public banks, default rate, and currency substitution or dollarization. Box 2 details the empirical evidence of the effects of these variables on the increase in bank credit at the aggregate level.

Box 2. Evidence of Variables That Explain the Evolution in Bank Credit

Bank capital

The evidence shows a positive relationship between improvement in capital ratios and bank credit growth. Montoro and Liliana Rojas-Suárez (2012) describe, in general terms, the argument that connects capital ratios with bank credit, pointing to informational asymmetries as the cause of an adverse selection problem that leads to a premium on high-risk banking liabilities. Thus, with the deterioration of capital ratios, the risk premium increases and banks face greater difficulties and costs in issuing risky liabilities to finance new assets. The most capitalized banks should be better prepared to expand their loans while meeting the minimum regulatory requirement and without the need for additional contributions. Moreover, a strong capitalization implies a greater capacity to absorb eventual losses without having to liquidate assets, which can stimulate the willingness to increase the volume of loans and take on new risks (Admati, 2015). This effect could in principle be magnified when the banking system maintains capital in excess of the regulatory minimum. The counterargument is that excess capital may be a choice for banks if they anticipate losses and a high probability of default. In such a case, a high level of capital may not be signaling the will to increase credit but, on the contrary, a defensive strategy to protect solvency, which would even include an aversion to increasing the supply of credit in order to mitigate associated risks. The evidence favors the position that capital advantages invigorate credit. In this sense, Berrospide and Edge (2010), Valencia (2017), Brei and Schclarek (2013), Carlson, Shan, and Warusawitharana (2013), and Aiyar, Calomiris, and Wieladek (2016), among other studies, report a positive effect for different measures of bank capital.

Bank liquidity

The evidence is mixed regarding its effects. The maturity mismatch is inherent in the activity of banks, due to the process of transforming liquid liabilities (deposits) into illiquid assets (term loans), which gives rise to liquidity risk (De Haan and van den End, 2013). As a result of their maturity transformation function, banks must maintain a certain level of liquidity. As in the case of capital, this liquidity can exceed the minimum imposed by the regulator. Also as occurs with capital, this comfortable liquidity can lead to an expansion of the loan portfolio or, instead, reveal the presence of precautionary motives, justified by the fear of suffering illiquidity episodes that could in turn lead to a forced and premature liquidation of assets.

The available evidence is mixed. Berrospide (2012) produces evidence for the United States in favor of the hypothesis of the displacement effect of loans due to the precautionary liquidity policy of banks after the 2008 crisis. Buch, Buchholz, and Tonzer (2014) verify the positive effect of liquidity with banking microdata for 48 countries. At the regional level, in relation to the more stringent liquidity policy promoted by the Basel III Accord, Hansen and Urbina (2020) detect a weak to insignificant influence of changes in liquidity requirements on the evolution of credit for Chile, contrary to the evidence presented by Restrepo-Tobón, Tamayo-Tobón, and Osorio-Rodríguez (2020) for the case of Colombia.

Bank funding

The evidence describes a positive relationship. Although the funding structure of the banking system varies between countries, the main source of resources in LAC and other countries continues to be deposits. Greater availability of deposits means greater loaning capacity (Drechsler, Savov, and Schnabl, 2017). The stability of these deposits is more debatable, especially in the face of micro- or macroeconomic shocks that may undermine the confidence of savers, even more so considering the short term of these placements in relation to other financial liabilities. However, it is agreed that deposits generally demonstrate reasonable stability over time. Antoshin et al. (2017), Buch, Buchholz, and Tonzer (2014), Park, Ruiz, and Tressel (2015), and Pham (2015) endorse this positive relationship between deposits and credit with different international bases.

Bank profitability

From a theoretical point of view, bank profitability can affect credit performance positively or negatively. For example, due to agency and limited liability issues, after having achieved a reasonable return for shareholders, managers may have incentives to engage in activities other than profit maximization, for example leading to an excessive increase in granting credit to increase the influence of the organization and managers. On the other hand, low profitability can lead managers to excessive credit growth while portfolio deterioration takes place with some lag (Ghosh, 2010). More mechanically, changes in profitability can affect capitalization and liquidity levels; for example, low or negative profitability tends to slow the growth rate of loans by making the regulatory capital constraint more likely to become operational. On the other hand, positive earnings make it possible to meet such requirements through retention of earnings. The available evidence generally validates these latter effects (see, for example, Bustamante, Cuba, and Nivin [2019], Aisen and Franken [2010], and Pham [2015]). When market discipline is present, high profitability (as is also the case with solvency and liquidity) improves the prospects for banks to access more financing under more favorable cost and term conditions (see Martínez Pería and Schmukler [2001] for evidence on Latin America).

GDP growth

Credit procyclicality is a recurring pattern in international theory and evidence. This positive correlation between economic conditions and the vigor of credit activity can be rationalized on the basis of four elements: (i) the so-called financial accelerator, by which the value of collaterals is reduced when the macroeconomic situation deteriorates, hindering access to credit; (ii) the aggravation of information frictions (adverse selection and moral hazard) when assessing the debtors' ability and willingness to pay; (iii) the possible underestimation of risks by financial institutions during economic boom stages and their overestimation in negative phases (Borio, Furfine, and Lowe, 2001); and (iv) the decline in demand itself in bad times and its acceleration in good times, in response to the greater or lesser existence of profitable and low-risk projects in the short term (especially with myopic investors), including the mitigating factor that growth improves the availability of self-financing, thus reducing the need for third-party funds. The available evidence leans in favor of procyclicality (Huizinga and Laeven, 2019; Stepanyan and Guo, 2011; Laidroo, 2014), although not unanimously (Bebczuk et al., 2011).

Risk and uncertainty

Debtor repayment problems have a negative impact on the ability to generate credit and the willingness to expand it, as a result of both the greater risk involved in granting new lines and the erosion of equity to absorb such losses (Buch and Dages, 2018; Berrospide and Edge, 2010; Berrospide, 2012). In turn, credit behavior is also influenced by the degree of macroeconomic uncertainty, by making it more complex to assess the quality of debtors and toughen the conditions for access to funding via deposits and capital markets. In the empirical field, the adverse impact of uncertainty is verified (Buch, Buchholz, and Tonzer, 2014; Park, Ruiz, and Tressel, 2015; Valencia, 2017).

Lending interest rate

For the same repayment risk, a rise in the ex ante real lending rate—explained, for example, by changes in the monetary policy rate—should suppress demand and increase the supply of loans, with an ambiguous a priori effect on the credit balance level, which will depend on the corresponding elasticities. If, on the other hand, the rate increase is accompanied by a considerable upward revision in the perception of payment risk, both supply and demand should decline. Beutler et al. (2020) and Raknerud and Vatne (2013) reveal a negative effect based on data for the Swiss and Norwegian banking systems, respectively. Borio and Gambacorta (2017) reach the same conclusion with respect to a sample of banks from advanced countries, although with the exception that the effect is attenuated in periods of very low interest rates.

Participation of public banks in private credit

Micco and Panizza (2004) analyze three reasons public banking can be acyclical or less procyclical than private banking: (i) as part of the public sector, state banks internalize the social benefit of macroeconomic stability and smoothing fluctuations in the level of activity; (ii) if savers perceive that public banks are less likely to default than private banks because they are relatively more protected by the banking safety net (deposit insurance, lender of last resort, regulatory laxity), public banks will enjoy greater access to deposits and therefore will be able to sustain or increase their lending capacity; and (iii) according to the hypothesis of lazy banks (“lazy xcha”), the directors of these entities would not have the incentives to act aggressively to increase their loans in good times or decrease them in bad times, despite changing risk and expected return conditions. The available evidence favors the acyclical or less procyclical role of public banks in Latin America and the world (see Micco and Panizza [2004] and Brei and Schclarek [2013], where a large international sample of banks is presented; Cull and Martínez Pería [2013], for the case of Latin America during the 2008 crisis; and Cull, Martínez Pería, and Verrier [2018] for a broad overview of the previous empirical evidence).

Dollarization of the banking system

The degree of dollarization of bank assets and liabilities can affect the depth of credit, especially as a consequence of the emergence of currency mismatches between deposits and loans, as well as between loans and debtor income. These mismatches can eventually inhibit both supply and demand for credit. However, this adverse effect can be partially mitigated in economies with a history of high inflation, in which dollarization makes it possible to mitigate financial disintermediation in domestic currency. Bannister, Turunen, and Gardberg (2018), Court, Ozsoz, and Rengifo (2012), and Bustamante, Cuba, and Nivin (2019) provide evidence in both cases.

In addition to the determinants of bank credit to the private sector at the aggregate level, it is possible to make a differentiation by sector. Given the limited budgetary space to implement support policies and the need to maximize the efficiency of interventions, it is of interest to establish a quantitative framework that allows a better understanding of the allocation of bank credit by sector.³ Below is a theoretical review applied to the LAC case, on how banks allocate their loans among the various sectors.

A priori, a bank that seeks profit maximization and risk minimization should lend more to sectors with higher growth and lower volatility. In principle, with an intertemporal approach, banks should take into account the expected return and risk over the life of the contract. In practice, however, decisions made at the time of loan creation are mainly governed by current or recent conditions, with a secondary incidence of expectations about the future dynamics of these variables. This is attested in the empirical field by the procyclical behavior of credit. The same happens with business investments, an activity that initially incorporates expectations about future conditions but that in fact reveals, through an accelerator model, a high degree of myopia and dependence on short-term conditions. These behaviors can be explained by the uncertainty surrounding any projection and the preference for easily accessible, tangible, and verifiable information, even when it does not constitute a good prediction of the future.⁴ Therefore, the basic principles of building an optimal financial portfolio do not fully apply to banking entities, for which there are restrictions linked to the lack of liquidity of loans, informational imperfections, and regulatory standards. This leads to a number of factors that could limit the sensitivity of the sectoral composition to risk-adjusted return conditions, including:

Loans are relatively long-term commitments and, with few exceptions, do not have the option of exit via negotiation that assets enjoy in the capital market. This illiquidity renders the loans irreversible to some extent.

Changes in portfolio composition mean a slow understanding of new sectors. Banks do not collect or process information quickly, so the transition to a new loan structure can result in higher costs and default rates.

³ This would allow, for example, to forecast which sectors could see a greater “autonomous” recovery of credit in the recovery stage once the critical stage of the pandemic passes.

⁴ For these reasons, the empirical analysis will be based on historical data.

Each bank may be waiting for the other banks to modify their portfolio before doing so themselves, especially if they do not have reliable information on the sector and fear falling into the so-called “winner’s curse,” whereby the bank gains a stake in the sector that the other institutions reject.

In an environment of high uncertainty and projections with wide confidence intervals, maintaining the loan structure may constitute an acceptable policy, either because the bank is afraid of making a mistake in changing the current portfolio, or because the prevalence of systemic, not diversifiable risk by sector is forecasted. An example would be the impact of a strong real devaluation of the loan portfolio. In principle, this price signal should redirect a greater proportion of the portfolio toward tradable activities. However, when the future direction of the real exchange rate is uncertain, it is probable and reasonable that this elasticity is low.

Banks may have incentives not to make changes. For example, management may not see incentives to compensate for their effort to enter new sectors (the “lazy xcha” phenomenon), or shareholders may find that the changes will primarily improve their creditors’—depositors and others—situation but not their own (the “debt overhang” phenomenon). The existence of prudential regulations that discourage the assumption of risk by financial institutions is added to these elements.

Allocation by sector also depends on credit demand. Moreover, it is expected that the fastest-growing sectors will be at the same time those with the greatest capacity to generate and retain profits, reducing the need for external financing.

Another relevant factor in building loan portfolios is the financial dependence of each sector (need for third-party resources). These external financing requirements vary from sector to sector due, among other characteristics, to the following: differences in the intensity of physical capital (because capital investments demand higher expenditures and mature more slowly), the duration of the product cycle (due to the financial gap that mediates between the start of the production process and the effective generation of cash flow), and the company’s age (due to the fact that, for a given sector, consolidated establishments require less investment and have more regular income).

To measure financial dependence, the distinctions between the following must be taken into account: (i) domestic indicators versus international benchmarks and (ii) flow versus stock measures. Regarding the first point, Rajan and Zingales (1998) argue that optimal or desirable financial dependence cannot be accurately measured from domestic sector information, since the observed dependence may be low simply because firms suffer a financial restriction that forces them to adapt their productive technology and their growth rate to credit availability. Consequently, they recommend the use of an international benchmark that represents as faithfully as possible a financial market free of informational frictions and therefore allows each company to reach its optimum degree of financial dependence, suggesting using the United States as a benchmark. Regarding the flow or stock measurements, Rajan and Zingales (1998) favor the first type, and define financial dependence as the ratio between physical investment minus cash flow divided by physical investment; that is, the fraction of the investment financed with external funds.

Although the study by Rajan and Zingales (1998) has had a wide influence on the literature on growth and credit, the adopted indicator is not without criticism (see Bebczuk, Filippo, and Sangiácomo, 2017). First, investment, cash flows, and the change in the volume of credit show a notorious variability throughout the economic cycle, which weakens the assumption of stability conferred on the benchmark in this line of research.⁵ Stocks, on the other hand, are much more stable, thus offering a more reliable and structural measure (less sensitive to the cycle) of financial dependence.⁶ Second, the index takes as the basis of calculation the companies, classified by sector, in public offering in the United States, a tiny and unrepresentative subset of the total number of establishments in the economy.⁷ Lastly, it is hypothesized that financial dependence for a given industry is greater in the United States than in each country, as would be expected when comparing economies with and without imperfect financial markets. This lack of validation also calls the index into question.

In light of these deficiencies, the sectoral ratio between the stock of bank credit and GDP will be adopted as a measure of financial dependence, as it is more stable over time and is available for a good number of countries in the region and for the aggregate total of companies with bank debt (and not only for the few companies on the stock exchange).⁸

⁵ Likewise, it is possible to add the criticism that the index focuses on investment financing, but completely ignores working capital expenditures, which have a preponderant weight in many companies, especially those with low capital use.

⁶ An illustrative example is the trajectory of private credit in the United States around the 2008 crisis. Between the third quarter of 2007 and 2008, the flow of credit was positive (+3.9 percent), but it became negative (-3.3 percent) in the four subsequent quarters, which would imply a sharp change in the financial dependence index. In contrast, the stock of private credit over GDP remained mostly stable at around 195 percent.

⁷ According to World Bank (2021), currently only about 5,300 companies are listed, out of a total of more than 30 million establishments, according to official census data. Similarly, Rajan and Zingales' data dates back to the 1980s, which also makes it unreliable as an up-to-date measure of financial dependence.

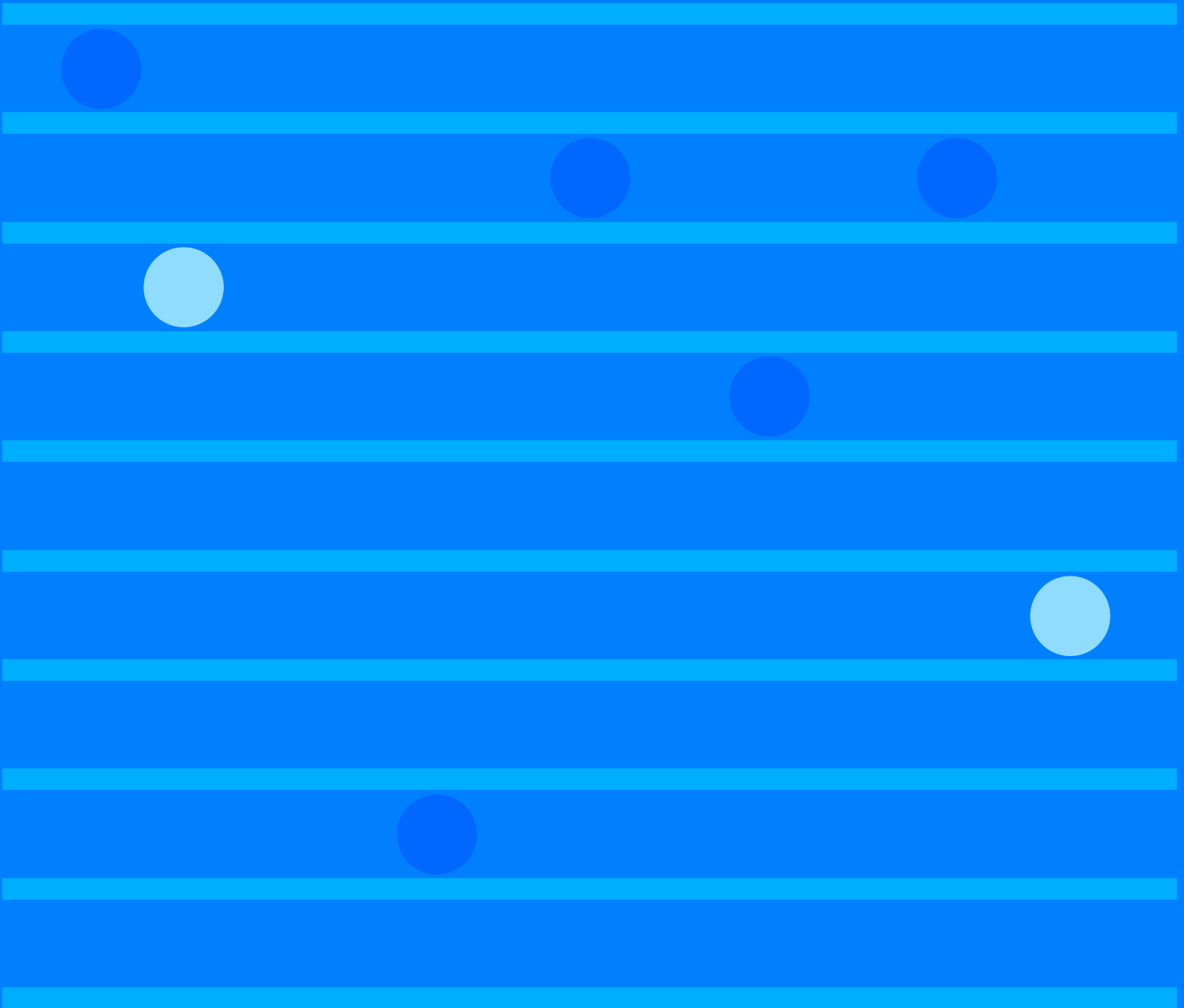
⁸ As an example, as can be seen in World Bank (2021), with data up to 2018, in Argentina there are 96 firms with public offering and some 170,000 with bank credit. In Chile, there are 212 listed companies, but 1,205,000 with bank debt.

The international benchmark will be built based on comparable information for four developed European countries with high financial depth (Germany, Spain, France, and Italy), calculating the average of the bank debt ratio to GDP for each sector for the four countries in the period 2007–18.⁹

Existing studies are scarce in the field of empirical applications. Based on data for 65 countries, Wurgler (2000) concludes that, in countries with more developed financial systems (but not in others), credit flows in greater volume to growing sectors. Bebczuk and Sangiácomo (2007) and Bebczuk and Galindo (2008) find a high rigidity of the loan portfolio for Argentina, similar to what Bebczuk, Filippo, and Sangiácomo (2017) find in the case of Haiti.

⁹ The data is from the BACH database (<https://www.bach.banque-france.fr/?lang=en>). Unfortunately, the Federal Reserve and other financial regulators in the United States do not publish data on credit opening by sector, which is why that country has been excluded from the benchmark. Given the high degree of economic and financial development of the countries included, this omission should not compromise the credibility of the results.

2. Análisis cuantitativo



This section presents the results of the econometric analysis of the determinants of aggregate and sectoral bank credit growth. Additionally, a potential recovery index of private credit is introduced and broken down by activity sector focused on Latin America and the Caribbean (LAC).

For the main estimates (and for the computation of the credit potential recovery rating by sector), information will be used from a database of an unbalanced panel of 15 LAC countries with quarterly data from 2007 to 2020 (or the longest sub-period available in each country at the time of these calculations). The country sample includes: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, and Uruguay. Sectoral opening is carried out in accordance with the upper level (letters) of the International Standard Industrial Classification (ISIC). In order to achieve a homogeneous format (although still not complete for all countries), the various sectoral structures presented by each country were merged into one, which includes the following sections: A: Agriculture, forestry, and fishing; B: Mining and quarrying; C: Manufacturing industries; F: Construction; G: Commerce; H and J: Transportation, storage, information, and communications; I: Accommodation and food service activities, and L: Real estate activities. Moreover, annual information will be used as an international benchmark throughout 2007–18 for Germany, Spain, France, and Italy, taken from the BACH database managed by Banque de France. The primary sources on the structure of loans by sector in LAC are the respective central banks or the corresponding banking supervisory agencies. Other data come from the respective Institutes of Statistics or Ministries of Finance. In turn, annual data obtained from the World Bank's World Development Indicators (WDI) database will also be used for global estimates of the determinants of bank credit to the private sector.

2.1. Bank Credit Added to the Private Sector: Global and LAC Estimates

By exploiting the new banking database for LAC compiled for the purposes of this work, panel regressions (unbalanced) were run with monthly frequency data for 17 countries in the region in 2007–20 in order to explain the rate of real annual growth of private credit as a function of the variables identified by the previous literature for which information is available. The panel estimation has been carried out with and without fixed effects. This methodology is used in the vast majority of the studies surveyed in the previous section. Beyond the use of lagged values for the explanatory variables, no techniques have been applied to address possible endogeneity problems associated with the inclusion of GDP growth on the right side of the regression.¹⁰ Tables 2 and 3 present the results of the panel estimates without fixed effects, and with fixed effects using the monthly sample of LAC countries.

Table 2. Determinants of the Real Annual Growth Rate of Private Credit in LAC (monthly data 2007–20, 17 LAC countries, no fixed effects)

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital over risk-weighted assets (t-1)	-0,633*** [0,0826]							-0,924*** [0,0675]	-1,694** [0,794]
Ample liquidity over assets (t-1)		-0,140*** [0,0348]					0,0512*** [0,0296]	-0,228*** [0,0386]	0,164 [0,341]
ROE (t-1)			0,101*** [0,0370]				-0,00455 [0,0249]	-0,0321 [0,0235]	-0,0275 [0,0232]
Default (t-1)				-2,502*** [0,161]			-2,282*** [0,159]	-2,755*** [0,173]	-2,749*** [0,173]
Annual growth activity level (t-1)					0,485*** [0,0454]		0,308*** [0,0404]	0,230*** [0,0390]	0,226*** [0,0391]
Inflation (t-1)						-0,243*** [0,0346]	-0,238*** [0,0329]	-0,194*** [0,0321]	-0,183*** [0,0366]
Capital ^ 2									0,0239 [0,0235]
Liquidity ^ 2									-0,00598 [0,00516]
Constant	16,71*** [1,327]	11,10*** [0,993]	5,774*** [0,525]	13,92*** [0,472]	6,166*** [0,228]	8,964*** [0,220]	11,86*** [0,882]	36,60*** [1,883]	36,30*** [9,398]
Observations	1655	1967	2098	2148	2259	2271	1860	1547	1547
Fixed effects by time	No	No	No	No	No	No	No	No	No
Fixed effects by country	No	No	No	No	No	No	No	No	No
R-squared	0,029	0,015	0,010	0,144	0,090	0,047	0,232	0,320	0,321

Source: Authors' elaboration.

Note: Standard errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

¹⁰ The potential bias does not seem qualitatively and, possibly, quantitatively relevant in the present context, since the available evidence suggests that the reverse causality from credit to short-term growth does not have greater empirical support (Djankov, McLeish, and Shleifer, 2007; Bebczuk et al., 2011).

Table 3. Determinants of the Real Annual Growth Rate of Private Credit in LAC (monthly data 2007–20, 17 LAC countries, fixed country and time effects)

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital over risk-weighted assets (t-1)	-1,696*** [0,522]							-0,970* [0,509]	-5,675** [2,636]
Ample liquidity over assets (t-1)		-0,300* [0,141]					0,324 [0,255]	0,230 [0,265]	-0,983 [0,937]
ROE (t-1)			0,0300 [0,230]				0,106 [0,129]	0,0568 [0,102]	0,0681 [0,0946]
Default (t-1)				-3,695*** [0,932]			-3,001*** [0,505]	-3,437*** [0,647]	-3,618*** [0,661]
Annual growth activity level (t-1)					0,387** [0,139]		0,141 [0,109]	0,100 [0,124]	0,0743 [0,124]
Inflation (t-1)						-1,015*** [0,0766]	-0,902*** [0,0930]	-0,807*** [0,0943]	-0,889*** [0,153]
Capital ^ 2									0,139* [0,0754]
Liquidity ^ 2									0,0184 [0,0161]
Constant	32,94*** [8,090]	14,63*** [4,376]	4,222 [3,245]	15,47*** [3,379]	12,77*** [3,702]	9,236*** [1,582]	9,790 [8,682]	28,79*** [12,50]	87,30*** [23,08]
Observations	1655	1967	2098	2148	2259	2271	1860	1547	1547
Fixed effects by time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects by country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0,217	0,206	0,148	0,399	0,242	0,326	0,487	0,516	0,528

Source: Authors' elaboration.

Note: Standard errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

Table 4 presents the results of a comparable specification, but using annual data on a sample (according to data availability) of up to 180 countries from 1963 to 2018. The results indicate that the level of capitalization shows a negative effect on the growth rate of bank credit, while the liquidity and profitability measures (return on equity, or ROE) do not show a statistically robust impact. The default rate of the portfolio decreases the rate of credit growth.

Robust non-linear effects (through the respective quadratic terms) associated with capital and liquidity are not detected. Among macroeconomic variables, the growth of the level of activity has a positive effect, but not significant in the specification with fixed effects, while the effect of inflation is negative and significant. In the specification with annual data, it is also observed that return on assets (ROA) has a positive effect, while efficiency (approximated by the differential between active and passive rates) has a negative effect on credit.

Table 4. Determinants of the Variation in the Bank Credit Ratio to the Private Sector (annual data, country and time fixed effects)

Dependent variable: Change in relationship (Bank credit to the private sector) / GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(Regulatory capital) / (risk-weighted assets)	-0,0937* [0,0560]										-0,0952* [0,0554]
(Liquid assets) / (assets)		-0,0231** [0,00895]									-0,0636** [0,0247]
Consumer inflation			-0,000354 [0,000278]								-0,0928*** [0,0209]
% of portfolio in irregular situation				-0,0643 [0,0762]							-0,160*** [0,0560]
ROA					0,140* [0,0757]						0,470* [0,236]
ROE						0,00490 [0,00500]					-0,0457 [0,0331]
Rate differential (AP)							-0,930*** [0,310]				-5,583** [2,120]
(Private consumption + general government spending) / GDP								-0,0125 [0,0129]			0,174* [0,0927]
(Bank credit to the private sector)/GDP									0,201*** [0,0483]		-0,0841* [0,0492]
(Bank credit to the private sector)/GDP ^ 2										-0,000263*** [0,0000438]	-0,000724*** [0,000156]
Constant	6,964*** [2,562]	0,487 [0,393]	0,579 [0,457]	6,932*** [2,522]	4,532*** [0,287]	4,530*** [0,288]	18,08*** [0,329]	0,214 [0,176]	0,496 [0,320]	0,230 [0,307]	3,546** [1,482]
Observations	1148	2170	6296	1135	1157	1153	3432	6165	7269	7472	587
No. of countries	133	145	180	133	134	134	137	173	185	185	69
R-squared	0,053	0,035	0,030	0,049	0,055	0,055	0,054	0,031	0,068	0,051	0,243
Fixed effects by country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects by year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors' elaboration.

Note: All explanatory variables are in lagged differences. Standard errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

2.2. Private Credit by Activity Sector

To inquire about the factors that explain the changes in the allocation of credit by sector, as a previous and essential step to the computation of an index of sectoral credit recovery, the following econometric model with panel data is proposed:

$$\Delta y_{i,j,t} = \alpha + \beta y_{i,j,t-1} + \gamma g_{i,j,t-1} + \gamma \sigma_{i,j,t-1} + \gamma z_{i,j,t} + \delta_i + \delta_j + \delta_t + \epsilon_{i,j,t} \quad (1)$$

Where:

Sub-indexes i, j and t denote sector, country, and quarter, respectively. The dependent variable Δy is the change in the share of each sector in total commercial credit with respect to the same quarter of the previous year. Meanwhile, the explanatory variables include the percentage share in the same quarter of the previous year: g , GDP growth in the last four quarters; σ , the standard deviation of the GDP growth rate in the last four quarters; z , the financial dependence of the corresponding sector; and δ , the respective fixed effects (by sector, country, and quarter).

The inclusion of lagged participation seeks to compare whether banks tend to increase their exposure in sectors with greater initial weighting (which would indicate greater familiarity and knowledge) or if, on the contrary, they try to maintain a diversified portfolio, gradually reducing such exposure in order to avoid a high concentration in some sectors. In the first case, coefficient β will be positive, and in the second, negative. It is expected that, if the banks' credit decisions respond to the profitability and risk conditions of the respective sectors, the growth of each activity should have a positive sign and the standard deviation should have a negative sign. Regarding financial dependence, the relationship between sector credit and GDP can have a negative or positive impact. From the bank's point of view, high leverage can, a priori, give rise to opposite effects: on the one hand, it may indicate that the sector's debt is too high and, therefore, so will be the credit risk. In this case, the higher credit risk will induce banks to reduce their exposure to such activity and the sign of the γ coefficient will be negative; on the other hand, high initial debt indicates that the sector has fluid access to credit, presumably based on a good reputation and history of repayment (positive γ). As an alternative to the leverage of each sector in LAC, the explanatory power of financial dependence in LAC relative to the average in Europe by sector will be tested.

Unlike the previous argument, based on considerations on the supply side of credit, here an argument must be made on the demand side: the greater the distance (ratio) between the observed leverage and the optimum (the optimum being higher than observed due to financial restrictions), the greater the demand for credit and the increase in the sector's share of total credit (the γ coefficient would be negative).

The econometric results to explain the change in the share of credit by activity are shown in Tables 5–8, which differ in the sample (with and without extreme values) and the measure of financial dependence (that of each sector and the quotient relative to Europe). To control for invariant heterogeneities in different dimensions, fixed effects by country, sector, and quarter are included, first individually and then simultaneously. The main results are as follows: (i) lagged participation acts negatively; (ii) the two dependency measures have a positive sign; (iii) sectoral growth has a positive influence; and (iv) the standard deviation of sectoral growth has a negative impact, but it is not robust to the exclusion of extreme values.

Table 5. Regressions (I): Complete Sample with Financial Dependence Measured by Credit on GDP by Sector

Dependent variable: Change in the sectoral participation in commercial credit (against the same quarter of the previous year)	(1)	(2)	(3)	(4)	(5)
Lagged sector participation (same quarter previous year)	-0,0314*** [0,00315]	-0,0347*** [0,00323]	-0,0440*** [0,00525]	-0,0321*** [0,00321]	-0,0519*** [0,00603]
Real annual sector GDP growth (against the same quarter of the previous year)	0,00506*** [0,00174]	0,00581*** [0,00174]	0,00498*** [0,00177]	0,00523*** [0,00172]	0,00654*** [0,00174]
Standard deviation of real annual growth in sectoral GDP (last 4 quarters)	-0,00572* [0,00331]	-0,00673** [0,00326]	-0,00149 [0,00365]	-0,00826*** [0,00318]	-0,00644* [0,00370]
Credit on sectoral GDP	0,00286*** [0,000516]	0,00381*** [0,000567]	0,00408*** [0,000688]	0,00308*** [0,000521]	0,00628*** [0,000953]
Constant	0,276*** [0,0366]	0,403*** [0,0578]	0,328*** [0,0499]	1,647*** [0,509]	1,644*** [0,553]
Observations	3,875	3,875	3,875	3,875	3,875
Fixed effects by country	No	Yes	No	No	Yes
Fixed effects by sector	No	No	Yes	No	Yes
Fixed effects by quarter	No	No	No	Yes	Yes
R-squared	0,051	0,064	0,061	0,064	0,089

Source: Authors' elaboration.

Note: Robust square errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

Table 6. Regressions (II): Complete Sample with Financial Dependence Measured by Credit on Sectoral GDP Relative to European Countries

Dependent variable: Change in the sectoral participation in commercial credit (against the same quarter of the previous year)	(1)	(2)	(3)	(4)	(5)
Lagged sector participation (same quarter previous year)	-0,0328*** [0,00375]	-0,0363*** [0,00394]	-0,0435*** [0,00569]	-0,0348*** [0,00387]	-0,0519*** [0,00656]
Real annual sector GDP growth (against the same quarter of the previous year)	0,00511*** [0,00181]	0,00590*** [0,00181]	0,00514*** [0,00183]	0,00505*** [0,00181]	0,00669*** [0,00178]
Standard deviation of real annual growth in sectoral GDP (last 4 quarters)	-0,00566* [0,00343]	-0,00666* [0,00340]	-0,00169 [0,00375]	-0,00861*** [0,00326]	-0,00758** [0,00378]
(Credit on sectoral GDP) / (Credit on sectoral GDP in Europe, 2007–18 average)	0,00203*** [0,000484]	0,00270*** [0,000565]	0,00251*** [0,000570]	0,00251*** [0,000505]	0,00422*** [0,000762]
Constant	0,281*** [0,0403]	0,429*** [0,0597]	0,387*** [0,0587]	1,235* [0,707]	1,313* [0,728]
Observations	3,461	3,461	3,461	3,461	3,461
Fixed effects by country	No	Yes	No	No	Yes
Fixed effects by sector	No	No	Yes	No	Yes
Fixed effects by quarter	No	No	No	Yes	Yes
R-squared	0,047	0,061	0,056	0,063	0,086

Source: Authors' elaboration.

Note: Robust square errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

Table 7. Regressions (III): Sample without Outliers with Financial Dependence Measured by Credit on Sectoral GDP

Dependent variable: Change in the sectoral participation in commercial credit (against the same quarter of the previous year)	(1)	(2)	(3)	(4)	(5)
Lagged sector participation (<i>same quarter previous year</i>)	-0,0316*** [0,00317]	-0,0349*** [0,00325]	-0,0444*** [0,00527]	-0,0324*** [0,00323]	-0,0523*** [0,00606]
Real annual sector GDP growth (<i>against the same quarter of the previous year</i>)	0,00879** [0,00377]	0,0111*** [0,00382]	0,00914** [0,00372]	0,00797** [0,00386]	0,0122*** [0,00384]
Standard deviation of real annual growth in sectoral GDP (<i>last 4 quarters</i>)	-0,00329 [0,00469]	-0,00359 [0,00469]	-0,00167 [0,00524]	-0,00718 [0,00444]	-0,00396 [0,00512]
Credit on sectoral GDP	0,00284*** [0,000516]	0,00376*** [0,000568]	0,00409*** [0,000691]	0,00308*** [0,000523]	0,00628*** [0,000961]
Constant	0,263*** [0,0406]	0,383*** [0,0597]	0,303*** [0,0528]	1,640*** [0,518]	1,614*** [0,572]
Observations	3,803	3,803	3,803	3,803	3,803
Fixed effects by country	No	Yes	No	No	Yes
Fixed effects by sector	No	No	Yes	No	Yes
Fixed effects by quarter	No	No	No	Yes	Yes
R-squared	0,052	0,065	0,062	0,065	0,091

Source: Authors' elaboration.

Note: Robust square errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

Table 8. Regressions (IV): Sample without Outliers with Financial Dependence Measured by Credit on Sectoral GDP Relative to European Countries

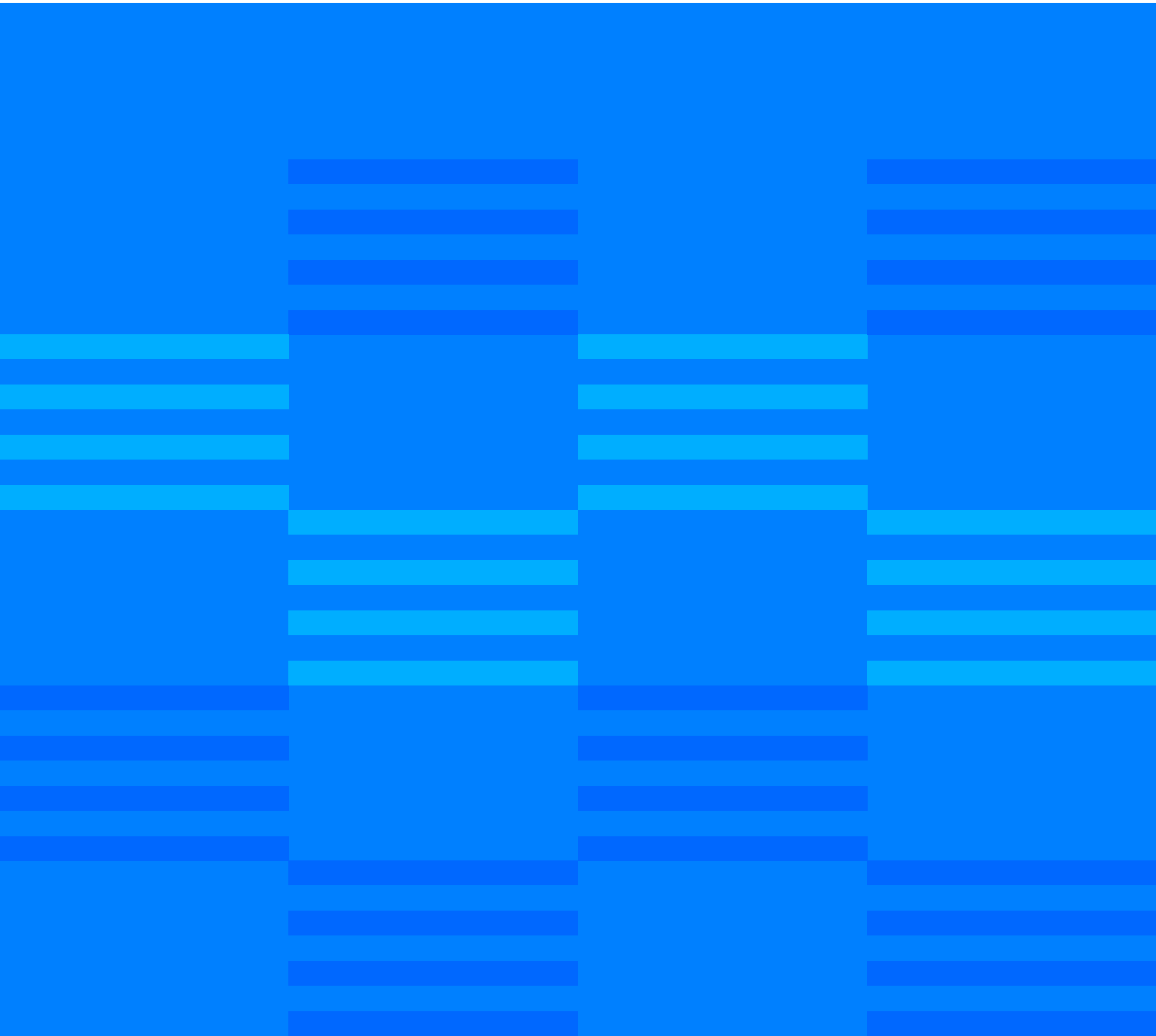
Dependent variable: Change in the sectoral participation in commercial credit (against the same quarter of the previous year)	(1)	(2)	(3)	(4)	(5)
Lagged sector participation (<i>same quarter previous year</i>)	-0,0330*** [0,00377]	-0,0365*** [0,00397]	-0,0439*** [0,00572]	-0,0351*** [0,00391]	-0,0523*** [0,00660]
Real annual sector GDP growth (<i>against the same quarter of the previous year</i>)	0,00929** [0,00401]	0,0118*** [0,00408]	0,00966** [0,00393]	0,00777* [0,00407]	0,0125*** [0,00399]
Standard deviation of real annual growth in sectoral GDP (<i>last 4 quarters</i>)	-0,00327 [0,00492]	-0,00367 [0,00493]	0,00121 [0,00541]	-0,00781* [0,00456]	-0,00609 [0,00515]
(Credit on sectoral GDP) / (Credit on sectoral GDP in Europe, 2007–18 average)	0,00202*** [0,000486]	0,00269*** [0,000568]	0,00250*** [0,000573]	0,00251*** [0,000509]	0,00422*** [0,000768]
Constant	0,267*** [0,0448]	0,411*** [0,0615]	0,363*** [0,0616]	1,674*** [0,528]	1,740*** [0,586]
Observations	3,394	3,394	3,394	3,394	3,394
Fixed effects by country	No	Yes	No	No	Yes
Fixed effects by sector	No	No	Yes	No	Yes
Fixed effects by quarter	No	No	No	Yes	Yes
R-squared	0,048	0,062	0,057	0,063	0,087

Source: Authors' elaboration.

Note: Robust square errors in brackets.

*p<0,10, **p<0,05, ***p<0,01.

3. An Index of Potential Recovery of Private Credit by Activity Sector



As mentioned above, the lag in financial factors is one of the substantive areas that determine the general lag of Latin America and the Caribbean (LAC) in terms of recovery conditions from the negative economic effects of COVID-19. This makes support programs for the financial sector priority policy instruments, so that they can grant credit appropriately in order to accelerate the adjustment process. However, limited budgets make it necessary to focus interventions in order to maximize returns as defined by economic policy preferences. In this sense, the quantitative analysis carried out offers a clear guide for building an index of potential recovery of private credit by activity sector. Based on the results of the regressions presented above, the variables that emerge as supported by a solid theoretical and empirical framework adjusted to the reality of LAC are the following:

The participation of the sector in total commercial credit: In order to avoid a high sector concentration of credit, the higher the initial participation, the less the subsequent change in that participation.

Leverage in the sector: Measured by the lagged value of the credit ratio over the sector's GDP, this variable exerts a positive effect, explained by the favorable reputational signal linked to broad prior access to credit (which would offset the eventual higher risk of a higher debt ratio).

Annual growth in GDP by sector: The higher growth (in the previous year), the greater the change in the sector's share of commercial credit, in line with the intuition that banks react to the recent performance observed in each sector.

To build the index, the values of each of these three variables were ordered for the entire sample of countries and sectors with the objective of creating an index on a scale of 1–10 based on data from the second quarter of 2020 (the cuts correspond to each decile of the distribution, following a criterion analogous to that used by Támara and Fernández Díez [2020]).¹¹

¹¹ It should be noted that, at the time of obtaining the data for the calculation, Panama was the only country for which insufficient data was available (in particular, GDP data for the second quarter); therefore, it has not been considered in the calculations.

The index compares LAC countries against each other: the higher the rating value, the higher the expected growth in the share of the respective sector in total commercial credit post-pandemic.¹² In accordance with the previous arguments, for the participation variable of the sector in total commercial credit, the value 1 in the index corresponds to the top decile (10 percent) and the value 10 to the bottom decile, while for sector leverage and sectoral GDP growth the order is the opposite. The final rating obtained is the simple average of the three sub-indexes. Taking a simple average—that is, assigning the same weight to each sub-index—favors the transparency of the index. It is also not evident, from the theoretical or empirical point of view, whether some sub-indexes should receive a higher weight compared to others. It should also be added that a large number of indexes that are highly accepted and used in academic and economic policy circles adopt the same position regarding uniform weighting of the different sub-indexes.

Table 9 presents a series of descriptive measures for the entire region (it should be noted that the index does not anticipate absolute variations, but rather changes in participation in total credit). Moreover, it shows that, taking the median values, the two sectors with the greatest potential for bank credit recovery are the agriculture, forestry, and fishing sector, followed by the real estate sector; the sectors with the least potential for autonomous credit recovery are commerce and manufacturing industries.

Table 9. Private Credit Sector Recovery Index (0–10) in the Post-Pandemic Setting (regional situation)

	Median	Avg.	Max.	Min.	Stand. Dev.	CV
Agriculture/forestry/fishing	6,7	6,5	8,0	4,0	0,9	0,1
Real estate activities	6,5	6,2	7,0	5,0	0,8	0,1
Transportation, storage, information, and communications	5,7	5,5	7,0	4,3	0,8	0,1
Construction	5,3	5,4	7,3	4,0	1,1	0,2
Exploitation of mines and quarries	5,3	5,8	7,3	4,0	1,1	0,2
Accommodation and food activities	4,8	5,2	8,0	4,0	1,3	0,2
Commerce	4,7	4,5	6,0	3,3	0,8	0,2
Manufacturing industries	4,5	4,7	6,3	3,0	0,9	0,2

Source: Authors' calculations based on econometric estimates and data for sector product and credit.

Note: The countries considered include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, and Uruguay. The number of sectors considered varies according to data availability. The sectors are ordered by their median, and this order varies by country.

¹² It should be taken into account that this exercise is closely linked to the expected evolution of aggregate credit to the non-financial private sector, since the index built in this section only provides guidance on the change in the sectoral distribution of private credit, the aggregate volume of which depends on various banking and macroeconomic indicators reviewed in Section 1.

In order to clarify the interpretation and use of the index, Table 10 presents three selected cases: the sector with the highest rating (agriculture, forestry, and fishing in Chile, with a rating of 8.0), the sector with the lowest rating (manufacturing industries in Argentina, with a rating of 3.0), and the median of the sample for all sectors (5.3). According to this median, the average drop in GDP by sector in the second quarter of 2020 was 16.6 percent compared to the same period in the previous year, while the average leverage (credit over GDP) was 27.6 percent. The average participation in the total commercial portfolio is 8.9 percent. Taking this point as a reference, the reason the primary sector in Chile heads the ranking is easily inferred: its productive performance was markedly better in relation to the average (-6.1 percent); pre-pandemic it already enjoyed broad access to credit (110.9 percent) and represented only 9 percent of the commercial portfolio of the banking system. Based on the estimated model, these conditions favorably position the sector to benefit from an increase in credit relative to other sectors. On the contrary, the manufacturing industry in Argentina exhibits much less favorable conditions, with a sharp post-pandemic contraction (-20.8 percent), low insertion in the banking system (15.7 percent), and high initial exposure (28.2 percent of the total portfolio).¹³

Table 10. Private Credit Potential Recovery Index (0–10) by Activity Sector: Maximum, Minimum, and Median Value

Country	Chile		Argentina		Median (total countries and sectors)	
Sector	Agriculture/forestry/fishing		Manufacturing industries			
Components of the index	Value	Rating	Value	Rating	Value	Rating
Participation in total commercial credit (%)	9,0	6,0	28,2	1,0	8,9	6,0
Credit over sectoral GDP (%)	110,9	10,0	15,7	3,0	27,6	5,0
Annual sectoral GDP growth (%)	-6,1	8,0	-20,8	5,0	-16,6	5,0
Global index		8,0		3,0		5,3

Source: Author, based on data from the respective central banks and other national sources.

¹³Policy implications are discussed in the next section.

4. Final Comments and Recommendations

This study developed a conceptual and quantitative framework adjusted to the characteristics of the financial markets of Latin America and the Caribbean (LAC) in order to establish the determining factors of growth and the sectoral distribution of bank credit to the private sector. Based on this theoretical and empirical framework, a potential credit recovery index has been formulated by productive sectors by country. The analysis has the limitations of using retrospective information, although it is valid to the extent that the indicators and variables used to compose the index are widely used in the literature to prospectively forecast the behavior of credit by sector. The econometric results are consistent with preventive behavior regarding capitalization and banks' liquidity management, with aggregate credit growth highly influenced by the evolution of the real sector.

Regarding credit by sector, the evidence in the present study follows the intuition that industries with greater access to credit (measured by their leverage) and lower participation in the commercial banking portfolio before the pandemic, as well as with a better productive performance during this event, should gain preference with banks in the future. Although these results do not make it possible to direct public support, which would require additional information on the behavior of the sectors, they do offer policymakers a framework for analyzing the differences between sectors and their autonomous recovery capabilities.

Given that the market would turn toward the previous sectors, from the point of view of credit policies, there is the dilemma and the opportunity to direct support to other sectors, particularly those that experienced more pronounced declines in their sales and production levels. While these measures would have a welcome countercyclical effect, it should not be overlooked that they pose a considerable repayment risk. The application of fresh funds to these industries should, for this reason, be accompanied by a careful *ex ante* evaluation of the beneficiary firms' ability and willingness to pay.

As an alternative to granting direct credit, partial guarantee programs could be implemented for the operations of the private and state banks in each country, in which case the incentives of the banks to participate in these programs would have to be explored, especially given the definition of the minimum guarantee levels for success. Finally, these results can be extended, making use of the compiled data, to: (i) explore the effects of distortions in LAC credit markets on the evolution of the credit sector; (ii) explore the effect of market failures on the "autonomous" evolution of credit; (iii) anticipate the sectors that may benefit the most from the relaxation of global credit conditions in response to the COVID-19 crisis, and (iv) analyze the effects by sector on employment, subject to levels of financial dependence and labor regulation.

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Annex



Annex 1. Potential Recovery Rate of Private Credit by Sector (in descending order)

Country	Sector (letter)	Sector (name)	Rating
Chile	A	Agriculture/forestry/fishing	8,0
Honduras	I	Accommodation and food activities	8,0
Costa Rica	F	Construction	7,3
Honduras	B	Exploitation of mines and quarries	7,3
Paraguay	F	Construction	7,3
Bolivia	A	Agriculture/forestry/fishing	7,0
Colombia	H_J	Transportation, storage, information, and communications	7,0
Guatemala	B	Exploitation of mines and quarries	7,0
Guatemala	L	Real estate activities	7,0
Peru	A	Agriculture/forestry/fishing	7,0
Dominican Rep.	A	Agriculture/forestry/fishing	7,0
Brazil	L	Real estate activities	6,7
Chile	B	Exploitation of mines and quarries	6,7
Colombia	A	Agriculture/forestry/fishing	6,7
Colombia	L	Real estate activities	6,7
Costa Rica	A	Agriculture/forestry/fishing	6,7
El Salvador	A	Agriculture/forestry/fishing	6,7
Mexico	A	Agriculture/forestry/fishing	6,7
Paraguay	A	Agriculture/forestry/fishing	6,7
Brazil	A	Agriculture/forestry/fishing	6,3
Brazil	F	Construction	6,3
Chile	C	Manufacturing industries	6,3
Chile	F	Construction	6,3
Guatemala	A	Agriculture/forestry/fishing	6,3
Honduras	A	Agriculture/forestry/fishing	6,3
Mexico	B	Exploitation of mines and quarries	6,3
Dominican Rep.	L	Real estate activities	6,3
Uruguay	A	Agriculture/forestry/fishing	6,3
Bolivia	G	Commerce	6,0
Chile	H_J	Transportation, storage, information, and communications	6,0
El Salvador	H_J	Transportation, storage, information, and communications	6,0

Country	Sector (letter)	Sector (name)	Rating
Guatemala	F	Construction	6,0
Honduras	H_J	Transportation, storage, information, and communications	6,0
Bolivia	C	Manufacturing industries	5,7
Brazil	H_J	Transportation, storage, information, and communications	5,7
Chile	G	Commerce	5,7
Costa Rica	H_J	Transportation, storage, information, and communications	5,7
Costa Rica	I	Accommodation and food activities	5,7
Paraguay	C	Manufacturing industries	5,7
Dominican Rep.	H_J	Transportation, storage, information, and communications	5,7
Argentina	B	Exploitation of mines and quarries	5,3
Brazil	C	Manufacturing industries	5,3
Colombia	B	Exploitation of mines and quarries	5,3
Costa Rica	C	Manufacturing industries	5,3
El Salvador	F	Construction	5,3
Guatemala	C	Manufacturing industries	5,3
Guatemala	H_J	Transportation, storage, information, and communications	5,3
Guatemala	I	Accommodation and food activities	5,3
Honduras	F	Construction	5,3
Mexico	L	Real estate activities	5,3
Dominican Rep.	B	Exploitation of mines and quarries	5,3
Uruguay	F	Construction	5,3
Argentina	L	Real estate activities	5,0
Bolivia	F	Construction	5,0
Guatemala	G	Commerce	5,0
Dominican Rep.	G	Commerce	5,0
Dominican Rep.	I	Accommodation and food activities	5,0
Brazil	G	Commerce	4,7
Colombia	F	Construction	4,7
Costa Rica	G	Commerce	4,7
Honduras	G	Commerce	4,7
Mexico	I	Accommodation and food activities	4,7

Country	Sector (letter)	Sector (name)	Rating
Peru	B	Exploitation of mines and quarries	4,7
Peru	H_J	Transportation, storage, information, and communications	4,7
Uruguay	C	Manufacturing industries	4,7
Argentina	F	Construction	4,3
Argentina	H_J	Transportation, storage, information, and communications	4,3
Colombia	C	Manufacturing industries	4,3
El Salvador	C	Manufacturing industries	4,3
El Salvador	I	Accommodation and food activities	4,3
Honduras	C	Manufacturing industries	4,3
Mexico	F	Construction	4,3
Mexico	H_J	Transportation, storage, information, and communications	4,3
Peru	I	Accommodation and food activities	4,3
Dominican Rep.	C	Manufacturing industries	4,3
Dominican Rep.	F	Construction	4,3
Uruguay	G	Commerce	4,3
Argentina	A	Agriculture/forestry/fishing	4,0
Argentina	I	Accommodation and food activities	4,0
Bolivia	B	Exploitation of mines and quarries	4,0
Peru	C	Manufacturing industries	4,0
Peru	F	Construction	4,0
Peru	G	Commerce	4,0
Argentina	G	Commerce	3,7
Colombia	G	Commerce	3,3
Mexico	C	Manufacturing industries	3,3
Mexico	G	Commerce	3,3
Argentina	C	Manufacturing industries	3,0

Source: Authors' elaboration based on data from the respective central banks and other national sources.