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Impact of financial development on Latin America's economic growth

Impacto del desarrollo financiero en el crecimiento económico de América Latina

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Abstract

The aim of this paper is to examine the impact of financial development on economic growth. To that effect, the contribution of both the capital market and the banking system to the dynamics of the per capita gross domestic product (GDPpc) in Latin America (LA) is empirically tested for the period 1996- 2017 with a panel Autoregressive Distributive Lag (ADL) model. Our main findings show that: i) the deepening of the financial system generates positive effects on the evolution of the product, though the coefficients are small; ii) international trade and the local technological effort maintain a direct relationship with economic performance; iii) the correlation between foreign direct investment (FDI) and product evolution is negative.

JEL Code: G21, G10, O47, C33, O30
Keywords: : banking system; capital market; economic growth; ARDL panel model; Latin America

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Resumen

El objetivo de este trabajo es examinar la incidencia del desarrollo financiero sobre el crecimiento económico. Con este fin, mediante un modelo autorregresivo con rezagos distribuidos (ARDL) para panel, se prueba empíricamente la contribución del mercado de capitales y del sistema bancario en la dinámica del producto interno bruto per cápita (PIBpc) en América Latina (AL) durante el periodo 1990-2017. Los resultados principales indican que: i) la profundización del sistema financiero genera efectos positivos en la evolución del producto, aunque la magnitud de estos coeficientes es pequeña; ii) el comercio internacional y el esfuerzo tecnológico local mantienen una relación directa con el desempeño económico; y, iii) la correlación entre la inversión extranjera directa (IED) y la evolución del producto es negativa.

Código JEL: G21, G10, O47, C33, O30
Palabras clave: sistema bancario; mercado de capitales; crecimiento económico; modelo ARDL para panel; América Latina

Introduction

The exhaustion of the Substitutive Industrialization Model (MIS) gave rise to intense debates on pursuing new economic objectives. Along this path, during the second half of the 1980s and early 1990s, many semi-industrialized countries, particularly Latin America, began transitioning to an open economy model (OEM) rooted in trade liberalization and financial deregulation. The guiding principle of this metamorphosis would be to correct the profound macroeconomic imbalances accumulated during the operation of the MIS, such as the substantial deficit in public finances, the size and cost of the debt, exchange rate volatility, price instability, and loss of economic competitiveness. Certainly, several structural reforms would be implemented to ensure optimal integration into world markets and achieve sustained long-term economic growth rates, anchored to the expansion of the export manufacturing sector.

Nevertheless, the macroeconomic results of the last four decades are contradictory; while some economies, such as those in Asia, have achieved a strong expansion of economic activity, other countries, such as those in Latin America, show mixed and less robust patterns. An example of this dichotomy is South Korea and Mexico. While the former has managed to move from a context of underdevelopment to the world technological frontier, a process based on the consolidation of savings and investment, the latter has followed a pattern of industrialization based on the intermediate stages of global value chains, with clear restrictions on credit and financial capitalization.

At a theoretical level, endogenous growth models position the financial system as an essential source of output expansion since its consolidation has a significant impact on the capacity of agents (countries or industries) to accumulate factors that generate externalities (human capital and R&D spending) and, thus, on the rate of innovation, to the extent that this process reduces the costs associated

with the allocation and management of resources and risk management (Aghion & Howitt, 2009). At the empirical level, the results are mixed and inconclusive regarding this link, due to persistent conceptual and methodological difficulties, especially in the robustness of the indicators used to characterize the structure of the financial system and the level of disaggregation of the analysis (Liu & Zhang 2020; Botev et al., 2019; Asteriou & Spanos, 2019; Pan & Mishra, 2018; Durusu-Ciftci et al., 2017; Murari, 2017; Levine, 2005).

Accordingly, this study seeks to answer what impact the expansion of the capital market and the banking system have on a product's performance in Argentina, Brazil, Chile, Colombia, and Mexico. This research aims to obtain consistent evidence that makes it possible to trace the dynamic effects of financial development on the economic growth rate and those associated with international trade and domestic technological innovation. Therefore, it is conjectured that those economies with lower financial frictions will be able to achieve higher rates of innovation and competitiveness, a condition that could provide a sustained boost to output growth in the long term.

The contribution of this study is twofold: on the one hand, the simultaneous effect of the consolidation of the structure, activity, and efficiency of the financial system is evaluated, which will permit greater analytical precision in the channels through which effective gains are generated on the dynamics of output, for the case of emerging economies; on the other hand, the hypothesis test is carried out based on an autoregressive model with lags distributed for panel (ARDLP), a methodological resource that produces unbiased estimates of the coefficients, derived from possible endogeneity problems or restrictions in the size of the sample (Pesaran et al., 2001).

The document is organized as follows. The first and second sections present a review of the theoretical and empirical state of the art on the externalities associated with the consolidation of the financial system to learn about the main results and methodologies used for this topic. The third section describes some stylized facts about macroeconomic and financial dynamics in Latin America to outline a preliminary causal relation between financial development, productivity, and economic growth. In the fourth part, the hypothesis testing is performed.

Innovation, growth, and the financial system: Theoretical elements

In the theory of economic growth, two approaches can be identified. The first is the supply-side approach, in which the dynamics of output, in the long run, are determined by technological progress (TP) and therefore by the inherent conditions of the production process. Two distinctive perspectives make up this view: the neoclassical theory, where the rate of innovation is exogenous to the economic system, and the endogenous theory, where technological change is subject to immediate sources (human capital and R&D

spending) that generate externalities and fundamental causes (international trade, institutions, or the financial system), whose nature affects the capacity of countries to accumulate factors of production (Aghion & Howitt, 2009; Romer, 1990; Lucas, 1988).

On the other hand, the demand approach emphasizes that output variations are constrained by the dynamics of effective demand (domestic and external); the dialectic of this construct originates from investment-led growth models, going from those explained by income distribution to those that emphasize the role of the super multiplier and the external constraint (Romero & McCombie, 2018; Dutt & Ros, 2007; Thirlwall, 2003; Barbosa-Filho, 2000).

Naturally, the purpose of this research is not to carry out an exhaustive review and enumeration of the characteristics of the theoretical models but to highlight the mechanisms through which the development of the financial system generates dynamic gains for economic functioning in the context of endogenous growth models (EGM).

Financial constraint and technological innovation

The endogenous theory of economic growth (supply-side approach) considers that in the long run the expansion of output and investment is contingent on the rate of innovation, which is determined by the availability of resources, market incentives, human capital accumulation, and product differentiation (R&D spending). Indeed, the presence of externalities constitutes the main hypothesis since it can replace the neoclassical assumptions of constant returns to scale, diminishing returns to factors of production, and the structure of perfect competition with those of constant (or increasing) marginal returns, increasing returns to scale, and imperfect competition, thus creating a departure from and controversy about the predictions of convergence of the traditional approach. (Aghion & Howitt, 2009; Grossman & Helpman, 1991).

In fact, in the line of idea-based models, the evolution of technological progress is formalized in production as a result of deliberate actions, which translate into a continuous process of technological innovation. In this analytical perspective, the company represents the agent responsible for the increase in productivity and, therefore, for the possibilities of product growth at the aggregate level, not only because they invest in R&D activities but also as a result of the process of imitation and technological incorporation that they carry out (Grosman & Helpman, 1991).

In this context, the endogenous theory assigns a meaningful role to the financial system in technological innovation since the development of banking intermediation and the stock market consolidates the process of identifying, financing, and monitoring investment projects, particularly those oriented toward R&D activities. Therefore, financial consolidation will stimulate the output growth rate

to the extent that, on the one hand, it reduces the effects associated with risk management, acquisition costs, and resource allocation and, on the other hand, optimizes savings management (Aghion & Howitt, 2009).

Thus, this paper is based on Aghion and Howitt's (2009) proposal of vertical innovation with a financial system[1]. Initially, a production function of the following form is assumed:

$$Y_t = (A_t L_t)^{1-\beta} x_t^{\beta} \tag{1}$$

Where Y_t represents the production of final goods (which can be dedicated to final consumption, as an input to the R&D sector or in the production of other intermediate goods); L_t constitutes the total labor directly employed in producing the final good (assumed to be fixed); A_t represents the mean productivity of innovation; and x_t symbolizes the quantity of differentiated intermediate goods.

Analytically, mean innovation productivity is defined by:

$$A_t = (1-\tau)A_{t-1} + \tau\sigma A_{t-1} \tag{2}$$

Where A_{t-1} symbolizes the previous version of the intermediate input; σ represents the size of the innovation; and τ constitutes the probability of an innovation occurring in sector i during period t.

Solving the optimization problem faced by the monopolist[2], in each sector where innovation occurs, the equilibrium quantity of intermediate goods is given by:

$$x_{it} = \omega A_t \tag{3}$$

Equation (3) shows that the degree of differentiation of intermediate inputs is determined by the mean productivity of innovation (A_t). Given this proposition, in equilibrium the level of output (Y_t) is proportional to the mean productivity of innovation (A_t), that is:

$$Y_t = \beta^{\frac{2\beta}{1-\beta}}(1-\beta^2)A_t \tag{4}$$

[1]This implies that the efficiency of an input depends on the number of times it has been improved.

[2] It results from the maximization problem $\max_x \Pi = \beta A^{1-\beta} x^{\beta} - x$. With this strategy, the monopoly equilibrium profit is given by $\Pi = \beta^{\frac{1+\beta}{1-\beta}}(1-\beta)A = \pi A$, The parameter ω is defined as $\omega = \beta^{\frac{2}{1-\alpha}}L$, where β is a positive constant that characterizes the different tastes by their variety.

Using the natural logarithm and differentiating Equation (4) over time, in the long run the growth rate of output (g_Y) is determined by the rate of innovation (g_A), that is:

$$g_Y = g_A \tag{5}$$

According to this equation, economies with high rates of innovation experience rapid growth in output and investment.

In this regard, there are two main difficulties: first, the difficulties faced by companies in financing their investment projects and, second, the role of the financial system in correcting these frictions since the symbiosis of these conditions raises the question of the profit optimization of economic agents given the cost of indebtedness imposed by the supply of liquidity.

What happens when companies face constraints in financing their investment projects? In the long run, the expected benefits of the innovation process (simultaneous payment of the entrepreneur and the financial intermediary) of the firms are equal to the expected profit from a successful innovation minus the R&D spending and the cost of selecting the financial intermediary, that is:

$$\Phi_t = \tau\Pi - R_t - \frac{fR_t}{\varepsilon} = \tau\pi A_t - \left(1 - \frac{f}{\varepsilon}\right)\frac{A_t\eta\tau^2}{2} \tag{6}$$

Where ε and f measure, respectively, the probability that an economic agent comes up with a feasible project with the financial intermediary and their selection cost, η captures the agent's cost of innovation, and τ constitutes the probability of innovation, whose equilibrium value $(\max_{\tau} \Phi)$ is given by:

$$\tau = \frac{\pi}{\left(1 + \frac{f}{\varepsilon}\right)\eta} \tag{7}$$

Thus, in the long term, the innovation rate[3], with credit restrictions, is defined as follows:

[3] The innovation rate is obtained as:

$$g_A = \frac{A_t - A_{t-1}}{A_{t-1}} = \frac{(1-\tau)A_{t-1} + \tau\sigma A_{t-1} - A_{t-1}}{A_{t-1}} = \frac{(1 - \tau + \tau\sigma - 1)A_{t-1}}{A_{t-1}} = \tau(\sigma - 1)$$

$$g_A = \frac{\pi(\sigma - 1)}{\left(1 + \frac{f}{\varepsilon}\right)\eta}$$

(8)

As can be deduced from this expression, the lower the cost of selecting feasible projects faced by financial intermediaries (more efficient banks) and the higher the productivity of the R&D sector, the more the frequency of innovation will be systematic; consequently, in the long run, economies will tend to experience higher output growth rates.

It is important to note that a widely discussed topic in the area of endogenous theory is the effect of international trade on the capacity of countries to accumulate factors and produce knowledge. Some of the conjectures made in this debate are: a) it facilitates access to the technological frontier, b) it promotes the rapid introduction of new technologies and varieties of inputs to production processes, c) it reduces the costs associated with the development of new products, d) it enables the reallocation of resources from traditional sectors to more dynamic ones, e) it increases the use of installed capacity and economies of scale, and f) it provides access to larger markets. Thus, a country's growth rate may be higher when technological knowledge, which contributes to the productivity of industrial research, is easily transmitted between countries, particularly between semi-industrialized and industrialized countries (Coe et al., 2009; Grossman & Helpman, 1991).

Therefore, in addition to the impact of the financial system and local technological innovation, this work includes the effect of international trade on the dynamics of the product, that is:

$$g_y = \pi + (\sigma - 1) + \widetilde{sf} + ci$$

(9)

Where g_y and $(\sigma - 1)$ represent, respectively, the GDP growth rate and the size of innovation; ci measures the intensity of international trade; and $(\widetilde{sf})$ captures the degree of development of the financial system, which would imply that to the extent that this indicator increases, a significant contraction of the feasible project selection costs faced by financial intermediaries will persist and, hence, the easing of an economy's financial constraints.

Financial development and economic growth: A review of the empirical literature

The results in the empirical literature on the impact of financial development on economic growth are mixed and inconclusive, particularly in the case of emerging economies, a condition inherent to the

conceptual and methodological difficulties present in empirical operationalization, either due to the way the causal relation is approached, the robustness of the indicators used to characterize the structure of the financial system, or the level of aggregation of the analysis (Liu & Zhang 2020; Botev et al., 2019; Asteriou & Spanos, 2019; Pan & Mishra, 2018; Durusu-Ciftci et al., 2017; Murari, 2017; Levine, 2005).

In their results, Liu and Zhang (2020), in a study of 29 provinces in China from 1996-2013, find that capital market consolidation —stock market capitalization/bank credit— constitutes a driver of GDP per capita. Nevertheless, this effect varies according to the stage of technological development. They also find that the development of financial services negatively impacts GDP performance due to the high concentration of financing in state-owned companies, whose efficiency is relatively low. Their estimates, in turn, show that capital accumulation (physical and human) and trade openness play a cardinal role in this link and provide evidence of conditional convergence among Chinese regions.

In a study of 47 countries over the period 1970-2016, Yan (2019) finds, using a panel-corrected standard error and vector autoregressive model, that increases in credit, stock market capitalization, and government spending generate a positive impact on GDP per capita growth, total factor productivity, and capital accumulation, with stock market liquidity being the most relevant factor. Moreover, the results suggest a circular motion between credit consolidation and inflation, a condition that imposes restrictions on economic expansion in the case of middle-income economies.

The findings of Botev et al. (2019), in a study of 128 countries in the period 1990-2012, suggest (linear estimation) that increasing credit and stock market capitalization generates an increase in GDP per capita, although the financial liberalization index lacked statistical significance. Similarly, the non-linear regressions showed that the expansion of bank and stock market financing is a driver of output. In this regard, they find that greater stock market development reinforces the effect of credit on economic dynamics, although the evidence for the hypothesis of complementarity between the banking system and the stock market is weak.

In a paper on 26 European Union countries during the period 1990-2016, through a panel-corrected standard error model, Asteriou and Spanos (2019) indicate that bank assets, stock market capitalization, and stock turnover index generate a positive effect on the GDP growth rate, contrary to the liquid liabilities indicator, which lacked statistical significance. They also show that trade openness is a driving factor of economic dynamics, while inflation and FDI had a negative impact. These results confirm the preponderant role of financial development in economic growth and bank capital adequacy in financial stability.

Based on an ARDL model with estimates for the case of China, over the period 2005:07-2015:11, Pan and Mishra (2018) find a mixed effect of the stock market on the industrial production index, negative with the stock market value of class A shares, listed in Shanghai, and positive with the series B

shares, listed in Shenzhen. In addition, they detect that the financial ruptures of 2007-2012 had a meaningful impact on both the goods and services market and the stock market. Additionally, they find unidirectional causality from telecommunications and public services (state monopolies) to output performance and a bidirectional relation of monetary (M1) and fiscal policy with output expansion and the financial system.

Using a dynamic panel, in a paper for 116 countries over the period 1991-2014, Ruíz (2018) studies the relevance of institutional investors (pension fund, insurance company assets and mutual funds) in the consolidation of the financial system and the effects of the latter on economic performance. His results show that providing credit to the private sector harms the growth rate of GDP per capita if the participation of institutional investors in the financial market is below the average threshold; in contrast, if the size of institutional funds is larger than the average threshold, the impact is positive.

The empirical estimates, based on static and dynamic panel estimators, of Aali-Bujari et al. (2017), in a study of Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela) during the period 1994-2012, suggest that the consolidation of both stock market capitalization and domestic credit generates a positive impact on the economic growth rate, although this effect is more significant with the increase in stock market liquidity; they also warn that the widening of interest rate spreads causes a contraction of GDP per capita.

Durusu-Ciftci et al. (2017), in their regressions based on a sample of 40 countries over 1989-2011, find that the development of financial markets is a determinant of GDP per capita dynamics. Nevertheless, at the country level, the evidence is mixed. For Mexico, the results do not show a statistically meaningful impact, in contrast to the evidence for Brazil and Colombia, which suggests a positive effect of both private credit and equity on economic growth.

In a paper on Bhutan, India, Malaysia, Pakistan, and Sri Lanka over the period 1980-2013, Murari (2017), using a dynamic panel, finds that an increase in total credit, stock market capitalization, and FDI promotes GDP expansion; nonetheless, the evidence is ambiguous on the effect that credit extended to the private sector exerts on economic activity. Consequently, he concludes, those countries with stronger financial institutions tend to grow faster.

The findings of Prochniak and Wasiak (2017) in a study of 28 European Union and 34 OECD countries in the period 1993-2013 confirm that changes in credit, stock market capitalization and stock turnover rate generate a positive effect on the dynamics of GDP per capita, while an increase in non-performing loans and bank capital induces a contraction of output per person, which confirms (they claim) the financial system as an essential source of economic growth.

In a paper on Mexico in the period 1990-2013, López and Basilio (2016) observe a unidirectional causal relation of GDP per capita growth to financial development, which rules out the

hypothesis that the development of the financial system promotes economic growth, given the increasing provision of credit to households, and, therefore, the rationing of credit to the production sector. Similarly, Cermeño et al. (2016) find unidirectional causality from financial development to the GDP growth rate for the United States, while estimates for Mexico show that GDP variations determine the financial system's evolution.

In another study for Mexico in the period 1993-2011, Castillo-Ponce et al. (2015) found, in general terms, that the GDP growth rate maintains a long-term co-movement with the development of the stock market (stock market price index, the level of stock market operations, and the stock market capitalization value). These results conclude that sound financial markets provide greater capital liquidity and promote economic growth.

Also, using data from Mexico during the period 2000-2010, Zavaleta and Martínez (2015) show, on the one hand, that an increase in the index of prices and quotations of the Mexican stock market generates a positive impact on the Index of Global Economic Activity (IGAE) and, on the other hand, a unidirectional causal relation from the stock market to the IGAE. In addition, they state that the Mexican stock market constitutes a significant source of financing for the growth and development of production.

In a study of Argentina, Colombia, Mexico, and Peru during the period 1986-2009, Ruíz and Rosales (2014) find, using a dynamic panel, that the evolution of the financial system (activity, size, and efficiency) directly impacts economic activity. Nevertheless, the effect of bank consolidation[4] on the expansion of output lacked statistical significance; in contrast, their results show that the increase in bank profitability and performance constitutes a driver of financial development, indirectly boosting GDP per capita.

The results of Bittencourt (2012), in a paper on Latin America (Argentina, Bolivia, Brazil, and Peru) during the period 1980-2007, confirm the speculation that the development of the financial system (stock market capital, size, and banking activity), as well as the increase in the investment rate, promote the growth of GDP per capita, while an increase in government spending contracts output. According to this paper, good macroeconomic and institutional performance (e.g., central bank autonomy and sound public accounts) are necessary for strengthening this link.

Similarly, Terceño and Guercio (2011), in another study on Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela) between 1990-2007, find a positive effect of the financial system on production -with bank assets as the most significant channel-, although the importance of capital markets in Argentina, Chile, Peru, and Mexico has increased significantly. With these data, the authors

[4]To measure the expansion of the banking system, the following indicators are used: bank concentration, net interest margin, return on bank assets (ROA) and return on invested bank capital (ROE), and bank income-cost ratio.

conclude that the banking sector represents a central element in the financing of economic activity in Latin America.

In their regressions for Mexico during 1995-2010, Cruz and Alcántara (2011) find -at the aggregate level- a positive effect of total (and consumer) credit on the Index of Overall Economic Activity (IGAE), while at the sectoral level, the association is significant only between the IGAE of the tertiary sector and the financing granted to it. At the same time, they find unidirectional causality from private credit provided to the service sector to economic performance and bidirectional causality between consumer credit and the IGAE. Despite these results, they point out that the orientation of the banking system toward household consumption constitutes a restrictive condition for the development of innovation and industrial competitiveness.

To summarize, many empirical studies partially examine the different channels through which financial development impacts the evolution of output. This condition could subject the results to over/underestimation biases, as well as the omission of relevant variables (e.g., institutional quality, international trade, or FDI), and thus skew the proper interpretation of the empirical evidence; consequently, the empirical analysis should focus on the simultaneous analysis of the consolidation of the stock market as well as the banking system.

Latin America: Macroeconomic and financial trends

The persistent macroeconomic imbalances[5] accumulated during the operation of the MIS in Latin America provoked (throughout the 1980s and early 1990s) an intense debate on the efficiency and continuity of this critical strategy, despite the remarkable expansion of GDP and per capita output that the region experienced in those years (their average annual expansion rate during 1960-1980 was 5.8% and 3.1%, respectively). This debate led to the establishment of a new development strategy based on trade and financial openness, aimed at reducing the volatility of relative prices, reducing economic and financial vulnerability to external shocks, and increasing technology transfer, developing the financial system with the orientation of increasing financial instruments, strengthening financial and monetary cooperation, expanding the savings rate, credit, and capital flow, stabilizing the interest rate and regulating organizational and corporate functioning; promoting productive reconversion (based on increasing competitiveness and sectoral productivity), and ensuring a sustained increase in added value (Landa & Arriaga, 2017; OECD, 1998).

[5] Large fiscal and trade deficit, exponential increase in debt, systematic exchange rate, and inflationary pressures.

Several reforms to the economic system were implemented to promote the open economy model in Latin America, which were aimed at: (i) eliminating effective trade protection through the dismantling of tariff brackets and average and maximum tariffs, eliminating import permits/licenses, incorporating anti-dumping measures, and establishing countervailing and customs duties; (ii) broadening taxation schemes and restructuring government spending, as well as an intense process of privatization of public companies; (iii) disincorporating and eliminating restrictions on foreign participation; iv) standardizing and regulating the provisions of the guarantee, savings, capitalization, and insolvency regimes; v) eliminating interest rate controls; vi) making the exchange rate regime more flexible, synchronized with capital movements, and granting autonomy to the monetary authority; vii) adjusting (reformulating) the foreign direct investment law; and viii) adapting the labor market and pension system legislation. It is surmised that the symbiosis of these elements would boost output and economic development in the long term.

The operation of the open economy model (OEM) in Latin America has generated heterogeneous results. The characteristic feature of this stage has been the development of output, which continues to expand slowly, in addition to a significant contraction in productivity and the stagnation of both investment and local technological activity (see Table 1). A relevant contrast is the sustained expansion of economic activity in Southeast Asia, where average annual growth between 1990 and 2018 in China, Indonesia, or Singapore reached 9.7%, 4.8%, and 5.7%, respectively.

On the other hand, economic liberalization has enabled Latin American countries to increase exports and FDI inflows substantially. However, it has also led to rapid growth in imports, particularly of intermediate and capital goods, due to the high content of foreign value added in export production, a situation that has created significant pressure on the trade balance, essentially associated with the systematic imbalance of the external account of the manufacturing sector, with the compensating effect of the agricultural and mining-extractive surplus being insufficient for some countries.

Specialization in primary products, as well as in industries with low added value (intermediate stages of global value chains), helps explain the vulnerability of the dynamic gains associated with trade and FDI, among other aspects, because product differentiation is not the engine of competitiveness to the extent that the corporate strategies of transnational companies (TNCs) are focused on the exploitation of natural resources or the establishment of export platforms.

Table 1
Economic activity, external sector and technological activity

Variable	Argentina			Brazil			Chile			Colombia			Mexico		
	1990 - 2000	2000 - 2010	2010 - 2017	1990 - 2000	2000 - 2010	2010 - 2017	1990 - 2000	2000 - 2010	2010 - 2017	1990 - 2000	2000 - 2010	2010 - 2017	1990 - 2000	2000 - 2010	2010 - 2017
GDP [/1]	4.1	3.4	1.2	2.6	3.7	0.4	6.3	4.2	3.2	2.7	4.0	3.9	3.4	1.5	2.8
GDP per capita[/1]	2.8	2.3	0.2	1.0	2.5	-0.4	4.8	3.1	2.3	1.0	2.7	2.9	1.6	0.0	1.4
PTF[/1]	1.4	0.9	-0.9	-0.5	0.1	-2.1	1.8	-1.5	-0.2	-1.2	0.3	0.3	0.1	-1.7	0.2
FBC[/1]	17.6	16.3	15.9	19.2	18.2	19.0	24.5	21.6	23.3	20.7	19.1	21.9	19.7	21.1	22.1
Export[/1]	6.6	5.0	-1.2	7.3	6.3	2.9	9.2	4.2	0.9	5.9	4.0	2.9	8.7	3.5	5.4
Import[/1]	18.3	4.8	4.5	10.9	8.0	-0.9	10.7	9.1	2.6	8.3	8.3	5.7	11.9	2.9	4.9
Trade Balance[/1]	-0.7	5.6	0.3	-0.7	0.7	-1.0	0.8	6.7	1.6	-2.6	-2.9	-3.6	-1.6	-1.7	-1.5
R&D spending[/2]	0.4	0.5	0.6	1.0	1.0	1.2	-	0.3	0.4	0.2	0.2	0.3	0.3	0.4	0.5
Patents[/3]	7	11	9	21	67	65	1	7	11	2	3	4	9	17	22
Staff in R&D[/4]	704	856	1185	421	537	799	-	326	400	81	140	166	215	322	287

1/ Average annual growth rate; 2/ Indicator as a proportion of GDP; 3/ Number of triadic patents; 4/ Total R&D personnel per 1000 employees with figures up to 2016.
Source: created by the authors with data from the World Bank, OECD and IMF

Indeed, price stability, debt containment, and fiscal consolidation represent the symbolic result of the OEM, see Table (2). With the implementation of the inflation targeting policy, within the framework of the new macroeconomic consensus (NCM), not only did the interest rate become the mechanism for adjusting inflation differentials, but it also required the adoption of a structural balance fiscal policy and, therefore, controlled management of the external and domestic liabilities of the countries in Latin America, which in symbiosis have made it possible to stop the systematic contraction of purchasing power and the vulnerability of public finances.

Regarding financial intermediation and market capitalization, the results generally are dissimilar to the values expected from the financial deregulation carried out in Latin America. On the one hand, the conditions of zero growth in the savings rate of significant thresholds and the reconversion of the structure of credit provided by commercial banks, oriented by the short-term profits that household and public sector financing provides, seem to impose significant credit restrictions to stimulate the degree of liquidity of the companies. On the other hand, although the value of stock market capitalization has risen visibly in Latin America over the last three decades, the persistent concentration in a small group of large companies and low stock turnover reduce the dynamic gains associated with stock market consolidation. Undoubtedly, the evolution of the stock market system is significant since its consolidation not only reflects the degree of strength of the financing, investment, and hedging operations of the production sector but also constitutes a reference for the capital and exchange markets since it provides relevant information on the profitability of the financial system to the process of formation and adjustment of the expectations of economic agents.

Table 2
Credit, debt, and equity markets

Variable	Argentina			Brazil			Chile			Colombia			Mexico		
	1990-2000	2000-2010	2010-2017	1990-2000	2000-2010	2010-2017	1990-2000	2000-2010	2010-2017	1990-2000	2000-2010	2010-2017	1990-2000	2000-2010	2010-2017
Inflation /1	4.5	9.5	20.1	7.5	6.6	6.5	9.4	3.1	3.3	20.0	5.6	4.0	18.3	4.7	3.8
Tax balance/2	-2.2	-0.5	-4.2	-5.3	-3.3	-5.4	1.2	1.7	-0.9	-1.8	-2.0	-2.2	-2.3	-2.2	-3.4
Total debt/2	33.1	77.1	46.4	28.2	27.6	22.3	20.2	9.2	15.1	34.5	28.5	30.0	32.2	20.5	32.2
Interest rate	14.5	11.8	18.1	29.9	15.7	10.8	14.6	4.5	4.0	35.9	10.8	6.7	22.5	8.0	4.2
Internal saving/2	15.4	18.1	15.5	15.7	17.1	16.5	22.4	22.8	22.0	17.0	16.0	17.4	21.0	21.9	22.4
Exchange rate/1	7.4	14.6	23.0	14.8	-0.4	8.9	5.9	-0.6	3.5	15.3	-0.9	6.5	12.9	2.9	5.9
Market capitalization/2	13.1	17.3	9.6	16.6	48.8	44.9	75.9	98.9	102.2	12.3	29.2	49.9	24.1	24.6	36.6
Traded shares/2	11.3	1.8	0.5	10.3	22.7	30.5	6.3	13.6	15.0	1.6	4.4	6.0	8.3	6.6	9.6
Turnover rate	85.1	10.0	6.0	90.6	47.2	71.2	8.4	14.4	14.3	9.2	12.5	12.1	38.7	28.8	27.5
International reserves/1	16.1	4.8	-0.7	12.4	21.7	2.1	7.3	4.1	3.2	4.6	9.7	6.0	11.4	10.6	3.4
FDI/1	16.6	-1.3	-1.0	39.1	7.5	-5.6	19.6	9.5	-12.2	14.8	7.9	10.5	18.9	1.9	-0.4
Internal credit/2	29.0	35.3	33.5	86.0	80.2	102.8	60.9	88.0	116.9	37.1	48.1	64.0	34.5	34.0	49.2
Government/3	51.9	71.7	72.9	53.1	57.1	49.6	-	10.7	11.4	26.3	44.7	40.8	39.8	44.9	47.0
Households/3	8.3	4.5	8.3	12.9	12.8	19.4	-	24.7	26.7	21.1	16.3	23.9	16.6	22.6	22.0
Companies/3	40.0	23.8	18.8	33.6	29.9	31.0	-	64.6	61.9	52.6	39.0	35.3	43.5	32.6	31.0

1/ Average annual growth rate; 2/ Indicator as a proportion of GDP; 3/ As a proportion of total domestic credit.
Source: created by the authors with data from the World Bank, OECD, and IMF

Similarly, reforms to foreign ownership controls and stock market hedging instruments allowed Latin American economies to substantially increase investment inflows (direct and portfolio) and the systematic accumulation of net foreign assets, which in macroeconomic terms, by establishing profitability expectations, improved country risk projections, increased liquidity, and reduced volatility in the exchange and capital markets; nevertheless, this accumulation of international reserves could, outside the optimal stock, create an extension of financial costs and financial asset prices, in addition to potential exchange rate losses (Rozo & Maldonado, 2018; Blancas, 2015).

It should be noted that the operation of the single target monetary policy would require implementing a free-floating exchange rate system, in line with the fundamentals of the NCM, to mitigate the effects of external shocks and contribute to the profitability/stability of the financial system. Certainly, these transformations have succeeded in reducing exchange rate volatility in Latin American economies. Nonetheless, the exchange rate continues to depreciate (overvalue) in the long term, see Table 2.

Empirical analysis: The Latin American case

Econometric specification

Empirically, an autoregressive panel model with distributed lags (ARDL) estimated by the Pooled Mean Group (PMG) method is assumed so that the stochastic specification of Equation (9) is defined as follows:

$$ln\Gamma_{it} = \sum_{j=1}^{p} \phi_{ij} ln\Gamma_{it-\mathrm{j}} + \sum_{j=0}^{q} \theta'_{\mathrm{ij}} H_{it-j} + \mu_i + \epsilon_{it} \tag{10}$$

In the expression (10), Γ represents gross domestic product per capita, H a vector of kx1 explanatory variables (credit to the private sector, cred; stock market capitalization, capbur; financial activity, actfin; financial size, tamfin; financial efficiency, effin; local technological activity, caphum; trade intensity, apcom; foreign direct investment, ied; capital formation, gfcf), while ϕ_{ij} and θ'_{ij} are two-column vectors containing the coefficients associated with the lagged values of the dependent and explanatory variable, respectively, with μ_{i} and ϵ_{it} being the group-specific effects and the model error term.

Certainly, if the system's variables are stationary in differences and their linear combination produces stationary errors at I(0) levels, a cointegration relation will exist between them in the long run. Therefore, Equation (10) should incorporate an error correction equation, whose objective will be to introduce the short-term dynamics of the variables, influenced by the deviations from the equilibrium path, to the long-term behavior.

Therefore, specification (10) should be rewritten as an error correction equation, as follows:

$$\Delta ln\Gamma_{it} = \alpha_i ln\Gamma_{it-1} + \beta_i' H_{it} + \sum_{j=1}^{p-1} \phi_{ij}^{*} \Delta ln\Gamma_{it-\mathrm{j}} + \sum_{j=0}^{q-1} \theta_{ij}^{'*} \Delta H_{it-j} + \mu_{it} + \epsilon_{it} \tag{11}$$

Where Γ represents gross domestic product per capita, H constitutes a column vector of kx1 independent variables (credit to the private sector, cred; stock market capitalization, capbur; financial activity, actfin; financial size, tamfin; financial efficiency, effin; local technological activity, caphum; trade intensity, acpcom; foreign direct investment, ied; capital formation, gfcf), α_{i} symbolizes the speed coefficient of adjustment toward equilibrium, while β'_{i} groups the long-run parameters and the vectors ϕ_{ij}

and θ'_{ij} the short-run estimators and μ_{it} and ϵ_{it} capture the fixed effects and the error term, respectively; the indices i and t compute the cross-sectional unit (country) and time.

The coefficients associated with the financial structure[6] (credit to the private sector, cred; stock market capitalization, capbur; financial activity, actfin; financial size, tamfin; financial efficiency, effin) are expected to be positive and statistically significant, which would indicate that the greater dynamism of the banking system and the capital market generates higher per capita GDP growth rates, to the extent that it reduces the financing restrictions that impede industrial and company expansion. On the other hand, it is assumed that international trade and FDI will have a direct impact, a condition that would indicate that greater trade intensity with industrialized countries and the presence of transnational companies will lead to productivity gains and, therefore, an increase in the output growth rate. Similarly, a positive relation between human capital accumulation —a proxy for the size of innovation— and the dynamics of GDP per capita is envisaged.

An advantage of the PMG estimator compared to other methodologies in dynamic panel models is that it allows the specific heterogeneity of each economic subsector to be considered, which means that the short-run parameters, as well as the variance of the errors and the speed of adjustment are heterogeneous among the groups. At the same time, the long-run slope coefficients are assumed to be homogeneous among the cross-sectional observation units. Moreover, the estimator can produce efficient and consistent parameters even in small samples, controlling for autocorrelation and heteroscedasticity (Blackburne & Frank, 2007; Pesaran et al., 2001)[7].

Econometric results

The sample collects data from Argentina, Brazil, Chile, Colombia, and Mexico in the period 1990-2017 on domestic credit provided by banks to the private sector, stock market capitalization, total value of traded shares on the stock exchange, stock turnover index, administrative costs and total value of bank assets, foreign direct investment, human capital, exports, imports, and Gross Domestic Product per capita. The information is to be found in the statistical repositories of the Organization for Economic Cooperation and Development (OECD), the Federal Reserve Bank, and the Penn World Table.

[6] The financial activity indicator is the ratio of the total value of traded shares and private credit; financial size, on the other hand, comprises the ratio of stock market capitalization and private credit; finally, the financial efficiency variable is the ratio of the total value of traded shares and the bank administrative cost to total assets.

[7] In contrast to the generalized method of moments (GMM), which in the case of samples with small N and large T produces notable biases, since as the number of endogenous variables increases the number of instruments increases significantly, particularly when the length of T increases, creating an excessive burden on the estimation (over-identification of the model) and loss of robustness of the variance-covariance matrix.

The empirical contrast begins with analyzing the stationarity properties of the variables included in the system, through the unit root tests for Im, Pesaran, and Shin panel, Fisher Augmented Dickey-Fuller, and Fisher Phillips-Perron. The results suggest that the variables are integrated I(1) in levels and stationary stochastic processes and I(0) in first differences. Once the stochastic properties were determined, each specification's potential long-run equilibrium relations were identified; the Kao and Pedroni cointegration algorithm was used (see appendix).

In general, the empirical results suggest a positive effect of the consolidation of the financial system on economic performance, see Table (3). First, the estimates confirm a positive relation between credit to the private sector and the economic growth rate, implying that a 1% increase in the level of credit generates a mean GDP expansion of 0.03%. This result confirms the hypothesis that economies with more efficient banks will be able to experience better economic performance; nevertheless, the size of this impact is small. One interpretation of this small effect lies in the trend and characteristics of lending activity in Latin America, which generally has been (re)oriented to short-term financing of sectors with low sensitivity to interest rate variations.

Similarly, estimates show that an increase of one percentage point in stock market capitalization causes a mean expansion of 0.03% in GDP, which suggests that the increase in liquidity in the stock market tends to reduce the explicit frictions faced by the industrial sector in terms of the diversification of financial instruments, information skewness, or the cost of intermediation. Nonetheless, leverage, through the capital market, is focused on large-scale companies which, in conjunction with the credit sector, impose systematic restrictions on the production system of Latin American economies.

Table 3
Economic growth and financial system
(Latin America, selected countries)

Variable	Model 1 Δlny	Model 2 Δlny	Model 3 Δlny	Model 4 Δlny
Constant	1.2869 [0.000]*	0.9828 [0.000]*	0.8846 [0.000]*	0.8019 [0.006]*
lncred	0.0316 [0.001]*	-	-	-
lncapbur	0.0311 [0.000]*	-	-	-
lnactfin	-	0.0213 [0.000]*	-	-
lntamfin	-	-	0.0039 [0.081]**	-
lneffin	-	-	-	-0.0041 [0.194]
lnied	-0.0080 [0.006]*	-0.0075 [0.011]*	-0.0071 [0.086]**	0.0072 [0.100]

lnapcom	0.0332	0.0448	0.0517	0.0316
	[0.005]*	[0.000]*	[0.000]*	[0.000]*
lncaphum	0.0828	0.1554	0.2101	0.1605
	[0.057]**	[0.000]*	[0.000]*	[0.082]**
lnfbcf	0.3409	0.4060	0.4042	0.3837
	[0.000]*	[0.000]*	[0.000]*	[0.000]*
α	-0.5651	-0.5522	-0.5599	-0.4052
	[0.000]*	[0.000]*	[0.000]*	[0.007]*

Estimation based on an autoregressive model with Distributed Lagging cred: domestic credit provided by banks to the private sector; capbur: market capitalization; actfin: financial activity index; tamfin: financial size indicator; effin: financial efficiency; fdi: foreign direct investment; apcom: economic openness; gfcf: gross fixed capital formation. All variables are expressed in natural logarithm
P-value in square brackets * relevant at 5% ** relevant at 10%
Source: created by the authors

At the same time, the statistical direction of the parameters associated with financial market activity and size confirms the hypothesis about the propulsive effect of stock market development on output expansion. Although this result shows that the consolidation of the capital market is a major catalyst for companies' investment decisions in real assets, a method of diversifying for risk (domestic and international), an anchor for monetary policy (through open market operations), and a basis for liquidity -particularly when the private sector faces significant credit restrictions- it is also true that the magnitude of the parameters shows a weak impact on economic performance.

On the other hand, the regressions suggest that an increase in trade intensity (apcom) induces an increase in the growth rate of output per capita; this result strengthens the conjecture that international trade represents an essential source of the growth rate of output by establishing itself as an effective channel of technological diffusion (Aghion & Howitt, 2009; Grossman & Helpman, 1991). Surprisingly, the estimates show a negative relation between FDI and economic performance. One explanation for this dissimilar link lies in the fact that the emergence of productivity gains associated with the presence of transnational companies (TNCs) is not an automatic process since it depends, on the one hand, on the nature of these inflows (exploitation of natural resources, export platforms, the conquest of local markets, or taking advantage of local technological capacity) and, on the other hand, on the transition time of the TNC to its equilibrium size. Finally, the estimators confirm an effective correlation of capital formation (gfcf) and human capital (caphum) with the development of economic activity in Latin America.

Conclusions

This paper has evaluated the financial system's contribution to the dynamics of output in Latin America during the period 1990-2017 through the analysis of the dynamic effects linked to financial structure and

efficiency. Having reviewed the theoretical foundations and the variety of empirical results in the literature, the hypothesis testing of this research was based on an extension of the credit-constrained growth model of Aghion and Howitt (2009), which, in addition to the implications of the financial sector and local technological capacity, incorporated the evolution of international trade and other control variables (FDI and capital formation).

The empirical evidence, first, confirms a direct relation between financial expansion and GDP expansion. Second, it shows that the impact of this link is reduced. The reason for this result lies in the conversion of the structure of bank credit, directed toward the financing of households and government instruments, as well as the significant concentration of stock market liquidity in a reduced group of companies and the low rotation of shares in the Latin American stock markets. Third, the regressions corroborated, in the sense of the axioms of the endogenous theory, the role of international trade in the expansion of output, through the phenomenon of technological externalities.

Given the above, institutional strengthening (among others: regulatory quality, government effectiveness, rule of law, or political stability) is an important condition for strengthening the network of incentives that, on the one hand, enable the transfer of liquidity/financing to the production sector and, thus, the consolidation of financial inclusion and, on the other hand, contribute to the attraction of long-term capital funds to the stock market.

Future research must include more robust indicators on profitability, performance, and financial structure, including institutional investors, and differentiate the analysis with different levels of disaggregation, such as comparative studies of economic blocs and by industry.

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Annex

Table A1
Unit root test for panel

Variable	Im, Pasaran and Shin [/1]		Fisher-ADF [/2]		Fisher-Phillips-Perron		# lags	I(d)
	No trend	trend	No trend	trend	No trend	trend		
				Levels				
lnpibpc	-1.0155 [0.1549]	-0.1680 [0.4333]	4.7837 [0.9052]	6.5182 [0.7700]	10.7053 [0.3809]	7.6018 [0.6677]	2	I(1)
lncred	-2.2825 [0.0112]	-0.9726 [0.1654]	2.3163 [0.9933]	2.2091 [0.9945]	3.0983 [0.9790]	2.3850 [0.9924]	2	I(1)
lncapbur	-2.6117 [0.0045]	-0.8611 [0.1946]	13.6753 [0.1883]	17.5025 [0.0640]	44.8492 [0.0000]	49.8544 [0.0000]	3	I(1)
lnactfin	-1.7402 [0.0409]	0.4798 [0.6843]	6.6068 [0.7620]	6.5838 [0.7641]	17.2036 [0.0700]	15.4289 [0.1172]	2	I(1)
lntamfin	-2.1050 [0.0176]	-0.5623 [0.2869]	5.1042 [0.8841]	10.6002 [0.3895]	43.1276 [0.0000]	46.2890 [0.0000]	3	I(1)
lneffin	-0.9891 [0.1613]	1.1399 [0.8728]	7.1099 [0.7150]	10.3266 [0.4123]	5.3372 [0.8675]	3.8851 [0.9524]	1	I(1)
lnied	-1.8966 [0.0289]	-3.6386 [0.0001]	18.5305 [0.0466]	11.7361 [0.3031]	24.6785 [0.0060]	16.6833 [0.0817]	1	I(1)
lnapcom	-1.7980 [0.0361]	-0.6299 [0.2644]	10.9596 [0.3607]	11.3509 [0.3308]	12.9290 [0.2277]	8.8724 [0.5443]	1	I(1)
lncaphum	0.6988 [0.7577]	-3.6296 [0.0001]	5.9145 [0.8224]	26.5355 [0.0031]	1.7289 [0.9980]	73.0388 [0.0000]	3	I(1)
lnfbkf	-3.2599 [0.0006]	-1.7470 [0.0403]	5.3072 [0.8697]	15.1666 [0.1261]	7.5595 [0.6718]	13.5144 [0.1963]	2	I(1)
				First differences				
d.lnpibpc	-6.0111	-5.6005	24.2020	27.1307	66.9749	51.8792	2	I(0)

	[0.0000]	[0.0000]	[0.0071]	[0.0025]	[0.0000]	[0.0000]		
d.lncred	-4.1137	-2.5574	18.6226	31.4514	64.6630	51.4197	3	I(0)
	[0.0000]	[0.0053]	[0.0453]	[0.0005]	[0.0000]	[0.0000]		
d.lncapbur	-5.6602	-4.9064	47.0789	33.5177	-	-	1	I(0)
	[0.0000]	[0.0000]	[0.0000]	[0.0002]				
d.lnactfin	-4.1733	-2.2749	61.5390	41.1047	41.3713	26.6009	1	I(0)
	[0.0000]	[0.0115]	[0.0000]	[0.0000]	[0.0000]	[0.0030]		
d.lntamfin	-4.5957	-5.2242	34.3491	21.3032	-	-	3	I(0)
	[0.0000]	[0.0000]	[0.0002]	[0.0191]				
d.lneffin	-3.3618	-5.1794	22.5220	11.5140	45.2101	32.8376	2	I(0)
	[0.0004]	[0.0000]	[0.0127]	[0.3189]	[0.0000]	[0.0003]		
d.lnied	-8.5559	-7.4503	27.9124	23.6632	168.2036	162.5417	2	I(0)
	[0.0000]	[0.0000]	[0.0019]	[0.0085]	[0.0000]	[0.0000]		
d.lnapcom	-8.8920	-8.2079	60.6157	47.3998	116.9968	99.6853	1	I(0)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]		
d.lncaphum	-12.7007	-11.3917	78.8290	69.1971	339.2279	306.4886	3	I(0)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]		
d.lnfbkf	-8.9042	-7.1380	47.9761	33.0926	91.4200	73.2451	1	I(0)
	[0.0000]	[0.0000]	[0.0000]	[0.0003]	[0.0000]	[0.0000]		

1/ Ho: all panels contain a unit root, and Ha: some panels are stationary. The table reports the value of the W_t-bar statistic. 2/ Ho: all panels contain a unit root, and Ha: at least one panel is stationary. In square brackets, the p-value. cred: domestic credit provided by banks to the private sector; capbur: market capitalization; actfin: financial activity index; tamfin: financial size indicator; effin: financial efficiency; fdi: foreign direct investment; apcom: economic openness; gfcf: gross fixed capital formation. All variables are expressed in a natural logarithm, while (d.) represents the first difference operator.
Source: created by the authors

Table A2
Cointegration test

	Pedroni					Kao			
Statistic	Model 1	Model 2	Model 3	Model 4	Statistic	Model 1	Model 2	Model 3	Model 4
MPP	2.0524	2.6010	2.6191	3.2113	MDF	-2.2905	-2.6732	-2.7793	-2.3329
	[0.0201]	[0.0046]	[0.0044]	[0.0007]		[0.0110]	[0.0038]	[0.0027]	[0.0098]
PP	-1.6738	0.5260	0.9302	0.0983	DF	-1.5641	-1.8382	-1.8939	-2.2855
	[0.0471]	[0.2995]	[0.1761]	[0.4608]		[0.0589]	[0.0330]	[0.0291]	[0.0111]
ADF	1.5107	2.6843	2.7447	1.3314	ADF	-1.5040	-1.9807	-2.0979	-0.2243
	[0.0654]	[0.0036]	[0.0030]	[0.0915]		[0.0663]	[0.0238]	[0.0180]	[0.4113]
					UMDF	-2.0232	-2.3181	-2.4843	-2.4329
						[0.0215]	[0.0102]	[0.0065]	[0.0075]
					UDF	-1.4682	-1.7232	-1.8006	-2.3189
						[0.0710]	[0.0424]	[0.0359]	[0.0102]

The test is subject to the following hypothesis: Ho: no cointegration and Ha: all panels co-integrate. The table reports the p-value in square brackets.
MMP: Modified Phillips-Perron; PP: Phillips-Perron; ADF: Augmented Dickey-Fuller; MDF: Modified Dickey-Fuller; DF: Dickey-Fuller; UMDF: Unadjusted MDF; UDF: Unadjusted DF.
Source: created by the authors