

## THE CAUSALITY LINK BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN MEXICO

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### SUMMARY

To assess the nexus between financial development and economic growth in Mexico, we used an ARDL model over the period of 1978-2019. Domestic credit to the private sector is used as a proxy for the banking sector development; value of shares traded is used as a proxy for the financial market development. In the long-run, we find that the banking sector development has a positive impact on growth; an increase by 1% in the banking sector development causes an improvement of 0.098% in growth. Moreover, we find a negative relationship between the stock market development and growth; where an increase by 1% in the stock market development causes a decrease by 0.046% in growth. Findings from this paper suggest that Mexican authorities should accelerate in priority the financial reforms of the stock market, and reinforce the regulatory environment in order to stimulate economic growth in the long-run.

### KEY WORDS

Financial development; Economic growth; Autoregressive Distributed Lag model; Mexico.

**JEL CLASSIFICATION:** C32, G21, E5, F43

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## العلاقة السببية بين التنمية المالية والنمو الاقتصادي في المكسيك

### ملخص

لتقييم العلاقة بين التنمية المالية والنمو الاقتصادي في المكسيك، اعتمدنا نموذج ARDL خلال الفترة 1978-2019. تم استخدام الائتمان المحلي الموجه للقطاع الخاص كمؤشر لتنمية القطاع المصرفي؛ كما تم استخدام قيمة الأسهم المتداولة كمؤشر لتنمية السوق المالي. على المدى الطويل، نجد أن لتنمية القطاع المصرفي تأثيراً إيجابياً على النمو الاقتصادي، حيث أن الارتفاع بنسبة 1% في تنمية القطاع المصرفي يؤدي إلى تحسن النمو بنسبة 0.098%. علاوة على ذلك، نجد علاقة سلبية بين تنمية السوق المالي والنمو الاقتصادي. حيث تؤدي الزيادة بنسبة 1% في تنمية السوق المالي إلى انخفاض النمو الاقتصادي بنسبة 0.046%. تشير النتائج الواردة في هذه الورقة إلى أنه على السلطات المكسيكية التسريع في وتيرة الإصلاحات المالية للسوق المالي، وأن تعزز البيئة التنظيمية لأجل تحفيز النمو الاقتصادي على المدى الطويل.

### كلمات المفتاحية

التنمية المالية؛ النمو الاقتصادي؛ نموذج الانحدار الذاتي للإبطاء الموزع؛ المكسيك.

تصنيف جال: F43, E5, G21, C32

## **LE LIEN DE CAUSALITÉ ENTRE LE DÉVELOPPEMENT FINANCIER ET LA CROISSANCE ÉCONOMIQUE AU MEXIQUE**

### **RÉSUMÉ**

Pour évaluer le lien entre le développement financier et la croissance économique au Mexique, nous avons utilisé un modèle ARDL sur la période 1978-2019. Le crédit intérieur au secteur privé est utilisé comme indicateur du développement du secteur bancaire; la valeur des actions négociées est utilisée comme indicateur de développement du marché financier. Sur le long terme, nous constatons que le développement du secteur bancaire a un impact positif sur la croissance économique; une augmentation de 1% du développement du secteur bancaire entraîne une amélioration de 0,098% de la croissance. De plus, nous avons trouvé une relation négative entre le développement du marché financier et la croissance; où une augmentation de 1% du développement du marché financier entraîne une baisse de 0,046% de la croissance économique. Les résultats de cette étude suggèrent que les autorités mexicaines devraient accélérer en priorité les réformes financières du marché financier et renforcer l'environnement réglementaire afin de stimuler la croissance économique à long terme.

### **MOTS CLÉS**

Développement financier ; Croissance économique; Modèle autorégressif à retards échelonnés ; Mexique.

**JEL CLASSIFICATION** : C32, G21, E5, F43

## INTRODUCTION

Several studies have shown that the financial system has a positive effect on economic growth, as well as on the volume and effectiveness of investment. Both (McKinnon, 1973) and (Shaw, 1973) showed that government intervention and restrictions imposed by governments on the financial system reduce and create distortions in the process of financial development, which would limit economic growth. This negative impact on the economy is due to the ineffective distribution of resources.

Economists such as (Greenwood & Jovanovic, 1990); (King & Levine, 1993a) argue that government intervention in the banking system reduces the rate of growth of the economy. On the other hand, (Stiglitz, 1993) argues that financial market failures, such as information asymmetry and imperfect competition, could have negative effects on growth.

The literature on this topic can be categorized into three broad perspectives on the importance of the financial sector in economic growth. The first one considers the financial sector as a key component of growth (Schumpeter, 1911); (Goldsmith, 1969); (McKinnon, 1973); (King & Levine, 1993b) and (King & Levine, 1993a). There are also those who take a completely dissenting position since they view the financial sector as a relatively unimportant factor of growth (Lucas, 1988); (Robinson, 1979) and (Stern, 1989). The third opinion focuses on the potential negative impact of financial sector performance on growth (van Wijnbergen, 1983); (Arcand et al., 2015); (Cecchetti & Kharroubi, 2012); (Cournede & Denk, 2015); (Sahay et al., 2015) and (Svirydzenka, 2016). These studies, among others, confirm that beyond a certain threshold, financial development has a negative impact on economic growth. The inverted U-shaped relationship between finance and growth can be explained by several reasons. The first set of explanations has to do with the economic fluctuations and the increased likelihood of economic crashes (Charles P. Kindleberger, 1978). (Arcand et al., 2015) has shown that financial depth starts having a negative effect on output growth when credit to the private sector reaches 80 to 100% of GDP. (Beck et al., 2014) show that the

relationship between finance and growth could depend upon the manner in which financing is provided. The reason for the lack of monotony in the relationship between financial development and economic growth may be the increasing importance of the role played by financial derivatives and the emergence of the shadow banking system, whose institutions are not subject to the rules of caution that banks adhere to, such as the bank solvency ratio brought by the Basel committee on banking supervision. Accordingly, we believe that the relationship between financial development and growth is positive in the beginning, but after a certain threshold it becomes reversed.

The second set of reasons explaining the inverse relationship between finance and growth is based on the idea brought by (Tobin, 1984), which considers that a large financial sector would cause a brain drain from the productive sectors of the economy towards the financial sector. (Philippon & Reshef, 2013) find that the size of the financial sector is positively correlated with higher wages for workers in this sector, which exacerbates the phenomenon of brain drain. Thus, the original U-shaped relationship between finance and growth begins to take an inverse form as the size of the financial sector increases.

In parallel with these insights, a large number of empirical studies and surveys have been conducted. However, some of them found mixed evidence regarding the effects of financial development on economic growth (Ang, 2010); (Arestis et al., 2014) and (Valickova, Petra; Havranek, Tomas; Horváth, 2013). Contrary to what would be expected according to the MacKinnon-Shaw hypothesis, there are cases in which a positive relationship is not observed, while others do not even reveal a significant relationship (Xu, 2000).

Despite the great interest raised in the relationship between the development of the financial systems and growth, some questions are not entirely clear in the theoretical and empirical analysis of this important link. For example, it highlights the fact that it is not known precisely if liberalized stock markets are important to economic growth, and despite the advances shown by theoretical developments in this area, they do not in an indisputable way establish the causal direction between financial development and economic growth.

So far, there is no consensus that financial development determines economic growth or vice versa. More recently, a series of empirical works (Durusu-Ciftci et al., 2017); (Yang, 2019); (Hossin, 2020) ;(Jung & Cha, 2021) and (Ho et al., 2021) have attempted to establish a causal trend between financial development and economic growth. Some tend to assert a positive relationship between financial development and economic growth. In this paper, we deal with the issue of causality between financial development and economic growth using Mexico's time series data. Our primary goal is to determine whether there is a long-run relationship between economic growth and financial development in Mexico.

The reason for choosing the Mexico case study is its uniqueness. Mexico can be considered as a benchmark for developing countries that aim to reform their financial and trade sectors and enter the midst of financial globalization. Therefore, dealing with a group of countries (panel data or cross-section data) can neglect some of the economic, social and historical characteristics of this unique experience that was embodied in Mexico. Accordingly, a single country study was chosen.

As well as that, Mexico has experiences in dealing with currency crises such as the 1994 crisis. All these factors would assist developing countries in designing their economic and social policies, and dealing with the crises that they may face in the future. Another reason justifies choosing the study of the Mexican case is the lack of studies dealing with the relationship between financial development and economic growth in Mexico.

Section 1 provides a brief overview of the Mexican economy and discusses the key characteristics of its financial sector. Section 2 explains the methodology and the econometric model used in our study. Section 3 discusses the findings of the study. Finally, the conclusion section offers some policy implications.

## **1- OVERVIEW OF THE MEXICAN ECONOMY AND ITS FINANCIAL SECTOR**

Since the early 1980s, the authorities in Mexico have carried out a series of reforms aimed at achieving economic stability, as the economy was plagued by a deep crisis, which was exacerbated by difficulties in obtaining funding from international borrowers. In 1988, the Mexican government deepened changes in the internal development strategy of the economy in an effort to accelerate the structural reforms that had begun a few years earlier. In this way, it sought to highlight the importance of the export sector, restrict the dominant role of the public sector, and lay the foundations for the private sector to become the main engine of the economy (Solís, 1996).

Before starting these reforms, the Mexican government was the main player in the economy, as it had an active participation in the most important sectors of production of goods and even some services that were growing at a rapid rate. According to available statistics, this strong state participation in the main branches of economic activity was associated with high rates of growth in GDP, which lasted for several decades. Public spending has been the engine of economic and social growth (Tello, 2007). To cover the growing deficit associated with the expansion of public spending, the Mexican government has had to resort to excessive foreign debt. The main objective behind borrowing was to complete the financing that can be obtained from the local financial market, as it appeared that borrowing is available in an inexpensive and non-inflationary manner to finance the budget deficit (Aspe Armella, 1993).

The stagflation that the developed countries witnessed in the 1970s caused an increase in interest rates (rising borrowing costs for Mexico) and a drop in oil prices (a decline in global demand for oil). All this caused the Mexican government to have trouble paying off its debt services with the international financial community. The same thing happened with other relatively poor and indebted countries, as this situation was called the Third World debt crisis. For Mexico, the direct consequence of this crisis was the restriction of growth, as the new negotiated debts only paid off old debts, and the resources obtained were not directed towards productive activity. As a result, the

Mexican government undertook economic reform, transferring to the private sector the task of strengthening the economy, including financing productive activities through the new regulatory framework to liberalize and open the financial system.

At the macroeconomic level, and with a view to creating adequate means of financing for the productive activities of companies, the beginning of the 1990s was mainly marked by the liberalization of the Mexican financial system, in which the liberalization of the banking sector emerged between 1988 and 1991. The re-privatization of 18 banks between 1991 and 1992 led to the formation of new and powerful financial groups, with a high degree of concentration, as these new financial institutions controlled more than 50% of the assets in 1994 (Tinoco Zermeno et al., 2011).

The modernization of the financial structure was based on the internationalization of the financial system in the face of the impending globalization process. A new legal framework has been created that enables private Mexican financial intermediaries to conduct activities at the level of international financial markets. Huge foreign financial groups have also been allowed to operate in Mexico.

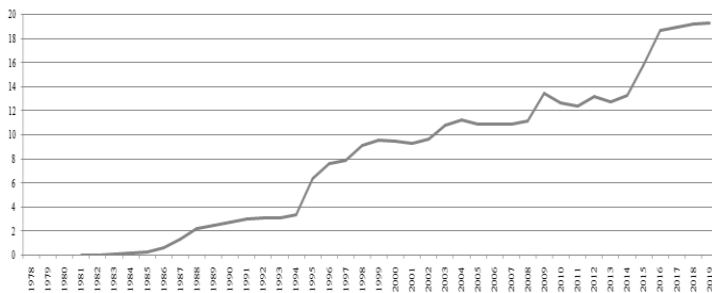
As for the process of reforming the Mexican economy, new legal frameworks were formed to regulate the functioning of the financial system, which aimed mainly at facilitating the work of liberalized markets away from government intervention, liberalizing the exchange rate, removing control over debit and credit interest rates and liberalizing capital flows with international financial markets.

In the early 1990s, the goal of economic stability appeared to have been achieved. However, the huge number of negative external and internal shocks at the beginning of the decade, which culminated with the economy entering into a financial crisis and a crisis in the balance of payments at the end of 1994, changed these optimistic expectations. Given the relatively accelerated depletion of international reserves since the beginning of the year 1994, the central bank was unable to maintain the parity of the exchange rate (see Figure 1), and therefore the Mexican authorities found themselves forced at the end of that



year to abandon the fixed exchange rate system and switch to a floating regime.

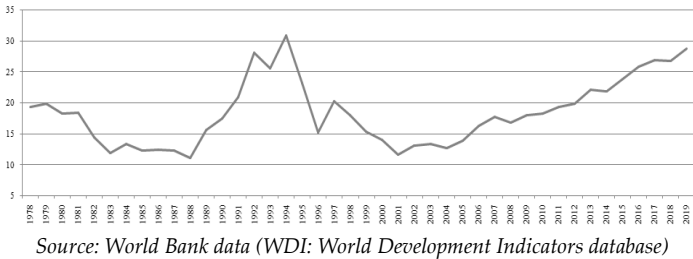
**Figure 1.** Nominal exchange rate of the Mexican peso against the US dollar (1 dollar per peso)



Source: World Bank data (WDI: World Development Indicators database)

In the wake of the crisis, a package of economic policies aimed at achieving macroeconomic stability was adopted, as loans were negotiated with the International Monetary Fund and the government of the United States of America to save the country. After recovering from the financial crisis that hit the country in the period 1994-1995, the Mexican government embarked on restructuring the banking system, bailing out debtors, which strengthened confidence in the economy again (Tinoco Zermeno et al., 2011). In addition, the authorities have put in place a new framework for strict supervision and preventive regulation, based on self-regulation, and a new pension system has been established based on the use of private funds to support domestic savings. Foreign investors have also been allowed to enter as shareholders in local commercial banks, as well as opening branches of banks (Citigroup, BBVA, and HSBC). The presence of these banks, together with a better regulatory framework, allowed the Mexican banking system to recover from the crisis of 1994-1995. This situation helped to revive the volume of bank credit again after the crisis, to approach in 2019 from those levels it was before the crisis (see Figure 2).

**Figure 2.** Domestic credit to private sector by banks (% of GDP)



Speaking of the Mexican stock market (Bolsa Mexicana de Valores: BMV). It is the second largest stock market in Latin America after the São Paulo Stock Exchange in Brazil. The creation of the Mexican financial market dates back to 1933. In the same year, the National Commission for Securities was created, later renamed the National Committee for Banking and Commission (Comisión Nacional Bancaria y de Valores: CNBV), which was set up to supervise the stock market. Now, monitoring is the main function of the CNBV; it monitors the formation and financial transactions carried out by financial groups, strengthen measures to ensure that financial institutions implement preventive control mechanisms and audit verifies compliance with legal and administrative requirements, streamlines the information requirements of the Mexican banking system, and investigates breaches of regulations.

Due to the great industrial and commercial growth in Mexico in the middle of the last century, which was thanks to the rise and creation of the maquiladoras<sup>2</sup> in northern Mexico, as well as the accumulation of capital and the continuous creation of new companies in that period, the Monterrey Stock Exchange was established, which grew to fully serve North Mexico, the number of listed companies has reached 100 (Vellinga, 1988). Soon after, companies in Guadalajara began to organize the creation of a new

<sup>2</sup> The maquiladoras are export processing zones (EPZ). This term refers to a duty-free factory in order to be able to produce assembled, transformed goods at the lowest costs by relying on imported components. Most of these goods are subsequently exported.

stock exchange, and in 1960 the Western Stock Exchange was established to serve Mexico's west coast.

The poor performance on the two stock markets (Guadalajara and Monterrey), led the Mexican authorities in 1975 to enact a stock market law by which the two financial markets were merged into one market. A single entity was created which remains to this day the only stock exchange in Mexico under the name of Bolsa Mexicana de Valores (BMV). This action enhanced the size of transactions in the Mexican stock exchange (see Figure 3).

In 2001, Citigroup became the first foreign company to start trading in the BMV, which opened the door for many new companies to do the same, especially from Central and South America. In 2003, Mexican investors were allowed to acquire foreign securities via the BMV from within the country. In 2006, the Mexican stock market was opened to foreigners through the Mexican Derivatives Exchange (MexDer) system, allowing them to operate from anywhere in the world. In 2010, the BMV signed an alliance with the world's largest derivatives exchange, the Chicago Mercantile Exchange, making Mexican derivatives accessible to international investors.

**Figure 3.** Stocks traded, total value (% of GDP)



Source: World Bank data (WDI: World Development Indicators database)

In December 2014, the BMV announced its first trade as part of the Mercado Integrado Latinoamericano (MILA) created in 2009, which includes: Chile, Colombia, Mexico, and Peru. With the accession of Mexico to MILA, the market has now included 798 issuers of securities, making it the largest market by number of listed companies in Latin America, and the largest in terms of market capitalization according to the World Federation of Exchanges. This step comes

within the framework of the Mexican authorities' efforts to join regional and international economic blocs.

## **2- DATA AND METHODOLOGY**

### **2.1- The model description**

The economic literature interested in studying the relationship between finance and growth supported the idea of adopting per capita real GDP as a reliable measure of economic growth. Therefore, it was adopted in this paper as a measure of growth in Mexico. Financial operations involve the interaction of many activities and institutions and, therefore, cannot be easily monitored on a single scale. In fact, in this study, we used two financial development indicators: the first to measure the impact of the banking sector and the second to measure the impact of the financial market on economic growth in Mexico, separately.

Our measure of the development of financial intermediation is the volume of domestic credit directed to the private sector by banks. Credit to the private sector represents an appropriate measure of the development of the financial intermediation function associated with mobilizing savings and providing capital for investments, which provides opportunities for new companies, as it measures the issue of credit allocation, which is the most important function of the financial intermediaries.

Traditionally, financial market development has been measured either in terms of the market total value traded to GDP or by the stock turnover ratio. Volume ratio measures the total value of shares traded in a country's financial market divided by GDP. The ability to trade stocks is an indicator of the economy's performance. Thus, using a regression model (Thorsten Beck, 2001), we aim to reflect market activity through the number of transactions ratio, which has an important influence on economic growth.

We add to these two measures of financial development, an indicator that measures the degree of trade openness, which is the ratio of foreign trade to GDP, and the justification for adopting this variable comes from the commercial nature of the Mexican economy,

as it is an export-oriented economy. Mexico is an important trading power, measured by the size of its trade exchanges. We use log-linear specification for our empirical purpose. Log-linear specification provides efficient results as noted by (Farooq et al., 2013). The functional form of our empirical growth model is constructed as follows:

$$\ln(GDP)_t = \beta_0 +$$

Where  $\ln GDP$  is the natural log of real GDP per capita; and  $\ln BANK$  expresses the natural log of domestic credit to private sector by banks divided by GDP;  $\ln MARKET$  is the natural log of shares traded divided by GDP; the natural log of trade openness is indicated by  $\ln TRADE$ , which is measured by calculating the natural log of the sum of exports and imports of goods and services divided by GDP; and  $\varepsilon_t$  is the error term. Table 1 represents a summary of the data used in the model.

The coefficients of the model measure the sensitivity of the variables to economic growth. Typically, the equation of our model will have  $\beta_1$  (elasticity of domestic credit to private sector to the economic growth)  $> 0$ ,  $\beta_2$  (elasticity of the value of shares traded to the economic growth)  $> 0$ ,  $\beta_3$  (elasticity of the sum of exports and imports of goods and services to the economic growth)  $> 0$ .

**Table 1.** Descriptive statistics of the data and sources of variables

Variable	Mean	Median	Max.	Min.	Std. Dev.	Obs.	Data source
lnGDP	9.069	9.092	9.249	8.857	0.108	42	WDI, World Bank
lnBANK	2.879	2.892	3.430	2.416	0.280	42	WDI, World Bank
lnMARKET	1.677	1.957	2.552	-0.858	0.856	42	WDI, World Bank
lnTRADE	3.783	3.901	4.387	3.068	0.402	42	WDI, World Bank

Source: Author's calculations based on EViews 10 outputs

## 2.2- Methodology and model specification

This study uses the ARDL model proposed by (Pesaran et al., 2001) to test the cointegration property. This approach has several statistical advantages, as it enables us to easily estimate the cointegration relationships using the OLS method after selecting the appropriate number of lags. It also allows us to test both the long and short-run relationships between variables. Finally, the ARDL test remains true regardless of whether the variables are I (0) or I(1).

2.2.1. Model specification

Following (Khan et al., 2005); (Frimpong & Oteng-Abayie, 2006); (Ang & McKibbin, 2007), and the ARDL version of the vector error correction model (VECM), our model can be represented as follows:

$$\begin{aligned} \ln(GDP)_t = a_0 + \sum_{i=1}^p b_i \Delta \ln(GDP)_{t-i} + \sum_{i=0}^q c_i \Delta \ln(BANK)_{t-i} + \sum_{i=0}^q d_i \Delta \ln(MARKET)_{t-i} \\ + \sum_{i=0}^q e_i \Delta \ln(TRADE)_{t-i} + \gamma_1 \ln(GDP)_{t-1} + \gamma_2 \ln(BANK)_{t-1} \\ + \gamma_3 \ln(MARKET)_{t-1} + \gamma_4 \ln(TRADE)_{t-1} + \varepsilon_t(2) \end{aligned}$$

Where  $\Delta$  indicates the first difference operator,  $a_0$  is the drift component,  $\varepsilon_t$  is the white noise residual, and the variables:  $\ln(GDP)$ ,  $\ln(BANK)$ ,  $\ln(MARKET)$ , and  $\ln(TRADE)$  are as defined before.

2.2.2. Estimation process

First, we begin with the estimation of Eq. (2) using OLS and then we perform an F-test for joint significance of the parameters of lagged variables for the purpose of verifying the existence of a long-run relationship between variables. We test the null hypothesis,  $H_N: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ , that there is no long-run relationship (cointegration) between variables, against the alternative hypothesis  $H_A: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq 0$ . Then the calculated F-statistic is compared with the tabular values suggested by (Narayan, 2005), where we have two types of tabular values (upper and lower bounds). If the calculated (F-statistic) is greater than the upper tabular value at a specified level of significance, then we reject the null hypothesis and thus there is a long-run equilibrium relationship between the variables. Whereas, if the calculated (F-statistic) is less than the lower tabular value, then we accept the null hypothesis. Finally, if the calculated (F-statistic) falls between the upper and lower bounds, then the test is inconclusive.

In a second step, after testing the relationship between the variables, it becomes possible to estimate the long-term parameters of the ARDL model by adopting the following equation:

In this process, we determine the optimum number of lags to be adopted in the ARDL model. Finally, we use the Error Correction Model (ECM) to estimate the parameters of the short-run as follows:

$$\ln(GDP)_t = \delta_0 + \sum_{i=0}^p \delta_1 \ln(GDP)_{t-i} + \sum_{i=0}^{q1} \delta_2 \ln(BANK)_{t-i} + \sum_{i=0}^{q2} \delta_3 \ln(MARKET)_{t-i} + \sum_{i=0}^{q3} \delta_4 \ln(TRADE)_{t-i} + \varphi(ECT)_{t-1} + \varepsilon_t(4)$$

### 2.2.3. Stability test of model parameters (CUSUM and QUSUM-squared)

In this last stage, we ensure the stability of the model parameters in the long and short-run after estimating the error correction model. We adopt two tests: the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of the squares of recursive residuals (CUSUM-squared). This type of test aims to verify that there are no structural changes in the data (Brown et al., 1975).

## 3- EMPIRICAL RESULTS AND DISCUSSION

### 3.1- Unit-root test

Before building the ARDL model, we test the integration order of each variable in the study by adopting the Augmented Dickey-Fuller test (Table 2). Although the ARDL model does not require pre-testing of variables, the unit root test guides us in the issue of whether or not to use the ARDL framework. As can be seen from Table 2, only some of the variables, in particular  $\ln(BANK)$  and  $\ln(TRADE)$  are stationary at 5% significance level, whereas all the other variables are stationary after first differencing. Hence, the results of the unit root test demonstrate that the ARDL model is more appropriate to analyze the data.

**Table 2.**Augmented Dickey-Fuller test (ADF test)

Variables	ADF test		ADF test	
	ln level I(0)		First difference I(1)	
	Intercept	Intercept and trend	Intercept	Intercept and trend
ln(GDP)	-1.371	-2.761	-5.700*	-5.619*
ln(BANK)	-1.361	-3.542**	-6.111*	-6.213*
ln(MARKET)	-2.063	-2.050	-6.841*	-6.752*
ln(TRADE)	-1.186	-3.975**	-5.625*	-5.584*

Note: \*, \*\* and \*\*\* indicates significant at 1%, 5% and 10% levels of significance respectively.

Source: Author’s calculations based on EViews 10 outputs

**3.2- Cointegration test**

We discover that the variables in our model are mutually cointegrated as reported in Table 3. The calculated F-statistic:  $F_{lnGDP}(lnGDP|lnBANK, lnMARKET, lnTRADE) = 4.326$  is higher than the upper bound critical value 5.455 at the 5% level of significance. This finding shows that there is cointegration between economic growth, financial development indicators, and trade openness in the case of Mexico for the period under study.

**Table 3.** Test for cointegration relationship

Model	Calculated F-statistic	SIC Lag	Sig. level	Critical bounds	
				I(0)	I(1)
$F_{lnGDP}(lnGDP lnBANK, lnMARKET, lnTRADE)$	4.326**	1	1%	3.967	5.455
$F_{lnBANK}(lnBANK lnGDP, lnMARKET, lnTRADE)$	2.982	1	5%	2.893	4.000
$F_{lnMARKET}(lnMARKET lnGDP, lnBANK, lnTRADE)$	5.544***	1	10%	2.427	3.395
$F_{lnTRADE}(lnTRADE lnGDP, lnBANK, lnMARKET)$	0.420	1			

Notes: Asymptotic critical value bounds are obtained from appendix, Case II: intercept and no trend for k = 4, and n = 40 (Narayan. (2005) p.1987).

Notes: \*, \*\*, and \*\*\* indicate significance at 10%, 5% and 1%, respectively.

Source: Author’s calculations based on EViews 10 outputs



### 3.3- Long-run impact

The empirical results are reported in Table 4. It shows that the banking sector development has a positive and significant impact on economic growth in the long-run at 1% level of significance. An increase in the volume of credit by 1% leads to an increase of 0.098% in the growth of the Mexican economy. This result is in line with (Benavides & Herrera, 2009); (Botev et al., 2019).

**Table 4.** Estimated long-run coefficients using the ARDL approach

ARDL(1,0,0,1) selected based on Schwarz Bayesian Criterion. Dependent variable is ln(GDP)				
Regressor	Coefficient	Standard error	t-ratio	Probability
<i>C</i>	7.817	0.125	62.131	0.000
ln( <i>BANK</i> )	0.098	0.032	3.046	0.004
ln( <i>MARKET</i> )	-0.046	0.013	-3.348	0.001
ln( <i>TRADE</i> )	0.276	0.026	10.396	0.000
Residual diagnostics		Test-statistic	Probability	
Serial correlation		3.580	0.023	
Heteroskedasticity		1.484	0.234	
Normality		1.574	0.455	

*Source: Author's calculations based on EViews 10 outputs*

Financial market development has a negative and significant effect on economic growth in Mexico at 1% level of significance. An increase in the volume of transactions in the financial market by 1% leads to a decline in economic growth by 0.046%. The weak and negative relationship between financial market development and economic growth in Mexico, found in our study is in line with (Tinoco Zermeno et al., 2011). This result can be attributed to the inefficiency of the financial market in Mexico due to information asymmetry (Stiglitz, 1993). This is a characteristic of the financial markets in emerging countries (Rioja & Valev, 2004); (Demirgüç-Kunt et al., 2013) and (Ben Jedidia et al., 2014). As the financial market sends distorted signals to investors due to lack of information, it allocates investments towards unproductive sectors in the economy, which negatively affects economic growth.

As for trade openness, it has a positive and important impact on the economic growth in Mexico during the long-run, as an increase in the degree of trade openness by 1% leads to an increase in growth by

0.276%. This result is in line with the view of (Farooq et al., 2013) and (Samargandi et al., 2014).

**3.4- Short-run impact and correction**

The coefficients of the error correction model are presented in Table 5. The negative sign of the coefficient of the ECM variable reveal that there is a cointegration relationship among economic growth, banking sector development, financial market development, and trade openness. The estimate of lagged error term ( $ECM_{t-1}$ ) also indicates the speed of adjustment from short-run towards long-run equilibrium path. The coefficient of the error correction term of about  $-0.381$  suggests that about 38.1% of the discrepancy between long-run and short-run economic growth is corrected within a year in the case of Mexico.

**Table 5.** Error correction representation for the selected ARDL model

ARDL(1,0,0,1) selected based on Schwarz Bayesian Criterion. Dependent variable is $\Delta \ln(\text{GDP})$				
Regressor	Coefficient	Standard error	t-ratio	Probability
$C$	2.983	0.685	4.353	0.000
$\Delta \ln(\text{TRADE})$	-0.064	0.041	-1.558	0.128
$ECM_{t-1}$	-0.381	0.088	-4.334	0.000
$R^2 = 0.40$				

Source: Author's calculations based on EViews outputs

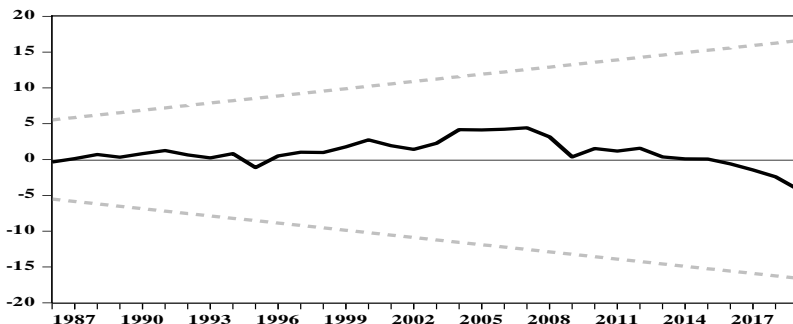
The results of the error correction model show that financial development, in both parts of the banking and financial market, does not affect the economic growth of Mexico in the short-run, and this result is consistent with (Tinoco Zermeno et al., 2011). Table 5 also shows that the relationship between trade openness and economic growth was negative and insignificant, and this may be due to the impact of the shocks caused by the COVID-19 pandemic, which has reduced drastically the international transactions since 2019.

**3.5- Stability checks**

We use the CUSUM and CUSUM-squared tests proposed by (Brown et al., 1975) to test for constancy of the long-run parameters. We apply the test to the residuals of the model. The CUSUM statistics are based on the cumulative sum of recursive residuals based on the

first set of observations. If the plot of the CUSUM statistics remains within the 5% significance level, then the estimates are stable. The same applies to the CUSUM-squared statistics.

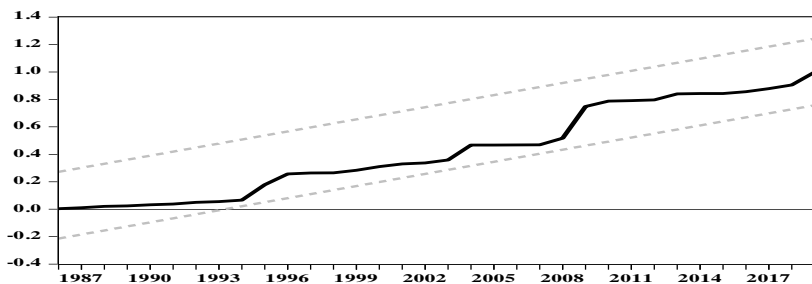
**Figure 4.** Plot of CUSUM for coefficient stability for the ECM model



Note: The straight lines represent critical bounds at 5% significance level

Source: EViews 10 output

**Figure 5.** Plot of CUSUMQ for coefficient stability for the ECM model



Note: The straight lines represent critical bounds at 5% significance level

Source: EViews 10 output

As can be seen in Figures 4 and 5 the plot of CUSUM and the plot of CUSUM-squared statistics remain within the critical bounds (the straight lines) indicating the stability of the coefficients. These statistics shown in Figures 4 and 5 confirm that the long-run coefficients and all short-run coefficients in the error correction model are stable and affect growth in Mexico.

## CONCLUSION

This study investigates the relationship finance-growth in Mexico during the period 1978-2019 using an ARDL-bounds testing approach. The study aims to test the long-run relationship between economic growth expressed as per capita real GDP and financial development indicators. The study concluded by emphasizing the existence of a positive long-run relationship between the credit directed to the private sector by banks and the economic growth in Mexico. The results also showed that the financial market in Mexico has a negative impact on the economic growth in the long-run. This may be due to the fragility that characterizes the financial markets in emerging countries. We argue that this finding is the result of financial liberalization in a poor regulatory environment.

Our study suggests that the Mexican authorities should pay attention to developing banking services and try to reach a larger segment of customers, especially those with low incomes. Hence, from a policy perspective, it is useful to further diversify trading partners to reduce future exposure to external shocks, given that the impact of the trade openness on the economic growth is positive and significant. Also, Mexican authorities should pay attention to policies aimed at reforming the financial market, as the latter allows for greater diversification of risks, which helps reduce the impact of future crises on the economy. In that way, we can expect that financial development will play a more prominent role in the economy in the long-run.

The recommendations in terms of economic policy that can be taken by the Mexican authorities to enhance the financial system are as follows:

- The creation of new incentives so that banks can provide more loans (targeting the poor);
- Establishing the principle of fair competition with regard to the banking and financial system, so that rates and expenses are reduced;
- The fortification of the financial and banking system via the implementation of the Basel committee recommendations, so that it may experience long-term continuous growth;

- The strengthening of the financial authorities' legal power to impose penalties;
- Ensuring that the relationship between debtors and creditors is properly rooted in equity;
- The diversification of the financial and trade partners;
- Disclosure of credible information within the financial market, which enables investors to make sound decisions, thus the market can achieve the optimum allocation of resources.

Finally, it is highly desirable to expand the scope of our study to encompass a wide comparison between the Latin American countries which have experienced diverse growth experiences and financial reforms.

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