Journal of Economic Integration | Vol: 12 - N°: 03 / (September 2024) | pp: 99-112

Measuring the Impact of Financial Liberalization on Economic Growth in the Arab Maghreb Countries: an econometric study for the period (2000-2023)

قياس أثر التحرير المالي على النمو الاقتصادي في دول المغرب العربي: دراسة قياسية للفترة (2000–2023)

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Received: 26/07/2024 **Accepted:** 30/09/2024 **Published:** 30/09/2024

Abstract:

Given the importance of financial liberalization and its major role in enhancing economic growth, this study sought to highlight this importance through an econometric study of financial liberalization on economic growth in the Maghreb countries during the period (2000-2023), using the (PANEL-ARDL) model. The results showed a long-run relationship between all indicators of financial liberalization and economic growth. The money supply index and the private sector credits index had negative effects on economic growth, and a positive effect for both foreign direct investment and trade openness. The study recommended the need to reform the financial sector and improve the investment environment further in the Maghreb countries.

Keywords: Financial Liberalization; Economic growth; PANEL ARDL; Maghreb countries; Dumitrescu Hurlin Causality

JEL Classification Codes: C33, F36, O47

ملخص:

نظرا لأهمية التحرير المالي، ودوره الكبير في تعزيز النمو الاقتصادي، سعت هذه الدراسة لإبراز هذه الأهمية من خلال دراسة قياسية التحرير المالي على النمو الاقتصادي في دول المغرب العربي خلال الفترة (2000–2023)، باستخدام نموذج (*PANEL-ARDL*)، وقد أظهرت النتائج وجود علاقة طويلة الأجل لكل مؤشرات التحرير المالي على النمو الاقتصادي، كما جاء مؤشر المعروض النقدي، ومؤشر القروض الممنوحة للقطاع الخاص بتأثيرات سالبة على النمو الاقتصادي، وتأثير موجب لكل من الاستثمار الأجنبي المباشر، والانفتاح التجاري، وقد أوصت الدراسة بضرروة إصلاح القطاع المالي وتحسين بيئة الاستثمار أكثر في دول المغرب العربي.

كلمات مفتاحية: التحرير المالي، النمو الاقتصادي، PANEL ARDL ، دول المغرب العربي، سببية Dumitrescu Hurlin

تصنيفات JEL: C33، F36، O47

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INTRODUCTION:

Economic globalization has contributed to influencing economic indicators as a whole, whether local or international. Financial liberalization is an important aspect of economic globalization, as it has led to increased financial interdependence and the integration of local financial systems into international financial markets, which has helped increase the flow of capital, especially in developing countries.

The Maghreb countries are among the countries that have tried to integrate with global development since the early nineties, as they have moved towards a policy of financial liberalization, with the support of the International Monetary Fund, by enhancing competition in the public and private banking system, adopting procedures and laws that encourage openness to the outside world, and taking measures that help the movement of capital more smoothly. This led to the liberalization of foreign direct investment flows and the removal of restrictions on banking systems, all of which contributed to enhancing economic growth in the Maghreb countries. According to the KOF Financial Globalization Index, its values improved in 2021 compared to 1995, when its values ranged between 30 and 53 in the five countries that make up the Maghreb.

The study problem

Economic growth is an essential goal that all countries seek to achieve, by searching for means that help achieve it. Financial liberalization is one of the most important of these means, as it helps improve the efficiency of capital allocation, attract foreign investments, and thus stimulate economic growth. With the Maghreb countries moving towards financial liberalization in order to support growth, **what is the impact of financial liberalization on economic growth in the Maghreb countries?**

The study hypotheses

To answer the study problem, the following two hypotheses will be relied upon:

- ✓ There is a long-run relationship between financial liberalization and economic growth in the Maghreb countries.
- ✓ There is a positive and significant impact of financial liberalization on economic growth.

- The study objectives

This study mainly aims to analyze and measure the impact of financial liberalization and economic growth in the Maghreb countries during the period 2000-2023 using the (Panel-ARDL) methodology.

- The importance of the subject

This study derives its importance from the importance of financial liberalization and the trend towards it with the exacerbation of the scale of economic globalization. The international community has translated this through many agreements and treaties that include all countries of the world. Moreover, the studies have not settled the ongoing debate about the impact of financial liberalization on economic growth, in particular in the countries of the Maghreb.

- The methodology used in the study

In order to cover the various aspects of the subject and answer the problem raised, we relied on the theoretical approach in presenting the most important economic theories in financial liberalization, and the most important previous studies that addressed the subject, In order to

measure the impact of financial liberalization on economic growth, we relied on the econometric approach using the PANEL-ARDL model for the period (2000-2023).

1- Literature Review

1-1 Review of Theoretical Literature

The beginning of the literature on financial liberalization was through the works of Mckinnon (1973) and Shaw (1973), who called for the removal of many restrictions on the movement of capital as a policy to support economic growth (Peter.M, 1995, p9), Their work came as a critique of policies that restrict financial markets, or what is known as financial repression, in addition to setting a ceiling on interest rates as a subsidy for banks, which led to inefficient allocation of capital (Bumman.S, 2012, P3), Financial liberalization gives complete independence to banks and financial institutions by eliminating all restrictions, adopting market mechanisms in determining the interest rate and reducing the mandatory reserve rate, while opening the banking sector to the private sector. Externally, it is related to liberalizing transactions related to the liberalization of capital (Bechroul.F, 2019, p258).

Many researchers believe that financial liberalization increases the efficiency of financial markets in converting savings into investment, which leads to improving the performance of economic growth. Venet (2000) states that financial liberalization allows for enhancing competition locally and abroad through the keenness of financial institutions to provide the best services in the economy and thus raise economic growth rates, even if this is not possible in the short term. The positive impact of financial liberalization on economic growth will be evident in the long term (Ben Yahia.Y, Talhaoui.F, 2020, p238)

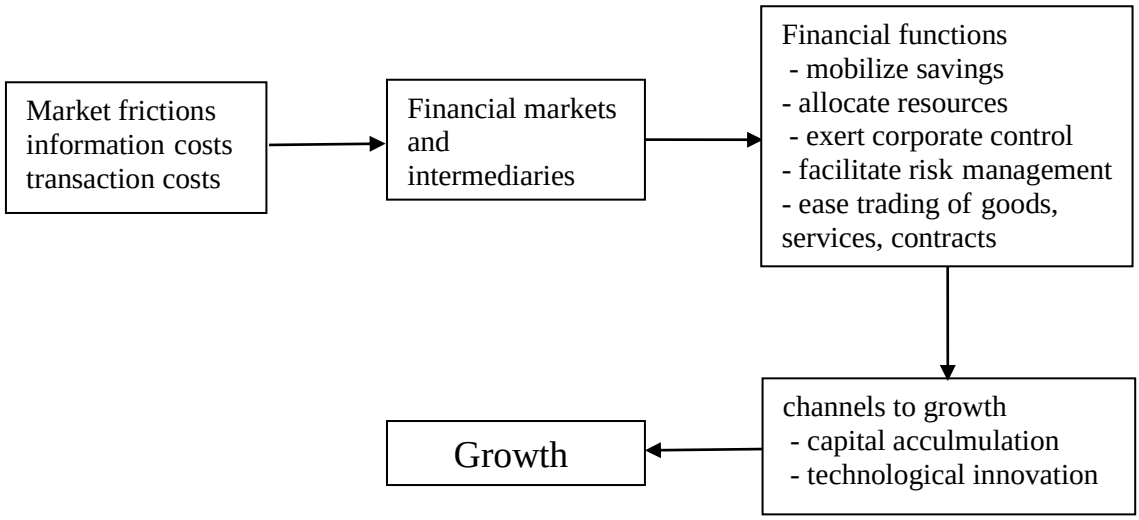
Neo-Keynesians such as Stiglitz and Weiss (1981) and Cho (1986) show that the credit market is subject to significant information asymmetries which hamper the effectiveness of reforms.(Togola.C,2019, p13)

The Neo-Structuralists, notably Van Wijnbergen (1983) and Taylor (1983), will also contest the merits of financial liberalization. Based on a more structural vision of the economy, they want to demonstrate that such a policy only leads to a slowdown in economic growth by emphasizing the important role played by the informal sector in financing the economy.Based on a more structural vision of the economy, they want to demonstrate that such a policy only leads to a slowdown in economic growth by emphasizing the important role played by the informal sector in financing the economy.(Togola C,2019, p13)

The relationship between economic growth and financial liberalization:

The relationship between financial liberalization and economic growth can be highlighted through the following figure:

Fig (1): The relationship between growth and financial development



Source:(Levine Ross, 1997, p 691)

The functions performed by the financial system through financial instruments and institutions are achieved by allocating capital through mobilizing savings, allocating resources, facilitating the exchange of goods and services and stimulating the emergence of financial contracts (Ayad.H , 2018, p88).Which helps increase investment, influence savings decisions, and raise the rate of technological innovation as shown in Figure (01). All of these functions lead to driving effective aggregate demand in ways that allow for economic growth.

1-2- Review of Empirical Literature

Many studies have found that increasing the development of the financial sector and taking measures for financial liberalization would have a positive impact on economic growth and productivity, while other studies have found that the relationship is negative or insignificant. The following are a group of studies that have addressed this topic:

(Dong-Hyeon.K & al, 2012) : The researchers analyzed the dynamic impact of financial openness on economic growth for the period (1975-2007) for a sample of 90 developing countries, using a model (PMG-ARDL). The study concluded that financial integration positively affects economic growth, while foreign direct investment negatively affects economic growth.

(Klic.C, 2015) : The researcher investigated the impact of economic, social and political globalization on economic growth For the period 1981-2011 for a sample of 74 developing countries, using the Fixed Effect model and Dumitrescu-Hurlin Causality. The study found that economic growth is positively affected by both economic globalization and political globalization, while it is negatively affected by social globalization.The study also found a two-way causal relationship between economic globalization and economic growth, and a uni-directional causal relationship between social globalization and economic growth.

(Bouaichi.N, Yaici.F, 2014) : The study aimed to investigate the impact of financial liberalization on financial development in Algeria, Morocco and Tunisia through classical financial indicators and FIDEX indicators. The results showed that Morocco has the most developed financial system, Tunisia has a medium degree, and Algeria has the weakest.

(Ayad.H, 2018) : The researcher tried to study the causal relationship between economic growth as measured by per capita GDP and financial liberalization as measured by the Kaopen Line Milesi-Ferreti indicators in the Maghreb countries (Algeria, Morocco, Libya, Tunisia and Mauritania) using the simultaneous integration methodology of the ARDL-PANEL model as well as the TYDL causality methodology developed for the period. Extending between 1980-2014, the results of this study indicated the absence of a co-integration relationship between the three variables. It also indicated the existence of a relationship in the short and long-run between the rate of economic growth and financial liberalization as measured by the Milesi-Ferreti index, while there is no relationship between them in the case of using Kaopen index.

(Bechroul.F, 2019) : This study attempted to investigate the impact of financial liberalization policy on economic growth for a sample of Maghreb countries for the period (1990-2017) using the Panel model. The results concluded that there is a positive impact of loans on economic growth in the long-run, and also a positive impact of money supply on economic growth in the short and long-run.

(Ben Yahia.Y , Talhaoui.F.Z, 2020) : The researchers estimated an equation linking the development of the financial sector and economic growth in the Maghreb countries (Algeria, Tunisia and Morocco) for the period (1990-2018), using the Panel methodology and the VAR methodology. The results showed that there is no effect of financial development on economic growth in the long-run, while there is a one-way causal relationship from economic growth to financial development.

(Seghiri.S & Boulesnam.M, 2021) : The study aimed to examine the relationship between economic growth and financial development in the MENA countries for the period (1990-2017), Using the PANEL ARDL methodology, The results showed that there is a long-run relationship between economic growth and financial development, between trade openness and the deposit money cial bank assets, and a short-run negative relationship between the liquidity index and economic growth.

(Azouza.A , 2021) :The researcher focused on measuring the impact of financial globalization on the Malaysian economy during the period (1990-2019) through rate of inflation, Kaopen index, foreign direct investment inflows, trade openness and financial deeping, using the fully modified least squeres Method (FMOLS), It was concluded that financial globalization has a positive impact on Malaysian economic growth, And that there is no impact of financial liberalization variables on economic growth in the short-run.

(Motaz.M, 2023): The study attempted to highlight the impact of trade and financial globalization on economic growth in Egypt, Tunisia, Algeria and Morocco, for the period 1980-2021, using the PMG-ARDL model. The results showed a long-run impact of both trade and financial globalization on economic growth, while in the short-run the impact is insignificant.

2-Econometric Methodology

2-1 Model and Data

In order to study the impact of financial liberalization on economic growth rates in Algeria, Tunisia, Morocco, Libya and Mauritania, during the period 2000-2023, we will rely on data collected from the World Bank from the World Development Indicators (WDI), and the study

model was chosen based on economic theories and previous studies that addressed this topic, and the model is given in the following form:

$$GDPC = f(CPS, FDI, FBV, OPEN)$$

Where :
GDPC : Economic growth represented by per capita GDP
CPS : Total credits to the private sector as a percentage of GDP
FDI : direct foreign investment
OPEN : Trade openness , The trade openness index is calculated by dividing the total exports and imports by the gross domestic product
FBV : Money supply index (M2 /GDP)

2-2-Econometric approaches

2-2-1-Cross-sectional dependency:

This test is used to determine whether cross-sectional dependence exists among individuals in panel data. Common effects and shocks among cross-sectional units in one country's economy can affect the economies of other countries. Inaccurate and unreliable estimates can result from ignoring cross-sectional dependence and assuming independence among cross-sections. (Alan T. W, Chin-Chia L, 2024, p178), it becomes necessary to address this issue by employing second-generation panel unit-root tests, which are specifically designed to handle cross-sectional associations(Mahali .K & al, 2023, p246).Determining the dependence of panel sections is also important because the second-generation stationarity tests and the Westerlund co-integration test assume the existence of dependence in panel sections, and the CD relationship is given as shown in the following relationship: (Pesaran, M. H. 2004, p05)

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{k=i+1}^{N} \delta ik\right) \dots\dots\dots\dots\dots\dots (1)$$

Where T represents the time, N represents the number of panel sections, and δik represents the correlation coefficient. The null hypothesis for this test is that there is no inter-sectional dependence, and the alternative hypothesis is that there is inter- sectional dependence. (Maaz ,A & al, 2023, p05)

The following table shows the results of the CD test in our study:

Table (1): results of CD–test - Pesaran (2004)

	CD–test value	Corr	Abs(Corr)
GDPC	3.82***	0.228	0.248
FBV	11.87***	0.709	0.709
FDI	3.35***	0.200	0.241
CPS	5.25***	0.314	0.459
OPEN	8.50***	0.508	0.516

Source: : Author Computation using STATA 17

*significant at the 0.10 level,**significant at the 0.05 level, ***significant at the 0.01 level.

According to the results shown in Table (1), we reject the null hypothesis that states the independence of the cross-sections forming the panel, and we accept the alternative hypothesis, which states there is a correlation between the cross-sections of all variables at a significance level of 1%. This indicates the possibility of shocks being transmitted between the countries of the Maghreb in the event that any of them is exposed to an economic shock.

2-2-2-Slop homogeneity :

There may be variations in the economies of the Maghreb countries, which constitute the study sample, so before moving on to the estimation process, the homogeneity of the regression parameters for all Maghreb countries must be verified. In this regard, Pesaran and Yamagata (2008) proposed delta tests. (Himin . Z & al, 2022, p05), Which is given according to the following two equations: (Pesaran, H., & Yamagata, T,2008, p62)

$$\acute{\Delta} = (N)^{\frac{1}{2}}\left(\frac{N^{-1}\tilde{S} - 1}{\sqrt{2}}\right) \dots\dots\dots\dots\dots (2)$$

$$\acute{\Delta}_{adj} = \sqrt{\frac{N(T+1)}{T-k-1}}\left(\frac{N^{-1}\tilde{S} - k}{\sqrt{2k}}\right) \dots\dots\dots (3)$$

Where, the tilde delta is represented by $\acute{\Delta}$, and the tilde delta after adjustment is denoted by $\acute{\Delta}_{adj}$. **N** represent countries, **T** represent time periods , **k** represent parameters.

The null hypothesis for this test is that the regression coefficients are homogeneous.
The following table represents the test results.

Table (2): The Results of Slope Homogeneity Test.

Tests	**Pesaran-Yamagata (2008)**		**Blomquist-Westerlund (2013)**	
	Stat	p-value	Stat	p-value
Delta	-2.713	0.007	-2.958	0.003
Delta Adj	-3.061	0.002	-3.337	0.001

Source: Author Computation using STATA 17

The results of the homogeneity test are shown using the calculated values (**Delta**) and (**Delta Adj**), and through the probability value we reject the null hypothesis that the regression coefficients are homogeneous at a significance level of 5%, and thus all variables are heterogeneous, and accordingly we will rely on the heterogeneous Panel methods in which the regression parameters differ from the individual cross-sections within the Panel models.

2-2-3-Unit root tests :

First-generation unit root tests often give inaccurate results, especially when there is cross-sectional dependence, so these tests were developed by Pesaran in 2003, and then improved in 2007 to have two of the most important second-generation tests, the cross-sectional augmented Dickey-Fuller (CADF) test and the cross-sectional augmented Im-Pesaran-Shin (CIPS) test (Christophe H & ValÈrie M, 2007, p19), The CADF equation is given as follows: (Westerlund, J & al, 2014, p02)

$$\Delta x_{it} = \delta_i + \alpha_i x_{it-1} + \beta_i \tilde{x}_{it-1} + \gamma_i \tilde{\Delta} x_t + \mu_{it} \dots\dots\dots\dots (4)$$

The relationship between CADF and CIPS is given by: (Westerlund, J, 2014, p8-13)

$$\mathrm{CADF_i} = \frac{\acute{y}_{i-1} M_x \Delta_{y_i}}{\widehat{\sigma}_{\epsilon,i} \sqrt{\acute{y}_{i-1} / M_x y_{i-1}}} \dots\dots\dots (5)$$

$$CIPS = \frac{1}{N} \sum_{i=1}^{N} CADF_i \dots\dots\dots\dots (6)$$

The results of the root tests were as follows:

Table (3): The results of Second generation unit root test - Pesaran (2007)

Test	Variable	Level		First Difference	
		Constant	Con trend	Constant	Con trend
CIPS Test	**GDPC**	-3.0596***	-3.4902***	-4.4437***	-4.4654***
	FBV	-1.4283	-2.0333	-5.0401***	-5.6360***
	FDI	-4.3222***	-4.1856***	-5.0401***	-5.6360***
	CPS	-2.4976**	-3.6214***	-2.6827***	-3.2788***
	OPEN	-2.2943***	-6.1337***	-4.6929***	-4.6779***
CADF Test	**GDPC**	-3.4617**	-4.2875**	-5.5433***	-5.8229***
	FBV	-2.6951	-3.5882*	-6.3914***	-6.4822***
	FDI	-3.1313***	-3.5627***	-4.6876***	-6.4823***
	CPS	-1.8051	-4.3557**	-4.4181***	-4.2947**
	OPEN	-4.2314***	-4.9889***	-4.3545***	-4.8789***

Source: Author Computation using STATA 17

*significant at the 0.10 level,**significant at the 0.05 level, ***significant at the 0.01 level.

According to the (CIPS) and (CADF) tests, shown in the Table (3)., we note the absence of a unit root for each of GDP per capita growth (GDPC), Total credits to the private sector (CPS), Direct foreign investment (FDI), and Trade openness (OPEN), and thus they are stationary at level, and integrated of degree I(0), while the results showed that the Money supply index is stationary after conducting the first difference and is integrated of degree I(1). This allows us to use panel Autoregressive Distributive Lag (ARDL) and Panel Mean Group (PMG) model.

2-2-4-Westerlund co-integration technique :

in order to study the long-run relationship between financial liberalization and economic growth, the four Panel co-integration tests developed by Westerlund (2007) will be used. It is a second-generation test, which is based on the assumption that the cross-sections are independent and the slope is heterogeneous (Qiang Ma & al, 2022, p5476). We find that two tests were designed to test the null hypothesis that there is no co-integration for the panel as a whole, and that there is no co-integration for at least one cross-section for the other two tests.

Westerlund's co-integration test statistic is given by the following equation. (Persyn, D., & Westerlund, J. 2008, p 233)

$$\Delta_{y_{it}} = \hat{\delta}_i d_t + \hat{\alpha}_i y_{i,t-1} + \hat{\lambda}_i x_{i,t-1} + \sum_{j=1}^{p_i} \hat{\alpha}_{ij} \Delta y_{i,t-j} + \sum_{j=1}^{p_i} \hat{\gamma}_{ij} \Delta x_{i,t-j} + \hat{\varepsilon}_{it} \dots\dots(7)$$

Statistics for the four tests are presented as follows: (Persyn, D., & Westerlund, J. 2008, p. 234-235)

$$G_T = \frac{1}{N} \sum_{i=1}^{N} \frac{\hat{\alpha}_i}{SE(\hat{\alpha}_i)} \dots\dots(8) \qquad G_\alpha = \frac{1}{N} \sum_{i=1}^{N} \frac{T\hat{\alpha}_i}{\hat{\alpha}_i(1)} \dots\dots\dots(9)$$

$$P_t = \frac{\hat{\alpha}}{SE(\hat{\alpha})} \dots\dots\dots\dots(10) \qquad P_\alpha = T\hat{\alpha} \dots\dots\dots\dots(11)$$

Table (4): The results of the coin-tegration test – Westerlund (2007)

Statistic	Value	Z-Value	P-Value
Gt	-3.938	-3.494	0.000
Ga	-3.651	-1.940	0.026
Pt	-35.072	-27.941	0.000
Pa	-3.059	-1.438	0.075

Source: Author Computation using STATA 17

The results in the Table (4) indicate that all results are significant at 1%, 5% and 10%, which means rejecting the null hypothesis and accepting the alternative hypothesis, and thus the existence of a long-run relationship between the dependent variable and the independent variables of the study model, or at the level of each country individually.

2-2-5-Model estimation :

The results of estimating the ARDL Panel model according to the Mean Group model (MG), the Pooled Mean Group model (PMG), and the Dynamic Fixed Effects (DFE) model are shown in the following table.

Table (5): ARDL Panel Model Estimation Results

Variables	MG	PMG	DFE
	Long-run Coefficients		
FBV	-0.0821**	-0.0241**	-0.0726
FDI	-0.0708	0.4570***	0.6196**
CPS	-0.0587	-0.0972**	-0.0152
OPEN	0.0845**	0.0237***	0.0961
	Short-run Coefficients		
ECT	-1.0796***	-1.0509***	-1.0332***
D(FBV)	-0.2734***	-0.3665***	0.1200
D(FDI)	-0.1364	-0.3246	0.5858**
D(CPS)	-0.1348	-0.0918	-0.2837*
D(OPEN)	-0.0560	0.2329	-0.2346
Cons	6.1085*	6.6252**	-7.5397**
Hausman test	**MG/PMG**	**1,1589(0.5182)**	
Hausman test	**PMG/DFE**	**0,0354(0.9743)**	

Source: Author Computation using STATA 17

*significant at the 0.10 level,**significant at the 0.05 level, ***significant at the 0.01 level.

The results in the Table (5) indicate the estimation results for (MG), (PMG), and (DFE). These results highlight the impact of financial liberalization on economic growth.

In order to choose the best model, a comparison is made between them using the Hausman test, where we notice that the (PMG) model is better than the (MG) model at a significance level of 5%. To compare between the (PMG) model and the (DFE) model, the result of the Hausman test indicates the acceptance of the null hypothesis, and therefore the best model is the (PMG) model.

From the results shown in the Table (5), we note that all the parameters of the financial liberalization indicators were significant at 1% and 5% in the long-run, while in the short-run, the money supply indicator was the only one that was significant. The results can be interpreted as follows:

The error correction coefficient has a negative sign (-1.0509) and is significant at a significance level of 1%, indicating the existence of a short-run relationship between the study variables towards a long-run equilibrium relationship, as deviations in the growth of per capita GDP in the short-run will be corrected in about 9 and a half months in order to return to equilibrium in the long-run.

The results show that there is an inverse and significant effect of the money supply index variable on the economic growth rate in the long-run, as an increase in the money supply by 1% leads to a decrease in the per capita share of the GDP to 0.0241%. It is also significant in the short-run, as an increase in the money supply by 1% will lead to a decrease in the per capita share of the GDP by 0.3665%. This confirms the weakness of the financial sector, and that the monetary policy followed in the Maghreb countries is ineffective. There fore, central banks must determine the money supply according to the increasing market requirements, and make it consistent with the economic growth rate.

The size of foreign direct investment has a positive and significant effect on the economic growth rate, as an increase in foreign direct investment by 1% leads to an increase in the per capita share of the GDP by 0.4570%, in the long-run, which is consistent with economic theory. However, in the short-run, it has no effect on economic growth, as it was insignificant. Despite the positive effect, it remains weak, as it is considered one of the most important indicators that lead to stimulating economic growth more than what is achieved by local investment.

There is a significant and inverse effect of the percentage of credits granted to the private sector on the economic growth rate, as an increase in the size of creditss to the private sector by 1% leads to a decrease in the per capita share of the GDP to 0.0972%, and it was also insignificant in the short-run, and this is inconsistent with economic theory, because the indicator of the size of credits directed to the private sector in the Maghreb countries did not rise to the required level, as the focus is still on directing credits to the public sector.

The trade openness index shows a positive impact on economic growth in the long-run, as an increase in openness by 1% leads to an increase in per capita GDP by 0.0237%, while in the short-run it is insignificant, which is consistent with economic theory and most previous studies. This is due to the increase in exports of raw materials in the study countries, especially in recent years, and the reduction in imports, which explains the effect of

liberalizing foreign trade, as facilitating the process of trade flow leads to attracting foreign investment, which in turn enhances the rate of economic growth.

2-3-Dumitrescu Hurlin Panel Causality :

Dumitrescu-Horlin panel causality analysis is effective in analyzing unbalanced panel data and cross-sectional dependency, and it offers a significant advantage over other causality tests in ruling out the relationship between time and cross-sections. (Özdemir, O & Kayhan, F. 2021, p 06). The test tests the null hypothesis that there is no Granger causality in the cross-sections, and the alternative hypothesis that there is Granger causality for at least one cross-section. In order to test the panel causality, taking into account that the linear model is heterogeneous, the following equation was used: (Dumitrescu, E.-I., & Hurlin, C. 2012, p1451)

$$y_{i,t} = \alpha_i + \sum_{k=1}^{k} \gamma_I^{(K)} y_{i,t-k} + \sum_{k=1}^{k} \beta_i^{(k)} x_{i,t-k} + \varepsilon_{i,t} \dots\dots\dots\dots (12)$$

where α_i is the constant term, K is the number of lags, $\gamma_I^{(K)}$ and $\beta_i^{(k)}$ is the differences between the cross sections.

In order to answer the hypothesis of the Dumitrescu-Horlin panel causality test, the following statistic can be used: (Dumitrescu, E.-I., & Hurlin, C. 2012, p1453)

$$W_{N,T}^{Hnc} = \frac{1}{N} \sum_{i=1}^{N} W_{i,T} \dots\dots\dots\dots (13)$$

It is the average of all test statistics for the cross-sectional units.

Table (6): The Results of causality test Dumitrescu-Hurlin(2012)

Null Hypothesis	W-Stat	Zbar-Stat	Prob
GDPC >>> FBV	4.26991	1.87431	0.0609
FBV>>>> GDPC	1.71576	-0.45031	0.6525
GDPC >>> FDI	4.84755	2.40004	0.0164
FDI >>> GDPC	1.78919	-0.38347	0.7014
GDPC >>> CPS	3.51022	1.18289	0.2369
CPS >>> GDPC	3.89215	1.53050	0.1259
GDPC >>> OPEN	1.57101	-0.58204	0.5605
OPEN >>> GDPC	5.36584	2.87175	0.0041
FDI >>> FBV	2.29862	0.08018	0.9361
FBV>>>> FDI	1.66193	-0.49930	0.6176
CPS >>> FBV	1.92910	-0.25614	0.7978
FBV >>> CPS	5.12548	2.37185	0.0152
OPEN >>> FBV	2.21617	0.00514	0.9959
FBV >>> OPEN	3.45990	1.13709	0.2555
CPS >>> FDI	2.77774	0.00514	0.9959
FDI >>> CPS	3.16459	0.86833	0.3852
OPEN >>> FDI	2.11181	-0.08985	0.9284
FDI >>> OPEN	3.89610	1.53410	0.1250
OPEN >>> CPS	8.68367	5.89141	0.0000

CPS >>> OPEN	2.42287	0.19327	08468

Source: Author Computation using EVIEWS 13

The results of the Dumitrescu-Hurlin causality test in the Table (6) show the following:

There is a unidirectional relationship from the growth rate of per capita GDP to the money supply index, a unidirectional relationship from the growth rate of per capita GDP to foreign direct investment, and from the trade openness index to the growth rate of per capita GDP.

We also recorded a one-way relationship from the money supply index to the private sector credits index, and another one-way relationship from the trade openness index to the private sector credits index.

3-Conclusion

The study attempted to determine the impact of financial liberalization on economic growth in the Maghreb countries during the period (2000-2023), using the (PANEL-ARDL) model. The study showed the following results:

- There is a negative impact of the money supply index and the percentage of credits granted to the private sector on economic growth
- There is a positive and significant impact of foreign direct investment and the trade openness index on economic growth

There is a long-run relationship between financial liberalization indicators and economic growth during the study period, and therefore the first hypothesis is achieved.

Since the long-run relationship of financial liberalization indicators had a positive and negative effect, the second hypothesis is not met.

Based on the findings of the study, we recommend the following:

- More focus on enhancing trade openness in the Maghreb countries, as it has a significant impact on economic growth
- The need to move towards reforming monetary policy, to support financial reforms, and developing financial markets by merging them into a single financial market
- The Maghreb countries should work more on diversifying their economies, and giving the private sector a greater role in this area
- Working for improving the investment environment in the Maghreb countries, and leaving more freedom for foreign investments.

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