

The impact of financial system activities on Non-Oil tax revenue collection in Algeria: Application of ARDL approach

دراسة تأثير أنشطة النظام المالي على تحصيل الإيرادات الضريبية في الجزائر
استخدام نموذج الانحدار الذاتي ذي الفجوات الزمنية الموزعة (ARDL)

Toufik Hadjmaoui¹, Hanane Benatek²

¹ University of Saida (ALGERIA), hadjmaoui_toufik@yahoo.fr

² University of Mascara (ALGERIA), hanane.hadjmaoui@univ-mascara.dz

Received: 01/09/2020

Accepted: 11/04/2021

Published: 27/04/2021

Abstract:

The main purpose of this research is to investigate the impact of financial system activities on Non-Oil tax revenue collection in Algeria for the period 1999 to 2017, using the Autoregressive Distributed Lag Model (ARDL). The results showed that there was no relationship between financial development indicators (stock market development, banking sector development) and Non-Oil tax revenue. In the short-run, only the credit to private sector has a positive and significant impact on the generating non-oil tax revenues, while credit to public sector has an insignificant impact. Furthermore, the stock market development has a weak negative impact.

Keywords: Financial Development; Non-Oil tax revenue; Banking Sector Development; Stocks Market Development.

JEL Classification Codes: C32, G38, H20, O23.

ملخص:

المهدف من هذه الورقة هو دراسة تأثير أنشطة النظام المالي على تحصيل الإيرادات الجبائية في الجزائر للفترة الممتدة ما بين 1999 و 2017، وذلك باستخدام نموذج الانحدار الذاتي ذي الفجوات الزمنية الموزعة (ARDL). وقد أظهرت النتائج أن المؤشرات الرئيسية للتنمية المالية (مؤشر تطور السوق المالي، مؤشرات تطور القطاع المصرفي) لا تلعب دوراً محورياً في تحصيل الإيرادات الضريبية في المدى الطويل؛ أما تقدير علاقة النموذج الديناميكي القصيرة الأجل فقد أفضت إلى نتائج متباينة، حيث كان للائتمان المقدم للقطاع

¹ Corresponding author: Hadjmaoui Toufik, e-mail: hadjmaoui_toufik@yahoo.fr.

الخاص تأثير ايجابي وهام على توليد الايرادات الضريبية، في حين أن الائتمان المقدم للقطاع العام لم يظهر أي تأثير؛ أما معامل التغير في مؤشر تطور السوق المالي فكان له تأثير سلبي إلا أنه ضعيف.

كلمات مفتاحية: التنمية المالية، الايرادات الجبائية العادية، تطور القطاع المصرفي، تطور السوق المالي.

تصنيفات JEL: C32، G38، H20، O23

1. INTRODUCTION

Non-oil taxation has been, and still is, at the heart of concerns of the Algerian authorities. Beyond its importance as a relatively stable resource for financing development needs, it is used to cope with the social and economic fluctuations that the state would have faced, particularly the adverse oil price shocks experienced by the oil market and their consequences on export earnings. Given the importance of the financial sector in improving and accelerating tax collection, alongside the fight against tax evasion, the government is working to improve it by building on the importance of banks and financial institutions as central components of any economy to supply liquidity to both businesses and consumers by providing different types of payment systems that are essential for noncash transactions. In fact, the presence of developed, transparent and efficient banks and financial institutions could encourage taxpayers (businesses and individuals) to use them to carry out their transactions, particularly with a view to obtaining high quality services; this would prompt the authorities to promulgate laws obliging banks and financial institutions to disclose, upon request, the necessary information from their customers to the tax authorities. However, in the case of underdeveloped financial institutions, the size of the underground economy increases and it becomes difficult to collect accurate tax information. (Akram, 2016, p. 154).

As a result, the problems encountered in tax mobilization and the possible solutions would relate to the financial development sector. As such, the financial development is not only an issue in terms of responding to the financial needs of economic actors, but also an important factor of the State to mobilize the necessary means to finance that the economic development needs, as well as the reliable and efficient execution of tax processes (calculation, collection and control), in addition to the fight against illicit financial flows and tax evasion.

In this context, many researchers believe that a developed financial system can be considered as a determining factor in the increase in taxable economic activities, and in the growth of the demand for goods and services leading to new investments and hence an increase in the tax base. On the

other hand, some studies have confirmed that the presence of an underdeveloped financial sector is one of the factors contributing to the decline in the level of tax revenues. In addition, some studies such as that of (Bittencourt, Gupta, & Standar, 2014) and (Capasso & Jappelli, 2013), have shown that financial development plays an important role in reducing the size of the informal economy, and consequently, the increase in tax revenues; these results are similar to those of (Blackburn & Bose, 2012) which confirm that the lower financial development level, the higher the rate of tax evasion and the size of the shadow economy and from it are great. Similarly, (Pyle, 1989) confirms that one of the consequences of the shadow economy is the existence of a portion of the non-taxable income; and its effect on the production of reliable and accurate statistics; this lack of data prevents policymakers from assessing the potential impact of major changes to the tax system (Tanzi & Zee, 2001, p. 2).

problematic:

It is clear from the information above that the financial sector development could be considered as one of the important determinants of tax revenue, which some researchers have pointed out when trying to examine and analyze the impact of financial development on taxes.

This relationship has received little attention in developing countries, and has not yet been treated, at our sources, on the Algerian economy. This leads us to reflect on the problematic of this research by asking the following question:

What is the impact of the activities of the banking and non-banking financial system on the non- oil tax revenues perception in Algeria?

Hypothesis to test:

To answer this problem, our study is based on the following hypothesis:

Algeria's financial system, both banking and non-banking, is very underdeveloped and unable to play its role in improving the non-oil tax revenues perception.

This study was divided as follows:

- Introduction.
- Methods and Materials.
- Results and discussion.
- Conclusion.

2. Review of the empirical literature:

There have been few empirical studies that focused on analyzing the interaction between financial development and tax collection. In one of the recent studies, we may mention (Akçay, Sağbaş, & Demirtaş, 2016) who investigated the relationship between financial development (banking and non-banking) and direct tax revenues in Turkey by analyzing the monthly data for the period 2006-2014. In order to study the long-run equilibrium relationship between variables, researchers used two tests to determine co-integration; the first test is that of (Johansen & Juselius, 1990), while the second one is that of (Hatemi, 2008). At this level, the results showed that there is an integrating relationship between financial development and direct tax revenues.

The researchers also used the VECM model to study the short and long-run relationship between the different variables, and also the Granger causality test to examine the causal relationship. The results confirmed that financial development, both banking and non-banking, affected direct tax revenues in long-run and that the banking sector affected direct tax revenues only in the short-run. Similarly, (Bayar & Karamelikli, 2017) have attempted to study the interactive relationship between tax revenues and the main indicators of financial development, represented by the banking sector development and the stock market in Turkey, using monthly data for the period 2006-2016. To achieve the objective of this study, the ARDL method was used.

The results showed that the banking sector development and the stock market would have had a positive impact on the total tax revenue, if the relationship between them were considered a non-linear one. On the other hand, the results would have given no relationship between them if the nonlinear relation were ignored. For their part, (Assadzadeh & Fouman Ajirlou, 2017) examined the impact of banking and stock market activities on Iranian tax revenues, using the ARDL model for seasonal data for 2000-2013. The results of the model estimation indicated that banking and stock market activities had a positive and significant impact on tax revenues.

In another study, (Ajide & Bankefa, 2017) tried to examine the effect of the financial system on the tax revenues collection in Nigeria for the period 1981 to 2014, using the ARDL method, by testing the

causal relationship, by analyzing the impulse response function (IRF), and performing the variance decomposition. The results indicated that the variables of the financial system, namely the stock market development, the banking sector development, the financial crisis and the variables of financial integration play a key role in the tax revenues collection.

In addition, (Akram, 2016) attempted to analyze the role of financial markets in generating tax revenue in Pakistan, using time series data for the period 1975–2014. To study the short and long-term relationship between the variables, the VECM model was used as well as the Granger test to examine the causal relationship. The results revealed that, in the long run, the number of bank branches and market capitalization has a positive and significant impact on tax revenue. While credit to the private sector has a bidirectional relationship with tax revenue, public sector credit has an insignificant impact. In the short run, only the number of bank branches and market capitalization has a significant impact on tax revenue. On the other hand, (Ilievski, 2012) used both theoretical and empirical study to determine which component of the financial sector would have an impact on the government's ability to increase tax revenues. The study was divided into three axes; the first axis was devoted to study the role of the banking sector as a mechanism for application and collection of taxes, and this was done by conducting an econometric study on a sample of 116 countries between 1990 and 2008. The results showed that the banking sector had a big impact on tax revenues.

The second axis was devoted to studying the impact of financial markets on the level of tax revenues, by conducting an econometric study on a sample of 96 countries for the same period (1990-2008). The results showed that financial markets have a positive impact on the government's ability to increase tax revenues. In the third axis, the researcher studied the effect of financial liberalization on tax revenues by conducting an econometric study of a sample of 126 countries for the same period. The results showed that financial liberalization had a positive impact on the level of tax revenues.

The recent work of (Taha, Colombage, Maslyuk, & Nanthakumar, 2013) where they examined the relationship between direct tax

revenue and banking and non-banking activities in Malaysia's financial system, using monthly data for the period 1997–2008. The existence of the long run equilibrium relationship between tax revenue and the financial system was investigated using the autoregressive distributive lag (ARDL) bounds testing approach to co-integration. They find a long-run equilibrium relationship between the financial system and tax revenue in Malaysia. The short-run dynamic relationship between direct tax revenue and financial system was investigated using the vector error correction model (VECM). The estimated ECTt–1 coefficient indicates a relatively fast speed of adjustment from short-run disequilibrium to long-run equilibrium. The Granger causality tests reveal unidirectional causality running from stock market towards direct tax revenue, indicating that an increase in stock market activities is likely to improve the collection of direct tax revenue. Overall, the results show that the impact of the financial system on direct tax revenue is more profound in the short run than in the long run.

3. Level of tax revenues in Algeria:

The Algerian tax system, like other tax systems, has undergone several reforms responding to the social and economic fluctuations experienced by the country, the most important of which, among others, being the reforms adopted in 1992 to establish a system effective, clear and able to gradually free the Algerian economy from hydrocarbon revenues.

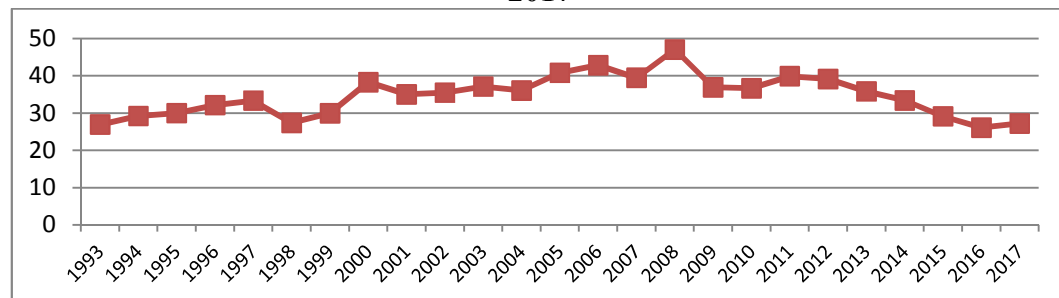
The objective of these reforms was to broaden the tax base, increase the rates of certain taxes and reduce others, introduce new taxes, value-added tax (VAT), income tax (IT), corporate profit tax (CPT) ..., and to eliminate others, which will lead us to highlight the evolution of tax revenue mobilization by focusing on the period following these reforms. To do this, we will use the budget revenue / GDP ratio; i.e., the total budget revenue (excluding social security) as a percentage of Gross Domestic Product (GDP), as an indicator of changes in the level of tax levies, and in as the most widely used indicator in tax studies, and which is generally used by the OECD in its annual publications on public budget statistics to measure the importance of levy for member countries (OCDE, 2000, p. 31).

Figure (1) shows that the evolution of budget revenue reported GDP has been on an upward trend, but was not stable. This ratio increased from 26.91% in 1993 to 39.11% in 2012, and began to decline in 2014 following the unfavorable oil market crisis, and then stabilized around 27% in 2017. The budgetary revenue increased from DZD 5110,1 billion in 2016 to DZD 6182,8 billion in 2017, which is an increase of 21% (+ DZD 1072,7

The impact of financial system activities on Non-oil tax revenue collection in Algeria: Application of ARDL approach

billion), this increase mainly stems from oil revenue (central bank of Algeria annual report, 2017, p 45). For comparison, the budget revenue / GDP ratio was 34.3% in 2016 for the OECD area(OCDE, 2018, p. 51).

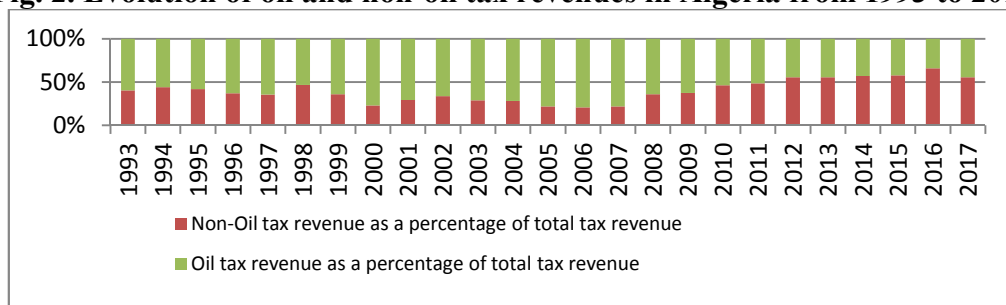
Fig. 1. Evolution of budget revenue as a percentage of GDP in Algeria 1993-2017



Source: Authors based on International Monetary Fund Statistics.

Much of the increase (or decrease) in budget revenues is attributable to oil revenues; this can be illustrated by the figure (2).

Fig. 2. Evolution of oil and non-oil tax revenues in Algeria from 1993 to 2017



Source: Authors based on International Monetary Fund Statistics.

Figure (2) highlights, in a very clear way, the predominance of oil-tax revenues, whose total tax revenue weight was close to 60% during the period 1993-2017, confirming the continued dependence of the economy Algerian oil tax revenue as a primary resource to finance the public treasury. This is interpreted by the increased vulnerability of the Algerian economy to fluctuations in international oil prices, which reflects the inability of the Algerian economy to overcome this dependence and the failure of reforms and efforts. In recent years (2012-2017), the weight of oil revenues relative to total tax revenues has been significantly reduced, giving way to ordinary (non-oil) taxation. This change is primarily due to the drop in oil prices since 2014, and the large-scale tax and economic reforms led by Algeria mainly since 1991; on the other hand, the evolution of customs duties and value added tax revenues, in line with the increase in

the volume of imports, particularly those of consumer goods and intermediate goods.

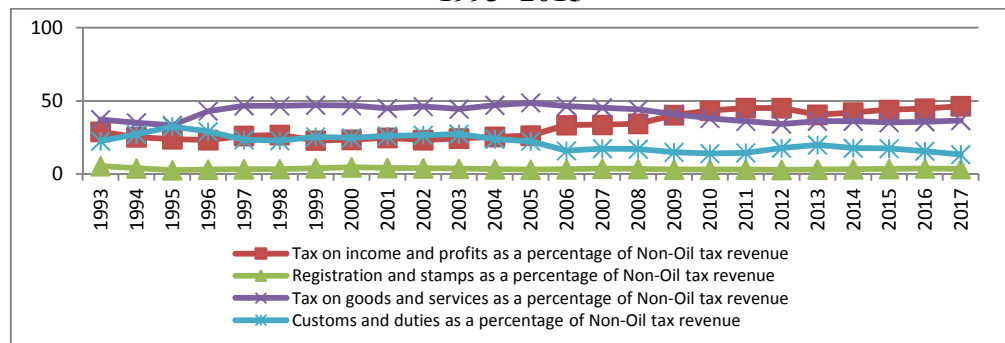
3.1 Trends and Composition of Non-Oil Tax Revenue:

Because of its importance, not only as a relatively stable and necessary resource for mobilizing state revenues and financing for development, but also as an increasingly important mechanism for achieving various economic and social goals the non-oil tax system in Algeria has received a great deal of attention from the authorities.

Figure (3) shows the predominance of indirect taxation to the detriment of direct taxation. Tax revenues on goods and services account for an average of 41.29 % of non-oil tax revenues for the period 1993-2017, which confirms that Algeria would have been dependent on indirect taxes as both an average important to obtain non-oil tax revenues and to achieve many economic and social objectives, and one of the effective tools that the government could use to balance supply and demand.

Customs duties revenues, as indirect taxes, were generally stable, with an average of 21.19 % for the period indicated above, but have started to decline in recent years. The lowest rate was 14.02% recorded in 2010. Tax on income and profit revenues remained stable at an average of 26.62 % of total non-oil tax revenue between 1993 and 2008, but exceeded 40 % thereafter. This remarkable growth could be seen as a logical consequence of wage increases in some areas of public administration at that time.

Fig. 3. Evolution of different taxes constituting non-oil taxation in Algeria 1993- 2015



Source: Authors based on International Monetary Fund Statistics.

The relative importance of indirect taxes (Customs duties and taxation on goods and services) increased on average by 62.48%, while the relative importance of taxes on income and profits decreased contrary to what has been registered in developed countries.

4. Methods and Materials :

To achieve the objective of this study, we will use the analytical approach to assess the performance and effectiveness of fiscal policy in revenue mobilization, as well as the econometric approach, using the ARDL model, to analyze and measure the impact of financial sector development on the collection of ordinary tax revenues in Algeria, distinguishing the effects of the development of financial markets from those of the banking sector.

4.1 Data and variables description:

In this study, we used the annual data covering the period of 1999 to 2017. This period was selected based on the availability of these data. Table (1) presents the data used and their sources. It is worthy to note that the data is transformed into logarithm so that the estimated parameters can be interpreted as elasticity.

Table 1. Description of variables and sources of data

Variable	Symbol	Source of data
Total non-oil tax revenue as a percentage of GDP (in log).	NOT	<i>National Office of Statistics(NOSAlgeria).</i>
Market capitalization as% of GDP (in log).	MC	Authors from the Algiers Stock Exchange.
Domestic credit provided to the private sector (in log).	DCPR	World Development Indicators (The World Bank).
Domestic credit provided to the public sector (in log).	DCPU	World Development Indicators (The World Bank).
Number of bank branches and financial institutions per 100,000 adults (in log).	NBB	Authors from NOS.

Source: Authors

4.2 Model specification:

The model applied for this study is inspired by the models used in the work of (Ilievski, 2012), (Taha, Colombage, Maslyuk, & Nanthakumar, 2013), (Akram, 2016), which express the linear relationship between tax revenues and financial development described in the following formula:

$$TR = f(\text{Financial System}) \dots (1).$$

Since the financial system includes many components, including banking and stock market activities, and the logarithm is applied to all variables, the model can be restated as follows:

$$NOT = f(LMC, LNBB, LPRVC, LPUBC) \dots (2).$$

This equation can be reformulated as follows:

$$LNOT_t = \alpha_0 + b_1 LMC_t + b_2 LPRVC_t + b_3 LPUBC_t + b_4 LNBB_t + \varepsilon_t \dots (3)$$

where:

The dependent variable **NOT_t**: Total Non-oil tax revenue as a share of GDP.

The explanatory variables:

- **LMC_t**: Market capitalization as a percentage of GDP as an indicator of financial market development.
- **LPRVC_t**: Domestic credit provided to the private sector (Banks and financial institutions) as a percentage of GDP.
- **LPUBC_t**: Domestic credit provided to the public sector (Banks and financial institutions) as a percentage of GDP.
- **LNBB_t**: Number of branches of banks and financial institutions for 1000000 adults.
- **L**: Natural logarithm.

The financial development indicators of this model have been integrated as potential determinants of Non-oil tax revenues, as they can potentially influence tax revenues by reducing informal economy activities and positively influencing economic activity.

4.3 Empirical Methodology:

To analyze the impact of the financial development sector on the Non-oil tax revenues collection in Algeria, the ARDL model, developed by (Pesaran , Shin , & Smit, 2001), will be used while distinguishing the effects of the financial development market from those of the banking sector. There are several advantages to using this dynamic model: Firstly, it is preferable when dealing with variables that are integrated of different order, $I(0)$, $I(1)$ or combination of the both. Secondly, contrary to Johansen's co-integration method, it is robust when there is a single long run relationship between the underlying variables in a small sample size, which corresponds to the sample size used in this study (19 observations). However, this model will crash in the presence of integrated stochastic trend $I(2)$ (Nkoro & Uko, 2016, p. 64) . Thirdly, the ARDL approach deals with the endogeneity of certain variable regressions by providing long-term estimates and significant t-statistics. Fourthly, The ARDL approach also enables the simultaneous identification of the short and long-term effects of a variable (GÖVDELI, 2019, p. 125). In addition, this model also takes sufficient numbers of lag and directs the data generating process in a general specific modeling framework (Yimer, 2017, p. 133). According to the study by (Pesaran & Shin, 1995) and that of (Pesaran H. , 1997), we

can reformulate model 3, in a dynamic framework to the ARDL model as follows:

$$\begin{aligned} \Delta LTR_t = & \alpha_0 + \sum_{i=1}^p a_1 \Delta LTR_{t-i} \\ & + \sum_{i=0}^q a_2 \Delta LMC_{t-i} \sum_{i=0}^q a_3 \Delta LPRVC_{t-i} \sum_{i=0}^q a_4 \Delta LPUBC_{t-i} \sum_{i=0}^q a_5 \Delta LNBB_{t-i} \\ & + b_1 LTR_{t-1} + b_2 LMC_{t-1} + b_3 LPRVC_{t-1} + b_4 LPUBC_{t-1} + b_5 LNBB_{t-1} \\ & + \varepsilon_t \dots (4) \end{aligned}$$

Where:

α_0 : Intercept.

a_1, a_2, a_3, a_4, a_5 : Parameters of the short-run relationship.

b_1, b_2, b_3, b_4, b_5 : Parameters of the long-run relationship.

p, q : The lag lengths.

ε_t : The error term.

In order to test co-integration among variables, the Wald F-Statistics for testing the join hypothesis has to be compared with the critical values as tabulated by (Pesaran , Shin , & Smit, 2001).

The representation of the error correction of the ARDL model is given by:

$$\begin{aligned} \Delta LTR_t = & \alpha_0 + \sum_{i=1}^p a_1 \Delta LTR_{t-i} \\ & + \sum_{i=0}^q a_2 \Delta LMC_{t-i} \sum_{i=0}^q a_3 \Delta LPRVC_{t-i} \sum_{i=0}^q a_4 \Delta LPUBC_{t-i} \sum_{i=0}^q a_5 \Delta LNBB_{t-i} \\ & + \theta \mu_{t-1} + \varepsilon_t \dots (5) \end{aligned}$$

Where:

a_1, a_2, a_3, a_4, a_5 : Parameters of the short-run relationship.

θ : Adjustment rate coefficient (correction coefficient), which should be negative, as it indicates the rate at which the short-term relationship is close to the long-run equilibrium relationship.

ε_t : The term of errors

5. Results and discussion:

5.1 Stationary Test:

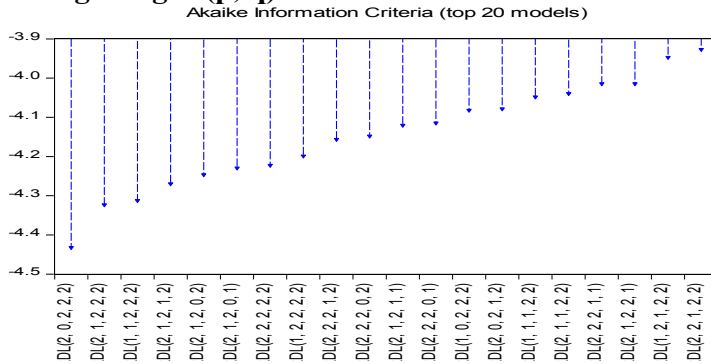
We tested the stationary of the different series, using the Phillips and Perron (PP) test (1998). The results indicate that all variables are stationary in first difference I (1), which means that the co-integration test could be applied.

5.2 Cointegration test of Pesaran, et al. (2001):

5.2.1 The choice of the optimal Lag Length for the ARDL Model:

In this study, we applied AIC for lags selection. Figure (4) shows that the model ARDL (2,0,2,2,2) is optimal among the 19 other models, because it gives us the smallest value of AIC and offers us a model without the problem of autocorrelation errors, no problem of heteroscedaticity.

Fig. 4. Optimal Lag Length (p, q)



Source: Authors

5.2.2 ARDL Bounds Test:

It is clear from Table (2) that the Calculated F-statistic is greater than the upper bound critical value proposed by (Pesaran , Shin , & Smit, 2001) for the different thresholds of significance (1%, 5%, 10%). These results confirm the rejection of the null hypothesis of the absence of a long-run relationship.

Table 2.ARD L Bounds Test

Calculated F-statistic	Significancelevel	Critical value	
		LowerboundI(0)	UpperboundI(1)
15.46	10%	2.45	3.52
	5%	2.86	4.01
	1%	3.74	5.06

Source: Author's calculations.

5.3 Estimating long-run relationships among variables:

As shown in Table (3), all the estimated parameters of the explanatory variables are not significantly different from zero, with the exception of the number of bank branches and financial institutions that was significant at 10%, though having a negative sign. This confirms that the increase in the tax revenues perception in the long-run in Algeria is subject to other determinants and factors (economic and non-economic) and that the main financial development indicators (financial market development indicator, banking sector indicators) have had no impact on the government's ability

to increase tax revenues in the long-run, confirming the inefficiency of the Algerian financial system (banking and non-banking) to improve taxation revenue collection in the long-run, which requires reforms that will improve the performance of the financial sector.

Table 3. The estimated long-run coefficients

Variables	Coefficient	Standard error	t-Statistic	P-value
LBB	-22.86	10.36	-2.21	0.0919
LSM	-0.42	0.54	-0.77	0.4866
LPRVC	4.56	2.36	1.93	0.1258
LPUBC	-0.54	1.39	-39.52	0.7171

Source: Author's estimates.

5.4 Short-Run Coefficients Estimates of Model:

The short-run relationship is estimated using the Error Correction Model (ECM) according to equation (5) mentioned above. The results presented in Table (4), indicate that the estimated error correction coefficient (CointEg (-1)) is negative and significant at a level of 5%, confirming the existence of a correction mechanism error. This coefficient, expressing the degree to which the tax revenue variable will be recalled to the long-run target, is estimated at -0.29 for our ARDL model. In other words, the difference in the short-run tax revenue index will be corrected in the long-run by 29% of each period until it reaches a long-run equilibrium. Moreover, the results showed that the index of change in the banking sector (credit to the private sector) is essentially different from zero, indicating that the banking sector development seems to have a positive and significant effect on the perception of short-run.

The value of market capitalization relative to GDP has had a negative impact, but it is low, which could be explained by the poor performance and inefficiency of the Algerian financial market. Whereas the second indicator of the banking sector development (credit to the public sector) was not statistically significant, and this indicates that public sector credit had no effect on the tax revenues generation. This could be explained by the non-productive use of public loans.

Table 4. The estimated short-run coefficients

Variables	Coefficient	Standard error	t-Statistic	P-value
Constant	3.63	0.29	12.34	0.0002
ΔNOT_t	-0.21	0.07	-2.75	0.0513
ΔLSM_t	-0.31	0.05	-6.29	0.0033
ΔLSM_{t-1}	0.15	0.03	5.52	0.0053
ΔLPRVC_t	1.74	0.12	14.1	0.0001
$\Delta \text{LPRVC}_{t-1}$	-0.24	0.09	-2.65	0.0569
ΔLPUBC_t	0.05	0.08	0.55	0.6124
$\Delta \text{LPUBC}_{t-1}$	-0.73	0.08	-9.47	0.0007
CointEg(-1)	-0.29	0.02	-12.43	0.002
R-sq	0.97	DW	2.74	

Source: Author's estimates.

5.5 Robustness tests of the estimated ARDL model:

To test the validity of the estimated ARDL model we used some tests. The results obtained, presented in Table (5), confirm the absence of serial correlation, the absence of heteroscedasticity, and the normality of the residues.

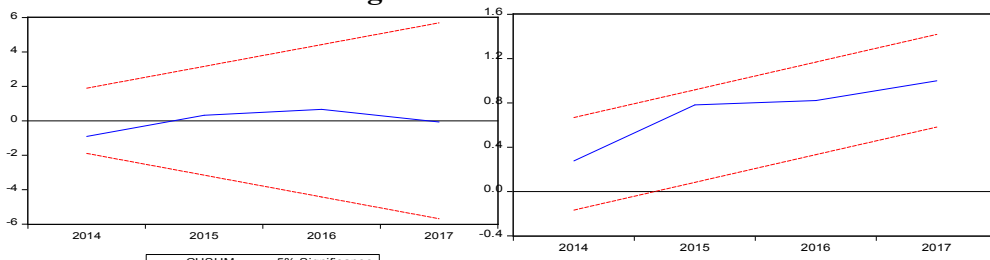
Table 5. Diagnostic tests of ARDL model

Tests	Statistic	Value	Prob
Autocorrelation: Breusch-Godfrey	F-Statistic	5.46	0.15
	chi-squared	14.37	0.0008
Normality: Jarque-Bera	Jarque-Bera	2.43	0.29
Heteroskedasticity: Breusch-Pagan-Godfrey	F-Statistic	0.23	0.97
	chi-squared	7.00	0.85

Source: Author's calculations.

5.6 Stability test of the model:

Figure (5) shows that the both CUSUM and CUSUMQ remain, at all times, within the area restricted by the lines, thus, the estimated ARDL model is effective with stable recursive residuals.

Fig. 5. CUSUM and CUSUM

Source: Authors

6. CONCLUSION:

Although economic theories do not fully mention the relationship between financial, banking and non-banking activities, and tax revenues, many studies have attempted to analyze them. This study was conducted to determine the impact of the financial system activities on the tax revenues collection in Algeria for the period from 1999 to 2017, applying the ARDL model.

The results have shown that the financial sector activities, banking and non-banking, do not play a central role in the tax revenues collection in Algeria in the long-run, which confirms that the increase of the latter (tax revenues collection) is subject to other determinants and factors (economic and non-economic). Based on the empirical results obtained, our hypothesis, which assumes that Algeria's financial system; both banking and non-banking, is very underdeveloped and unable to play its role in improving the Non-oil tax revenues collection, is confirmed. This means that the main financial development indicators (financial market development, changes in the banking sector) have had no long-run impact on the government's ability to increase tax revenues, therefore confirms the inefficiency of the Algerian financial system activities to improve long-run revenue collection, which requires reforms to improve the financial sector performance.

The short-run dynamic model estimate yielded mixed results: credit to the private sector had a positive and significant impact on tax revenue generation, while public sector credit had no effect and could be explained by the non-productive use of loans. On the contrary, the coefficient of variation of the financial market development index had a negative impact, though weak. This supports the assumption of poor performance and inefficiency of the Algerian financial market.

All in all, from these results, Algeria is invited to do more to create an appropriate financial system that will help generate tax revenue by strengthening the stock market's activities and offering investment incentives, generating more tax revenues. Especially since the development of financial markets is negatively related to the informal economic size. In addition, the government should promote additional banking activities that might well help generating tax revenues in the short- and long-run.

5. Bibliography List:

1. Ajide, F., & Bankefa, O. (2017). Does financial system influence tax revenue? The case of Nigeria. *African Journal of Economic Review* , 5(3), 15-33.
2. Akçay, S., Sağbaş, İ., & Demirtaş, G. (2016). Financial Development and Tax Revenue Nexus in Turkey. *Journal of Economics and Development Studies* , 4(1), 103-108. doi:10.15640/jeds.v4n1a10
3. Akram, N. (2016). Do financial sector activities affect tax revenue in Pakistan? *The lahore journal of economics*, 153-169.
4. Assadzadeh , A., & Fouman Ajirlou, Y. (2017, May). Investigating Effects of Banking and Stock Market Activities on Tax Revenues in Iran. (M. a. Faculty of Economics, Éd.) *Quarterly Journal of Applied Theories of Economics*, 149-172.
5. Bayar , Y., & Karamelikli, H. (2017). Financial development and tax revenues in Turkey: A non linear cointegration. *The european journal of applied economics*, 31-42. doi:10.5937/ejae14-14838
6. Benatek, H., & Hadjmaoui, T. (2015). Estimating the Tax Buoyancy of Non-Hydrocarbon Direct And Non-Hydrocarbon Indirect For ALGERIA During 1993-2011. *revue scientifique Avenir économique*, 37-56.
7. Bittencourt, M., Gupta, R., & Standar, L. (2014). Tax evasion, financial development and inflation: Theory and empirical evidence. *Journal of Banking & Finance*, 41, 194-208.
8. Blackburn, K., & Bose, N. (2012). Tax evasion, the underground economy and financial development. *Journal of Economic Behavior & Organization*, 83, 243-253. doi:10.1016/j.jebo.2012.05.019
9. Bourbonnais, R. (2011). *Econométrie : Manuel et exercices corrigés*.Paris: Dunod.
10. Brown, R., Durbin , J., & Evans, J. (1975). Techniques for Testing the Constancy of Regression Relationships over Time. *Journal of the Royal Statistical Society. Series B*, 37(2), 149-192.
11. Capasso, S., & Jappelli, T. (2013). Financial development and the underground economy. *Journal of Development Economics*, 101, 167-178. doi:10.1016/j.jdeveco.2012.10.005
12. GÖVDELİ, T. (2019). External Debt and Economic Growth in Turkey: An Empirical Analysis. *"Sosyoekonomi Journal*, 119-130. Récupéré sur <http://dergipark.gov.tr/download/article-file/691349>
13. Hatemi, A. (2008, January). Tests for cointegration with two unknown regime shifts with an application to financial market integration. *Empirical Economics*, 497-505.

14. Ilievski, B. (2012). Tax Revenue and Financial Development: Theory and Evidence (PhD Dissertation). 1-30.
15. Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 169-210.
16. Nkoro, E., & Uko, A. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique. *Journal of Statistical and Econometric Methods*, 5(4), 63-91.
17. OCDE. (2000). *Mesurer les charges fiscales : Quels indicateurs pour demain ?* Paris: Etudes de politique fiscale de l'OCDE. doi:10.1787/9789264281585-fr
18. OCDE. (2018). Paris: OCDE/ATAF/CUA. doi:10.1787/9789264305885-en-fr
19. Pesaran , H., Shin , Y., & Smit, R. (2001, June 22). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16, 289-326. doi:10.1002/jae.616
20. Pesaran, M., & Shin, Y. (1995, February). Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. (U. o. Department of Applied Economics, Éd.) *DAE Working Paper Series No. 9514*, 1-33.
21. Pesaran, M., & Shin, Y. (1999). Autoregressive distributed lag modelling approach to cointegration analysis In: *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. (S. S, Éd.) *Cambridge University Press, Cambridge*, 371-413.
22. Pyle, D. (1989). The Consequences of Tax Evasion and the Black Economy. *Palgrave Macmillan*, 130-152.
23. Taha, R., Colombage, S., Maslyuk, S., & Nanthakumar, L. (2013). Does financial system activity affect tax revenue in Malaysia? Bounds testing and causality approach. *Journal of Asian Economics*, 24, 147-157. doi:10.1016/j.asieco.2012.11.001
24. Tanzi, V., & Zee, H. (2001, March). Tax Policy for Developing Countries. *International Monetary Fund*, 1-21.
25. Yimer, A. (2017). Macroeconomic, Political, and Institutional Determinants of FDI Inflows to Ethiopia: An ARDL. (A. Heshmati, Éd.) *Springer Singapore ptd ltd*, 123-151.