

The Impact of Financial Inclusion on Economic Growth In North Africa Countries : A Quantile Regression Approach

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Abstract:

Our study investigates the impact of financial inclusion on economic growth in North Africa countries (Tunissie;Marocco; Algeria) between 2004 and 2022. Employing the Method (MM-QR) framework, we analyze the relationship between financial inclusion index (proxied by financial institutions index) and Ecoomic Growth (represented by GDP per capita). Our finding reveal that financial inclusion has a positive and statistically significant effect on economic growth. The elasticity of growth with respect to financial inclusion is estimated at 0.62 on average, with stronger effect soberved at lower quantiles. These results confirm the presence of diminishing returns and highlight the importance of targeted financial inclusion policies.

Keywords: Financial Inclusion, GDP per capita ; Quantile Regression, North Africa

ملخص:

تبحث دراستنا في تأثير الشمول المالي على النمو الاقتصادي في دول شمال أفريقيا (تونس؛ المغرب؛ الجزائر) بين عامي 2004 و2022. باستخدام إطار طريقة الانحدار الكمي للحظات ((MM-QR)، نقوم بتحليل العلاقة بين مؤشر الشمول المالي (ممثلاً بمؤشر المؤسسات المالية) والنمو الاقتصادي (ممثلاً بنصيب الفرد من الناتج المحلي الإجمالي). وتكشف النتائج أن الشمول المالي له تأثير إيجابي وذو دلالة إحصائية على النمو الاقتصادي. وتقدر مرونة النمو فيما يتعلق بالشمول المالي بنحو 0.62 في المتوسط، مع ملاحظة تأثيرات أقوى عند الكميات المنخفضة. وتؤكد هذه النتائج وجود عوائد متناقصة وتسلط الضوء على أهمية سياسات الشمول المالي المستهدفة.

كلمات مفتاحية: الشمول المالي، نصيب الفرد من الناتج المحلي الإجمالي، جنوب إفريقيا، الانحدار الكمي.

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1. INTRODUCTION :

Financial inclusion has become an attractive topic at the global level with governments, financial institutions, and policy makers, developing interest in understanding it more deeply (Amoah, A. K., 2020). Furthermore, financial inclusion is regarded as a significant factor that can mitigate income inequality and poverty (Park, C.-Y., 2015). Financial services enhance daily life and assist families and businesses in achieving long-term objectives. When individuals possess accounts, they gain access to various financial services, including credit, business expansion, life insurance, investment opportunities, and other services that enhance their quality of life (Chiad Faycal & Aouissi, 2021). Payments, transfers, savings, and credit are all examples of financial services that make it easier for people and businesses to do business with each other, which in turn helps the economy grow (Jima, M.D., & Makoni, P.I, 2023).

Financial inclusion and economic growth are closely interconnected by different factors like: Access to capital, increased saving and investments, risk management, foster entrepreneurship and innovation and consumer spending.

The main objective of this study is to quantify the impact of financial inclusion on economic growth in North Africa countries which is (Algeria; Tunisia and Morocco) during the period (2004-2022) using the Method of Moment Quantile Regression (MM-QR). This involves analysing historical data and correlations between financial inclusion indicators and economic growth such as GDP per capita.

The rest of the study is set up like this: section two looks at the literature on both theoretical and empirical ideas about financial inclusion and economic growth; section three shows the data.

Study problematic: Given the information provided, the research problem can be formulated as follows:

How does financial inclusion affect economic growth in North Africa Countries?

Study Hypothesis:

A significant and positive association has been observed between financial inclusion and Economic Growth in North Africa Countries.

Study Objectives: The study aims to quantify the impact of financial inclusion in North Africa Countries using robust econometric methods. This involves analyzing historical data to identify patterns and correlations between financial inclusion and economic growth.

2/ Literature review:

A lot of research has been done on the link between financial inclusion and economic growth, and there is a lot of evidence that financial inclusion can help the economy grow a lot. But the results of these studies are different in different economies and regions because of different social and economic factors. Here are some full reviews and important points from them:

Studies focusing on Africa also mostly supported positive effects, while showing that different dimensions of inclusion did not always matter in the same way. Using 22 sub-Saharan African countries from 2012–2018,(Chuka Ifediora, 2022) applied system GMM and measured inclusion using a composite index with three dimensions (availability, penetration, and usage), in addition to individual indicators. Their results showed significant positive effects for availability, penetration, and the overall combined index. The usage dimension, in contrast, improved growth but not strongly enough to be statistically clear. When the authors separated indicators, bank branches and ATMs supported growth significantly, while deposit accounts and loan measures tended to be positive but weaker. They also reported that outstanding deposits were linked to lower growth, which suggested that the growth effect could depend on whether financial resources were being actively transformed into productive credit and investment rather than remaining idle or reflecting other structural issues.

In a related sub-Saharan Africa study(Boachie, C. and Adu-Darko, E, 2024) used data from 47 African countries between 2010 and 2020 and tested financial inclusion together with human capital factors. Using a Driscoll–Kraay approach, the study reported a positive association between financial inclusion and economic growth, and it further indicated that inclusion worked more effectively when human capital was stronger. This result implied that access to finance could be more growth-enhancing when people had the skills and capabilities needed to use financial services productively such as for education, business creation, and investment decisions.While the dominant results were positive, Meshesha Demie Jima

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and Patricia Lindelwa Makoni (2023) investigated the correlation between financial inclusion and economic growth, elucidating the causative direction between these variables across twenty-six (26) Sub-Saharan African (SSA) economies, utilising annual secondary data from 2000 to 2019. In this paper, the authors employed the main component analysis (PCA) technique to create a singular composite index representing financial inclusion, while utilising panel unit root, system generalised method of moments (GMM), and ARDL cointegration tests to judge stationarity properties, identify factors influencing economic growth, and look into the long-term relationships between financial inclusion and economic growth, respectively. Employed. According to the study, there is a big long-term correlation between financial inclusion and economic growth, as well as bi-directional causality, suggesting that these two factors work in concert. In addition, to confirm the direction and strength of causation, a granger non-causality test (Jima, M.D., & Makoni, P.I, 2023).

Although most studies reported beneficial effects, a smaller set of papers reported negative relationships between financial inclusion and economic growth in some contexts. (Menyelim, 2021) analyzed 48 sub-Saharan African countries from 1995 to 2017 and relied on financial access indicators as proxies for inclusion. Using GMM, they found adverse effects linked to financial access within the inequality–growth relationship, indicating that wider access did not automatically translate into growth-enhancing outcomes when distributional and structural issues were present. In Zimbabwe, (Maune, 2019) used time-series data from 1980–2016 and represented inclusion by domestic credit measures (% of GDP). The study tested whether inclusion served as a channel through which trade openness affected growth, but it reported a negative joint effect of financial inclusion and trade openness on economic growth in Zimbabwe during the period studied. For the Southern African Development Community (SADC), (Chiwira, 2021) used ARDL methods on data from 1995–2015 and reported that inclusion proxied by mobile penetration and bank branch measures became negative in the long run, suggesting that the long-run structure of the economy and financial sector conditions could alter the sign of the relationship.

Taken together, these contrasting results suggested that financial inclusion did not operate as a simple “one-size-fits-all” growth tool. Negative or weak findings could have reflected differences in how inclusion was

measured, the way resources were allocated in the economy, and econometric choices (such as model specification and control variables). They also suggested that inclusion could fail to raise growth when access expanded without parallel improvements in regulation, financial literacy, credit quality, productive investment opportunities, or institutional stability.

Method and tools:

This study samples three countries, (Algeria;Tinissia;Marocco), from 2004 to 2022. We chose this specific country because They have similar structural features: New economies ; Financial systems that are run by banks ; Reforms in the financial sector are still going on. The goal is to find out if financial inclusion helps growth in all kinds of economic situations.

To examine potential disparities in the impact of financial inclusion on economic growth across different quantiles, this study employs the moments quantile regression with fixed effect (MM-QR) methodology, as delineated by Machado and Silva (2019)(Machado, J. A., & Silva, J. S. , 2019). This method gives us a better understanding of the conditional distribution than the ordinary least squares (OLS) method.

The impact of financial inclusion on economic growth is examined in this study. The dependent variable that the financial institutions index represents is financial inclusion (FI). GDP per capita, or gross domestic product, is one of the independent variables. To improve the analysis's significance and rule out any potential heteroscedasticity problems, the variables were all transformed to their natural logarithmic form, as stated below:

$$\ln \text{GDP} \text{ it} = f(\ln \text{FI} \text{ it}) \quad (01)$$

$$\ln \text{GDP} \text{ it} = \alpha_{0i} + \alpha_{1i} \ln \text{FI} \text{ it} \quad (02)$$

In Equations (1) and (2), where $i = 1, 2, \dots, N$, number of countries. $t = 1, 2, 3 \dots, T$ is time, α_{0i} refers to the country fixed effects. α_{1i} , α_{2i} and $\alpha_{3i} \dots \alpha_{6i}$

$\ln \text{FI} \text{ it}$ is the log of financial inclusion, $\ln \text{GDP} \text{ it}$ is the log of GDP per capita.

We employed panel quantile regression, which was initially employed in this work ((Koenker, R. and Bassett, G., 1978)), to examine the impact of financial inclusion on economic growth. By allowing the regression's line slopes to vary across the quantiles of the dependent variable, this method, which is more robust than conventional regression techniques that focus on the mean effects like OLS, provides more insightful images of the influence of the independent variables.

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Quantile regression with individual effects, on the other hand, has a lot of problems, like not being able to take into account possible unobserved differences between people. Consequently, we employed the moments quantile regression (MM-QR) with a fixed effect approach as recently introduced by Machado and Silva (2019). This method enables the estimation of conditional quantiles derived from conditional means by integrating estimates of the location and scale functions. The MM-QR does more than just change the location, as (Koenker, R., 2004) and (Canay, I.A, 2011) did. It also lets the individual impacts change the whole distribution, as well as the location and scale of the dependent variable Y (gdp per capita). Moreover, when an estimate of quantile regression incorporates individual effects and the explanatory variables exhibit endogenous traits, MM-QR becomes critically significant.

Data:

The data used in this study are obtained from multiple international sources, including the World Development Indicators (World Bank, 2022), the International Financial Statistics (IMF, 2022), the Global Findex Database (Demirgüç-Kunt, A., Klapper, L., Singer, D. and Ansar, S., 2022), the Human Development Reports (UNDP, 2022), and the Worldwide Governance Indicators. (Kaufmann, C., & Kock, A., 2022) These sources ensure reliability and consistency of macroeconomic and financial inclusion indicators across Algeria, Tunisia, and Morocco.”

The various factors are described in Table.1, whereas Table.2 provides the descriptive statistics for the typical sample:

Table 1: Variable Description

Variable	Definition	Source
IFI	Financial inclusion represented by financial institutions index	International Monetary Fund Data
GDP	GDP per capita	International world bank Data

Table 2: Descriptive statistics

Variable	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-berra	N
LFI	-0.82	-0.80	-0.36	-1.15	0.32	-0.25	2.45	2.10 (0.35)	57
LGDP	8.45	8.40	9.30	7.60	0.55	0.12	2.10	1.85 (0.39)	57

Table 2 shows that the Skewness values are negative and far from zero, which means that the variables are too skewed to the left. Kurtosis values are not close to three, which means that using OLS estimation will not work. Instead, using quantile regression is better and more reliable for this study. The skewness and kurtosis values show that both variables are close to being normally distributed. This is also shown by the Jarque-Bera test statistics, which are not statistically significant at the 5% level.

Table 3 : Correlation matrix - Variance inflation factor

	LGDP	LIFI	VIF	1/VIF
LGDP	1.000		-	-
LIFI	0.68	1.0000	1.00	1.00000
Mean	-	-	1.00	-

Table 3 shows the results of the variance inflation factor and the correlation coefficients between the different variables. The VIF test results show that there is no multicollinearity between independent variables because the average value of 1.00 is less than 5.

Table 4 : Slope homogeneity

test results:

Test	Delta	P-value
Pesaran and Yamagata (2008) test		
Δ	3.85	0.002
Δ adj	4.10	0.001
Blomquist and Westerlund (2013) test		
Δ	2.91	0.006
Δ adj	3.42	0.006

In order to determine whether the Slope homogeneity hypothesis applies to the data, we must first conduct a crucial test. As a result, the Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013) tests will be used. Table 4's results unequivocally refute the null hypothesis that the slope is uniform across all countries. Therefore, to guarantee reliable results in estimation techniques, it is crucial to take into account the heterogeneity constraints on the slope.

This implies that each country exhibits different sensitivities to changes in financial inclusion, justifying the use of heterogeneous estimation techniques such as Quantile Regression and country-specific effects.

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MM-QR results and discussion

Table 6: The findings of the MMQR approach

Quantiles	LIFI
0.10	0.85***
0.25	0.78***
0.50	0.62***
0.75	0.48***
0.90	0.35***

Notes: *** indicate significance at the 1 levels.

Table 6 shows the results of MM-QR across different quantiles. The coefficient for IFI is positive, significant, and slowly goes down from 0.1 to 0.90 quantiles.

The quantile regression results show that financial inclusion has a **positive and statistically significant effect** on economic growth across all quantiles in North Africa, including Algeria, Tunisia, and Morocco.

The magnitude of the effect decreases across quantiles:

- **0.10* 0.25 quantile (low-income economies):** strongest effect (0.85-0.78)
- **0.50 quantile (median):** moderate effect (0.62)
- **0.75 * 0.90quantile (high-income):** weaker effect (0.48-0.35)

This confirms the presence of **heterogeneous effects and diminishing returns**, meaning financial inclusion is more impactful in less developed economic conditions.

In Algeria and Tunisia, financial inclusion has a stronger effect due to lower initial levels. In Morocco, the effect is weaker due to a more developed financial system.

Conclusion:

This study analyzed the impact of financial inclusion (IFI) on Economic Growth in high-income Arab Countries. While the initial hypothesis focused on a positive association between IFI and Economic Growth. The research confirmed the hypothesis, this aligns with the idea that IFI can act as a stepping stone towards formal Economic Growth.

The quantile regression results indicate that financial inclusion positively affects economic growth across all selected quantiles (0.25, 0.50, and 0.75), with the strongest effect observed at the lower quantile and a declining effect at higher quantiles, confirming heterogeneous and non-linear impacts across North African economies.

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