Financial Development and Economic Growth among Arab Maghreb Countries: Dynamic Panel Model Analysis

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Abstract
This paper examine the short and the long run elasticities and the link between financial development and economic growth in Arab Maghreb countries. Using credit to private sector, foreign direct investment and domestic savings as a proxy for financial development. The study adopts Generalised Method of Moments (GMM) technique with data from World Development Indicators (1970-2012).The results reveals positive relationship between financial development and economic growth. Also, reveals that improvement in financial indicators has the same impact on economic growth in both the long and the short-run.
Keywords: Arab Maghreb union, Economic growth, financial development

Introduction

From the past decade to recent times, both theoretical and empirical studies on the link between financial development and economic growth have been inconclusive and ambiguous especially in the Africa continent. However, Baliamounce (2008) found that the importance of financial development in fostering economic growth and development in both developed and developing countries cannot be overemphasized. It has been shown that financial development has positive effects on economic growth and development (Bittencourt, 2012). In addition, Liang and Teng (2006) found that a well-developed financial system is instrumental in attaining sustainable and balanced growth in any country. This is because such a system increases the availability of funding by mobilising idle savings, facilitating transactions and attracting foreign investments. Cerra and Saxena (2008), in their study on financial development and growth in six Asian countries found savings and investment as two key intermediate macro variables with micro foundation that play a significant role in economic growth. In addition, World Bank (2012) report indicate that the financial sector is one of the forces pushing development in both developed and developing countries.

According to McKinnon- Shaw (1973), financial development is a pre-requisite for economic growth. They also point out that financial development can affect growth rate positively through its influence on saving and investment. The endogenous growth models, for example Bencivenga and Smith (1991), Greenwood and Jovanovic (1991) and King and Levine (1993) provide additional theoretical support to the relationship between financial development and economic performance.

Levine and Zervos (1998), using stock market variables as a measure of financial development found that the rate of financial development has positive impact of economic growth. Beckea et al. (2000) and Levine (2000) using the generalised methods of moments in a panel data analysis found financial development to exert positive influence on economic growth.

On the Africa continent, there have been several empirical studies between financial development and economic growth. Some of these empirical studies include Ghirmay (2004), Agbetsiafe (2004), Abu-Bader and Abu-Qarn (2008), Baliamoune-Lutz (2008), Atindehou et al. (2005) and Odhiambo (2007). However, despite the extensive literature in the area, there is no consensus on direction of causality between financial development and economic growth and also none of the studies examine both the short and the long run elasticity between financial development and economic growth. For example, the results by Ghirmay (2004) provided evidence in support of finance-led growth in eight out of the thirteen sub-Saharan countries investigated. In the same way, Agbetsiafe (2004) found unidirectional causality running from financial development to economic growth in seven African countries lending credence to finance-led growth hypothesis. Abu-Bader and Abu Qarn (2008) equally provided evidence in support for finance-led growth in Egypt, Morocco and Tunisia. However, Odhiambo (2007) found conflicting results for three sub-Saharan African countries investigated. He found evidence in support of demand-following hypothesis in Kenya and South Africa while in Tanzania the supply-leading hypothesis was supported. Similarly, Baliamoune-Lutz (2008) obtained mixed results for North African countries. Atindehou et al (2005) found weak causal relationship in almost all the twelve West African countries included in their study.

Among the Maghreb union member countries (Algeria, Libya, Mauritania, Morocco and Tunisia), prior to financial reform in these countries, the degree of monetisation differed significantly among them. Financial sector was market oriented in Morocco, while it was heavily regulated and repressed in many other union countries. Financial repression was mainly in the form of interest rate ceilings, credit allocation by government and setting high reserve requirements whiles interest rate in general was negative in real terms which caused

financial disintermediation resulting in a situation where savers direct their surplus outside the formal financial sector. Prior to the implementation of the financial liberalisation policies, banks were obliged to make loans to state enterprises in some Arab countries such as Algeria and Tunisia (Nigel et al, 1996). Furthermore, in these countries the banking sectors is generally not competitive and the range of financial services available to customers are narrow thereby the maturity and yield structure was not related to risk and liquidity (Elhag et al, 2000).

Essentially, given the plethora of reforms implemented in African countries over the study period and the conflicting results on the direction of causality between finance and economic growth, it is important to revisit the issue of finance-growth nexus among the Arab Maghreb member countries and also estimate short and long run elasticity for financial development and economic growth. Hence, the objective of this paper is to increase the understanding of the short run and long run elasticity and the relationship between financial development and economic growth by providing evidence from countries in the Arab Maghreb Union in Africa using the General Method of Moment (GMM) approach. The rest of the paper is structured as follows: Section 2 presents the empirical model and data source. Section 3 presents and discusses the empirical results. And finally, section 4 supplies some concluding comments.

2. Empirical model and data source

The generalized-method-of-moments (GMM) estimators for dynamic panel model as in the works of Sadorsky (2010), Arellano and Bond (1991), Arellano and Bover, (1995) and Blundell and Bond (1998) have been applied in this study as is widely used in recent years, especially in deriving the impact of financial development on economic growth. There are several merits associated with the use of GMM such as controlling time fixed effect, country specific effects and also determine the short run and the long run elasticities. In addition the GMM estimator is also typically used to correct for bias caused by endogenous explanatory variables.

The empirical model used in this study is specified as a reduced form dynamic panel model of economic growth as shown in equation (1):

$$Y_{it} = \alpha_i Y_{it-1} + \beta_{i1} fdi_{it} + \beta_{i2} \pi_{it} + \beta_{i3} gds_{it} + \beta_{i4} dcp_{it} + \varpi_i + \psi_t + \varepsilon_{it} \quad (1)$$

Where (Y_t) represent economic growth, (fdi) foreign direct investment, (π) annual rate of inflation, (gds) gross domestic savings and (dcp) domestic credit to the private sector. In addition, i represent the number of countries and t the time period of the study. Equation (1) is a general specification which allows dynamic effects, individual country effects (ϖ_i), fixed time effect (ψ) and stochastic error term (ε). In this approach the unobserved country-specific heterogeneity is eliminated by using a first differencing transformation. The Arellano and Bond (1991) approach is specifically designed for situations where there are a large number of cross sections and a small number of time periods. In this estimation process, the gross domestic credit to the private sector is treated as endogenous variable.

Data source and variables definition

Yearly data ranging from 1970 to 2 012 was collected from the World Bank Development Index (WDI, 2014) and International Monetary Fund (IMF) statistics covering member countries (Algeria, Mauritania, Morocco and Tunisia). To address the objective of this paper, foreign direct investment, domestic credit to the private sector and gross domestic savings were used as a proxy for financial development. This is because foreign direct investment can stimulate economic growth through technology transfer and diffusion, spill over effects, productivity gains, and the introduction of new processes and managerial skills (Batten and Vo, 2009). Studies by Grossman and Helpman (1991), Barro and Sala- i-Martin (1995) and Hermes and Lensink (2003) suggest that Foreign Direct Investment (fdi) plays an important role in modernizing the economy and promoting economic growth in developing countries.

In addition to FDI, choosing an appropriate measure of financial development is crucial to analysing the relationship between financial development and economic growth. Construction of financial development indicators is an extremely difficult task because of the diversity of financial services catered for in the financial system (Ang and McKibbin, 2005). Several indicators of financial depth have been used in the empirical literature as a proxy for development of the financial sector. Also, the ratio of domestic credit to the private sector (dcp). This ratio excludes the public sector and therefore reflects more efficient resource allocation in the economy, since the private sector is able to utilise funds in a more efficient and productive manner than the public sector. In addition it shows the extent to which the banking system channel funds to the private sector in order to facilitate investment and growth. Finally, according to the classical economists, savings is one of the key variables that drive economic growth and this relationship between savings and economic growth is confirm in a

number of empirical findings like Odhiambo (2009) and Masih and Peters (2010).

3. Empirical result and discussion

The empirical result presented in Table 1 shows the average annual growth rates of member countries from 1970 to 2012.

Table 1: Average annual growth rates over 1970–2012

countries	Gr	Dcp	fdi	gds	inf
Algeria	3.8	32.5	-	37.2	9.5
Mauritania	3.2	-	3.5	7.7	-
Morocco	4.2	-	0.98	18.8	5.1
Tunisia	4.9	56.6	-	22.1	-

Source: WDI, 2014

The average annual rate of financial development varies greatly among these member states. In terms of foreign direct investment, Morocco and Mauritania recorded 0.98 and 3.5 respectively. This implies that during the period under study, Mauritania experience more foreign investment that Morocco.

However, the result in Table 1 reveals that the average annual growth rates among these countries do not vary widely. The lowest growth rate among these countries is 3.2 percent (Mauritania) and the highest during the period under study being Tunisia that experience average growth rate of 4.9 percent. Also average rate of inflation among the union do not show a great disparity as the member state with the high average rate of inflation during the period is Algeria (9.5) percent and the lowest Morocco with 5.1 percent.

Credit to the private sector as a ratio to gross domestic product is 32.5 and 56.6 for Algeria and Tunisia respectively. This indicate that in this two countries, the private sector is consider as the engine of growth and relative high proportion of credit is given to the private sector. The effect of the high level of credit in the private sector is observed to have an impact of the economic growth of this countries as shown in the table with a level of 3.8 and 4.9 respectively.

Finally, the level of savings in this countries is relatively high except Mauritania. From Table 1 it can be observed that gross domestic savings are 37.2, 7.7, 18.8 and 22.1 for Algeria, Mauritania, Morocco and Tunisia respectively.

On the other hand, Table 2 shows the unit root test on the variables from a fixed panel regression.

Table 2: Unit root tests from fixed panel regression

	gr	dcp	Inf	fdi	gds
lgr	3.919***(17.55)				
ldcp		0.183***(8.97)			
linf			3.821***(5.67)		
lfdi				9.792***(8.18)	
lgds					12.755***(8.46)
H0:a1=1	3.543***	-6.3074***	7.778***	-6.0260 ***	-1.9937*

Source: WDI,2014; *p<0.01***,p<0.05**,p<0.10*: Robust t statistics reported in bracket*

The empirical result in Table 2 reports the estimated coefficients obtained from estimating a linear regression model of each variable on a one period lag of itself. The underlying asymptotic theory for the Arellano, Bond and Bover GMM estimator used in this study assumed that the time periods remains fixed and the cross sections become large. Using Levin-Lin-Chiu (2002) each of the variables unit root hypothesis is rejected. The empirical result in Table 2, revealed gross domestic savings (gds) variable shows the highest degree of coefficient while domestic credit to the private sector $(ldcp)$ series shows the least amount of persistence.

Table 3: Correlation matrix

	lgr	ldcp	fdi	lgds	linf
Lgr	1.00				
Ldcp	0.85	1.00			
Fdi	0.51	0.22	1.00		
lgds	0.39	0.25	-0.08	1.00	
Linf	-0.02	0.38	0.35	0.03	1.00

Source: WDI,2014

The result presented in Table 3 indicates the correlation matrix among the variables used for the Generalised Method of Moments (GMM) estimation. For the purposes of modelling, the variables under consideration are expressed in the natural logarithm form. The economic growth (lgr) variable shows a strong correlation (0.85) with domestic credit to the private sector and the lowest correlation with the rate of inflation. It can also be observe that most of the financial development indicators have a fair high correlation with economic

growth. In addition, the correlation among the financial development indicators are fairly low, indicating there is no problem of multicollinearity.

Table 4 present the results from the panel estimates for the system of GMM growth equations with domestic credit to the private sector as an endogenous variable as it strongly correlated with economic growth shown in the correlation matrix in Table 3.

Table 4: System of GMM estimation with domestic credit to the private sector as endogenous variable

	Model A	Model B	Model C	Model D	Model E
Igr(-1)	0.094**(2.24)	0.067**(2.24)	0.305**(2.24)	0.699**(2.24)	0.655**(2.24)
Idcp	0.111**(2.28)	0.108**(2.28)	0.167**(2.28)	0.138**(2.28)	0.145**(2.28)
Iinfl	-0.106*(1.93)	-0.106*(1.99)	-0.175*(1.98)	-0.229*(1.91)	-0.003*(1.91)
Ifdi		0.001**(2.01)	0.003**(2.81)	0.003**(2.81)	0.224**(2.81)
Igds				0.170**(2.976)	0.005**(2.976)
AR(1)	-2.07(0.02)	-2.14(0.01)	-2.12(0.00)	-2.13 (0.01)	-1.687(0.03)
AR(2)	0.54(0.54)	2.03(0.17)	0.566(0.23)	1.876(0.96)	2.876(0.65)
Sargan	85.299(0.07)	80.123(0.16)	79.67(0.11)	98.07(0.14)	88.99(0.23)

*p<0.01***,p<0.05**,p<0.10*: Robust t statistics reported in bracket: AR(1) and AR(2) show tests for autocorrelation in differences: Sargan test for over identification restriction*

As presented in Table 4, the AR (1) and AR (2) are Arellano and Bond (1991) tests for first-order and second-order autocorrelation in the first differenced errors. Also, the Sargan test (Arellano and Bond, 1991) is a test for over identifying restrictions. A rejection from this test indicates that the model or instruments may be miss-specified. The post estimation result presented in Table 4 shows that there is no existence of autocorrelation at the conventional levels of significance. On the Sargan tests the result indicate that none of the models shows evidence of miss-specification at 1% level .Therefore the post estimation results indicate that the dynamic panel economic growth model is a reasonably good specification for economic growth in Arab Maghreb member countries.

The result in Table 4 reveals financial development indicator variables have significant influence on economic growth among the union member countries. The estimated coefficient domestic savings are positive and statistically significant 5%. This result is important because it establishes the fact that financial growth plays a very critical role in economic development and this finding is confirmed by the work of Law and Singh (2014), Chen, Wu and Wen (2013) and Kleimeir andVersteeg (2010). In addition Batten and Vo (2009) and Levine and Zevos (1998) in their studies also found financial development to have a positive impact of economic growth.

Further, the empirical result also reveals foreign direct investment to be statistical significant at 5 per cent and positively related to economic growth. This means that as the rate of foreign direct investment in the region increases, the rate of economic growth will also increase in this direction. This positive relationship between foreign direct investment and economic growth has also been confirmed in other empirical studies such as Omri and Bassem (2014), Gao (2005), Johnson (2006) and World Bank (2002, 2003, 2005).

The result presented in Table 4 further shows a negative relationship between inflation and economic growth as this finding is in line with studies by other researchers. Stockman (1981) argued that individuals' welfare falls whenever there is an increase in inflation. The negative and significant effect of inflation on economic growth is an indication that inflation causes economic growth. This is consistent with the results by Bittencourt (2010) for four Latin American Countries (Argentina, Bolivia, Brazil and Peru) that inflation has a negative effect on economic growth. Ahmed and Mortaza (2005) found a statistically significant long-run negative relationship between inflation and economic growth for Bangladesh. Gokal and Hanif (2004) also found a statistically significant negative effect of inflation on economic growth for Fiji.

In other to determine the degree of change in economic growth as a result of change in each explanatory variable, the study estimated the elasticity coefficient of each of the explanatory variables as shown in Table 5. These elasticity coefficients of the variables are derived from the coefficients of the GMM estimates shown in Table 4. The short- run elasticity is the coefficients obtain from the GMM results while the long run elasticity is derived by dividing the short run elasticity by one minus the estimated coefficient of lag of economic growth variable.

Table 5: Economic growth elasticity estimates calculated using the estimates from GMM

	Model A	Model B	Model C	Model D	Model E
Short-run					
Idcp	0.111	0.108	0.167	0.138	0.145
Iinfl	-0.106	-0.106	-0.175	-0.229	-0.003
Ifdi		0.001	0.003	0.003	0.224
Igds				0.170	0.005
Long run					
Idcp	0.123	0.119	0.184	0.152	0.160
Iinfl	-0.117	-0.117	-0.193	-0.253	-0.003
Ifdi		0.001	0.003	0.003	0.247
Igds				0.188	0.006

Source: WDI, 2014

On the issue of the elasticity of financial development on growth, the result in Table 5 shows that the short run elasticity for domestic credit to the private sectors ranges from 0.108 to 0.167, indicating 10 % increase in domestic credit to the private sector increase economic growth in the short run within an average range between 1.1 to 1.7 %. Besides, in the long run 10% increase in domestic credit will increase growth between 1.2 to 1.8 % as the elasticity coefficients are between 0.12 to 0.18.

On the issue of inflation, the elasticity in the short-run ranges between -0.003 to 0.229 and in the long run it ranges between -0.003 to 0.253. This mean 10% increase in inflation will decrease economic growth in the short-run between 0.03 to 2.3% whiles in the long run the decrease will be between 0.03 to 2.5%.

The results from this paper show that increases in financial development indicators, measured using financial sector indicators, increases economic growth among the Arab Maghreb union countries in both the long run and the short run. The financial development indicator variables have relatively small short-run elasticities with respect to economic growth, typical between the ranges 0.001 to 0.224. The long run elasticities are similar to the short run elasticities which ranges between 0.001 to 0.247. This means for domestic savings, for example, 1% increases in savings increases economic growth by 0.05% in the short run and 0.006% in the long run.

Generally the result reveals that both the long-run and the short run financial development variables have almost the same elasticities. This implies that changes in financial development variables have similar magnitude of effect of growth in both the long and the short run.

The empirical results in this paper show that increases in financial variables increases the growth in Maghreb member countries. Since financial development indicators in these countries is likely to increase in the future, this additional increase in growth stemming from increased financial development needs to be taken into account when modelling the growth of these economies. Growth formulating policies of member countries is one area where the results of this paper could have key impact.

4. Concluding comments

The economic growth literature has emphasized the importance of financial development in helping most economies to grow and prosper. This paper is believed to be among the first to extend the study on the relationship between finanancial development and economic growth by estimating the short run and the long elasticity between financial development and growth.

The study adopted generalized method of moment's techniques to control for possible endogeneity between economic growth, domestic credit and financial development. The resulting empirical models fit the data well and pass a number of diagnostic tests. The results from this paper show that increases in financial development, measured using foreign direct investment, domestic savings and credit to the private sector increases the economic growth among the Arab Maghreb countries. It also revealed that improvement in the financial indicators has the same impact on economic growth in both the long run and the short-run. The study become very important as it will help policy makers to identify key sectors that drive economic growth and create the enabling environment.

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