

Foreign Direct Investment, Financial Development and Economic Growth in North African Countries

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Summary

This paper examines the relationships between foreign direct investment (FDI), financial development and economic growth on a panel of four North African countries (Tunisia, Morocco, Algeria and Egypt), over a 5-year period from 1992 to 2016. Using the system Generalized Method of Moments (GMM) in a panel data analysis, we found that FDI has a positive effect on economic growth. We also found that financial development appears to be working as a complement to FDI and, that the effect of FDI is more pronounced in the presence of the financial development variable. The policy implications of this study appeared clear. Improvement efforts need to be driven by local-level reforms to ensure the development of domestic financial system in order to benefit more from the significant inflows of FDI.

Keywords: foreign direct investment, financial development, economic growth, panel data analysis

JEL classification: F23, F34, F43

1. Introduction

The endogenous growth model has been developed by Romer (1986) and Lucas (1988). This growth model introduces capital

in the form of human capital accumulation and R&D and emphasizes the externalities that arise from these, types of capital. Foreign direct investment (FDI) encourages the incorporation of new inputs and technologies in the production systems of host countries. FDI could also promote economic growth endogenously if it generates productivity, positive externalities and spillover effects. Since FDI is considered as an important source of know-how, human capital and technological diffusion, these factors can be initiated to stimulate economic growth through FDI inflows. In the FDI-growth literature, empirical studies have so far yielded mixed results on whether FDI contributes positively to economic growth (e.g. Borensztein et al., 1998; De Mello, 1997, 1999; Hansen and Rand, 2006). Meanwhile, in the financial development-growth literature, the empirical results were more conclusive; most studies found that financial sector development contributes positively to economic growth (e.g. King and Levine, 1993a; Beck et al., 2000; Levine, et al., 2000).

Some studies have shown that the impact of FDI on economic growth can be limited by the local conditions existing in the host developing countries. For example, Borensztein et al., (1998) and Xu (2000) confirmed that FDI brings technology, which translates into higher growth only when the host country has a minimum threshold of stock of human capital. Further, the beneficial effect of FDI is enhanced in an environment characterized

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by an open-trade and investment regime and macroeconomic stability (Balasubramanyam et al., 1996). In Alfaro et al., (2004) it is found that the developed of local financial markets is crucial for FDI having positive growth impact. Somewhat similar effects seem to be in place in Alfaro et al., (2010) and Choong (2012) where linkages are found between the development of the host economy's financial system and the positive effects of FDI on economic growth: economies with more developed financial systems reap more benefits. Therefore, the implications for North African markets are mixed because poorer countries are less likely to possess the necessary initial absorptive characteristics.

This study is particularly significant for the North Africa region following recent political unrest and social tensions in many of these countries. Indeed, FDI contributes to economic growth in North Africa, which in turn generates additional revenues for the governments and the populations of the region through fiscal policies and job creation. Additionally, well-functioning financial markets can help channel foreign investments more efficiently into productive sectors, and therefore create more value for investors, hence making the countries more attractive to FDI. It is therefore important for governments in this region to reform and improve the development of domestic financial system in order to benefit more from the presence of FDI.

The contribution of this paper to the literature is threefold. First, further on the literature of the link between FDI and economic growth, this article, among other recent studies, is intended to identify the appropriate financial conditions under which a beneficiary country can fully benefit from FDI. Second, in terms of policy implications, the results of this research will guide policy makers in designing policies aimed at better directing external capital, such as FDI, towards sectors with the highest effect on economic growth. Third, for governments and policy makers, having

a better understanding of the characteristics of FDI and how they are linked to economic growth is key when designing sound policies to attract more "quality" foreign investments and to direct them toward appropriate sectors of the economy in a manner which increases the overall well-being of the population.

The main *purpose of this paper* is to examine the role of financial development in mediating the *impact* of FDI on economic growth on a panel of four North African countries, namely Tunisia, Morocco, Algeria, and Egypt, over a 5-year period from 1992 to 2016. Our dynamic panel regression analyses show that FDI positively and significantly effects economic growth in North Africa. This study also highlights the positive complementarities between financial development and FDI. This implies that the presence of FDI induces more capital-intensive investment in host countries and a better-developed domestic financial market is more effective in promoting economic growth.

The organization of the paper is as follows. Section 2 provides a detailed literature review. Section 3 describes the used data and the empirical methodology. Section 4 presents the empirical results. Section 5 presents the concluding remarks and policy implications.

2. Review of literature

2.1. Review of theoretical literature

The economic benefits of attracting FDI are generally twofold. First, countries with domestic savings so low that they are insufficient to finance a strategy of economic expansion (or where weak financial intermediation has a similar effect) may harness FDI as a source of external finance. This is assumed to be particularly relevant in the case of developing and emerging countries. Second, foreign corporate presence is, as demonstrated by an ample body of economic literature, generally associated with positive externalities ("spillovers") toward the host economy. The

channels through which the spillovers operate are at least fivefold. Foreign corporate presence may 1) act as a trigger for transfers of technology and know-how; 2) assist enterprise development and restructuring, not least in connection with privatization; 3) contribute to fuller international trade; 4) reinforce business sector competition; and 5) support human capital formation in the host country (De Mello 1997; Todo 2003; Basu and Guariglia 2007). Second, FDI flows tend to be more stable compared to alternatives, as it is purportedly more costly to reverse and less sensitive to global shocks than foreign portfolio investment (Lipsey 1999).

Similarly, the literature considers that trade openness contributes positively to the long-term growth prospects of a country (e.g. Van den Berg and Lewer, 2015). Integration and cross-border trade promote economic efficiency through resource reallocation, increased productivity, production specialization, scale economies and increased market opportunities. There is also accumulated empirical evidence suggesting that international trade has led to the increased efficiency, productivity, technology, and economic growth in both developed and developing countries (World Bank, 2015; Feenstra, 2015).

However, a number of studies *do not* report *significant unqualified statistical* relations between FDI and economic growth (Aitken et al., 1997; Aitken and Harrison 1999; Mencinger 2003). Using plant level data in Venezuela, Aitken and Harrison (1999) found that the net effect of FDI on productivity is quite small, with FDI raises productivity within plants that receive the investment but lowers that of domestically owned plants. Similarly, Haddad and Harrison (1993) re-examined the relationship between economic growth and FDI, however they did not found any positive effects of FDI on economic growth. Ghosh (2003) argued that although private capital flows are conducive to economic growth, these flows may also create the problem of

macroeconomic vulnerability, and in such a situation, the occurrence of financial crisis may not be an uncommon possibility. Kosack and Tobin (2006) noted that aid and FDI are not significantly related because development aid largely supports human capital, whereas FDI, being private, supports physical capital.

De Mello (1997) reported two main channels through which FDI may enhance economic growth. First, through capital spillovers, FDI facilitates the adoption of new technology in the production process. Second, FDI may stimulate the transfer of knowledge both in terms of labor training and acquisition of skills and by introducing alternative management practices and better organizational capabilities. Most studies have essentially attempted to explain this capacity in terms of commercial policies and human capital (see, for instance, Balasubramanyam et al., 1996 and Borensztein et al., 1998). Specifically, in an authoritative explanation of the importance of host country characteristics, Balasubramanyam et al., (1996) argued that the high technology which FDI typically embodies tended to serve as a favorable framework for the establishment of intellectual property rights. More aptly put, the more the weight attached to creating legislation backed guidelines for protecting property rights, the higher the willingness of foreign firms to follow through with high technology investments.

Theoretical explanations suggest that financial development stimulates economic growth by creating economic conditions that improve efficiency in resource allocation (see Levine, 1999). Building on this theoretical foundation, a number of empirical studies examined the relationship between financial sector development and economic growth (see, for example, Hermes and Lensink 2003; Alfaro et al., 2004, 2010; Azman-Saini et al., 2010; Choong, 2012; among others). The conventional wisdom suggested that financial development is an essential determinant as well as a major contributor of economic growth for several reasons.

First, a better-developed financial system provides a fertile ground for the allocation of resources, better monitoring, fewer information asymmetries, and economic growth (Shen and Lee, 2006). The financial system may contribute to economic growth via two channels. On the one hand, it mobilizes savings; this increases the volume of resources available to finance investment. On the other hand, it screens and monitors investment projects (*i.e.* lowering information acquisition costs); this contributes to increasing the efficiency of the projects carried out (Greenwood and Jovanovic 1990; Levine 1991). The more developed the domestic financial system, the better it will be able to mobilize savings, and screen and monitor investment projects, which will contribute to higher economic growth.

Second, financial systems influence the amount of credit rationing in financial markets and constrain potential entrepreneurs, which in turn determine economic growth. This is *particularly* true when the arrival of an entirely new technology brings with it the potential to tap not just domestic markets but export markets (Alfaro et al., 2004).

Third, the development of the domestic financial system *may also* determine to what extent foreign firms will be able to borrow in order to extend their innovative activities in the host country, which would in turn lead increase the scope for technological spillovers to domestic firms. Hermes and Lensink (2003) argued that the diffusion process may be more efficient once financial markets in the host country are better developed, since this allows the subsidiary of a multinational corporation to elaborate on the investment once it has entered the host country. As Demetriades and Andrianova (2004) explained, the existence of a sound financial sector is a precondition for the country to materialize new innovations and exploit its resources efficiently. In this way, finance is a deep determinant of economic growth.

Finally, the efficiency of financial market matters to the economic growth. According to Blejer (2006), the financial system's efficiency can be measured by the efficiency with which it transforms resources into capital. In other words, the financial sector functions efficiently if it intermediates at a minimum price and reduces the comprehensive cost of capital to its optimal level.¹ In fact, some researchers have argued that countries with efficient financial systems are less susceptible to the risk that a financial crisis will erupt in the wake of real economic disturbances and more resilient in the face of crises that do occur (Bordo and Meissner 2006; Beck et al., 2000). Indeed, countries with better developed financial systems, *i.e.* financial markets and institutions that more effectively channel society's savings to its most productive use, experience faster economic growth (Bekaert et al., 2003; Ranciere et al., 2006). Blejer (2006) highlighted that countries with an efficient financial system are better protected against the occurrence and magnitude of banking and currency crises.

Rather, some empirical studies argued whether FDI promote economic growth is contingent on some key *characteristics* of the host *country*, or absorptive capacity. In the substantial literature on relationship between FDI and economic growth there are few studies which have been conducted to test the role played by the local conditions to exploit the positive spillover effects of FDI (Hermes and Lensink, 2003). In such scenario, role of financial institutions is important in establishing link between FDI and economic growth effectively. A good financial system increases the efficient allocation of resources which in turn improves the absorptive capacity of a country with respect to FDI inflows.

¹ The comprehensive cost of capital is the sum of the cost of: raising funds by selling capital claims, monitoring the users of capital, and managing the portfolios of the capital claims themselves.

Developed financial sector can play an essential role by ensuring access to external finance and better allocation and monitoring of these funds. The presence of developed domestic financial sector is also crucial in determining the extent of foreign firms' borrowing to broaden their innovative activities to the domestic economy. Furthermore, a well-developed financial system can substantially reduce transaction costs and ensure proper capital allocation to high performing projects. This leads to enhanced growth rates. Alfro et al., (2004) confirmed that the absence of highly-developed financial markets limits the potential positive FDI externalities. The absorptive capacity of the host country seems to be the key explanatory variable for conflicting relationship between FDI-growth. Recently, Azman-Saini et al., (2010) argued that there is a minimum threshold level of financial development required for the positive effect of FDI on economic growth.

To further underline the crucial role of human capital, Borensztein et al., (1998) showed that in addition to the aforementioned level of investments, a well-trained and adequately motivated work force is required as a complement. At the heart of their argument is the fact that the spillover effects from the adoption of new technology can only be enjoyed by domestic firms if the host economy has attained a certain threshold in terms of human capital development. However, Baltagi et al., (2005) found that the role of FDI is significantly influenced by the third countries effects and the complex integration strategies of multinationals, especially the bilateral trade costs among host countries.

2.2. Review of empirical literature

Over the past decade, numerous studies have found evidence suggesting the importance of financial development in influencing FDI inflows in the African countries. Mlambo (2005) identified the weakness of financial systems as one of the factors constraining

FDI inflows to Southern African Development Community member states. Anyanwu (2006) indicated that, although prospects of increased domestic, foreign direct and private portfolio investment in Africa were awarded on inadequate resource mobilization, uncertainty, corruption, low human capital development, reliance on primary products and exports, poor governance, and underdeveloped capital markets all contributed to the rise and further the entrenchment of these constraints.

Gelb et al., (2007) found that the most fundamental constraints in Africa (such as macroeconomic stability and access to finance) appear to be most binding at low levels of income. Then, as a country develops, firms have to deal with a number of problems caused by weak governance and low administrative and bureaucratic capacity (corruption, level of taxation, quality of administration). Finally, as a country moves up to a higher-income status, labor regulation becomes a more serious determinant of the business environment, largely because the state has a stronger capacity to implement it. Brambila-Macias and Massa (2010) also investigated the long-run relationship between FDI, cross-border bank lending, bond flows, portfolio equity flows and economic growth in a sample of selected sub-Saharan Africa (SSA) countries. They proved that FDI and cross-border bank lending have a significant and positive impact on economic growth in SSA, whereas portfolio equity flows and bonds flows have no economic growth impact. Esso (2010) examined the finance-growth connection with focus on Burkina Faso, Cape Verde, Cote d'Ivoire, Ghana, Liberia and Sierra Leone and established a long-run relationship between the two variables. He showed that financial development precedes economic growth in Ghana and Mali, growth leads finance in Burkina Faso, Cote d'Ivoire and Sierra Leone, and finance and growth cause each other in Cape Verde and Liberia.

Kouki (2013) investigated the link between financial development and economic growth

in the North Africa region, using a panel regression and different indicators of financial development. The researcher found that the relation depends on the type of the indicator of financial development. In fact, while both financial institutions and markets in Morocco and Tunisia have a positive effect on the economic growth, only the financial markets in Egypt will improve economic growth by increasing the supply of financial services. For Algeria, the banking system has a positive effect on economic growth. Agbloyor et al., (2013) in their study of African countries found a three way relationship between banking industry, FDI and development of financial markets. Bi-directional positive causality was observed between FDI and development of banking sector. As per the study this leads to greater openness in banking sector in particular and financial markets through relative opening up of capital account. This can bring in more FDI.

Walle (2014) examined the long-run finance-growth nexus in SSA. He indicated the existence of a long-run relationship between financial and economic development in SSA countries. Moreover, he showed that the long-run causality runs from financial to economic development; although a muted support for the reverse causal impact is observed when financial development is measured by the percentage of liquid liabilities in GDP. Guidiby (2014) examined the impact of FDI on economic growth in 50 African countries. He found that FDI inflows have a significant impact on economic growth in the African region during the period of interest. Adams and Opoku (2015) confirmed that neither FDI nor regulations have independent significant impact, though; their connection has a major positive influence on economic growth. Their study concluded the regulatory regime of the countries affects the FDI-GDP correlation for 22 SSA countries. Anyanwu and Yameogo (2015) also argued that West African countries must increase their national incomes by

deepening macroeconomic and structural reforms to increase their competitiveness, dismantle existing structural bottlenecks to private and public investment, scale-up investments in hard and soft infrastructure, and increase productivity, especially in agriculture.

Zghidi et al., (2016) investigated the causal interactions between FDI, economic freedom and economic growth on a panel of four North African countries. They found that economic freedom appears to be working as a complement to FDI and that the effect of FDI is more pronounced in the presence of the economic freedom variable. Moreover, Ahmed (2016) explored the relationship between financial openness, financial market development and economic growth in 30 SSA countries. He showed that international financial integration may positively influence economic growth through enhancing the depth of the domestic financial system.

Otchere et al., (2016) examined the relationship between FDI and financial market development in Africa and found bidirectional causality, a positive relationship supported by multivariate regressions. Malikane and Chitambara (2017) studied the link between FDI, democracy and economic growth in Southern African countries. They found that FDI has a positive effect on economic growth and that strong democratic institutions are a significant driver of economic growth in the sample countries. The impact of FDI on economic growth is dependent on the level of democracy in the host countries.

A recent study by Desbordes and Wei (2017) found that source and destination countries' financial development have a large positive influence on green-field, mergers and acquisitions, and expansion FDI. The influenced by direct and indirectly, through increasing access to external finance and boosting manufacturing activity, respectively. Financial market development has an impact on the relationship between FDI and

business start-up, which is a salient feature of entrepreneurship (Munemo 2016). His study found that financial market development above threshold enabled FDI to crowd-in new businesses. Improving financial conditions in developing countries is important as a precondition for facilitating the positive effect from FDI inflows which stimulate entrepreneurship and boosting economic growth.

3. Data and Empirical methodology

3.1. Data

This paper considers a sample of four North African countries, namely Tunisia, Morocco, Algeria and Egypt. The choice of the selected countries for this study is primarily dictated by the availability of reliable data over the sample period. The panel covers the period 1992–2016, and is divided into five non-overlapping five-year periods.² The dependent variable is economic growth, measured as the growth rate of real GDP per capita at 2010 USD prices. The main variable of interest (FDI) and the other control variables are obtained from the World Development Indicators database (World Bank, 2018).

According to the World Bank, FDI are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP. It is expected that the sign of the coefficients associated with FDI would

be positive as spillover effects may have been observed in North African countries.

In this study we use the credit provided by the banking sector to GDP to measure financial development. This indicator measures how much intermediation is performed by the banking system, including credit to the public and private sectors. Calderon and Liu (2003) suggested that this indicator has an advantage as it takes into account the credits to private sector only and isolates credit issued to the private sector, as opposed to credit issued to governments, government agencies, and public enterprises. Furthermore, it excludes credits issued by the central bank. They argued that the measure is even better than indicators used by previous studies such as King and Levine (1993a, b)³ and Levine (1999).⁴ Indeed, De Gregorio and Guidotti (1995) claimed that indicator is a better measure of financial development than measures of monetary aggregates such as M1, M2 and M3 because it reflects the more accurately on the actual volume of funds channeled into private sector. The ratio, therefore, is more directly linked to the investment and economic growth. Moreover, Calderon and Liu (2003) showed that a higher ratio credit provided by the banking sector to GDP indicates more financial services and hence, greater financial intermediary development.

The hypothesis that FDI and other economic and institutional variables affect economic growth is tested by estimating dynamic panel data model for GDP per capita growth for consecutive, non-overlapping, 5-year periods,

² Most panel studies on growth cycles are based on five-year averages as the time unit to eliminate the business cycle effect. Additionally, in this study we lacked annual data for some of the variables of interest. As such this did not allow us to use annual data.

³ King and Levine (1993a, b) use a measure of gross claims on the private sector divided by GDP. But, this measure includes credits issued by the monetary authority and government agencies.

⁴ Levine (1999) uses a measure of money bank credits to the private sector divided by GDP, which does not include credits to the private sector by non-deposit money banks and it only covers the period 1976–1993.

from 1992 to 2016.⁵ Our baseline model includes the explanatory variables common to most growth regressions found in the literature (all except initial GDP per capita are averaged over each 5-year period):

- Initial GDP per capita (log): log of real GDP per capita lagged by one 5-year period. A negative coefficient is expected, indicating the existence of conditional convergence among countries;
- Investment (% GDP) defined as the ratio of gross fixed capital formation to GDP. A positive coefficient is expected, as greater investment shares have been shown to be positively related to economic growth (Mankiw et al., 1992);
- Trade openness measured by the ratio of total imports plus exports over GDP. Assuming that openness to international trade is beneficial to economic growth, a positive coefficient is expected.

In order to account for the effects of macroeconomic stability on economic growth, two additional variables will be added to the model⁶:

- Inflation rate measured as the annual percentage change in the consumption price index.⁷ A negative coefficient is expected, as high inflation has been found to negatively affect growth (Elder, 2004);
- Government spending defined as the ratio of central government expenditures to GDP. An excessively large government is expected to crowd out resources from the private sector and be harmful to economic growth. Thus, a negative coefficient is expected.

The extended model will also include the following institutional variable⁸:

- We use the Fraser Institute's economic freedom index that comprehensively quantifies the role of free market institutions and so enables us to analyze the role of economic freedom in promoting economic growth in North African countries. This index provides a concise measure of free market activities and captures the extent to which a country relies on free markets to allocate resources. It has five major components, namely: government size, legal system and property rights, access to sound money, freedom to trade, and regulation of business, labor and credit markets.

The index of economic freedom from the Fraser Institute (2018) is used to measure economic freedom in a country. This is an 11-point ordinal scale, ranging from 0 to 10, where a higher value indicates greater economic freedom. This index has been widely used and contains economic freedom measures over a longer period of time (since 1970) across a large number of countries and thus it has maximum coverage compared to any other existing measures of economic freedom. Again, this index relies mainly on quantitative measures and is often used as a measure of market-based institutions (Gwartney et al., 2012). According to the survey of De Haan et al., (2006), which focused on the empirical studies that used this economic freedom indicator, greater economic freedom stimulates economic growth. Thus, a positive coefficient is expected.

3.2. Empirical methodology

The purpose of our empirical analysis is to examine if financial development plays an important role in influencing the effects of FDI

⁵ The periods are: 1992-1996, 1997-2001, 2002-2006, 2007-2011, and 2012-2016.

⁶ Here, we follow Levine et al., (2000), who accounted for macroeconomic stability in a growth regression by including the inflation rate and the size of government.

⁷ In order to avoid heteroskedasticity problems resulting from the high variability of inflation rates, Inflation was defined as $\log(1 + \text{Inf} / 100)$.

⁸ There is an extensive literature on the effects of institutions on economic growth. See, among others, Acemoglu et al., (2001), Glaeser et al., (2004) and De Haan (2007).

on economic growth in North Africa. To this end, we employ a specification that is broadly similar to others (e.g., Alfaro et al., 2004, 2010; Choang, 2012). We consider the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta_1 FDI_{i,t} + \beta_2 FD_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

Eq. (1) can also be alternatively written with the growth rate as a dependent variable as:

$$Growth_{i,t} = y_{i,t} - y_{i,t-1} = (\alpha - 1)y_{i,t-1} + \beta_1 FDI_{i,t} + \beta_2 FD_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

The subscript “ t ” represents one of these 5- year periods, whereas i represents the country, y is the logarithm of the real GDP per capita, FDI is foreign direct investment, FD is the financial development variable and X is the matrix of control variables described in the previous section, μ_t is a time specific effect, η_i is an unobserved country-specific fixed effect and $\varepsilon_{i,t}$ is the error term. Eq. (2) forms the basis for our estimation. $(\alpha - 1)$ is the convergence coefficient.

While FDI has the potential to affect economic activity through a host of channels, in a second set of regressions, we examine one specific link between FDI and economic growth, specifically the one working through FD. The hypothesis we would like to test is whether the level of FD in the host country affects FDI on economic growth. To this end, we add an interaction term constructed as the product of FDI and the FD (i.e., FDI*FD) to Eq. (2) as an additional explanatory variable, apart from the standard variables used in the economic growth equation. To ensure that the interaction term does not proxy for FDI or the level of FD, both of the latter variables were included in the regression independently. If the coefficient on the interaction term is positive and significant, it implies that the marginal effect of FDI on economic growth depends on the level of FD.

The regression to be estimated is the following:

$$Growth_{i,t} = (\alpha - 1)y_{i,t-1} + \beta_1 FDI_{i,t} + \beta_2 FD_{i,t} + \beta_3 (FDI_{i,t} \cdot FD_{i,t}) + \beta_4 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (3)$$

This paper applies the GMM panel estimator developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). There are two main reasons for choosing this estimator. The first is to control for country specific effects, which cannot be done with country-specific dummies due to the dynamic structure of the regression equation. Second, is to control for a simultaneity problem caused by the possibility that some of the explanatory variables may be endogenous with growth or other dependent variables.

Following Arellano and Bond (1991), Eq. (1) can be transformed into a first-difference equation to eliminate country-specific effects as follows:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta_1(FDI_{i,t} - FDI_{i,t-1}) + \beta_2(FD_{i,t} - FD_{i,t-1}) + \beta_3(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (4)$$

To address the possible simultaneity bias of the explanatory variables and the correlation between $(y_{i,t-1} - y_{i,t-2})$ and $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$, Arellano and Bond (1991) proposed that the lagged levels of the regressors are used as instruments. It is valid under the assumptions that the error term is not serially correlated and the lag of the explanatory variables are weakly exogenous. This strategy is known as Difference GMM estimation and the moment conditions can be listed as follows:

$$E[y_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (5)$$

$$E[FDI_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (6)$$

$$E[FD_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (7)$$

$$E[X_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T \quad (8)$$

If the variables are persistent, however, their past values convey little information about their future changes, making their lagged value

a weak instrument for their differenced series (Acemoglu and Robinson, 2008). This may be the case for the institution variables which may lead to a biased estimation of parameters in small samples and asymptotically larger variance. Arellano and Bover (1995) suggested a combination of the differenced Eq. (4) and level Eq. (1). Blundell and Bond (1998) showed that this estimator is able to increase the efficiency via its reduction in biases, and imprecision characterized the Difference GMM estimator, especially the abovementioned weak instrument problem. Arellano and Bover (1995) and Blundell and Bond (1998) proposed a System GMM estimator as follows. In addition to the moment conditions of Eqs. (5)-(8), the authors proposed that the System GMM uses the following moment conditions:

$$E[(y_{i,t-s} - y_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s=1 \quad (9)$$

$$E[(FDI_{i,t-s} - FDI_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s=1 \quad (10)$$

$$E[(FD_{i,t-s} - FD_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s=1 \quad (11)$$

$$E[(X_{i,t-s} - X_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s=1 \quad (12)$$

The consistency of the System GMM estimator depends on the validity of the

assumption that the error term does not exhibit serial correlation and on the validity of the instruments. By construction, the test for the null hypothesis of no first-order serial correlation should be rejected under the assumption that the error is not serially correlated; but the test for the null hypothesis of no second-order serial correlation, should not be rejected. We use two diagnostics tests proposed by Arellano and Bover (1995) and Blundell and Bond (1998), the Sargan test of over-identifying restrictions, and whether the differenced residuals are second-order serially correlated. If the null hypothesis of both tests cannot be rejected, this would indicate that the model is adequately specified and the instruments are valid. The results from this estimation procedure are reported in table 1.

4. Empirical results

The empirical results are presented in Table 1. Column (1) reports a preliminary analysis on the effects of FDI and FD on economic growth. Column (2) presents the coefficient estimates obtained from the baseline specification, which used an interaction term constructed as a product of FDI and FD.

Table 1: The growth effect of FDI and financial development

Variable	(1)	(2)
Initial GDP per capita	-0.0476*** (-3052)	-0.0483*** (-3.57)
Foreign Direct Investment	0.0063*** (2.66)	0.0075*** (3.175)
Financial Development	0.0042* (1.744)	0.0049* (2.03)
Foreign Direct Investment*Financial Development	-	0.0081* (1.714)
Investment	0.0386** (2.58)	0.0366** (2.39)
Trade Openness	0.027** (2.28)	0.0278** (2.3)
Inflation	-0.275*** (-3.035)	-0.282*** (-3.08)
Government Spending	-0.0144 (-0.67)	-0.0092 (-0.406)
Index of Economic Freedom	0.0016* (1.921)	0.0015* (1.82)
Constant	0.17 (0.79)	0.171 (0.81)
R-Squared	0.54	0.49
AR(2) test (p-value)	0.653	0.565
Sargan test (p-value)	0.711	0.671

Notes: The dependent variable is the growth rate of real GDP per capita. System-GMM estimations for dynamic panel data models. Sample period 1992-2016. AR(2) is a test of second order residual serial correlation. J-test is the Hansen over identification test. t-Statistics are in parentheses. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

The results in Column (1) clearly indicate that the estimated coefficient on FDI is statistically significant at 1% level, which suggests that FDI plays a positive role in boosting the economic growth of North African countries. This result is consistent with some studies in the FDI-growth literature (e.g. Chong et al., 2010; Gui-Diby, 2014). In addition, we also control for the level of financial development in the estimations. The major message is that countries with a well developed domestic financial system have better absorptive capacity in benefiting advantages embodied in the FDI inflows. The results show a strong relationship between financial development, FDI, and economic growth. While the coefficient of financial development measures is positive and statistically significant in all countries, the coefficient of FDI is also positive and significant at the 1% significance levels. Evidently, this hypothesis does hold when controlling for the level of financial development, which suggests that development of domestic financial system may help host countries to benefit more from FDI inflows. Additionally, the estimated regression passed both specification tests. The null hypothesis of no second-order serial correlation cannot be rejected at 5% level. The regression is not plagued by simultaneity bias as the orthogonality conditions cannot be rejected at 5% level, as indicated by the *Hansen's* test. This suggests that the equation is adequately-specified and the instruments employed in the analysis are valid.

Next, Column (2) shows the regression results based on interaction specification using an interaction term between FDI and the FD indicator (FDI*FD). In this specification, we relied on the interaction term to establish the contingency. If the term is positive and significant, this implies that the impact of FDI on economic growth increases with FD. The first thing to note is that the interaction term turns out to be positively signed and statistically significant at 10% level. The results suggest

that FDI and financial sector development are complementary in facilitating economic growth, *ceteris paribus*. It concludes that beneficial impact of FDI on economic growth can be stronger by developing the local or domestic financial markets. This conclusion is also consistent with previous empirical studies such as Hermes and Lensink (2003); Alfaro et al., (2004, 2010) and Azman-Saini et al., (2010).

We introduced the level of initial GDP per capita (the natural logarithm) as an independent variable according to the conditional convergence hypothesis. The coefficient of initial GDP per capita shows the expected negative sign and is highly significant; indicating a convergence of per capita income across countries as proposed in the growth theories. This result corroborates the work of Barro and Sala-i-Martin (1997). The effect of the other variables in the regression is consistent with the standard growth regression results. Investment and trade openness have positive and statistically significant coefficients, indicating that greater investment and trade openness promote growth. Regarding macroeconomic stability, inflation and government size have the expected signs, but only the first is statistically significant. Finally, the Index of Economic Freedom is included in the model in order to account for favorable economic institutions. It is statistically significant and has a positive sign, as expected.

5. Conclusions and policy implications

Our study examines the relationship between FDI and growth in the presence of domestic financial system. Using GMM panel data model to examine the link between FDI, financial development, and economic growth in a panel of four countries of North Africa, over a 5-year period from 1992 to 2016, both FDI and financial development indicators generally show a significant and positive impact on economic growth.

To examine whether financial development helps a country to benefit more from FDI, the study interacted FDI with different measures of financial market development. The result is that when FDI is interacted with the financial development indicators, the interaction terms are generally positive and significant, shedding light on the role of financial development in benefiting from FDI.

The results have clear policy implications, namely the effect of FDI on economic growth is subject to the underlying financial conditions and institutions. A well developed domestic financial system plays an important role in complementing the impact of FDI on economic growth; that is, countries with better-developed financial sectors experience a raise in their growth rates.

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