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The Impact of Financial Openness on Total Factor Productivity Growth, through the Channel of Banking Credit

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Abstract

This paper examines the impact of financial openness on total factor productivity growth in five selected countries (Algeria, Egypt, Jordan, Morocco, Tunisia), using a System GMM method. The findings showed a negative but non-significant impact of total capital flows on TFPG. However, it turns positive when adding an interactive term with domestic credit to private sector. This might reflect the inefficiency of the banking sector in these countries and hence weak absorptive capacity. Focusing on FDI, the results also proves a negative non significant impact on TFPG that turns positive once the interactive term with domestic credit to private sector is added. This may suggest that the positive FDI spillovers and its positive impact on TFPG could only be attained when the domestic credit to the private sector attain a certain threshold.

I. Introduction

Total Factor Productivity Growth (TFPG) - which may be defined as improvements in technology and efficiency- has become a dominant factor in explaining the largest part of differences in per capita income among countries[1]. TFPG is considered as the major determinant of long- term growth. Economic growth theories attempted to identify the main determinants that could TFPG. Among these determinants figure the policies that affect resource allocation such as: liberalizing capital flows, enhancing financial intermediation and banking credit, trade openness, human capital development, in addition to promoting investment in Research and Development (R&D). Recent empirical studies underlined the increasing importance of financial openness[2] in explaining changes of TFP. Theoretically, financial openness should lead to an increase in capital inflows, a decline in the cost of capital, an efficient allocation of international capital flows and better international risk sharing.

Developing countries should benefit from financial openness, especially in the light of their large funding gap. In fact, it is highly recommended to raise TFPG, in order to attain high sustainable long term per capita income growth. Resource gap in many emerging countries is mainly due to low levels of savings and investment rate. In this regard, financial openness

[1]- There are two main sources of economic growth: Input driven growth (i.e. adding more labor and capital) and Total factor productivity. Total factor productivity is defined as the efficiency in production or the increase in production as a result of using same amount of inputs. It is often referred to as the "residual" of the production function. This encompasses all factors, other than labor and capital, such as organizational and managerial capacities, research and development, technological change. It could also be referred to as "spillovers". These spillovers could result from international trade, foreign investments, labor migration licenses, cross border learning and research publications. Also, these spillovers could result from many sources: supplier- client relationship, competition and Research institutes. Spillovers could take many forms: information spillovers (imitation of innovations) and network or agglomeration spillovers.

2- Financial openness refers to removing all measures and restrictions that may hamper the international capital flows, encompassing the capital transactions and all related payments and transfers. This also implies free currency convertibility in international financial transactions and removing restrictions on local firms' access to foreign financing as well as allowing foreigners to possess local assets. Capital account convertibility also allows free convertibility of local financial assets to foreign financial assets or vice versa (IMF, 2012; Ahmed and Islam, 2010; Schneider, 2000).

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could play an important role as a potential catalyst for TFPG. Hence, this study focuses on estimating the impact of financial openness on Total Factor Productivity Growth (TFPG), with a special focus on the role of the banking credit as a channel mechanism and as an absorptive capacity in the local economies.

Few empirical studies also measured the impact of financial openness (capital flows liberalization) on the sources of economic growth; especially the total factor productivity. To our knowledge, none of those studies were concerned with exploring the effect on our selected countries in the MENA region. Therefore, this paper attempts to make a contribution in this regard.

Financial openness (especially Foreign Direct Investment -FDI) can affect TFPG through technology transfer. FDI can contribute to acquiring new organizational and management methods, labor training, upgrading labor skills, outsourcing contracts with local suppliers, technology licenses, and importing capital goods. According to endogenous growth models, FDI may contribute to increasing the number of diversified goods as well as improving product quality. Therefore, FDI generates knowledge spillovers that may have a positive impact on TFPG. As a matter of fact, one may identify three channels through which FDI can positively contribute to TFPG: competition with local domestic firms, linkages with local suppliers by using local intermediary goods, demonstration effects by imitating foreign products and labor mobility.

However, the relation between TFPG and financial openness is not linear. It depends on other conditions, such as financial development (especially the banking credit) that often affects how financial openness can influence TFPG. Financial development can have a positive impact on productivity by stimulating competition in international financing and hence efficient resource allocation and directing investment to the most productive projects and higher return ones. However, this depends on the level of soundness and deepening of the financial sector. In other words, financial sector (with specific focus on the banking credit) must reach a certain threshold level before financial openness could lead to a positive impact on TFPG.

As a first step, this study aims to estimating TFP series during 1970-2010, using growth accounting framework. Second, it sheds light on the status of financial openness and financial intermediation in the selected countries (Algeria, Jordan, Egypt, Tunisia and Morocco). And finally it focuses on estimating the impact of financial openness and financial intermediation on TFPG.

In this regard, this study will use the dynamic panel data estimation, the GMM system methodology to estimate the above mentioned relation to control for reverse causality and endogeniety in order to answer the following research questions:

- What is the role of financial openness in explaining TFPG differences among selected countries?
- Does the level of financial intermediation constitute a constraint (or an easing mechanism) in this relation?

This paper is structured as follows: First we will discusses the economic growth theory to identify the determinants of total factor productivity, then we will follow with a literature review of the most recent empirical studies that tackled the concerned issue of our study.

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Second, an overview of the status of TFPG, financial openness and banking credit policies in our selected countries will be presented. The third part will focus on estimating the impact of financial openness on TFPG, taking banking credit into consideration, using system GMM method. The paper concludes with main findings and policy recommendations.

I. Theoretical Background

According to the new-classical theory, long term economic growth is determined by the exogenous technological progress. Solow (1957), in his influential paper, presented the Cobb Douglas production function and the notion of total factor productivity. He assumed that the factors of production, labor L and Capital K, are compensated by their marginal products. Although the marginal product of capital increases with the injection of more investments flows, it declines in the long run as result of the law of diminishing returns. The capital-output ratio turns out to be constant in the long run, and the economic growth rate reaches the steady state. However, the "exogenous" technological progress is considered as the only factor that could contribute to achieve higher growth rates- shifting the production frontier to higher levels. The theory also emphasizes the role of both the discount rate and the inter-temporal substitution rate (both represent the inter-temporal preference for consumption as the main factors that determine the growth rate in the long term). In an open economy, the financial openness, i.e., liberalized access to international credit market, in terms of free movements of capital flows- can only contribute to the increase of physical capital stock and not to the economic growth rate in the long-term. It only influences the speed of convergence.

The new classical growth theory did not explain the factors that could enhance the total factor productivity- the sole factor responsible of the long-term economic growth. Therefore, the Endogenous growth models emerged to fill this theoretical gap. These models tried to explore the factors explaining the changes in the "endogenous" total factor productivity. They defeated the constraining law of diminishing returns. Hence, the process of factor accumulation could generate constant, if not, increasing returns.

The AK model encompasses the general idea of endogenous growth models. The willingness to save and the marginal product of capital could generate constant returns to scale, if they have been accompanied by a decline in the intertemporal preferences parameters and an increase in the technological progress (A) (Rebello (1990)) .Moreover, the governmental services or public physical capital (infrastructure…) could generate positive spillovers which could lead to an increase in the profitability of the private sector, realizing constant returns (Barro, 1990). Furthermore, human capital enhancements, through education and raising the level of workers' skills, could also generate positive spillovers that lead to constant returns to scale (Lucas (1988)).

Romer, 1986, has highlighted that physical capital could grow with unlimited rates. Romer suggested that knowledge is part of the physical capital, which can generate spillovers that lead to total factor productivity growth; causing an increase in the marginal product of the intangible knowledge capital. This can be induced through boosting investments in Research and Development sector, and the accumulation of the knowledge capital stock. Moreover, the "learning by doing" methodology also contributes to the increase of stock (Barro, Sala I Martin (1995)). The private firm that produces knowledge could achieve high rates of profits by virtue to the nature of knowledge, i.e, non-rival and partially excludable, as well as due to property rights and licenses (Romer (1989)). However, knowledge is a public good generating knowledge spillover that could be shared by all the society. A societal knowledge stock could be accumulated without any additional costs. The law of diminishing returns only

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applies to the producer but physical capital of the whole society could generate constant returns. Romer concluded that there are three factors that could lead to the increase of total factor productivity growth: allocating parts of human capital and physical capital (equipment and laboratories) towards research and development sector as well as the accumulation of a knowledge capital stock.

As well, exports and imports of goods could lead to knowledge spillovers as a result of exchanging embedded intangible ideas. However, trade openness might not affect the economic growth rate in the long run, but it can only influence the speed of knowledge accumulation (Helpman and Grossman (1990)).

Later, Barro and Sala I Martin (1995) introduced two models for technological progress. The first one is based on product diversification, where research and development activities that benefit from monopolistic profits contribute to introducing new and more productive capital goods. The second model is based on the concept of creative destruction, where each product has a ladder of quality. Again, monopolistic profits stimulate investors to inject new investments in research and development sector to improve the product quality and move upward the quality ladder.

However these theoretical models didn't include many other significant variables that could explain the total factor productivity growth. Then, the Second generation economic growth models have emerged. They tackled many factors such as infrastructure investments (Canning and Pedroni (1999)), as well as the significant role of institutions, i.e., legal and political systems, contract and law enforcement (North and Walis (1994)). Intellectual property rights and contract enforcement encourage the entrepreneurs to increase their investments in R&D activities, and hence new innovations could be materialized (Acemoglu and Robinson (2004)).

In addition, new literature has emerged, concerning the role of corruption and conflict of interests that could lead to opposing technological changes in order to preserve traditional rental activities (Aidt et al. (2006)).

Financial intermediation might also play a pivotal role in economic growth. Banks convert liquid funds to productive funds by lending loans to investors. This action reduces household's liquid savings outside the banking sector, which is similar to Romer's spillover effects. However, asymmetric information causing imperfect credit markets -especially in developing countries- may lead to an increase in the cost of borrowing and hence credit rationing (Bencinega and Smith (1991)). Therefore, endogenous financial intermediation aims to reduce market frictions such as information and transactions costs. The main model assumption is that banks accomplish assessment and monitoring role better than individuals. This encourages banks to assess potential entrepreneurs in order to select high return projects (Hassan et al. (2011)). However the impact of banking credit on economic growth depends on whether funds are directed towards consumption or investment type projects (Hung and Cothren (2002)).

Financial openness may also induce economic growth rates. Developing countries opted for liberalizing capital account since the nineties. Financial openness policy aims to removing all measures that hinder free movements of capital flows. According to the new classical theory, international capital inflows lead to an increase in the accumulated physical capital stock. Nevertheless, the endogenous growth theory states that capital flows could affect the

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economic growth rates in the long-term through technology transfer (production process, management and organizational techniques…). This can generate positive spillovers either through product diversification or product quality improvement. Foreign direct investment could also contribute in increasing the knowledge stock by injecting more investment in R&D sector.

II. Literature review

Many empirical studies examined the determinants of the total factor productivity growth. Similarly, more recent literature also focused on the impact of financial openness on the TFP growth. Hence our study also highlights the role of financial intermediation in this regard.

Several empirical literatures have attempted to examine the impact of many determinants on the total factor productivity growth. Trade openness seems to be one of the most important factors that stimulate total factor productivity. It is an important channel to induce technology transfer as the economy becomes more exposed to international competition and modern technology (Loko and Diof (2009)). Knowledge spillovers as well as economies of scale could be also generated; either through the imports of capital and intermediate goods or the exports to international markets (Castillo et al. (2012)).

Expenditures on Research and Development might also lead to the increase of TFPG. R&D activities aim to produce new goods and services that realize more efficient production process, i.e. cost reduction. The availability of large pool of qualified researchers as well as engineers and scientists strengthen the country's absorptive capacity of advanced technologies (Rravo-Ortega &Marin (2011)). Particularly, skilled labor force is a prerequisite to achieve higher growth rates of TFP. Moreover, skilled workers with tertiary education could be in far better position when dealing with advanced imported technologies. In this regard, human capital development could boost the TFPG. High rates of educational attainment: primary and secondary are associated with increased TFPG (Jajri (2007)).

Financial sector development could also enhance the entrepreneurship spirit by granting loans to active firms with promising ideas; in order to implement high risk and highly productive projects. Many empirical studies have found a positive relation between access to banking credit and TFPG. Firms with high long term debt to capital ratio have achieved higher profitability rates, sales and TFP (Gotti and Love (2006)). However, other strand of literature mentioned that high growth rates of credit could adversely affect TFPG, in case of mismanagement of credit allocation decisions by the banking sector (Ghani and Suri (1999)).

However, many obstacles in the business environment might hamper the TFPG. Two aspects matter in this regard; first the availability of infrastructure and public utilities especially electricity, telecommunications and transport, second: the quality of infrastructure. On the other hand, regulations, legislations and bureaucracy also matter. The high transactions cost related to legislations and bureaucracy are considered as resources diverted away from the productive potential uses. Studies found out a negative impact of time length needed to customs clearance (as proxy of bureaucracy) and the low quality of the public utilities and TFPG (Subramamian et al. (2005)). Therefore, better institutions are positively associated with increased TFPG. Many indicators could be used in this regard such as: credit regulations, labor market regulations and economic freedom index (Loko and Diof (2009)).

Financial openness may also enhance economic growth, through its positive impact on TFPG (Garita (2009)), more than its expected positive impact on capital accumulation. Financial

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openness could also stimulate stock market and banking sector development. As well, investment efficiency is likely to increase following the financial liberalization (Bekaert et al. (2011)). However, the benefits of financial openness and its positive impact on the TFPG could not be achieved unless the country succeeds to attain a certain threshold of financial sector development (Kose et al. (2011)).Using de jure financial openness index; it was found that capital account liberalization induces positive impact on TFPG. Concerning de facto indicators, both foreign direct investment and portfolio flows stimulate TFPG contrarily to the negative impact of debt flows (Kose et al. (2009)). Foreign direct investment had a strong impact on the increase of TFPG compared to capital accumulation (Bonfiglioli (2008)). FDI is considered as a critical vehicle to enhance TFPG by facilitating the access to foreign technology, spreading innovations in the local market with lower fixed costs by reducing information and transactions costs, and transferring managerial and organizational skills(Sanchez, 2008 and Chaffai and Plane (2006)).

However, empirical studies found mixed results of FDI benefits on technological spillovers and hence on TFPG. Findings are still ambiguous in this regard, as it may be due to the country's absorptive capacity of the likely positive spillovers (Suyanto et al. (2009)). Local firms could benefit from FDI spillovers if they are located in financially developed areas. Financial sector could help in increasing these productivity related spillovers through providing loans to main players in the productivity enhancing activities such as: 1) local firms to help them upgrade their technology; 2) workers in multinational enterprises might intend to start their own business; 3) local suppliers of raw materials and intermediate goods to foreign firms. The low level of financial intermediation might hamper the FDI productivity spillovers inside the local economy. As well, the credit misallocation towards unproductive state owned enterprises could induce negative impact on the economic growth, as was the case in China (Xa (2009)).

Few empirical studies also attempted to estimate the impact of the aforementioned determinants of TFPG in the MENA countries, especially those concerned with the role of financial openness and financial intermediation. Makdisi et al. (2005), have highlighted the positive impact of institutions, human capital and the negative impact of inflation rate on TFPG. As well, Hakura (2004), has found that the government current expenditure had a negative impact on the long-term economic growth. Concerning, the technological catch up of the North African countries, Drine (2012), emphasized the importance of governance as well as the quality of institutions, using indicators of corruption, law enforcement and business climate, in narrowing the technological gap. This is also positively associated with FDI, human capital and trade openness.

III. Overview on TFP, Financial Openness and Banking Credit in the Selected Countries

A. TFP

In general, total factor productivity growth rate (TFPG) has remained very low during the four decades shown in (Table I). With a relatively high per capita GDP growth rate, TFPG attained 0.74 during the seventies due to favorable external financing conditions. This resulted from the rise in oil prices and the injection of public investments. However, the economic downturn in the eighties, has been accompanied by a negative TFPG as a result of the decline in oil prices, inefficient public enterprises, a worsened resource gap due to the low level of savings and macroeconomic imbalances (high budget deficit and high inflation rate) (Table I – Appendix 2). Despite the implementation of the economic reform programs suggested by the IMF, TFPG has continued to be negative in the nineties; along with a

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decrease in investment rates, tight fiscal and monetary policies and high tariff rates. By the beginning of the third millennium, these countries have implemented more liberalized policies; TFPG has turned to be positive as a result of progressive trade liberalization policy, increase of capital flows, export oriented industries, free trade agreements and efforts to improve the business climate.

Weak TFPG can be interpreted as a result of low share of the manufacturing sector in GDP, inconvenient industrial policy during the past decades, high trade tariffs, impediments in business climate (such as construction licenses, access to infrastructure, long time needed to contract enforcement, weak property rights), weak governance (lack of accountability, weak law enforcement, corruption…) and deterioration of human capital (insignificant R&D spending as a percentage of GDP, insufficient number of patents and the inadequate number of engineers and scientists, compared to other regions in the world).

B. Financial Openness

Financial openness de jure indicators measure the restrictions and regulations on capital account transactions that affect the financial procedures among residents and non-residents. This type of financial indicators is mainly based on the Annual Report on Exchange Arrangements and Exchange Restrictions, published by the IMF. Accordingly, many studies have attempted to construct indices that reflect the financial openness de jure status of the concerned economies (Quinn et al. (2011)). Using KAOPEN index, developed by Chinn and Ito[3], we could observe that in general, the concerned countries are different in terms of their degree of financial openness. To some extent, Egypt and Jordan are considered financially opened. However, Tunisia, Morocco and Algeria still remain with closed capital account (Table II).

The liberalization wave has started in the beginning of the nineties. In the case of Egypt, exchange rate was liberalized and unified in 1991; export receipts surrender was also abolished in 1994. Banking reforms were launched in 2004, of which an interbank market for foreign exchange was established. No restrictions are imposed on capital account receipts. FDI projects are subject to prior approval by the GAFI (General Authority for Foreign Investment), according to law No. 8 in 1997. In the case of Jordan, there are no restrictions on the capital transactions. However Jordan remains to have some restrictions on foreign direct investment (FDI); so that non-residents investments don't exceed 49% in ownership or 50% as subscription in shares in the following sector: trade, construction and transportation. On the other hand, Tunisia, Morocco and Algeria still hold closed capital accounts. Many limitations still restrict the capital transactions, except for the foreign direct investment.

Concerning the de facto indicators, capital flows increased significantly during the period 1970-2010, especially following the liberalization policies. However, capital inflows in the selected countries have followed the global cyclical pattern. On one hand, the selected countries have witnessed surges (during the seventies and nineties) with an increasing share

[3]- This index is composed of four components; the existence of multiple exchange rates, restrictions on current transactions, restrictions on capital transactions and requirements on exports proceedings surrender ranges from (-2 to 2: strictly closed to strictly opened) (Chinn and Ito, 2007).

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of FDI especially in the third millennium first decade. On the other hand, sudden stops occurred during the periods of debt crises, Asian crisis and the latest financial crisis.

C. Banking Credit

Financial liberalization has been adopted since the nineties in the selected countries as part of the comprehensive economic reform programs. In the beginning of reforms, financial deepening (M2) has declined especially in Egypt and Algeria. However it has bounced back during the last decade, with the significant financial reform policies in these countries. However, the banking sector is characterized by its high degree of concentration. As well public banks are still dominants and the interest rate margin remain high which reflect the lack of competition in the banking sector and the increasing cost of financing. Another indicator of the quality of banking assets, non-performing loans that represent nearly the fifth of total loans- especially in Egypt and Tunisia.

IV. Methodology

Recent Studies prefer to use panel data technique to estimate the determinants of the TFPG, as it takes individual heterogeneity into consideration, as well as the unobservable effects that are both time and country invariant. Moreover, panel data deals with information with more variability and less collinearity among explanatory variables, hence, increased degrees of freedom and more efficient estimators. It also allows studying the dynamics of adjustment.

In our study we will use the dynamic panel data estimation System GMM; the equation takes the following form:

$$g_{it} = \beta_0 + \beta_1 FO_{i,t} + \beta_2 (FO_{i,t} \times F_{i,t}) + \beta_3 F_{i,t} + \varphi' W_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t}$$

Where:

g_{it}: Total factor productivity growth

$FO_{i,t}$ Financial openness variables

F Variables related to financial sector

$W_{i,t}$ control variables.

μ_t time variable dummies .

η_i the country fixed effects .

$\varepsilon_{i,t}$ error term

β could only be consistent if the following orthogonality conditions are satisfied:

$$E(W_i \varepsilon_i) = 0 \qquad E(F_i \varepsilon_i) = 0$$

However these conditions might be violated for several reasons:

1) Estimators might be biased due to omitted variables in the case of correlation between the explanatory variable and the unobservable country effect, or because of omitting important explanatory variables in the model or its correlation with an existing explanatory variable, $E(W_i(\mu_i + \varepsilon_i)) \neq 0$.
2) The reverse causality between the TFPG and the financial sector and financial openness variables.
3) Mis-measurement of explanatory variables. OLS estimation would lead to biased and inconsistent estimators.

The endogeniety problem arises when one of the explanatory variables is correlated with the error term, hence the estimated parameters are biased and inconsistent. GMM dynamic panel

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data models were suggested as a remedy for this endogeneity problem. Estimators must fulfill the orthogonality condition i.e.$E(f(\theta)Z) = 0$, where $f(\theta)$ is the function of coefficients and Z is a set of instrumental variables. GMM estimator takes also into consideration the heterogeneity among countries and the unobserved individual impact.

The notion of moments is fundamental for describing the features of a population. The population mean μ is the moment that describes the central tendency, that is the expected value E(Y), or $m_k = \frac{1}{n}\sum_{i=1}^{n} y_i^k$(in the sample format), hence$E[m_k] = \mu_k = E[y_i^k]$. The second moment is the population variance, Var Y= $E[(Y-\mu)^2]$, describes the spread of the distribution. GMM aims to use these moments in a way to minimize the asymptotic variance among method of moments estimators of μ(Wooldridge, --- and Green, 2002).

In case of k parameters (θ), one might find solutions for (θ) by solving a system of the following equations:

$\hat{\theta}_k = \hat{\theta}_k[m1, \dots\dots, mk]$

These estimated parameters must fulfill the orthogonality conditions $E(f(\theta)Z) = 0$, where $f(\theta)$is a function of parameters and Z set of instrumental variables. The model must contain R moments, as follows:

$E = \{f(w_t, z_t, \theta)\} = 0$, where f is a function in R of elements, θ is a vector with k dimensions and contains unknown coefficients, w_t is a vector of variables endogenous or exogenous variables and z_ta vector of instrumental variables. Assuming that the number of moments is greater than number of coefficients, the system becomes overestimated as follows (Green, 2002):

$$E[m_l(y_i, w_i, z_i, \theta)] = E[m_{il}(\theta)] = 0$$

If the number of moments R is equal to K coefficients, the above equation could be equal to zero and hence we could find a consistent estimate of θ. But if the number of moments is less than that of parameters, θvector becomes undefined; the same applies if the number of moments is greater than that of parameters. The generalized method of moments is about minimizing the distance between the residuals and the set of instrumental variables to reach zero. Then, the residuals are assumed to be uncorrelated with the set of instrumental variables.

The sample averages are the following:

$$\bar{m}_l = (y, w, z, \theta) = \frac{1}{n}\sum_{i=1}^{n} m_l(y_i, x_i, z_i, \theta) = \frac{1}{n}\sum_{i=1}^{n} m_{il}(\theta)$$

This expresses a system that consists of L equations, that is greater than the number of unknown coefficients (K), in this case we may not obtain one unique value of θ:

$$\bar{m}_l(\theta) = \frac{1}{n}\sum_{i=1}^{n} m_l(y_i, x_i, z_i, \theta) = 0$$

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The GMM estimator which is considered to be a robust estimator aims to minimize the following quadratic form:

$$q = \sum_{l=1}^{L} \bar{m}_l^2 =$$

By minimizing this quadratic form we could get a consistent estimator for θ, but not efficient. So we will minimize a weighted quadratic form:

$$q = \bar{m}(\theta)' A_n$$

Hence θ can be obtained by differentiating with respect to θ. The optimal weighting matrix takes the following form:

$$A^{opt} = (E(f(w_t, z_t, \theta) f(w_t, z_t, \theta)')^{-1}$$

This matrix is equivalent to the inverse of the variance covariance matrix in the sample$A^{opt} = \Omega^{-1}$, where the moments with larger variance get lower weights and moments with lower moments get higher weights. By using this matrix, GMM can be robust to heteroscedasticity and serial correlation.

Two step efficient GMM (Beck, 2008) can be estimated by the following:

- choosing an initial weighting matrix, that assume independent residuals and homoscedasticity, then we can obtain a consistent estimator but inefficient.

- Finding an optimal weighting matrix that uses the estimators from the first step, then an efficient estimator can be obtained.

Assuming that the errors are iid, the optimal weighting matrix becomes:

$A^{opt} = \frac{\sigma^2}{T} Z'Z.$

GMM estimator doesn't require any assumptions concerning the normal distribution and allows for unknown heteroscedaticity.

Arellano and Bond (1994) suggested taking the first difference of the equation, (First differencing GMM) to remove the country specific effect, as follows:

$$\Delta g_{it} = \beta \Delta f_{it} + \gamma_1 \Delta W_{it} + \Delta \varepsilon_{it}$$

In order to deal with endogeniety and mis-measurement, they suggested taking the lagged values of explanatory variables as instruments, so the moments are the following:

$$E\left[\left(f_{i,t-s}\right)\Delta\varepsilon_{it}\right] = 0$$
$$E\left[\left(w_{i,t-s}\right)\Delta\varepsilon_{it}\right] = 0$$

Some explanatory variables may be exogenous and uncorrelated with the error term, hence such variables might be considered as instrumental variables in first differences without lagged periods, and the new variables could be as follows (Baltagi, 2005):

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$$Z'\Delta y = Z'(\Delta X)\beta + Z'\Delta v$$

The estimator takes the flowing form:

$$\hat{\beta} = ([\Delta X]'ZV_N^{-1}Z'[\Delta X])^{-1}([\Delta X]'ZV_N^{-1}Z'\Delta y)$$

However, the First difference GMM was criticized, because the country specific effect is no longer existing. As well, when the lagged dependent variable and explanatory variables have a persistent correlation over time, autocorrelation emerges, and hence biased estimators in finite samples. Arellano and Bover, and Blundell and Bond, have suggested using the GMM System model, where two equations are estimated. The first equation is estimated in the level form with instruments in lagged first difference and the second is estimated in first difference, while using lagged variables in levels as instruments. So, the country specific effect is not omitted and hence estimators become unbiased and more efficient. Another set of moment conditions is added:

$$E\left[\left(\Delta f_{i,t-s}\right)(\varepsilon_{it} + \mu_i\right] = 0$$
$$E\left[\left(\Delta w_{i,t-s}\right)(\varepsilon_{it} + \mu_i)\right] = 0$$

Hence GMM estimator proposed by (Arellano and Bover, 1995) and (Blundell and Bond, 1997) is consistent and efficient, especially when being used in our study that is interested in estimating the impact of financial openness and financial intermediation on TFPG[4],

In this regard, two tests are used. Firstly, in order to test the validity of the instruments, i.e uncorrelated with the error term, we refer to Sargan test (Beck, 2008):

Sargan test: $\frac{\hat{\varepsilon}'Z(Z'Z)^{-1}Z'\hat{\varepsilon}}{\hat{\sigma}^2} \backsim \chi^2(J-K)$

Or it can take the following form:

$$m = \Delta\widehat{v}'W\left[\sum_{i=1}^{N} z_i'(\Delta\hat{v}_i)\Delta\hat{v}_i z_i\right]^{-1} z'(\Delta\hat{v}) \sim \chi^2_{p-k-1}$$

The null hypothesis assumes that residuals are uncorrelated with instrumental variables (H0: valid instruments), where j is the objective function to be minimized and k number of estimated parameters.

The second test is the Arellano Bond test for autocorrelation; it examines the hypothesis that the errors are not serially correlated.

[4] -The model in first-difference of Arellano-Bond (1991) does have a shortcoming. It enlarges gaps in unbalanced panels and it is possible to construct data sets that completely vanish in first differences. This motivated Arellano and Bover (1995) to use a second transformation called "forward orthogonal deviations" or "orthogonal deviations". Contrary to first-difference transformation which subtracts the previous observation from the contemporaneous, the "orthogonal deviations" transformation subtracts the average of all future available observations. No matter how many gaps, it is computable for all observations except the last for each country. So it permits to minimize data loss. They are also valid instruments since lagged observations do not be used to compute them (Sadni-Jallab (2011)).

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V. Data

The model is estimated using GMM System, during the period 1970-2010, for four countries: Egypt, Jordan, Tunisia and Morocco. And for robustness checks, we will add Algeria and Turkey respectively in two subsequent attempts. Total Factor Productivity growth is the dependent variable and it was calculated using the following Cobb-Douglas function: $Y_t = A_t F(K_t, L_t)$.(See Appendix 1).

The independent variables could be categorized in three main groups. First, financial openness indicators, de jure indicators: Chinn and Ito index (KAOPEN), which is a binary index, measuring the impact of capital account policies. However, de jure indicators don't reflect the actual intensity or effectiveness if these controls (Ahmed, 2013). Therefore, it is better also to use de facto indicators, total capital flows (newcap): the sum of the three types of capital inflows: foreign direct investment, portfolio investment and errors and omissions (Kose et al., 2009, Kumar & Pacheco (2012)). We will also test the impact of foreign direct investment separately (FDI) to examine its role in technology transfer and positive spillovers (Suyanto et al. (2009)).

Second, the banking credit variables. This study will estimate the impact of banking credit and the degree of financial intermediation – that helps in reducing the information asymmetry and the cost of transactions. These variables are: the domestic credit as a percentage of GDP, the domestic credit to the private sector as a percentage of GDP and the domestic credit to the public owned enterprises (Beck et al., 2000, Bekeart et al., 2011, Kose et al., (2009)).

Third, the other control variables that might affect the growth rate of total factor productivity: the initial per capita GDP ((Bekeart et al. (2011), Beck et al. (2000), Park (2012), Loko and Diof (2009)); inflation rate and government current expenditure as a percentage of GDP, as two indicators of the macroeconomic stability (Kumar and Pacheco (2012), Loko and Diof (2009), Arlene (2001)); manufactured exports as percentage of merchandise exports (Makdisi et al. (2005)); the enrollment rate in secondary education (Bekeart et al. (2011)); the gross fixed capital formation as a percentage of GDP, the growth rate of electricity production as a proxy of the level of the infrastructure (Subramamian et al. (2005)); an indicator of the legal structure and property rights (legal), which is a sub-index of the economic freedom index, as a proxy of the level of institutions (Ahmed (2013)), (Loko and Diof (2009)) (for more details see list of variables below).

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List of variables:

	Variable	Source
TFPGR	Total factor productivity growth	Calculated by the author (see Appendix 3)
ELECTPRODGR	Electricity production(growth rate)	World Bank, World Development Indicators Database.
INFLATION	Inflation rate	World Bank, World Development Indicators Database.
GOV	Current government expenditure (% GDP)	World Bank, World Development Indicators Database.
Manufexp	Manufactured exports (% merchandise exports)	World Bank, World Development Indicators Database.
ENROLSEC	Secondary enrollment rate	World Bank, World Development Indicators Database.
GFCF	Fixed capital formation (% GDP)	World Bank, World Development Indicators Database.
LEGAL	Legal structure and property rights index	Heritage foundation
DOMCREDITPVT	Domestic credit to private sector (% GDP)	World Bank, World Development Indicators Database.
CREDITGOV	Domestic credit to public enterprises (% GDP)	World Bank, World Development Indicators Database.
FDI	Foreign direct investment (% GDP)	IMF, Balance of Payments Database.
KAOPEN	De jure financial openness index	Chin and Ito, 2011
Newcap	Total capital flows (fdi + portfolio + errors and omissions)	IFS Database
DOMCREDITPVT*FDI	Interactive term	
Lnpercapita	initial per capita GDP	World Bank, World Development Indicators Database.

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VI. Results and Interpretation

This section attempts to estimate the impact of financial openness on TFPG taking into consideration the effect of the banking credit (domestic and private credit in addition to loans provided to the public enterprises). This model will be done in four samples of countries in order to make sure that results are not driven by a specific set of countries.

- The first sample consists of six countries (Egypt, Jordan, Tunisia, morocco, Algeria and Turkey). These countries include the first four non-oil exporting countries with similar level of stage of development, in addition to Algeria that is similar to their level stage of development but is considered as oil exporting country. We also added Turkey that is a non-oil exporting country with a higher level of stage of development.

- The second sample consists of only the four countries (Egypt, Jordan, Tunisia and Morocco), categorized as low middle income and non-oil exporting countries.

- The third sample comprises the four non-oil exporting countries, in addition to Turkey, which is considered as high middle income country.

- The fourth sample encompasses the four non-oil exporting countries in addition to Algeria, which is considered as an oil exporting country, with a similar level of stage of development compared to the four concerned countries.

We also have estimated the model in various time periods, reflecting the different economic contexts and policies that were adopted in these countries. The first period is 1990-2010, which is the main focus of interest, in order to be able to assess the impact of the financial openness and liberalization policies on TFPG. This period has also witnessed the implementation of the market oriented policies, privatization of public enterprises, trade liberalization and the ratification of trade agreements. Then, in a second place, we run the model for the period 1977-1989, which was characterized by opposite policies: the financial repression, controls on capital flows, the dominant role of the state, trade protectionism, and import substitution. At last, we performed the estimation for the whole period 1977-2010, in order to figure out which policies have the dominating impact on the TFPG.

In this regard, 12 models were estimated that included the four above mentioned samples, in the three time periods. Also each model has been estimated twice, firstly using the total capital flows as an independent variable that reflects the de facto financial openness (Model A), and secondly we focused on one type of the de facto financial openness, i.e. FDI as an independent factor (Model B).

- Model 1: Six countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria and Turkey), during 1977-2010.

- Model 1-2: Six countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria and Turkey), during 1977-1989.

- Model 1-3: Six countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria and Turkey), during 1990-2010.

- Model 2: Four countries (Egypt, Jordan, Tunisia and Morocco; during 1977-2010.

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- Model 2-1: Four countries (Egypt, Jordan, Tunisia and Morocco; during 1977-1989.
- Model 2-2: Four countries (Egypt, Jordan, Tunisia and Morocco; during 1990-2010.
- Model 3: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Turkey), during 1977-2010.
- Model 3-1: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Turkey), during 1977-1989.
- Model 3-2: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Turkey) during 1990-2010.
- Model 4: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria) during 1977-2010.
- Model 4-1: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria) during 1977-1989.
- Model 4-2: Five countries (Egypt, Jordan, Tunisia and Morocco; in addition to Algeria) during 1990-2010.

A) Impact of Total Capital flows

1) The financial openness period (1990-2010):

Despite the implementation of the financial openness period since the beginning of the nineties, we found out that the impact of total capital flows was negative and non-significant during this period (Model 1A till Model 10A).

2) The pre financial openness period (1977-1989):

During the period of capital controls, the negative relationship still remains. This was obviously reflected in the results for the whole period 1977-2010.

This confirms the findings in the past studies that didn't find a decisive relationship between capital flows and total factor productivity (Gamara (2009)). This result could be attributed to many reasons. First, this might be due to the incomplete sequencing phases of financial liberalization: macroeconomic stability, free trade and financial sector reform. The unfinished reforms in these pillars might lead to mis-allocation of resources towards unproductive sectors (Gibson et al. (2006) and (Mahar and Williamson (1998)).

Moreover, the concerned courtiers should attain attaining a certain level of these absorptive capacities. Financial openness could only have positive benefits when the country reaches a certain threshold in certain factors, of which: a strong financial sector that succeed to allocate resources towards most productive projects, in addition to macroeconomic stability, quality of institutions and trade liberalization (Saadi-Sedik (2012), Kose et al. (2009)). Second, these countries might have been affected by several financial crises, especially East Asia crisis in 1997 as well as the financial crises in 2008.

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B) Impact of FDI

1) The financial openness period (1990-2010):

In a second step, we focused only on foreign direct investment. FDI impact on TFPG was also found to be negative and non-significant (Model 1B till Model 10B), despite the FDI liberalization policies and business climate reform that took place during this period. However, we notice that this sign turned out to be positive in Model 9B, when we added Turkey.

2) The pre financial openness period (1977-1989):

As expected, FDI has induced a negative impact in all models (Model 1B till Model 10B), during the pre-liberalization period.

Generally, the previous studies didn't reach an obvious result in this regard. A number of studies have found positive relationship between the FDI and TFPG; others have found a negative relationship and a third group of studies have reached inconclusive results (Mclean and Shrestha (2002)), (Loko and Diouf (2009)). FDI shouldn't be tackled as homogenous type of flows, FDI growth or spillovers impact might depend on its type: Mergers and acquisitions, privatizations, Greenfield investment or whether it is oriented towards manufacturing or services, or oil versus non-oil FDI. Many studies argue that, FDI in manufacturing sector could have a positive impact on TFPG compared to FDI in services or in oil industries.

Concerning our study, the negative impact of FDI on TFPG could be attributed to many reasons: a) FDI in our selected MENA countries be characterized by a horizontal seeking behavior, in order to benefit from the long periods of tariff and non-tariff barriers and trade protectionism. FDI has focused on establishing projects that meet local market demands rather than export oriented high productive ones (Naceur, Ghazouani (2007), (Omran and Bolbol (2003), (Sadik and Bolbol (2000)), (Haddad and Harrison (1993), (Loko, Diouf (2009)) and (Jallab et al. (2008)). b) FDI didn't encourage the competition among local firms, instead a crowding out effect was noticed in morocco for example, (Waldkirch (2010)). c) Foreign firms didn't succeed to create forward or backward linkages (Krogstrup and Matar (2005)). d) Negative impact of FDI on TFPG could also be attributed to weak absorptive capacities such as low level of labor skills and reluctance to increase R&D spending (Lin et al. (2009)), (Suyanto et al. (2009)), (Castillo et al. (2012)). e) FDI has not generated technological spillovers effect also because it wasn't concentrated in industries with medium or high technological content (Massoud (2008)). Instead, FDI was prevailing in non-tradable sectors such as: Retail trade, Banks, communication and real estate. These sectors are characterized by low level of productivity and- as a result of misallocation of resources- they might have negative impact on the country's potential to increase the high technology exports (Agémor (2001)), (Nicet-Chenaf and Rougier (2008)). Then, we could notice that our selected countries didn't succeed to participate in the international production supply networks. Our selected countries didn't focus on producing upgraded manufactured goods, or attracting FDI in high technology sectors.

C) Banking credit variables

1) The financial liberalization period (1990-2010):

During the liberalization period, we found that the domestic credit to the private sector as a percentage of GDP has induced a negative and non-significant impact on the TFPG. As well, the banking credit to public enterprises (as a % of GDP), is also negative but significant.

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These findings are compatible with other studies (Naceur, Ghazouani (2007)),(Omran and Bolbol (2003)), (Sassi and Goaied (2013)).

2) The financial repression period (1977-1989)

Results also revealed a negative and significant relationship between both previous variables with TFPG.

Generally, this negative relationship could be attributed to many reasons. First, financial intermediation hasn't succeeded in fulfilling its role in reducing cost of information, improving the assessment of investment opportunities, selecting the high tech projects and diversifying risks in order to include high risk and high return projects. This may also reflect a problem of adverse selection. Apparently, this resulted from a misallocation of loanable funds. The increased cost of funding could also be due to other factors such as the high rate of bank concentration, the low level of competition in the banking market, the high net interest rate margins and increased levels of non-performing loans.

D) Other Control Variables

1) The financial liberalization period (1990-2010)

Fixed capital formation as a percentage of GDP had a positive non-significant impact on TFPG**.** Secondary enrollment rate has induced a positive impact in both Model 5A and Model 6B, this confirms with previous studies in other empirical estimation (Miller and Upadhyay (2000)).Manufactured exports as a percentage of GDP had a positive and significant effect (Model 3A, Model 3B, Model 5A, Model 9A, Model 9B), which confirms the theoretical views concerning the beneficial impact of trade openness on technological spillovers**.** The growth rate of electricity production has proven to induce a positive and significant impact (Model 3A, Model3B, Model 5A and Model 9A). The inflation rate and the government current expenditure as a percentage of GDP, have a negative and significant impact on TFPG (Model 3A, Model 3B, Model 6B, Model 9A and Model 10B, for inflation rate; Model 3A, Model 3B, Model 5A and Model 6B, for government expenditure as a percentage of GDP). The former is an indicator of distortive unproductive public expenditure and the latter is a proxy of macroeconomic stability.

2) The pre-liberalization period (1977-1989)

Gross fixed capital formation has induced a positive and significant impact on TFPG only in Model 2A. The enrollment rate in Secondary education had a positive but non-significant impact. The growth rate of electricity production was significant in one only specification (Model 2B). Both variables of macroeconomic stability were negative and significant in many specifications. However, we didn't succeed to find any relationship between manufactured exports and TFPG. These countries were characterized by the high rate of export concentration, and failed to realize a substantial change in the production and sectoral structure towards an increasing share of high and medium technology industries. However, we could notice a limited progress in diversifying their exports only in the last decade.

The reform policies implemented by the countries in question, during the liberalization period 1990-2010, might be classified into three types of policies: First, policies that have caused a sluggish in economic activity, notably the deterioration in per capita capital stock accumulation, especially in the eighties and nineties. These countries are characterized by the widening financing gap as a result of the low savings rates. As well, investments were directed towards non tradable instead of export oriented industries in middle and high level of technology. Besides, this may be due to inefficient investment as a result of lots of obstacles

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in business environment such as the difficulty in obtaining construction licenses and the weak level of property rights protection and weak contract enforcement. Second, policies that haven't been enough improved, especially the education policy and macroeconomic stability. Despite the increase in secondary enrollment rates in these four countries during the last decades, one cannot discard the low quality of education and skill shortages, as well as the high unit labor cost as a result of low labor productivity. This also reflects the inadequate education versus required skills; subsequently the educational content doesn't help in high technology absorption (Bhattacharya and Wolde, 2010). Third, concerning policies that improved, we could mention both the improvement in electricity growth and the rising role of manufactured exports.

VII. Conclusion and Policy Recommendations

This paper attempted to estimate the impact of financial openness on total factor productivity growth (TFPG) while taking into consideration the effect of banking credit as a transmission channel. Considering possible endogeniety and causal relationship, GMM dynamic panel data models were suggested as a remedy for this endogeneity problem. Estimators must fulfill the orthogonality conditions. In the GMM System model, two equations are estimated. The first equation is estimated in the level form with instruments in lagged first difference and the second is estimated in first difference, while using lagged variables in levels as instruments. Sargan test was applied in order to test whether the instruments used are correlated with the residuals or not. As well, another test for autocorrelation was utiliusedzed to test whether the errors in the first-difference regression exhibit no second-order serial correlation. Number of Instruments was collapsed using Roodman command in Stata10, Xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables: the total capital flows, FDI, domestic credit to private sector as a percentage of GDP, credit to government firms as a % of GDP, in both the level and difference equation.

This study found out that total capital flows have a negative non- significant impact on TFPG in our selected countries. With a special focus on FDI, results showed a negative non-significant impact on TFPG, while a positive non-significant impact when Turkey is added. Domestic credit to private sector as a percentage to GDP has a negative non -significant impact on TFPG. Concerning the other control variables, both the growth rate of electricity production (as a proxy of infrastructure) and manufactured exports have induced positive and significant impact, specifically during the liberalization period (1990-2010). As well, both inflation rate and government expenditure as a percentage of GDP had their expected negative sign. Moreover, secondary enrollment rate and fixed capital formation as a percentage of GDP had a positive impact on TFPG, but rarely significant. Finally, the interaction variable between capital flows/ FDI and domestic credit to private sector as percentage of GDP was positive and non-significant, reflecting the fact that positive impact of financial openness could only be achieved when a certain threshold is attained. This was also confirmed when Turkey was added.

Following these empirical results, many policy recommendations could be suggested in order to foster TFPG in our selected countries. Increasing total factor productivity growth should be an ultimate target in order to attain long term economic growth. In this regard, financial openness, especially FDI, could play a potential role as a catalyst for TFPG. Economic policy should focus on enhancing the economic fundamentals of the domestic economies especially concerning the improvement of business climate, trade openness, governance, infrastructure and the level of human capital. Export oriented FDI could be stimulated to participate in the international supply chain. Forward and backward linkages with local firms could be

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enhanced through local content requirement and setting quality standards to improve the quality of local suppliers.

As well, improving the efficiency of banking sector, as an absorptive capacity, would essentially foster TFPG and hence contribute in reaping the benefits of financial openness. Policies should aim at reducing non-performing loans, establishing more advanced risk assessment units as well as strengthening macro prudential and regulatory measures in the banking sector. By enhancing competition and decreasing the concentration rate in the banking sector, the cost of borrowing will be subsequently reduced. This might encourage more productive and innovative firms to apply for loans, especially SMEs. Banking credit should also be more allocated towards high productive sectors, instead of financing private and government consumption and non-tradable sectors (such as construction).

Concerning the other variables that aim to boosting TFPG, human capital should be enhanced in these countries. Education systems must focus more on upgrading the level of education outcomes, by increasing the secondary and tertiary enrollment rate. It is highly recommended to focus on the quality of education through raising the number of scientists and engineers. As an important absorptive capacity, high skill labor would have a positive impact on TFPG, it might also attract FDI especially in high technology and more sophisticated export oriented industries. Improving the level of institutions, namely the legal structure, respect of law, contract enforcement and protection of property rights are also a very important prerequisite in order to maximize the benefits of financial openness on TFPG.

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Appendix 1

Table I Sources of Growth in the selected countries, During 1970-2010

	Per capita GDP growth rate	Per capita capital stock (growth rate)	Per capita human capital (growth rate)	TFPG
1970-1980 (period average)				
Algeria	2.64	2.7	0.72	-0.78
Egypt	4.3	3.69	0.64	-0.04
Jordan	12.41	6.16	0.55	3.92
Morocco	1.91	1.52	0.39	0
Tunisia	3.57	2.24	0.71	0.61
Average	4.96	3.26	0.6	0.74
1981-1990 (period average)				
Algeria	-1.6	0.13	1.06	-2.79
Egypt	2.92	2.23	0.83	-0.14
Jordan	-2.6	0.92	0.94	-4.46
Morocco	0.83	0.2	0.54	0.1
Tunisia	0.75	0.78	0.54	-0.57
Average	0.06	0.85	0.78	-1.57
1991-2000 (period average)				
Algeria	-2.11	-1.23	0.85	-1.73
Egypt	2.44	0.23	0.74	1.48
Jordan	-1.04	-0.89	0.73	-0.87
Morocco	-0.25	0.25	0.47	-0.97
Tunisia	1.91	0.45	0.69	0.77
Average	0.19	-0.24	0.7	-0.27
2001- 2010 (period average)				
Algeria	1.48	0.29	0.61	0.64
Egypt	1.73	0.55	0.56	0.62
Jordan	3.58	0.65	0.57	2.36
Morocco	3.71	1.72	0.53	1.46
Tunisia	2.52	0.84	0.72	0.96
Average	2.6	0.81	0.6	1.21

Source: calculated by the author.

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Table II :Kaopen Index

	1970-1980	1981-1990	1991-2000	2001-2010
Algeria	-1.8	-1.7	-1.2	-1.2
Egypt	-1.9	-1.9	-0.1	2.2
Jordan	-1	-0.5	0.3	2.4
Morocco	-1.7	-1.5	-0.9	-1.2
Tunisia	-1.2	-1.2	-0.7	-1.2
Average	-0.9	-1	-0.5	0.1

Source: http://web.pdx.edu/~ito/Chinn-Ito_website.htm.

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Table III Impact of total capital flows and domestic credit on TFPG during 1977-2010 and sub periods 1977-1989 and 1990-2010 in Six countries

				Model 1A	Model 1-2A		Model 1-3A	
	1977-2010				1977-1989		1990-2010	
lnpercapita						-8.44	-2.3	
						0.04**	0.45	
newcap	-0.56	-1.47	-1.77	-2.66	-0.68	-1.59	-2.4	-1.26
	0.66	0.29	0.36	0.24	0.154	0.478	0.32	0.337
KAOPEN	1.14		0.02		2.80	3.62	1.36	0.05
	0.41		0.97		0.257	0.18	0.383	0.9
CREDITPV	-0.316	-0.26		-0.12	-0.17		-0.3	
	0.10	0.17		0.66	0.22		0.371	
CREDOTGOV			-0.16			-0.30		-0.200
			0.44			0.152		0.265
Legal				0.17			-0.47	-0.56
				0.87			0.535	0.25
ELECT	0.23	0.25	0.26	0.28		0.09	0.46	0.36
	0.04**	0.04**	0.013**	0.048**		0.6	0.067***	0.09***
GFCF	0.3	0.23	0.10	0.17	0.15	0.048	0.48	
	0.037**	0.038**	0.468	0.37	0.09***	0.410	0.249	
Sec	0.038	0.069	0.016**	0.05	0.08	0.09	0.06	0.028
	0.69	0.36	0.69	0.27	0.20	0.36	0.205	0.288
POPGR		0.04						
		0.92						
manufexp	0.10	0.10	0.095	0.09			0.20	0.08
	0.012**	0.002*	0.078***	0.029**			0.042**	0.02**
INFLATION	-0.21	-0.19	-0.12	-0.148	-0.25	-0.09	-0.15	-0.11
	0.044**	0.041**	0.001*	0.103	0.186	0.537	0.007*	0.009*
GOV	-0.206	-0.32	-0.66	-0.66	-0.59	-1.22	-0.038	-0.53
	0.34	0.449	0.005*	0.37	0.06***	0.001*	0.967	0.08***
NEWCAP*creditpv	0.10	0.02		0.03	0.027		0.027	
	0.54	0.19		0.19	0.11		0.299	
NEWCAP*creditGOV			0.07			0.0049		0.05
			0.34			0.96		0.312
CONS	4.13	2.6	5.8	4.44	15.8	85.01	8.59	8.8
		0.52	0.248	0.664	0.248	0.002	0.441	0.32
Sargan test (p-value)	0.08	0.15	0.50	0.30	0.09	0.122	0.417	0.82
AR 2test (p-value)	0.129	0.15	0.11	0.08	0.26	0.21	0.248	0.19
No of instruments	15	13	13	13	15	17	16	14
F- prob	0.000	0.001	0.001	0.08	0.003	0.000	0.003	0.001

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.
For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.
Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi,domcreditpvt, creditgov), in both the level and difference equation.

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Table IV Impact of FDI and domestic credit on TFPG during 1977-2010 and sub periods 1977-1989 and 1990-2010 in Six countries

	Model 1B			**Model 1-2B**		**Model 1-3B**	
	1977-2010			1977-1989		1990-2010	
lnpercapita	-0.716				-11.56	-1.14	
	0.59				0.076***	0.431	
FDI	-2.96			-2.89	-1.97	-0.898	-1.10
	0.142			0.091***	0.716	0.65	0.12
KAOPEN	0.88			0.879	4.00		
	0.34			0.650	0.215		
CREDITPV	-0.22			-0.178		-0.123	
	0.219			0.318		0.4	
CREDOTGOV					-1.05		-0.12
					0.306		0.52
Legal							
ELECTPRODGR	0.26			0.132	0.12	0.36	0.36
	0.041**			0.049**	0.323	0.08***	0.13
GFCF	0.32			0.05		0.15	0.12
	0.18			0.336		0.53	0.67
sec	0.04			0.087			0.015
	0.4			0.264			0.64
manufexp	0.11					0.09	0.08
	0.03**					0.08***	0.07**
INFLATION	-0.204			-0.25		-0.10	-0.11
	0.059***			0.205		0.06***	0.007*
GOV	0.36			-0.65	-0.72	-0.21	-0.65
	0.029**			0.072***	0.015	0.46	0.056***
FDI*DOMCREDIT							
FDI*creditpv	0.031			0.102		0.01	
	0.146			0.141		0.616	
FDI*creditGOV					0.186		0.05
					0.6		0.11
cons	8.3			15.4	108.9	8.42	3.9
	0.095			0.335	0.06	0.37	0.76
Sargan test	0.258			0.398	0.09	0.87	0.43
AR test	0.127			0.218	0.084	0.11	0.17
No of instruments	18			16	11	14	12
Fprob	0.006			0.000	0.004	0.001	0.001

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.

For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi, domcreditpvt, creditgov).

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Table V Impact of capital flows and domestic credit on TFPG during 1977-1989 and 1990-2010 in four countries

	Model 2-1A		**Model 2-2A**		
	1977-1989		1990-2010		
lnpercapita		-19.2			
		0.07***			
NEWCAP	-1.16	-4.47	-0.05	-1.15	-1.2
	0.143	0.081***	0.8	0.19	0.08***
DOMCREDIT			-0.06		
			0.037		
CREDITPV	-0.28			-0.065	-0.21
	0.073***			0.62	0.116
CREDITGOV		-0.76			
		0.015**			
ELECTPRODGR			0.26	0.26	
			0.09***	0.06***	
GFCF	-0.04	0.14			
	0.784	0.592			
SEC	0.15			0.006	0.09
	0.126			0.916	0.059***
LEGAL					
Mnaufexp			0.047	0.08	0.21
			0.418	0.09***	0.02**
INFLATION	-0.41				
	0.151				
GOV	-0.70	-1.1	-0.22	-0.27	-0.24
	0.035**	0.039**	0.08***	0.53	0.32
cons	27.9	167.6	6.13	2.4	-6.4
	0.053	0.038	0.36	0.70	0.34
newcap*creditpvt	0.035	0.05		0.016	0.012
	0.144	0.628		0.18	0.141
Sargan test	0.257	0.95	0.58	0.51	0.769
AR test	0.196	0.414	0.25	0.36	0.355
No of instruments	12	11	8	12	13
P value	0.014	0.06	0.09	0.015	0.002

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.

For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi, domcredit, domcreditpvt, creditgov).

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Table VI Impact of FDI and domestic credit on TFPG during 1977-2010 and sub periods 1977-1989 and 1990-2010 in four countries

	Model 2B			**Model 2-1B**	**Model 2-2B**	
			1977-2010	1977-1989		1990-2010
lnpercapita				-0.27		
				0.97		
FDI	-0.927	-3.97	-4.3	-6.4	-1.05	-1.5
	0.718	0.019**	0.012	0.312	0.041**	0.43
KAOPEN		0.06	0.103	4.00	0.72	0.06
		0.93	0.39	0.263	0.587	0.941
CREDITPV	**-0.206**			**-0.43**	**-0.36**	
	0.341			0.072***	0.057***	
CREDOTGOV		**-0.24**	**-0.311**			**-0.19**
		0.015**	0.146			0.656
ELECTPRODGR	0.147	0.228	0.21			
	0.013	0.049**	0.048**			
GFCF	0.049	0.205	0.228	-0.25	0.45	
	0.774	0.079***	0.08***	0.307	0.223	
sec	0.073	0.031	0.036	0.13	0.13	0.04
	0.4	0.051***	0.242	0.318	0.023**	0.20
Legal			0.56			
			0.089***			
manufexp	0.07	0.06				0.08
	0.46	0.351				0.65
INFLATION	-0.29	-0.26	-0.308	-0.37	-0.40	
	0.117	0.329	0.26	0.079***	0.005*	
GOV	-0.26	-0.60	-0.64	0.65		-0.56
	0.131	0.024**	0.008*	0.020***		0.076***
FDI*DOMCREDIT						
FDI*creditpv	0.016			0.23	0.016	
	0.59			0.143	0.018**	
FDI*creditGOV		0.168	0.18			0.06
		0.016	0.011**			0.466
Sargan test	0.37	0.382	0.571	0.10	0.386	0.94
AR test	0.19	0.136	0.146	0.293	0.23	0.245
No of instruments	13	15	17	13	14	11
F- prob	0.028	0.007	0.042	0.014	0.035	0.022

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.

For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi, domcredit, domcreditpvt, creditgov).

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Table VII Impact of total capital flows and domestic credit on TFPG during 1977-2010 and sub periods 1977-1989 and 1990-2010 in five countries (adding Turkey)

	Model 3A		Model 3-1A		Model 3-2A	
	1977-2010		1977-1989		1990-2010	
lnpercapita	-2.8		-0.59			
	0.51		0.876			
newcap	-0.78	-2.06	-0.95		-0.75	
	0.52	0.006	0.18		0.54	
KAOPEN	1.07	0.124	5.6		0.51	
	0.5	0.892	0.20		0.61	
CREDITPV	-0.37		-0.23		-0.12	
	0.204		0.035**		0.54	
CREDITGOV		-0.16				
		0.226				
ELECTPRODGR	0.24	0.26			0.42	
	0.06***	0.096***			0.07**	
GFCF	0.177	0.178	0.007			
	0.442	0.220	0.93			
sec	0.07	0.009			0.013	
	0.535	0.7			0.749	
LEGAL						
manufexp	0.21	0.08			0.11	
	0.225	0.04**			0.009*	
INFLATION	-0.19	-0.12	-0.24		-0.13	
	0.037**	0.018**	0.184		0.037**	
GOV	-0.05	-0.69	-0.45		-0.23	
	0.899	0.002*	0.032**		0.721	
newcpvt	0.013		0.0339		0.008	
	0.428		0.217		0.548	
newcagov		0.08				
		0.018**				
Sargan test	0.109	0.83	0.237		0.431	
AR test	0.098	0.137	0.210		0.214	
No of Instruments	16	14	15		16	
F prob	0.05	0.000	0.010		0.002	

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.

For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi, domcredit, domcreditpvt, creditgov).

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Table VIII Impact of FDI and domestic credit on TFPG during 1977-2010 and sub periods 1977-1989 and 1990-2010 in five countries (adding Turkey)

	Model 3B		**Model 3-1B**	**Model 3-2B**	
	1977-2010		1977-1989	1990-2010	
lnpercapita					
FDI	-2.3	-1.7	-6.20	0.17	2.41
	0.5	0.3	0.015**	0.714	0.232
KAOPEN	0.43		3.12		
	0.44		0.182		
DOMCREDIT					
CREDITPV	-0.12		-0.433	-0.05	
	0.68		0.044**	0.521	
CREDOTGOV		-0.03			0.38
		0.8			0.258
Legal	0.41				
	0.7				
ELECTPRODGR	0.27	0.27		0.35	0.37
	0.09***	0.06***		0.18	0.226
GFCF		0.18	-0.30	0.14	
		0.25	0.22	0.58	
sec		0.02	0.129		
		0.35	0.309		
manufexp	0.04			0.067	0.11
	0.6			0.028	0.07
INFLATION	-0.13	-0.10	-0.29	-0.09	-0.03
	0.008*	0.004*	0.04**	0.034	0.08
GOV	-0.37	-0.56	-0.55		-0.21
	0.381	0.012**	0.014**		0.466
FDI*DOMCREDIT					
FDI*creditpv	0.03		0.24		
	0.5		0.007*		
FDI*creditGOV		0.07			-0.109
		0.3			0.271
Sargan test	0.26	0.59	0.336	0.897	0.914
AR test	0.12	0.11	0.355	0.161	0.173
No of Instruments	13	11	15	10	13
F prob	0.04	0.04	0.000	0.002	0.098

Note: p values are in parentheses, * significant at 1%, ** significant at 5%, *** significant at 10%.

For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Number of Instruments was collapsed using Roodman command in stata10, xtabond2, (Roodman, 2006). Instruments were taken as t-2 and t-3 for the following endogenous variables (newcap1, fdi, domcredit, domcreditpvt, creditgov).

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Table IX Impact of total capital flows and FDI and domestic credit on TFPG during 1977-2010 (adding Algeria)

	4A	4B
lnpercapita		-1.11
		0.7
newcap	-0.17	
	0.38	
FDI		-2.3
		0.3
KAOPEN	0.08	0.41
	0.86	0.7
CREDITPV	-0.03	-0.13
	0.6	0.6
CREDITGOV		
ELECT	0.17	0.16
	0.04**	0.03**
GFCF	0.004	
	0.9	
manufexp	0.03	0.04
	0.16	0.3
INFLATION		-0.24
		0.08***
GOV	-0.30	-0.24
	0.006*	0.12
NEWCAP*CREDITPV	0.004	
	0.38	
NEWCAP*CREDItgov		
FDI*creditpv		0.03
		0.3
FDI*creditGOV		
Sargan test	0.82	0.61
AR test	0.15	0.21
No of instruments	13	12
F prob	0.005	0.002

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Appendix 2

Table I Main macroeconomic indicators in selected countries during 1970-2010

A .

	budget balance (% of GDP)				Government Debt (% of GDP)				Inflation rate			
	1970-1980	1981-1990	1991-2000	2001-2010	1970-1980	1981-1990	1991-2000	2001-2010	1970-1980	1981-1990	1991-2000	2001-2010
Algeria				4.7					8.3	9.7	16.9	3.6
Egypt	-17.2	-8.5	-0.77	-6.3				85.8	9	17	9.1	8.4
Jordan		-3.4	-0.8	-3.8		128.8	113.1	75.6	10.8	7.5	3.5	4.3
Morocoo	-9.1	-6.8	-2.7	-0.7				52.6	7.9	7.3	4	1.8
Tunisia	-2.8	-5.1	-2.8	-2		54.8	57.1	49.5		7.4	4.5	3.4
China										11.8	7.5	2.2
India	-4.6	-7.5	5.5	-3.5		49.9	49.3	58	7.9	8.6	9.1	6.4
Indonesia	-2.5	-1.4	0.3	-0.9			41	37.7	17	8.6	14.1	8.6
Korea	-1.8	-0.83	-0.3	1.6		8	9.4		16.4	6.4	5.1	3.2

B .

	GDP real growth rate				Fixed Capital Formation (% of GDP)				Domestic Savings (% of GDP)			
	1970-1980	1981-1990	1991-2000	2001-2010	1970-1980	1981-1990	1991-2000	2001-2010	1970-1980	1981-1990	1991-2000	2001-2010
Algeria	6.6	2.8	1.7	4	37.6	31.2	25.6	27.1	35.9	29.9	31.9	49.4
Egypt	6.6	5.5	4.3	4.9	19.3	28	19.6	18.6	11.9	15.6	13.8	15
Jordan	16	2.2	5.2	6.3	34.5	26.7	26.8	24.3	-12.9	-6.2	4.4	-2.2
Morocoo	5.2	4	2.5	4.9	20.8	23.3	22.4	28.3	14.1	17.2	17.8	24.1
Tunisia	7.2	3.6	4.8	4.5	25.2	27.1	25.1	23.4	23.7	22.3	22.1	21.4
China	7.5	9.4	10.5	10.5	27.2	28.9	33.6	40.3	30.8	35.9	41	47.3
India	3.3	5.6	5.6	7.5	15.9	21	23	29.2	17.3	21	22.9	29.7
Indonesia	7.9	6.4	4.4	5.2	21.9	25.1	25.8	24.5	26.2	31	30.2	30.6
Korea	7.4	8.7	6.2	4.2	27.3	30.1	34.9	28.9	22.3	32.1	36	31.5

C .

	Current Account (% of GDP)				Current Account (% of GDP)				Average simple tariifs	
	1970-1980	1981-1990	1991-2000	2001-2010	1970-1980	1981-1990	1991-2000	2001-2010	1991-2000	2001-2010
Algeria	-7.2	-0.4			8.1	-0.11			23.4	17.2
Egypt	-6.7	-4.7	0.9	2.3	2.01	0.86	-2.12	-1.1	22	22.5
Jordan	0.55	-3.3	-4.3	-4.8	6.75	6.26	6.9	7	23.8	12.7
Morocoo	-10.5	-4.7	-1.4	1.14	15.4	4.9	0.48	-1.06	38.1	19.5
Tunisia	-7.1	-4.7	-4.2	-2.6	7.5	4.47	4.9	5.05	29.2	23.1
China		0.03	1.53	5.95		1.23	2.5	2.37	24.8	9.5
India	0.45	-1.72	-1.18	0.21	0.57	1.48	2.15	2.79	39.3	19.9
Indonesia		-3.09	-0.37	2.24		4.01	0.5	-0.72	11.8	5.8
Korea	-3.55	0.69	0.73	1.31	6.3	0.73	1.64	0.49	9.4	9.3

Source: World Bank, World Development Indicators Database.

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Appendix 3

Solow (1957) has presented the Cobb-Douglas production function, of which he has derived the total factor productivity (A):

$$Y_t = A_t F(K_t, L_t) \qquad (1)$$

WhereY_t is Gross Domestic Product, K_t, is capital stock, L_t is labor, A, total factor productivity. The Cobb Douglas production function could take the form of growth rates as follows:

$$\frac{\dot{Y}_t}{Y_t} = \frac{\partial Y}{\partial K}\frac{K_t}{Y_t}\frac{\dot{K}_t}{K_t} + \frac{\partial Y}{\partial L}\frac{L_t}{Y_t}\frac{\dot{L}_t}{L_t} + \frac{\dot{A}_t}{A_t}, \qquad (2)$$

where dots refer to first partial derivatives with respect to time, so that the GDP growth rate equals the growth rates of capital sock, labor (weighted by their elasticities with respect to GDP) and the growth rate of TFP, such as follows:

$$\frac{\dot{Y}_t}{Y_t} = \frac{MPK.K_t}{y_t}\frac{\dot{K}_t}{K_t} + \frac{MPL.L_t}{y_t}\frac{\dot{L}_t}{L_t} + \frac{\dot{A}_t}{A_t} (3)$$

Where, MPK and MPL are the marginal product of capital stock and labor, respectively, then:

$$\frac{\dot{Y}_t}{Y_t} = \alpha\frac{\dot{K}_t}{K_t} + (1-\alpha)\frac{\dot{L}_t}{L_t} + \frac{\dot{A}_t}{A_t} (4)$$

whereα and $(1-\alpha)$are income shares for both capital stock and labor respectively[5], assuming that the real return of the factor of production equals its marginal product with the presence of perfect competition. Labor share could be derived from national accounts in each country. Most empirical studies assume that labor share ranges between (0.55-0.7) (Blanchard, 2000). Capital income share is the complement of 1, hence it is assumed to be larger than one third in developing countries (Easterly & Levine, 2001). TFPG could be considered as the residual, as follows:

$$\text{residual} = g_A = g_y - (\alpha g_K + (1-\alpha)g_L) \qquad (5)$$

where g_A is TFPG , g_y is the GDP rate of growth , $g_K$and g_L are rate of growth of capital stock and labor respectively. Hence, $(\alpha g_K + (1-\alpha)g_L)$ is the growth due to the contribution of labor and capital stock respectively.

TFPG calculation could be improved by adding enhancements in human capital to account for labor quality, through adding years of education to account for labor quality. Human capital is proxy with average years of schooling (Barro and Lee, 2011)

[5]- Labor income share = $1-\alpha = \frac{WL}{PY}$, or wages divided by the values of GDP. Hence, GDP growth rate = labor share in GDP * labor growth rate + capital share in GDP *capital stock growth rate + TFP growth rate.

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In this case, Cobb Douglas function will be as follows:

$$Y = AK^{\alpha}(HL)^{1-\alpha} \qquad (6)$$

Where K is the capital stock, L is labor and H is human capital and A is TFP. The human capital function that incorporates labor enhanced with knowledge stock, is as following:

$$H_i = e^{\varphi(E_i)}L_i$$

The function $\varphi(E_i)$ reflects the efficiency of one unit of labor that took E number of schooling years. The derivative $\varphi'(E)$ is the return on schooling years according to mincerian function, where an additional one schooling yearleads to an increase in the efficiency of the employee by $\varphi'(E)$(Hall and Jones, 1999).

First, capital stock is estimated K, using the perpetual inventory model:

$$K_t = K_{t-1}(1-\delta) + I_t \quad (7)$$

The initial capital stock is $K_0 = \frac{I_0}{g+\delta}$, where g isthe geometric average of rate of growth of investment, then subsequent values of capital stock as in perpetual inventory model. Depreciation rate is assumed δ= 6%.

Growth accounting is as follows:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha\frac{\dot{K}}{K} + (1-\alpha)\left(\frac{\dot{H}}{H} + \frac{\dot{L}}{L}\right) (8)$$

Previous empirical studies about economics of education (return on education) has pointed out that quality of education increases by around 8% for each additional year of schooling: exp (0.08*E) L(Park, 2012; Kumer and Pacheco, 2012), and in terms of per capita (dividing by labor), the TFPG will be calculated as follows:

$$\Delta \ln TFP = \Delta lny - \alpha\Delta lnk - (1-\alpha)\Delta lnh (9)$$