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'FDI and Growth in Emerging Markets: Does the Sectoral Distribution Matter – The Case of Egypt'

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FDI AND GROWTH IN EMERGING MARKETS: DOES THE SECTORAL DISTRIBUTION MATTER - THE CASE OF EGYPT

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ABSTRACT

This study contributes to the on-going discussion on FDI relation with growth in emerging markets. It is based on evidence from Egypt, testing FDI's effect on growth over the period 1974-2005. The main argument of the paper is that FDI is not an aggregate phenomenon. Rather, it has different, if not contradicting, effects based on its sectoral distribution (whether its channeled to manufacturing, agricultural or service sectors) and should not be treated as a homogenous group.

The analysis uses an endogenous growth model. It extends the traditional production function through introducing FDI as a source of capital accumulation as well as a generator of knowledge.

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FDI AND GROWTH IN EMERGING MARKETS: DOES THE SECTORAL DISTRIBUTION MATTER? EVIDENCE FROM EGYPT

1. INTRODUCTION

Foreign direct investment (FDI) has dominated the development areas of economics over the last thirty years, due to the potential effects it has on the host economy. These effects range from influencing the production, employment, income, prices, exports and imports, to affecting the economic growth, balance of payments, and general welfare of the host country. The importance of FDI also increased in the 1990s with the globalization of the international economy; many economists consider FDI one of the leading factors in the changing economic environment.

Driven by this, Egypt has attempted to attract FDI since 1974 by offering generous incentives. Egypt was particularly motivated by low domestic savings rates accompanied by inefficient financial intermediation, which hampered strategies to finance growth.

However, Egypt lacks thorough studies on the assessment of FDI effects, investigation of its impact on growth, and adequate outlining of the direction of causation. This deficiency has affected the formulation of appropriate promotion policies for FDI in Egypt. As such an analysis is very important and has significant policy consequences; if FDI positively affects growth (after controlling for endogeneity and other growth determinants) then FDI should be welcomed and promoted without restriction. If, on the other hand, FDI does not exert a positive impact on growth, then there should be no tax incentives or any other form of subsidies or promotion schemes to attract it. It would be more productive to commit these public resources to benefiting the national economy. (Carkovic and Levine 2002: 3, and Nunnekamp and Spatz 2003: 40)

Owing to the importance of the phenomena, there is a vast literature on the determinants, effects and prerequisites for FDI. However, there has not been an agreement among economists as to the positive effects of FDI on growth. This study is motivated by the importance of the issue for emerging-market countries, particularly Egypt given the above-mentioned scarcity of studies and by the inexistence of a consensus among economists. Thus, this study analyses the effects of FDI (as an aggregate and disaggregated by sectoral distribution) on growth in Egypt since the year 1974.

The hypothesis of the study is that the ambiguous effects found in the empirical literature on FDI effect on growth are a result of analyzing FDI as a homogenous group. We argue that FDI is not an aggregate phenomenon, rather, it has different, if not contradicting, effects. The different effects are based on FDI's sectoral distribution (whether it is channeled to manufacturing, agricultural or service sectors). Thus, FDI should be disaggregated and treated as a heterogeneous group. Testing this hypothesis using evidence from Egypt is the study's

contribution to the on-going discussion on the relation between FDI on growth in emerging markets in the empirical literature.

The analysis uses an endogenous growth model to estimate FDI's effect on growth in Egypt, while factoring in scale economies and knowledge spillovers. We introduce methodological changes to the existing literature. The traditional production function is extended through introducing FDI as a source of capital accumulation as well as a generator of knowledge.

A novelty of the study is the empirical investigation of this issue on the basis of a broad panel of sectoral national accounts data for Egypt during the period 1974-2005[1]. Using sectoral data has the advantage of increasing the number of observations and the degrees of freedom, as opposed to aggregate data.

To satisfy the aim of the study, it is divided into three sections in addition to an introduction and a conclusion. Following this introduction, ***section two*** reviews the main findings of the important contributions to the literature on the effects of FDI on growth. The purpose of the section is finding answers that can help in assessing FDI's effect on growth in Egypt. ***Section three*** tests the aggregate effect of FDI on growth in Egypt, over the period 1974-2005. The analysis also allows FDI to interact with other growth explanatory variables that were identified by the empirical literature as governing the effect of FDI on growth. The purpose of the section is to check if aggregated data provides a clear picture for analysis, or gives ambiguous results. ***Section four*** is the main contribution of this paper to the empirical literature. We test the hypothesis that the sectoral distribution of FDI (to the manufacturing, agricultural and service sectors) has different, if not contradicting effects, based on the idea presented by Alfaro 2003 and Wang 2003. The economic justification behind this hypothesis is twofold; on the one hand, FDI to the manufacturing sector is usually an investment in tradables (versus FDI to the services sector that is mostly un-tradable), and causes increases in physical capital, which is responsible for the bulk of growth in Egypt[2]. On the other hand, FDI to the manufacturing sector is characterised by being labour-intensive, and thus FDI to the manufacturing sector enhances growth via increasing the demand for labour, which results in increases in both wages and employment. To sum up, we expect FDI to the manufacturing sector to stimulate growth via physical capital and creating more jobs. We hereunder test the validity of this hypothesis.

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[1] The study covers the period 1974-2005. The start date of the study was chosen to reflect the beginning of the change in Egyptian economic policies towards foreign presence in the economy and we stop at the year 2005, which is the latest year for which comprehensive data is available

[2] In a separate exercise, we calculated the sources of growth in the Egyptian economy and it was found that output growth in Egypt was the result of growth in physical capital (e.g., acquisition of machinery, equipment, and buildings) with a significant contribution that amounted to 12.6% as an average throughout the 1974-2005 period. Physical capital was followed, in importance as a source of GDP growth, by the changes in TFP with a 3.8% contribution. The contribution of the augmented human capital was least contributing factor to growth throughout the period, with a 1.2% contribution.

2. LITERATURE SURVEY

We hereby analyse the main findings of the important contributions to the literature on the effects of FDI on growth. We group the studies into three categories according to their results: first, studies that find a positive unconditional effect for FDI on growth. Second, studies that find an ambiguous role for FDI alone on economic growth, but find that FDI when combined with other conditions like a minimum level of human development, financial market development, etc. contributes positively to growth. Finally, studies that do not find any positive effect for FDI on growth even when associated with the previously mentioned conditions.

2.1 Studies that find a positive relation between FDI and growth

Pioneering work was conducted by Blomstrom et al 1992 when they analysed the influence of FDI on growth in 78 developing countries for the period 1960-85 using an endogenous growth equation. The study found a significant robust positive impact for FDI on per capita income growth in the host country (Blomstrom et al 1992: 12-13).

In a narrower group of countries, Baldwin et al 1999 present a theoretical model where TNCs directly affect the endogenous growth rate via technological spillovers. The static TNC model the study uses states that firms choose between supplying foreign markets via exports or local production (i.e. FDI) so that they can exploit the trade-off between production-scale and proximity to markets. The model in the study introduces knowledge capital as a productivity factor. The study then introduces endogenous growth and thus the study examines how FDI-linked technology spillovers encourage long-run growth. The growth in this case stems from ceaseless product innovation driven by learning externalities in the innovation sector. The study then presents some econometric evidence using industry-level data from nine OECD countries and finds that knowledge spillovers are boosted by FDI (Baldwin et al 1999). The results of Baldwin et al 1999 are consistent with Bashir, A.M. 1998, who tested the degree of association between FDI and economic growth in a sample of six Middle East and North Africa (MENA) countries during the period 1975-90. The econometric technique employed is a panel data once with "fixed effects" method, which includes a dummy variable and uses OLS, and another with "random effects" method, which uses generalized least squares (GLS). Both procedures provide consistent estimates of a positive relation between FDI and economic growth in the six MENA countries, where FDI leads to economic growth (Bashir, A.M. 1998: 4).

In another serious attempt, Gao 2001 tests the effect of FDI on income growth using data from all countries in the Penn World Table, while excluding the oil producing countries, for the years 1980, 1985, and 1990. Gao 2001 uses a simple log linear equation following a cross-country technique to examine the relation between FDI and income; once for FDI inflows and once for FDI as a stock. In all cases, FDI has a positive statistically significant coefficient[3]. The study finds that a one percentage point increase in FDI stock to GDP is associated with a 4.42% increase in income (Gao 2001: 8).

[3] Significant at the 5% level of confidence (Gao 2001: 8)

Lensink and Morrissey 2001 contribute to the literature on FDI and economic growth by introducing measures of the volatility of FDI inflows. They find that while FDI has a positive effect on growth, the volatility of FDI has a negative impact. Another important finding of the study is that the evidence on the positive effect of FDI on output growth in the recipient country is not conditional on any other explanatory variable. In particular, the positive effect is not conditional on the level of human capital accumulation, which is a significant deviating finding from the mainstream literature. The study utilizes a standard model using cross-section, panel data and instrumental variables technique (IV) for the period 1975-1997 to derive the results (Lensink and Morrissey 2001: 25-26).

Obwana 1996 explores the empirical relationship between FDI and GDP growth in Uganda for the period 1981-95. The study builds a two equations model for the FDI determinants and growth equations and uses a two-stage least squares estimation method to reach the conclusion that FDI had a positive impact on Uganda's growth, although the FDI coefficient was insignificant.

Maher and Christiansen 2001 reviewed and discussed the literature of the existing empirical studies on the benefits and costs of FDI. They observe that the vast majority of the reviewed studies indicate that FDI makes a positive contribution to economic growth in host economies, whether these studies depend on panel data, cross-sectional data or survey data (Maher and Christiansen 2001: 11)

2.2 Studies that do not find any positive relation between FDI and growth

Some other recent studies find the effect of FDI on growth dubious. For example, Carkovic and Levine 2002 examine the relationship between FDI and growth based on World Bank and IMF datasets covering the period 1960-95. The authors use the Generalized Method of Moments (GMM) panel estimator to extract estimates of the impact of FDI inflows on output growth. They find that FDI inflows do not exert an independent robust positive influence on economic growth. They show that while sound economic policies may encourage output growth and FDI, FDI does not have a positive impact on output growth that is independent of other growth determinants (Carkovic and Levine 2002: 13).

Fry 1992 estimates a macro-econometric model with three-stage least squares for a pooled time series cross section of 16 developing countries for the period 1966-88 using the IMF's International Financial Statistics (IFS) data. He concludes that FDI neither increases domestic investment nor provides additional balance of payments financing; thus it appears that FDI was used as a substitute for other types of foreign flows. Fry also observes that any increase in FDI reduces national savings, and that FDI does not exert a significantly different effect from domestically financed investment on the rate of economic growth. The study reaches the conclusion that FDI exerts both direct and indirect effects on the current account; FDI's effect on the latter was found out to be significantly negative. However, these were the broad conclusions for the whole sample group, while the disintegration of the countries into similar subgroups reveals differences in the results, especially with regards to Pacific countries, where FDI was not a substitute for other types of foreign capital flows.

Hassan 2004 examines the relation between FDI and economic growth in the context of a multivariate economic growth framework for 95 developed and developing countries over the period from 1980 through 2001, with special reference to eight MENA countries. The central theme of this study was to ascertain whether FDI enhances or retards economic growth with special reference to information technology. The regression of FDI against a set of explanatory variables finds no significant effect of GDP growth on FDI (Hassan 2004: 15).

Kumar 1996 reviews the literature on the macroeconomic effects of FDI and concludes that the available evidence from the empirical studies on the effect of FDI on economic growth is mostly fraught with simultaneity problems, and that the direction of causality runs more often from growth to FDI than the other way round.

Lipsey 2002 surveys the most important economic empirical literature on the effects of FDI, and determines that the studies of the effects of FDI inflows on national economic growth are inconclusive. Almost all studies find positive effects in some periods or among some groups of countries, in some specifications, with some controlling variables, but these effects cannot be universal as there are circumstances, periods and countries where FDI has insignificant relation with output growth (Lipsey 2002: 56).

Townsend 2003 examines the literature on the effects of FDI on growth, and he re-ran the Carkovic and Levine 2002 model that finds no positive effect running from FDI to growth, using a data set that contains less-developed countries (LDCs) only and excludes advanced economies from the sample. The results show that FDI has no robust significant effect on growth on LDCs, and therefore, these results suggest that it is unlikely that the disparate results of previous studies can be accounted for by differences in the datasets used (Townsend 2003: 13-14).

2.3 Studies that find a conditional positive relation between FDI and growth

Various explanations have been offered for the ambiguous effect FDI has on growth. It has been argued that the effect of FDI on growth depends on the stock of human capital, degree of development of the financial sector, openness of the trade regime and the size of the economy.

In addition, some studies argue that different modes of entry of FDI have different effects on growth and that the sectoral distribution of FDI affects its impact on growth.

The importance of the stock of human capital as a determinant for FDI's effect on growth is highlighted by Borensztein et al 1998 in their most influential study. They test the effect of FDI on economic growth in a framework of cross-country regressions using yearly data on FDI inflows from industrial countries to 69 developing countries in the decades from 1970-79 and 1980-89. All regressions are based on panel data and estimated using the seemingly unrelated regressions technique "SUR"[4]. They conclude that FDI has a positive overall effect on economic growth, with the magnitude of this effect depending on the stock of human

[4] Zellner introduced The SUR model in 1962. It is a multi-equation model which uses both cross-section and time series data and is expressed as a set of linear regressions where the disturbances in the different equations are correlated (Dufour and Khalaf (2001): 5).

capital available in the recipient economy (Borensztein et al 1998: 1-11). These results were echoed by Camps and Kinoshita 2002, who tested the effects of FDI on growth in transitional economies during the transitional period 1990-1998. They used an OLS panel data estimates and found that FDI had a direct and positive impact on economic growth that is not conditional on a minimum level of human capital. However, the study argues that the insignificance of the human capital in transition economies is because most of these countries have a labour force that is above the threshold level of human capital. Such an argument reinforces the importance of human capital (Campos and Kinoshita 2002).

Alfaro et al 2002 argued that the effect of FDI on growth depends on the degree of development of the financial sector and they conclude that countries with well-developed financial markets gain significantly from FDI. The results were robust to different measures of financial market development, the inclusion of other determinants of economic growth, and consideration of endogeneity. They reach this conclusion after examining the link between FDI and growth using cross-country data for the period 1975-1995.

The openness of the trade regime and its influence on FDI's impact on growth is highlighted by Agrawal 2000, who tests the economic impact of FDI in South Asia and finds that the impact of FDI inflows on GDP growth rate to be negative prior to 1980, slightly positive for the early 1980s and strongly positive in the late 1980s and the early 1990s. From this he concludes that for a country to benefit from the positive effect FDI can potentially have on output growth, it has to have an open economy. The analysis is done over the period 1965-96 for five South Asian countries[5] using a time-series cross-section panel analysis of data (Agrawal 2000: 12-13). The importance of the openness of the trade regime is reinforced by the study of Sadik and Bolbol (2000), in which they investigate the effect of FDI on growth and productivity in six Arab economies (Egypt, Jordan, Morocco, Oman, Saudi Arabia and Tunisia), utilizing a derived relation between GDP growth as the dependent variable, and growth of labor, capital and total factor productivity (TFP), and FDI's effect on TFP as the explanatory variables. OLS estimates from 1978-1998 were calculated. The results of the analysis indicate that the effect of FDI, through capital accumulation, is positive on growth in the six countries, but only significant in Egypt, Jordan and Tunisia. The effect of FDI on TFP was found to be negative for all except Oman, and was significant in Saudi Arabia, Tunisia and Egypt. The study explains the negative effect of FDI on TFP as the result of trade-induced distortions by firms attracted to serve the domestic market (Sadik and Balbol 2000: 5).

Shan et al 1997, who examine the FDI-led growth hypothesis in China, present the size of the economy as a determinant for the magnitude of FDI on growth . The study is based on quarterly time series data and a vector auto-regression model that applies Granger no-causality procedure for the period 1988-1996 to test the causal link between FDI inflows and the real output growth. The empirical results show that, "…there is a two-way causality running between industrial growth and FDI in China. Both FDI-led growth and growth-driven FDI hypothesis are therefore supported by empirical evidence from China…[this] indicates

[5] India, Pakistan, Bangladesh, Sri Lanka, and Nepal

that the FDI-led growth hypothesis, in the sense of a unidirectional causal ordering from FDI inflows to output growth is not valid for China. The results demonstrated that both economic growth and FDI inflow reinforce each other in the course of economic development" (Shan et al 1997: 11-13). Nunnenkamp and Spatz 2003 arrive at similar results in their test for the effect of FDI stock[6] on economic growth in developing countries factoring in host-country and industry characteristics. The authors use data on US outward FDI to developing countries in the 1990s to conduct a cross-country analysis of the role of industry characteristics and their interplay with host-country characteristics in shaping the growth impact of FDI. They reach the conclusion that the effect of FDI stock on economic growth in developing countries is ambiguous. However, when factoring in the locational characteristics of the host countries[7], FDI stocks tend to be associated with strong economic growth.

The study also presents another explanation for the variation in the results of the empirical studies on FDI: that effect of FDI on growth depends on the sectoral distribution of FDI. The analysis observes that the effect of FDI stock on growth varies among sectors, and that it is stronger in the services sector compared to the manufacturing sector. The effect also varies within the manufacturing sector between different industries, and finds that in industries that attract efficiency-seeking FDI[8], there is a positive effect for FDI on output growth, while in industries that mainly draw market-seeking FDI[9], there is no positive effect on growth. The importance of the sectoral distribution is reinforced by Alfaro 2003, who examines the effect of FDI on growth in the primary, manufacturing, and services sectors using cross-country data for the period 1981-1999 (Alfaro 2003: 13-14). However, his findings deviate from the results reached by Nunnenkamp and Spatz 2003 regarding which sectors affects growth positively. The results of Alfaro 2003 show that FDI exerts a positive effect on growth only in the manufacturing sector, while in the primary sector the effect on growth tends to be negative. Evidence from the service sector is ambiguous. Thus, the analysis shows that the benefits of FDI vary greatly across sector, which explains why FDI, when studied as an aggregate, gives mixed results.

In a recent attempt, Wang and Wong 2004 contribute to the literature by differentiating between the effects of the different modes of FDI, i.e., Greenfield FDI and M&As. They use a data set of 92 countries for the period 1987-2001 and conclude that the effects on growth vary across the two modes of entry. while Greenfield FDI exerts a positive effect on growth, M&A FDI does not seem to have a positive influence. The authors attribute the mixed results of the different empirical studies on the effects of FDI on growth to the summation of the two modes of entry of the FDI activities in the host country into one group (Wang and Wong 2004: 9).

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[6] As opposed to FDI flows, which are used more often in the empirical evidence of FDI effects on growth.

[7] Like GDP per capita, schooling, institutional development and openness to trade (Nunnenkamp and Shatz (2003): 39)

[8] Electrical equipment industry was considered the prototype of efficiency-seeking FDI.

[9] Chemicals industry was considered the prototype of market-seeking FDI.

De Mello 1996 surveys the recent developments in the literature on the impact of FDI inflows on growth in developing countries. He finds that FDI as a catalyst for growth, based on econometric grounds, depends on country-specific factors that are not observable in time series analysis. The survey concludes that the overall impact of FDI on growth depends on various types of externalities and productivity spillovers, which depend on the degree of non-rivalry and non-excludability of the innovations transferred by FDI, the intellectual property legislation, the amount of learning-by-doing, and the value-added content of FDI-related production in the host economy. De Mello also studies the literature on the causality between FDI and economic growth and observes that the association between FDI determinants and actual inflows may be so much stronger than that between FDI and growth that the causality may well run from output growth to FDI.

2.4 Critical Analysis

The effect of FDI on growth has been extensively studied; it was studied in cross-country studies, and time series studies. However, cross-country studies have been criticized for implicitly imposing or assuming a common economic structure and similar production technology across different countries, which is usually not accurate. In addition, the economic growth of a country cannot only be attributed to FDI flows and TNCs activities; rather, the output growth is factor of a combination of the host country's policies, such as its monetary, fiscal and external policies (Shan et al 1997: 6).

Most studies use random effects panel regression, weighted least squares (WLS) with white correction of heteroskedasticity, and apply feasible GLS (FGLS) panel regression (correcting heteroskedasticity across groups). WLS were applied because small economies and large economies should contribute differently to the regression coefficients; real GDP of each economy was usually used as the weight in WLS.

We can see from the above review of the empirical findings that, despite the large number of studies devoted to the relationship between FDI and growth, the issue is far from settled. Some studies find evidence of the positive effect of FDI on growth, other studies find such evidence elusive, while the third group of studies finds the effect of FDI on growth dependent on four main factors: the stock of human capital, the size of the economy, the degree of financial development, and the openness of the trade regime.

It thus appears that the benefits of FDI are more evident in the theories than detected in empirical studies. This is particularly important for emerging markets when designing an FDI promotion policy and also when negotiating the investment treaties and regime liberalization to allow FDI free entry.

This paper contributes to the empirical literature on the effects of FDI on growth by presenting an explanation for the ambiguous effects of FDI on growth. That is; FDI is not a homogenous group, rather it has to be disaggregated according to its sectoral distribution.

3. THE EFFECT OF AGGREGATE FDI ON GROWTH IN EGYPT

In this section, the study contributes to the empirical literature on the effects of FDI on growth in emerging countries through empirically testing its effect on growth in Egypt during the period 1974-2005.

For the purposes of this section, we construct a growth model that was is compatible with endogenous growth theories, and we assume the existence of scale economies and spillovers, and thus estimate FDI effect on growth in Egypt, while factoring in scale economies and knowledge spillovers.

Such an addition of FDI as the generator of knowledge introduces the idea of scale economies whereby an increase in all inputs leads to a more than proportional increase of output. Scale economies change the whole procedure of calculating the total factor productivity and can also account for endogenous sustainable growth.

A novelty of the study is the empirical investigation of this issue on the base of a broad panel of sectoral national accounts data for Egypt during the period 1974-2005[10]. Such an investigation based on sectoral data, for both growth and FDI, has the advantage of increasing the number of observations, and thus the degrees of freedom, as opposed to aggregate data.

3.1 ECONOMETRIC FRAMEWORK

Endogenous growth models predict that FDI can affect growth endogenously if it generates increasing returns in production via externalities and productivity spillovers. Moreover, policy changes might induce permanent increases in output growth by providing incentives to host FDI. Specifically, FDI is thought to be an important source of capital accumulation and technological change.

We start by estimating the famous production function of the Solow growth model, which represents how inputs are combined to produce output, as follows (Mohtadi and Roe 2001, and Smolny 2000)

(1) $Y = Y(K, L, residual)$

Where Y is the real output; K is the physical capital; L is the labour input and the residual is the exogenous state of technology or the total factor productivity (TFP).

Standard growth accounting models assume competitive markets and marginal changes in output and factor inputs, and thus the aggregates production function takes the following form:

(2) $Y_t = A_t K_t^{\alpha}, L_t^{1-\alpha}$ $\qquad 0<\alpha<1$

where α is the measure of the importance of physical capital in output, or the elasticity of output to capital. Standard growth accounting models rely on the assumption of constant returns to scale

[10] The novelty is in applying this method to Egypt, and not the introduction of the method, as it has been applied to other countries before.

for factor inputs (capital and labor), and thus the output growth is determined by the growth in the two production factors, weighed by their relative elasticities, and by the residual, or the TFP.

At this point, we start to depart from the classical Solow models, to the endogenous growth models following Bownsztien et al 1998. In both approaches at least one primary factor of production has to be produced indefinitely in order to obtain long-run growth. Only in this way this factor can be relatively abundant with respect to the eventual factor that cannot be accumulated, so that its productivity is not decreasing. In the classical approach, the labor input cannot be produced indefinitely because land is in limited quantity and it imposes diminishing returns to capital and labor, while in endogenous growth models the human capital input substitutes labor, and results in increasing returns to scale. Hence, at this point, we introduce increasing returns to scale (Borensztien et al 1998, Smolny 2000, Mohtadi and Roe 2001, Kheir-El-Din and Moursi 2002, and Ganev 2005).

Thus, we get the following equation by substituting the human capital H instead of the labour input L:

(3) $Y_t = A_t K_t^{\alpha}, H_t^{1-\alpha}$ $\qquad 0<\alpha<1$

Contrary to labor, the human capital input could be accumulated and it is not produced directly or indirectly by means of natural resources, so it can be expanded indefinitely. We express equation (3) in growth rates, and take natural logs, to get the following equation:

(4) $gy_{i,t} = gA_{i,t} + \alpha gh_{i,t} + (1-\alpha)gk_{i,t}$

where i is the sector index, as the analysis will be based on a broad panel of sectoral national accounts data for Egypt for the period 1974-05, in order to increase the number of observations, and thus the degrees of freedom.

The traditional Solow model assumes *a priori* knowledge of the size of elasticity of output to capital α, such information usually depends on the capital share of income, as well as on empirical studies, usually α is in the range of 0.3-0.5, given the constant returns to scale paradigm. However, it was found by many studies that the measures of TFP are very sensitive to this arbitrary value of α, and that by increasing its value, the estimated weight of the physical capital is enlarged, which results in downwardly biased TFP estimates. In addition, methodological difficulties are encountered, if we depart from the neoclassical assumptions of constant returns to scale (where *$0<\alpha<1$ and the elasticity of capital and labour inputs to output equal to unity)* and competitive markets and start introducing increasing returns to scale, monopolistic factor or product markets, or productivity spillovers, as was suggested by the endogenous growth theories.

Alternatively, to overcome these limitations, we estimate the output elasticities of the factors directly from the production function instead of calculating them from factor income shares. This method is appropriate in case of scale economies and spillovers (Smolny 2000 and Ganev 2005). Accordingly, we differentiate equation (4) with respect to time and express the growth in output in its log form as follows:

(5) $gy_{i,t} = gA_{i,t} + \beta gh_{i,t} + \alpha gk_{i,t}$ $\qquad \alpha + \beta \neq 1$

where β is the parameter of human capital

To empirically examine the effect of FDI on growth in Egypt, we expand this growth model by including the effect of FDI as a source for long-term growth in Egypt, based on the model introduced by Borensztein et al 1998.

The equation to be estimated includes, in addition to the FDI and the Human Capital factors, a vector (X) of control variables that affect growth and falls under the category of "efficient economic management", as well as adding another variable to capture the effect of the technology gap between Egypt and technologically advanced countries (TG_t) to the growth function. Besides, a dummy variable (DUM) is included to reflect the effect of the exogenous political events on the growth in Egypt over the period. Thus the equation to be estimated in the following log linear form:

$$(6)\quad g_{i,t}=c_0 + c_1 (FDI_{i,t}) + c_2 (H_{t-1}) + c_3 (TG_{t-1}) + c_4 (X_t) + c_5 DUM$$ [11]

where FDI_t is foreign direct investment, H_{t-1} is the initial level of human capital, TG_{t-1} is the initial GDP per capita, the vector X*t* includes a set of variables that capture the effect of the efficiency with which the economic activity is organised in Egypt on growth of output. We include six control variables: financial sector development; black market premium, openness of the trade regime (divided into exports and imports), inflation, government consumption, and deficit of the current budget, and DUM is the dummy variable included to reflect the effect of the exogenous political events on growth.

3.2 DATA DESCRIPTION

The dataset we use for the empirical investigation are the sectoral national accounts of the Ministry of Planning of Egypt and the General Organisation for Investments. The empirical analysis is performed with a panel of annual data from 1974-2005 for 24 sectors of agriculture, manufacturing and services sectors and conforms to the 2-digit level ISTC classification, 2 sectors are agriculture, 9 sectors are manufacturing and 13 sectors are services.

This sectoral approach for the determination of the sources of growth has several advantages. As compared with the estimation of cross-country growth regressions, as performed by many other authors, the cross-sectoral data set exhibits a much greater homogeneity. For instance, inconsistencies of data measurement and the omission of unobserved differences appears much less a problem in the cross-sectoral approach. On the other hand, if the cross-country analysis is confined to a more homogeneous group, for instance the Middle East and North Africa (MENA) countries, less observations and much less variance is left as for the disaggregated approach. This holds even more for a pure time-series analysis with aggregate data for Egypt.

The main data we use from this data set are the value added per sector and the foreign investment per sector.

[11] We should note that we follow the main stream literature in excluding the domestic investments from the growth equation, and the rationale behind this is: to avoid colliniarity with FDI (for a detailed discussion see Towensend 2003, Carkovic and Levine 2002, and Borensztein et al 1998)

The dependent variable, denoted as $g_{i,b}$ is the annual growth of value added of sector i in year t as a ratio of the number of workers of sector i in year t;

$FDI_{i,t}$ is foreign direct investment and is included as a conduit for the implementation of new technologies to capture the effect of knowledge. It is important to note that the measurement of knowledge constitutes a problem. It is usually proxied by R&D; however, R&D expenditures in Egypt do not exceed 2 per cent of GNI on average throughout the studied period (WDI 2005). This is a low figure that does not capture all expenditures related to improving production processes or the quality of goods. Since TNCs are the main producers of R&D, we follow Carkovic et al 2002, Smoolny 2000 and Borensztein et al 1998 in proxying the knowledge production factor by their operations or by FDI inflows to Egypt. We have to refer, however, that it is suggested by the arguments of learning by doing that knowledge can be acquired through gross investments in physical capital, or capital accumulation $(K_{i,t})$ as innovations are often embodied in new investment goods Improving production processes or the quality of goods usually means the reorganization of the whole production process, which requires capital investment. In this sense, capital accumulation and technological progress are complements (Smoolny 2000: 307-308).

H_{t-1} is the initial level of human capital. It is included as a substitute of the labour input L, as the human capital input is accumulable and it is not produced directly or indirectly by means of natural resources. It can be expanded indefinitely, thus it allows for increasing returns to scale. We use the average years of secondary schooling of the population over 25 years as a proxy for the stock of human capital.

TG_{-1} is the variable that captures the technology gap. We follow Khawar 2005, Carkovic et al 2002, Alfaro 2003 and Borensztein et al 1998 in taking the difference between US GDP per capita and Egypt's GDP per capita as a ratio to Egypt's GDP per capita, as the US is considered the most technologically advanced single country in today's world. Thus, this variable reflects the 'catch-up' effect by which the least developed countries are hypothesized to experience quicker rates of growth than other countries.

X_t is a set of variables often included in long-run growth studies, it includes six variables. ***Inflation rate (Inf)*** is included to gauge the macroeconomic stability of Egypt, after Gwartney and Stroup 1995. During the period 1974-2005, Egypt's inflation level and its variance did not provide a stable economic environment for sustained growth, with an average inflation rate of 11.77 per cent, and a large variance of 39.5 per cent. Thus, it is expected that the inflation rate would be negatively correlated with growth.

The ***black market premium*** is used as a proxy for exchange market distortions, which is another measure for macroeconomic stability and certainty in the economic and business environment. During most of the period, Egypt had a parallel market with 10.3 points above the official exchange rate, and a huge variance of 604.8 per cent, which raises uncertainty in the macroeconomic stability of Egypt. The existence of a black market premium for the exchange rate is expected to hinder growth rates in Egypt.

Credit to the private sector is included as a proxy of financial development, as in Alfaro et al 2002 and Carkovic et al 2002, as the argument is usually that the increased share of credit to the private sector reflects a development of the financial sector and thus has a positive effect on growth. However, the case in Egypt is not so straightforward. The credit to private sector, which peaked in 1998, did not reflect such a financial development for the banking system in Egypt. It was mentioned in Khier-El-Din and Morsi 2001 that "…A great deal of that credit [to private sector] was indulged in unproductive high-returns activities including investment in the construction and contracting industry, in speculation on land and real estate and in the importation of luxury goods. Moreover, corruption, lax judicial system and the absence of a regulatory mechanism to control capital outflows permitted some business tycoons to fraudulently transfer a part of the credit funds abroad. Illegal transfers had perverse effects on economic performance as well as on the credibility of the private business environment in Egypt. Accordingly, we do not have expectations regarding the sign of the effect of credit to the private sector on growth in Egypt; this has to be tested empirically.

Another determinant of growth is the ***degree of government intervention in the economy***, which is usually proxied by the total budget deficit as a percent of GDP, as in Kang et al 2005 and Towensend 2003. However, we use the current account deficit and not the total deficit as government investment is a driving force behind growth in Egypt, as was illustrated in Fawzy 2003 and Abdel-Khalek 1997, especially when it was allocated to support large-scale development projects (like the heavy industry projects). The current expenditure, however, has been allocated to pay wages and salaries for a massive number of civil employees; to subsidize basic commodities consumed by low-income brackets; to finance purchases of inputs used by agricultural producers; to support public sector industries, and to secure social services (including free education and health care) for a considerable fraction of the population. The government also has frequently found it necessary to allocate a considerable share of its spending to state-owned cultural and mass media institutions (including television, radio broadcasting and newsstands) and to provide some special privileges and facilities for members of the military corps, the police force and high ranking officials (Khier-El-Din et al 2001). On the other side, the tax collection system has suffered inefficiencies and corruption (Reffat 2003). Thus, our measure of the current budget deficit reflects the distorting effects of nonproductive fiscal expenditures and at the same time proxies aspects of government mismanagement and inefficiency. Fiscal deficit is expected to have a negative correlation with growth in Egypt

Openness of the trade regime is usually measured as the ratio of imports and exports to GDP. However, the high trade ratios of Egypt do not have technological spillovers, or benefits to the economy, as they mainly result from increases in imports since the open-door policy in 1974 that are confined to consumer goods with no technological spillovers, while non-oil exports witnessed a sluggish performance that resulted from declining competitiveness, thus openness may not be an appropriate explanatory variable in growth regressions rather, we capture the relation between foreign trade and growth by introducing export and import ratios, EXP/Y and IMP/Y, separately.

DUM is included to capture the political external events that affect growth. It takes the value of zero in normal years and the value of one in years following a political external shock[12]. The dummy variable is included as a shifting variable i.e., affecting the constant without interacting with any of the exogenous variables. The negative shocks would be expected to adversely affect growth.

Thus, the equation captures the three determinants that were acknowledged by the empirical literature to determine the magnitude of the effect of FDI on growth, that is: the size of the technology gap between domestic and foreign firms; the investment climate in the host country (which is measured using the inflation rate, the government intervention, the financial sector development and the exchange market distortions) and the trade regime.

The empirical literature has shown that the effect of FDI on growth depends on the absorptive capacity[13] of the host country which is determined mainly by four factors: The human capital quality of the host country; the level of technology used in domestic production in the host country; the level of financial sector development, and the degree of openness of the host countries trade regime[14].

To calculate the effect of FDI's interaction with the human capital, technology gap, the financial development, and the exports and imports. We multiply FDI by each variable to see if the effect of FDI on growth depends on its interaction with the factors identified by the literature or not[15].

3.3 RESULTS

The study estimates the effects of FDI inflows on economic growth after controlling for other growth determinants and the inclusion of initial income as an independent variable. In addition, the study examines whether the potential FDI-induced growth in Egypt depends on the level of educational attainment, economic development, financial development or trade openness. The analysis covers the period 1974-2005, and the regressions are based on a dynamic panel data model.

We perform the regressions for five models: the first model is our basic model, where we regress FDI over growth, while including only the technology gap and the human capital proxies and the eight control variables of growth. In model two we add the interaction of FDI with the level of human capital to the basic model one, i.e., we have both FDI and its interactive term with the

[12] These shocks are: President Sadat's visit to Israel in 1977 (which resulted in massive pullout of Arab investments from Egypt and seizing all Arab financial aid and thus a drop in the GDP growth rate from 13 per cent in 1977 to 6 per cent in 1978); the assassination of President Sadat in 1981; the first Gulf War 1991; an attack on tourists in Luxor in 1997, and the Anglo-American Invasion of Iraq in 2003.

[13] The absorptive capacity means the host country's ability to absorb FDI, and hence benefit from its potential externalities

[14] See Krogstrup and Matar 2005: 7, Thuy 2005, Sadik and Bolbol 2003, Alfaro et al 2002, Haskel et al 2002, Makdisi et al. 2000, Blomstrom et al 1998 and Borenzstein et al 1998.

[15] A summary of the variables of the growth function in Egypt are presented in Table A1 in the annex, including the dependent variable, and the nine independent variables, six of which are control variables.

level of human capital. In model three we add the interaction between FDI and the size of the technology gap. In model four we add the interaction between FDI and the financial sector development. Finally in model five we add the interaction between FDI and the trade openness (using both components of trade; exports and imports separately).

We use the instrumental variables technique to overcome possible endogeneity problems. As Borensztein et al 1998 explains it: "…the correlation between FDI and growth rate could arise from an endogenous determination of FDI, that is, FDI may be influenced by innovations in the stochastic process governing growth rates. For instance, any omitted factors that raise the rate of return on capital will also increase both the growth rate and the inflow of FDI simultaneously…" (Borensztein et al 1998: 4). In these circumstances there would exist a correlation that would bias the estimated coefficients. To perform the instrumental variables technique we used the statistical method of the Two Stage Least Squares (TSLS). Typically, good instrumental variables are variables strongly correlated with FDI, and not with any error term in the model. We choose lagged FDI and other independent variables in the model as instrumental variables, so from table A2 onwards, the instrumental variables used in the regressions will be the one lagged value of the independent variables.

From the results displayed in model 1 of table A2 in the annex, we can conclude that FDI does not exert any significant positive impact on economic growth in the different conditioning sets. That is at all conventional statistical levels of confidence, as we can see from the t-values in table A2.

The study also tests whether the impact of FDI on growth depends on the stock of human capital or not. Following Borensztein et al 1998[16], we use the FDI x H[17] s an additional independent exogenous variable. We conduct the regressions to see if the growth induced by FDI depends on the level of human capital. In other words, we test the hypothesis that there has to be a minimum threshold of the stock of human capital in a country before it can start to reap the positive effects of FDI on growth. The rationale behind this is that countries with adequate levels of human capital can benefit from the technological spillovers associated with FDI. The results, presented in model 2 of table A2, show that the lack of an impact of FDI on growth does not depend on the stock of human capital. FDI and the interaction term do not enter significantly in the regressions as we can see from model 3 in table A2. As we can see that FDI interaction with the stock of human capital does not exert a significant effect on growth, and thus we cannot accept that FDI effect on growth depends on the stock of human capital.

It is worth noting that in the calculations process, we tried the regression using the average years of secondary schooling of the working age population instead of the number of school years of the secondary schooling of the population above 25 years. The results were also insignificant; actually the effect of the variable FDI x H was negative on growth. This suggests that FDI

[16] Borensztein et al 1998 found that in countries with low levels of human capital, the direct effect of FDI on growth is negative despite being insignificant in some cases.

[17] FDI x H is the product of FDI and the average years of secondary schooling of the male population over 25 years

enhances growth when educational attainment is low, however, the coefficient is not significant and thus we cannot draw this conclusion[18].

We next test the argument of Blomstrom et al 1998 that countries with very low income per capita are unable to reap the positive effects of FDI on growth. The reason is that they are usually too technologically backward to benefit from the spillovers of FDI, i.e., the technology gap between them and advanced countries is too wide to bridge. We test for this hypothesis in Egypt and re-run the regression using the interaction term FDI x TG. The results are presented in model 3 Table A2, and these results show that there is no reliable link between growth and FDI when allowing for the level of growth to depend on the size of the technology gap in Egypt.

The interaction term does not enter robustly in the growth regressions in a statistically significant coefficient at conventional statistical levels, as we can see from the value of the t-statistics presented in model 3 of table A2. This is consistent with the findings of Carkovic and Levine 2002. Thus, we can say that the existence of a narrow technology gap between Egypt and the US (taken as a proxy of the most technologically advanced country in the world) does not affect the direction or the significance of FDI's effect on growth.

We also test the validity of the argument presented by Alfaro et al 2002 that countries with well-developed financial markets gain significantly from FDI. To test this hypothesis, we rerun the regression using the interaction term FDIxCredit.

The results, presented in model 4 of table A2, reveal that the interaction term of FDIxCredit had an insignificant effect on growth. Thus, we do not accept the argument of Alfaro et al 2002 that the effect of FDI on growth depends on the development of the financial sector of the host country. The findings in table A2 confirm that this argument does not apply to Egypt, as we can see that the existence of financial sector development does not change the insignificant effect of FDI on growth that were obtained in model 4 of table A2 when FDI's effect on growth did not depend on its interaction with any other control variable

Some empirical studies on the effect of FDI on growth argue that the positive effect that FDI potentially has on growth is dependent on the level of openness of the trade regime. Balasubramanyam 1999 and others conclude that FDI affects growth positively in countries with open trade regimes. We test the evidence on this in Egypt; that the relation between FDI and growth depends on the degree of trade openness, by including the interaction terms FDIxExports and FDIxImports in the growth regressions.

From the results of the effect of the interaction between FDI and exports and imports we can see that exports and imports affect growth differently when they interact with FDI. Exports and imports also have contradicting effects on growth when they interact with FDI; however they both interact insignificantly with FDI as seen from their coefficients and t-values results presented in model 5 of table A2. Thus we do not accept the argument that trade openness, as

[18] The coefficient was (-.001) and the t-statistics was (-0.289)

proxied by the share of exports and imports to GDP, helps FDI to influence growth positively as they did not change the insignificant effect of FDI on growth.

As to the other explanatory variables of growth, we see from the results of the regressions that the technology gap has a negative significant effect on growth. This means that the wider the size of the technology gap between Egypt and technologically developed countries is, the less growth Egypt will witness. In other words the results show that to achieve higher levels of growth, Egypt has to work on diminishing the technology gap.

On the other hand, the level of human capital positively and significantly affects growth, at conventional levels, in the regression. Such finding is consistent with most of the literature on empirical analysis of FDI and growth (see Borensztein et al 1998 and Carkovic et al 2002).

All control variables take an expected sign that is consistent with the economic theories and literature on the determinants of growth, except the inflation and the government deficit variables.

Exports positively and significantly affect growth, while imports negatively and significantly affect growth, as seen from the results presented in all models of table A2. The economic explanation for these different effects is that imports do not have technological spillovers, or benefits to the economy, as they are mainly resulting from increases in imports that are confined to consumer goods with no technological spillovers. Thus, our approach in capturing the relation between foreign trade and growth by introducing export and import ratios separately allowed us to take account of differences in the relative contribution of export and import ratios to growth arising from variance in their economic behavior. The findings confirm our assumption that exports and imports have contradicting effects on growth, with exports increases contributing positively to growth.

The black market premium, which is used as a proxy for exchange rate distortions, negatively affects growth. This means that the existence of a black market premium reflects macroeconomic instability and uncertainty in the economic and business environment and thus hampers growth.

Financial sector development, as proxied by the credit to the private sector, positively affects growth in Egypt. However, this finding, while consistent with Alfaro et al 2002 and Carkovic et al 2002, comes as a surprise in the case of Egypt due to large ratio of non-performing loans that was mentioned earlier.

Political shocks had a negative impact on growth, as expected due to the uncertainty associated with their occurrence.

The surprising variables were the inflation rate, which was included to proxy the macroeconomic stability/instability in Egypt. We expected that it will have a negative effect on growth in Egypt, however, it was found from the regression presented in table A2 that it has an insignificant effect on growth. This could be explained that the government depended on inflationary growth in a large part of the studied period and thus there was an association between inflation and growth. On the other hand, the increase in the inflation rate increased macroeconomic instability which had a negative effect on growth. The co-existence of the two contradicting effects of inflation on

growth could be responsible for the insignificance results obtained for the effect of inflation on growth in Egypt.

The other surprising result obtained from the regressions is the degree of government intervention in the economy, as proxied by the current budget deficit. While it was expected that it will hinder growth, the results presented in table A2 show that it had a positive impact on growth. The reason for this might be that the government was the largest employer in Egypt in most of the period thus its current expenditure on salaries resulted in increasing the levels of income in Egypt.

Finally, we performed two diagnostic tests for the results obtained by the model to test its statistical validity; the R^2 to check the explanatory powers of the model and the Durbin Watson test to check that there are no auto correlation problems. We found that the statistical explanatory power of the included independent variables in explaining the changes in the dependant growth variable exceeds 65 per cent, as we can see from the $\mathbf{R^2}$ values shown in table A2. We also conclude, from the above 2 Durbin Watson results that there is no autocorrelation problems. Thus we are comfortable with the statistical significance of the results obtained from the regressions.

From all the above tests on the effect of FDI on growth, we can conclude that gross FDI inflows to Egypt, as an aggregate, do not exert any positive significant independent effect on growth. Even when depending on the thresholds suggested by the literature, i.e., stock of human capital, level of per capita income, financial development, or imports openness. However, we accept that aggregate FDI's effect on growth depends on its interaction with exports, but we need to perform some robustness checks for these results to confirm the conclusions from the analysis reached by the IV approach using the TSLS statistical method. To assess the robustness of these results, we perform a number sensitivity analyses.

3.4 Sensitivity Analyses

We conduct a two sensitivity analyses to further test the conclusions obtained from the above regressions.

First, we checked the robustness of the regressions results obtained by using an alternative specification of data, namely using the growth in the sector output instead of the sector value added which also takes the percentage form of gross sector output as a share of the number of workers in the sector over the studied period. The conclusions did not alter; the independent variable FDI does not exert a positive, robust, significant effect on growth whether on its own or when allowed to interact with human capital, size of the technology gap, financial development, and openness of the trade regime[19].

Second, we use lagged values for FDI, assuming that the effect of FDI on growth needs a period to materialize. We used one and two years of lagged periods and the significance and direction of the FDI coefficient did not change.

[19] The results of the sensitivity analyses are presented in tables A3 and A4 in the Annex of this paper

From the above analysis, we conclude that FDI did not exert any positive significant effect on growth, the effect was either negative or insignificant, and that the effect of aggregate FDI on growth in Egypt does not depend on any pre-conditions. Even when aggregate FDI interacted with the stock of human capital, the technology gap, exports, imports, or the degree of development of the financial sector, no positive significant effect is found for aggregate FDI's interaction term on growth.

4. SEPARATE EFFECT OF FDI TO DIFFERENT SECTORS

An explanation for the puzzling econometric findings regarding FDI's effect on growth is that FDI to different sectors has different effects, which is the hypothesis of this study and is based on the idea presented by Alfaro 2003 and Wang 2003. The economic justification behind this hypothesis is twofold; on the one hand, FDI to the manufacturing sector is usually an investment in tradables (versus FDI to the services sector that is mostly un-tradable), and causes increases in physical capital, which is responsible for the bulk of growth in Egypt as mentioned earlier. On the other hand, FDI to the manufacturing sector is characterised by being labour-intensive, and thus FDI to the manufacturing sector enhances growth via increasing the demand for labour, which results in increases in both wages and employment. To sum up, we expect FDI to the manufacturing sector to stimulate growth via physical capital and creating more jobs. We hereunder test the validity of this hypothesis in the case of Egypt through studying the impacts of the different sector-level FDI on growth in Egypt during the period 1974-2005.

We thus divide FDI into FDI to manufacturing sector, FDI to the services sector, and FDI to the agriculture sector in the endogenous growth regression model presented in equation (6) in section three:

$$g_t = c_0+c_1(FDI^M_t)+ c_2(K_{it})+c_3(FDI^A_t)+c_4(FDI^S_t)+c_5GF_t x H_{t-1})+c_6(MA_t x H_{t-1})+(H_{t-1})+c_7(Y_{t-1})+c_8(X_t) + c_9 DUM$$

where FDIMt is the FDI to the manufacturing sector, FDIAt is the FDI to the agriculture sector, FDISt is the FDI to the services sector, and the rest of the variables are the same as equation (6)

4.1 DATA DESCRIPTION

All data are measured like the regression with respect to the aggregate model, while the three new variables are summarised in table A5 in the Annex:

4.2 RESULTS

We conducted the regressions following the IV approach via the TSLS statistical technique, and using the lagged independent variables as the instrumental variables. Similar to the approach we adopted in analysing aggregate FDI and disaggregated GF and M&As FDI effects on growth, we performed five scenarios for the regression model.

The results obtained from the regression analysis echo the findings of other studies (Alfaro 2003 and Wang 2003) on the issue. Overall, FDI to the manufacturing and services sectors

impact growth insignificantly, as we see from the t-statistics values of the regressions of model 1 in tables A6 and A8 for the effect of manufacturing and service FDI on growth respectively.

On the other hand, FDI to the agriculture sector has a negative effect on growth in Egypt, which varied across the eight regression scenarios from positive to negative. As we can see from the results on the coefficients and t-tests of FDI to the agriculture sector in model 1 of table A7.

We also test the conditionality of the impact of FDI to different economic sectors on growth. We try to determine whether such an impact depends on the stock of human capital, the size of the technology gap, the financial sector development, or the openness of the trade regime.

The analysis start by testing the conditionality of the impact of sectoral FDI on growth on the stock of human capital, to test the argument of Borensztein et al 1998 in that respect.

We perform the regressions after including an interaction term for the different sectoral FDI on the one side, and the level of human capital in Egypt on the other side.

From the results presented in table A6, we accept the argument that the effect of FDI to the manufacturing sector on growth in Egypt depends on the stock of human capital, as we can see from the positive coefficients and the statistically significant t values.

However, the direct effect of FDI to the manufacturing sector on growth points to a different direction than the interactive effect, thus we need to do some simulations to know which of these two effects dominates. We do the simulations using the real values of the variables and the results show that the threshold for benefiting from manufacturing FDI in positively affecting growth is one year of average secondary school attainment of the population over the age of 25. Above that threshold, FDI to the manufacturing sector has a positive stimulating effect on growth, while below that threshold; FDI to the manufacturing sector exerts no positive effect on growth.

Contrary to this finding, we reject the hypothesis that FDI to the agriculture and the services sectors depends on the interaction with human capital to impact growth in Egypt. This can be seen from the results of the two sectors that are presented in tables A7 for the agriculture sector and A8 for the services sector.

From table A7, we see that the interactive effect of FDI to the agriculture sector on growth is statistically insignificant, while the direct effect of the agriculture sector on growth remains negative at conventional statistical significance levels.

As to the services sector, we see from table A8 that the interactive effect of services FDI on growth is not significant, and thus we conclude that the interaction between services FDI and the level of human capital in Egypt does not change the service sector insignificant effect on growth.

We also test the argument presented by Blomstrom et al 1995, that FDI's effect on growth is dependant on the size of the technology gap between the host country and the technologically

advanced world. We thus test of the conditionality of the sectoral FDI impact on growth on the size of the technology gap in Egypt.

The results of the effect of the interaction between FDI to the manufacturing sector and the size of the technology gap are presented in table A6. We see that the coefficients of the interaction term are insignificant, and thus we reject the validity of Blomstrom et al's 1995 argument for Egypt.

The interaction between FDI to the agriculture sector and the size of the technology gap has an insignificant effect on growth in Egypt and the direct effect of agriculture FDI on growth remains negative. Thus we can reject the argument of Blomstrom et al 1995 that the size of the technology gap influences the effect of FDI (agriculture FDI in our case) on growth, as we can see from the coefficients and t-values of the interaction term and the direct effect presented in table A7.

As to the effect of the interaction between FDI to the services sector and the size of the technology, as presented in table A8. We observe that both the direct and interactive coefficients have insignificant effect on growth. We thus reject the hypothesis that the effect of FDI to the services sector on growth is conditional on the size of the technology gap in Egypt.

We test the validity, for Egypt, of the argument presented by Alfaro et al 2002, that FDI's effect on growth is conditional on the degree of development of the financial sector. Hence, we test the effect of the interaction between sectoral FDI and the development of the financial sector in Egypt.

The effect of the interaction between FDI to the manufacturing sector and the financial sector's development is first tested, and from the results presented in table A6, we reject the hypothesis of Alfaro et al 2002, as we can see that the interaction term's regression over growth is insignificant, as well as the direct effect of service FDI on growth.

Similar results were obtained for the interaction between FDI to the agriculture and services sectors and the financial sector's development that are revealed in tables 5 and 6 respectively. We see from the coefficients and t values of the two interaction terms that we could not establish any significant positive link for the financial sector development's interaction with either FDI to the agriculture or the services sectors. We thus conclude that the argument of Alfaro et al 2002 does not apply to the sectoral FDI in Egypt, which could also be a reason for the inefficiency of the credit to private sector in Egypt that was discussed in chapter four, as well as in section two of chapter five.

Finally, we test the hypothesis of Balasubramanyam 1999 that it is trade openness that governs the effect of FDI on growth. Hence, we test the effect of the interaction between sectoral FDI and the trade openness, through the interaction of the sectoral FDI with exports and imports separately.

We find from table A6 that interaction between manufacturing FDI and imports gives an insignificant results, while the interaction between manufacturing FDI and exports have a

positive significant effect on growth. The economic interpretation of this result is that export openness is a prerequisite for FDI to the manufacturing sector to impact growth, i.e., manufacturing FDI requires a threshold of exports that allows access to overseas markets for it to expand its activities and positively affects growth.

On the other hand, we see from the results displayed in tables 5 and 6 that the interaction between FDI to the agriculture and services sectors and both exports and imports does not have a significant impact on growth, as we can see from the values of the t-statistics. Thus we reject the hypothesis that the effect of FDI to the agriculture and services sector depend on its interaction with either exports or imports.

From the above results on the effect of sectoral FDI on growth in Egypt, we can conclude that it is manufacturing FDI that positively and significantly influences growth when it interacts with the level of human capital and through interacting with exports.

The results show that sectoral FDI's effect on growth does not depend on the size of the technology gap in Egypt, the financial development, or the openness of Egypt's trade regime, from its imports side.

FDI to the agriculture sector has a negative significant effect on growth, with and without the inclusion of other determinants of growth in Egypt. The existence of a minimum threshold of schooling or level of income or development of the financial sector or openness of the trade regime does not exert a positive significant effect over the impact of FDI to the sector on growth.

While FDI to the service sector have an insignificant effect on growth regardless whether or not it is allowed to interact with the pre-requisites for FDI to impact growth positively that were identified by the literature in chapter one

Thus, we accept the hypothesis that sectoral FDI have different contradicting effects, however, and we also accept that it is only FDI to the manufacturing sector that positively affects growth; but that is when it interacts with the level of human capital as well as exports.

However, we need to check the robustness of these results to be sure of the conclusions we are drawing and thus we perform the following sensitivity analyses.

4.3 SENSITIVITY[20]

We conducted two sensitivity analyses checks for the robustness of the results obtained from the TSLS regression analysis.

First, we used a different growth model, after ***Fry 1992***, and we reran the regressions based on the new model, and the results were consistent with the previous findings.

Second, we used a different statistical technique, and that is the ***Pooled Least Squares*** method instead of the TSLS with lagged IV technique, and the results did not differ.

[20] Results of the sensitivity checks are presented in tables A9 to A14 in the Annex

In a separate attempt, we addressed the possibility that the different source countries for FDI would influence the effect of FDI on growth. The logic behind this exercise is that FDI from more developed countries would have a higher potential for positively impacting growth. Thus, we re-ran the model segregating the FDI inflows to Egypt by the country of origin into two groups, Arab FDI and European FDI, to see if there is a different effect on growth depending on the source country of FDI. The results did not support that hypothesis: The coefficients of FDI originating form Arab countries and from European countries had the same impact on FDI both in the direction and magnitude.

In a nutshell, we confirm the hypothesis that FDI sectoral distribution impacts growth differently. FDI to the Manufacturing sector has a positive impact when they interact with the level of human capital and with exports..

5. Conclusion

In this paper we attempted to explain the ambiguous results obtained in the empirical literature on FDI's effect on growth in host countries, using evidence from Egypt. The paper justified these ambiguous results by the inability to distinguish between FDI flows to different sectors. As FDI to different sectors contributes differently to output growth, grouping FDI in the analysis could bias the conclusion on its effect on growth.

When we separated FDI we found that manufacturing FDI affects growth positively and significantly when it interacts with the stock of human capital and when it interacts with exports. FDI to the agriculture sector yielded negative impact on growth, with and without interacting with other conditional variables. This can explain the ambiguous effect that aggregate FDI has on growth, as its different components have contradicting effects.

These findings are important for policy making when designing FDI promotional policies to know which kind of FDI contributes positively to growth.

Emerging markets, when designing a policy for FDI, must focus on how to benefit from FDI and not how to attract any kind of FDI. Since the positive impact of FDI on growth is the main rationale behind FDI promotion schemes in emerging markets, only the FDI contributing positively to growth should be encouraged. Other forms of FDI should get no preferential treatment. If this is the case, thorough research should be undertaken to identify the determinants of FDI to the manufacturing sector to design policies geared towards promoting the kind of FDI that emerging markets really need.

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ANNEX

Table A1: Variable list of the Growth Function of Egypt

Variable Name	Specification of variables	Source
Dependent Variable		
$g_{i,t}$	Annual growth rate of real value added of sector i in the year t at 1987 constant prices as a ratio of the number of workers of sector i in year t. Percent	Ministry of Planning, GOFI and World Development Indicators 2006 (WDI 2006) constructed by the World Bank.
Independent Variables		
$FDI_{i,t}$	Gross Foreign Direct Investment inflows to sector i in year t at 1987 constant prices as a share of GDP of Egypt in year t. Logarithm	Ministry of Planning, GOFI and WDI 2006.
TG_{t-1}	The difference between the absolute value of GDP per Capita of the USA and the absolute GDP per capita of Egypt as a share of the absolute GDP per capita of Egypt in year t-1. US dollars at 1995 prices.	WDI 2006.
H_{t-1}	Average years of school attainment of the population over the age 25 in Egypt in year t-1. Logarithm.	Barro and Lee 2000, missing observations were obtained by linear interpolation
Control Variables		
Inf_t	Annual Change in the consumer price index from year t-1 to year t. at 1987 base year. Logarithm	WDI 2006
Gov_t	Current Budget fiscal deficit as a share of GDP of Egypt in year t. Logarithm	
Exp_t	The exports of goods and services relative to GDP of Egypt in year t. Logarithm	Same as above.
Imp_t	The imports of goods and services relative to GDP of Egypt in year t. Logarithm	Same as above.
$Forex_t$	The difference between the parallel market exchange rate and the official market exchange rate of Egypt in year t. Logarithm	Same as above.
$Credit_t$	The credit from domestic financial intermediaries to the private sector in Egypt in the year t as a share of GDP. Logarithm	Global Development Network Growth Database till the year 1999, and The Quarterly Review of the Egyptian Ministry of Finance from 2000 to 2005 International Finance Statistics constructed by the International

		Monetary Fund.

TableA2: Effect of Aggregate FDI on Growth in Egypt using TSLS (1974-2005)

Conditioning Information	1	2	3	4	5
Constant	0.080	0.081	0.080	0.079	0.082
	25.855	25.354	23.833	24.694	25.695
TG[1]	-0.013	-0.013	-0.013	-0.013	-0.013
	-8.513	-8.524	-8.507	-8.592	-8.563
HC2	0.044	0.042	0.044	0.043	0.043
	4.422	4.060	4.414	4.262	4.237
Inflation[2]	-0.006	-0.006	-0.006	-0.007	-0.006
	-1.464	-1.442	-1.439	-1.630	-1.572
Gov. Size[1]	0.038	0.001	0.001	0.001	0.001
	1.848	1.803	1.829	1.849	1.828
Openness					
Exports[1]	0.001	0.038	0.038	0.038	0.036
	1.829	13.154	13.467	13.393	12.029
Imports[1]	-0.014	-0.014	-0.014	-0.015	-0.013
	-7.172	-6.848	-7.158	-7.196	-6.033
Black Market	-0.002	-0.002	-0.002	-0.002	-0.002
Premium[2]	-4.064	-4.108	-4.060	-4.097	-4.260
Private	0.051	0.051	0.051	0.057	0.054
Credit[2]	2.070	2.055	2.040	2.247	2.149
Political	-0.018	-0.018	-0.018	-0.018	-0.018
Events	-14.081	-14.017	-14.069	-14.120	-14.045
FDI	-0.022	-1.023	-0.216	0.874	-1.868
	-0.422	-1.301	-0.149	1.161	-1.193
FDI*H		5.923			
		1.276			
FDI*TG			0.033		
			0.134		
FDI*Finance				-1.512	
				-1.192	
FDI*X					1.412
					1.606
FDI*M					-1.571
					-1.631
R^2	0.659	0.659	0.661	0.658	0.662
Adj. R^2	0.654	0.655	0.654	0.654	0.656
No. of obs	768	768	768	768	768
Durbin-Watson	2.183	2.186	1.178	2.162	2.196

Notes: the critical values for the t-statistics are 1.64, 1.96 and 2.33 for 90 per cent, 95 per cent and 99 per cent confidence respectively
(1) in the regression this variable is included as Ln (variable), (2) in the regression this variable is included as Ln (1+variable)

Table A3: Effect of FDI on Growth in Egypt Sector Output (1974-2005)

Conditioning Information	1	2	3	4	5	6

Constant	4.18	3.84	5.40	3.42	4.20	5.34
	(2.26)	(2.12)	(2.90)	(1.83)	(2.26)	(2.92)
TG[1]	-0.96	-0.91	-1.04	-0.63	-0.96	-0.94
	(-2.14)	(-2.04)	(-2.34)	(-1.35)	(-2.14)	(-2.14)
HC[2]	11.22	11.29	6.84	7.16	11.11	11.92
	(2.79)	(2.86)	(1.64)	(1.66)	(2.68)	(3.03)
Inflation[2]	-1.85	-1.84	-0.96	-1.23	-1.83	-1.88
	(-2.87)	(-2.93)	(-1.40)	(-1.78)	(-2.77)	(-2.98)
Gov. Size[1]	0.03	0.03	0.03	0.03	0.03	0.08
	(0.42)	(0.40)	(0.42)	(0.33)	(0.40)	(0.93)
Openness						
Exports[1]	2.03	2.06	2.25	2.12	2.03	2.15
	(4.7)	(4.78)	(5.22)	(4.93)	(4.69)	(3.33)
Imports[1]	-0.02	-0.04	-0.08	-0.02	-0.02	0.52
	(-0.06)	(-0.11)	(-0.24)	(-0.07)	(-0.06)	(1.04)
Black Market	-0.08	-0.08	-0.06	-0.06	-0.08	-0.08
Premium[2]	(-1.18)	(-1.32)	(-0.89)	(-0.99)	(-1.18)	(-1.23)
Private	6.99	6.99	8.81	8.27	7.12	6.01
Credit[2]	(4.86)	(4.96)	(5.81)	(5.44)	(3.75)	(4.22)
Political	0.0004	-0.01	-0.14	-0.08	-0.002	0.02
Events	(0.03)	(-0.07)	(-1.14)	(-0.50)	(-0.01)	(0.11)
FDI	-0.04		-0.56	-0.17	-0.04	-0.10
	(-1.05)		(-3.49)	(-2.48)	(-0.10)	(-0.48)
FDI x H		-0.08	0.46			
		(-1.59)	(3.11)			
FDIxTG				1.03		
				(-1.38)		
FDIxFinance					-0.03	
					(-0.26)	
FDIxExports						-0.20
						(-1.27)
FDIxImports						(-0.64)
						(-1.36)
R^2	0.85	0.85	0.98	0.99	0.82	0.91
Adj. R^2	0.79	0.78	0.87	0.87	0.75	0.80
No. of obs	548	548	548	548	548	548
Durbin-Watson	2.66	2.65	2.60	2.63	2.66	2.55
F-test	28.36	28.74	27.42	26.60	25.74	26.69
J[21]	1.44	1.44	1.42	1.43	1.44	1.41

[21] The J-statistics is a commonly used over identifying restrictions test, which is the statistic computed using the homoskedasticity-only F-statistic. If the regressions (using GMM) are over identified, then J-statistics should exceed critical values for the x2 distribution; the lowest level of the x2 distribution (at 90 per cent significance level) at 1 degree of freedom is 2.71, however, we can see that our regressions

prob	0.00	0.00	0.00	0.00	0.00	0.00

Notes: the critical values for the t-statistics are 1.64, 1.96 and 2.33 for 90 per cent, 95 per cent and 99 per cent confidence respectively
(1) in the regression this variable is included as Ln (variable), (2) in the regression this variable is included as Ln (1+variable)

Table A4: Effect of Lagged Aggregate FDI on Growth in Egypt (1974-2005)

Conditioning Information	1	2	3	4	5
Constant	4.14	4.14	4.14	4.14	4.14
	(2.22)	(2.22)	(2.22)	(2.22)	(2.22)
TG[1]	-0.96	-0.96	-1.00	-0.96	-0.96
	(-2.14)	(-2.14)	(-2.25)	(-2.14)	(-2.14)
HC[2]	11.22	11.18	11.22	11.22	11.22
	2.79	2.79	2.79	2.79	2.79
Inflation[2]	-1.85	-1.85	-1.85	-1.85	-1.85
	(-2.87)	(-2.87)	(-2.87)	(-2.87)	(-2.87)
Gov. Size[1]	0.03	0.03	0.03	0.03	0.03
	(0.42)	(0.42)	(0.42)	(0.42)	(0.42)
Openness					
Exports[1]	2.03	2.03	2.03	2.03	2.03
	(4.70)	(4.70)	(4.70)	(4.70)	(4.70)
Imports[1]	-0.02	-0.02	-0.02	-0.02	-0.02
	(-0.06)	(-0.06)	(-0.06)	(-0.06)	(-0.06)
Black Market Premium[2]	-0.08	-0.08	-0.08	-0.08	-0.08
	(-1.68)	(-1.68)	(-1.68)	(-1.68)	(-1.68)
Private Credit[2]	6.99	6.99	6.99	6.99	6.99
	(4.86)	(4.86)	(4.86)	(4.86)	(4.86)
Political Events	-0.10	-0.001	-0.0004	-0.0004	-0.10
	(-1.72)	(-1.65)	(-1.71)	(-1.73)	(-1.82)
Lagged FDI	-0.04	-0.04	-0.04	-0.04	-0.04
	(-1.05)	(-1.05)	(-1.05)	(-1.05)	(-1.05)
		-0.04			
Lagged FDI x H		(-1.05)			
Lagged FDI x TG			-0.04		
			(-1.05)		
Lagged FDI x Credit				-0.04	
				(-1.05)	
Lagged FDI x Exp					-0.04
					(-1.05)

are not over identified as the J-value is below the critical level at all statistical significance levels (Stock and Watson 2003, Greene fifth edition 2004)

Lagged FDI x Imp					-0.04
					(-1.05)
R^2	0.81	0.81	0.81	0.81	0.81
Adj. R^2	0.74	0.74	0.74	0.73	0.75
No. of obs	548	548	548	548	548
Durbin-Watson	2.66	2.66	2.66	2.66	2.66

Notes: the critical values for the t-statistics are 1.64, 1.96 and 2.33 for 90 per cent, 95 per cent and 99 per cent confidence respectively

(1) in the regression this variable is included as Ln (variable), (2) in the regression this variable is included as Ln (1+variable)

Table A5: Variable list of the Disaggregated Growth Function of Egypt

Variable Name	Specification of variables	Source
Independent Variables		
$FDI^M t$	The foreign contribution in sub sector i of the manufacturing sector in Egypt in year t. Logarithm	Ministry of Planning, GOFI
$FDI^A t$	The foreign contribution in sub sector i of the agriculture sector in Egypt in year t as a share of GDP of Egypt in year t. Logarithm	Same as above.
$FDI^S t$	The foreign contribution in sub sector i of the services sector in Egypt in year t as a share of GDP of Egypt in year t. Logarithm	Same as above.

Table A6: Effect of FDI to the Manufacturing Sector on Growth in Egypt using TSLS (1974-2005)

Conditioning Information	**1**	**2**	**3**	**4**	**5**
Constant	0.091	0.019	0.078	0.088	0.020
	18.938	0.492	4.929	14.569	0.532
Gap[1]	-0.017	-0.003	-0.015	-0.017	-0.007
	-5.908	-0.317	-4.430	-5.829	-1.749
HC2	0.045	0.048	0.107	0.045	0.070
	2.449	2.598	1.736	2.464	2.711
Inflation[2]	-0.009	-0.002	-0.002	-0.009	-0.004
	-1.250	-0.257	-0.180	-1.253	-0.455
Gov. Size[1]	0.001	0.000	0.000	0.001	0.001
	1.317	0.094	-0.191	1.086	0.816
Openness					
Exports[1]	0.040	0.037	0.046	0.039	0.016
	7.513	6.556	5.069	7.054	1.495
Imports[1]	-0.015	-0.015	-0.021	-0.014	-0.008
	-3.957	-3.885	-2.585	-3.847	-1.746
Black Market	-0.002	-0.003	-0.003	-0.002	-0.004
Premium[2]	-3.300	-3.740	-2.653	-3.377	-3.926
Private	0.079	0.029	0.035	0.081	0.041
Credit[2]	1.768	0.557	0.496	1.807	0.718
Political	-0.021	-0.019	-0.021	-0.021	-0.018

Events	-8.960	-7.733	-8.111	-8.912	-6.056
Man FDI	-0.978	-2.875	50.930	10.398	2.899
	-0.651	-1.831	0.852	0.703	1.541
Man FDI*HC		4.501			
		1.838			
Man FDI*Gap			-307.122		
			-0.870		
Man FDI*Finance				-18.349	
				-0.774	
Man FDI*X					1.852
					2.249
Man FDI*M					6.436
					0.463
R^2	0.658	0.664	0.611	0.660	0.671
Adj. R^2	0.644	0.654	0.605	0.654	0.664
No. of obs	288	288	288	288	288
Durbin-Watson	2.823	2.766	2.809	2.832	2.510

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)

Table A7: Effect of FDI to the Agriculture Sector on Growth in Egypt using TSLS (1974-2005)

Conditioning Information	**1**	**2**	**3**	**4**	**5**
Constant	0.076	17.966	0.090	0.074	0.078
	9.180	1.408	4.982	6.920	7.862
Gap[1]	-0.010	-0.009	-0.009	-0.011	-0.007
	-1.750	-1.690	-1.669	-1.724	-0.988
HC2	0.049	0.025	0.061	0.044	0.063
	1.696	1.655	1.610	1.647	1.684
Inflation[2]	-0.001	0.002	0.006	-0.005	0.009
	-0.098	0.154	0.365	-0.272	0.525
Gov. Size[1]	0.001	0.000	0.001	0.001	0.001
	0.426	0.168	0.443	0.458	0.633
Openness					
Exports[1]	0.039	0.032	0.038	0.038	0.035
	3.886	2.904	3.853	3.794	3.020
Imports[1]	-0.014	-0.009	-0.013	-0.015	-0.012
	-2.044	-1.726	-1.829	-2.055	-1.639
Black Market	-0.001	-0.009	-0.001	-0.001	-0.004
Premium[2]	-1.791	-1.726	-1.780	-1.797	-1.978
Private	0.015	-0.001	-0.037	0.038	-0.052
Credit[2]	0.159	-1.072	-0.331	0.334	-0.481
Political	-0.017	-0.008	-0.017	-0.017	-0.018
Events	-0.017	-0.091	-4.416	-3.768	-3.861
Agr FDI	-0.049	-3.110	-0.853	0.675	-0.342
	-1.689	-1.723	-3.730	0.335	-0.216
Agr FDI*HC		17.881			
		1.402			
Agr FDI*Gap			0.744		

			0.843		
Agr FDI*Finance				-1.200	
				-0.360	
Agr FDI*X					0.530
					0.317
Agr FDI*M					1.200
					0.892
R^2	0.671	0.684	0.676	0.672	0.681
Adj. R^2	0.609	0.617	0.607	0.603	0.605
No. of obs	64	64	64	64	64
Durbin-Watson	2.617	2.586	2.656	2.598	2.617

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)

Table A8: Effect of FDI to the Services Sector on Growth in Egypt using TSLS (1974-2005)

Conditioning Information	**1**	**2**	**3**	**4**	**5**
Constant	0.074	0.074	0.072	0.073	0.075
	21.349	21.226	19.014	21.129	20.514
Gap[1]	-0.011	-0.011	-0.011	-0.011	-0.011
	-5.740	-5.732	-5.709	-5.924	-5.793
HC2	0.044	0.043	0.042	0.041	0.042
	3.516	3.383	3.386	3.272	3.357
Inflation[2]	-0.004	-0.004	-0.005	-0.005	-0.004
	-0.780	-0.771	-0.928	-1.074	-0.894
Gov. Size[1]	0.001	0.001	0.001	0.001	0.001
	1.186	1.176	1.178	1.228	1.164
Openness					
Exports[1]	0.037	0.036	0.037	0.036	0.035
	10.415	10.252	10.422	10.357	9.367
Imports[1]	-0.014	-0.014	-0.014	-0.014	-0.013
	-5.550	-5.411	-5.602	-5.627	-4.779
Black Market	-0.001	-0.001	-0.001	-0.001	-0.001
Premium[2]	-2.421	-2.427	-2.427	-2.460	-2.554
Private	0.034	0.034	0.039	0.045	0.037
Credit[2]	1.097	1.089	1.248	1.428	1.201
Political	-0.016	-0.016	-0.016	-0.017	-0.016
Events	-10.275	-10.231	-10.303	-10.383	-10.218
Ser FDI	-0.029	-0.274	2.080	1.553	-1.005
	-0.493	-0.309	1.255	1.818	-1.037
Ser FDI*HC		1.450			
		0.277			
Ser FDI*Gap			-0.362		
			-1.273		
Ser FDI*Finance				-2.668	
				-1.856	
Ser FDI*X					1.227
					1.460
Ser FDI*M					-1.111

					-1.610
R^2	0.649	0.649	0.651	0.652	0.649
Adj. R^2	0.632	0.632	0.632	0.632	0.632
No. of obs	416	416	416	416	416
Durbin-Watson	2.817	2.818	2.811	2.806	2.808

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)

Table A9: Effect of FDI to the Manufacturing Sector on Growth in Egypt Using Fry's Model (1974-2005)

Variable	Coefficient	t-Statistic
C	-0.001	-0.245
IY	0.81	2.32
Manufacturing FDI	1.08	0.97
XKG	0.05	1.05
R2	0.76	

Notes: the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

Table A10: Effect of FDI to the Agriculture Sector on Growth in Egypt Using Fry's Model (1974-2005)

Variable	Coefficient	t-Statistic
C	-0.001	-0.248
IY	0.82	2.31
Agriculture FDI	-0.02	-1.23
XKG	0.06	1.04
R2	0.80	

Notes: the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

Table A11: Effect of FDI to the Service Sector on Growth in Egypt Using Fry's Model (1974-2005)

Variable	Coefficient	t-Statistic
C	-0.001	-0.25
IY	0.81	2.32
Service FDI	0.28	0.54
XKG	0.06	1.04
R2	0.73	

Notes: the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

Table A12: Effect of FDI to the Manufacturing Sector on Growth in Egypt using Pooled Least Squares (1974-2005)

Conditioning Information	1	2	3	4	5
Constant	0.089	0.098	0.066	0.087	0.060
	21.360	19.296	3.880	15.701	4.462
Gap[1]	-0.016	-0.017	-0.012	-0.016	-0.013
	-5.975	-6.364	-2.805	-5.905	-3.776
HC2	0.044	0.001	0.045	0.044	0.049
	2.474	0.040	2.540	2.486	2.572
Inflation[2]	-0.009	-0.013	-0.007	-0.009	-0.009
	-1.266	-1.918	-0.926	-1.268	-1.244
Gov. Size[1]	0.001	0.002	0.001	0.001	0.001
	1.333	2.403	0.900	1.131	1.229
Openness					
Exports[1]	0.039	0.035	0.038	0.038	0.024
	7.602	6.627	7.352	7.179	3.499
Imports[1]	-0.015	-0.010	-0.015	-0.014	-0.009
	-4.008	-2.701	-4.004	-3.912	-1.969

Black Market	-0.002	-0.002	-0.003	-0.002	-0.003
Premium[2]	-3.325	-2.520	-3.582	-3.369	-4.352
Private	0.078	0.108	0.062	0.080	0.077
Credit[2]	1.791	2.446	1.377	1.824	1.663
Political	-0.021	-0.021	-0.020	-0.021	-0.019
Events	-9.048	-9.274	-8.740	-9.002	-8.222
Man FDI	-0.888	-37.196	93.566	8.648	119.177
	-0.598	-3.100	1.395	0.598	2.244
Man FDI*HC		213.535			
		3.048			
Man FDI*Gap			-16.049		
			-1.409		
Man FDI*Finance				-15.367	
				-0.663	
Man FDI*X					91.832
					2.966
Man FDI*M					-6.561
					-0.753
R^2	0.676	0.687	0.679	0.677	0.687
Adj. R^2	0.664	0.674	0.667	0.664	0.674
No. of obs.	288	288	288	288	288
Durbin-Watson	2.611	2.563	2.649	2.620	2.590

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)

Table A13: Effect of FDI to the Agriculture Sector on Growth in Egypt using Pooled Least Squares (1974-2005)

Conditioning Information	1	2	3	4	5
Constant	0.076	0.086	0.090	0.074	0.078
	9.394	8.198	5.036	7.024	8.022
Gap[1]	-0.010	-0.009	-0.009	-0.011	-0.007
	-1.767	-1.605	-1.584	-1.739	-0.997
HC2	0.049	0.025	0.061	0.044	0.063
	1.409	0.660	1.626	1.159	1.700
Inflation[2]	-0.001	0.002	0.006	-0.005	0.009
	-0.099	0.155	0.368	-0.273	0.530
Gov. Size[1]	0.001	0.000	0.001	0.001	0.001
	0.429	0.169	0.447	0.462	0.639
Openness					
Exports[1]	0.039	0.032	0.038	0.038	0.035
	3.922	2.931	3.890	3.831	3.048
Imports[1]	-0.014	-0.009	-0.013	-0.015	-0.012
	-2.064	-1.136	-1.847	-2.074	-1.654
Black Market	-0.001	-0.001	-0.001	-0.001	-0.004
Premium[2]	-0.798	-1.083	-0.788	-0.804	-1.111
Private	0.015	-0.008	-0.037	0.037	-0.052
Credit[2]	0.161	-0.092	-0.334	0.335	-0.485
Political	-0.017	-0.016	-0.017	-0.017	-0.018

Events	-3.818	-3.621	-3.766	-3.803	-3.899
Agr FDI	-0.049	-3.116	-4.419	0.668	-0.338
	-0.492	-1.439	-0.861	0.335	-0.216
Agr FDI*HC		17.912			
		1.418			
Agr FDI*Gap			0.745		
			0.852		
Agr FDI*Finance				-1.189	
				-0.360	
Agr FDI*X					0.533
					0.323
Agr FDI*M					1.203
					0.904
R^2	0.671	0.683	0.676	0.672	0.681
Adj. R^2	0.609	0.617	0.607	0.603	0.605
No. of obs	64	64	64	64	64
Durbin-Watson	2.702	2.679	2.751	2.681	2.703

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)

Table A14: Effect of FDI to the Services Sector on Growth in Egypt using Pooled Least Squares (1974-2005)

Conditioning Information	1	2	3	4	5
Constant	0.072	0.073	0.070	0.071	0.073
	25.161	24.500	21.315	23.993	23.997
Gap[1]	-0.011	-0.011	-0.011	-0.012	-0.012
	-5.918	-5.886	-5.898	-5.976	-5.990
HC2	0.043	0.041	0.042	0.042	0.041
	3.522	3.298	3.404	3.397	3.354
Inflation[2]	-0.004	-0.004	-0.005	-0.005	-0.005
	-0.868	-0.822	-0.999	-0.996	-1.003
Gov. Size[1]	0.001	0.001	0.001	0.001	0.001
	1.186	1.161	1.177	1.197	1.159
Openness					
Exports[1]	0.037	0.036	0.037	0.037	0.035
	10.555	10.321	10.558	10.519	9.546
Imports[1]	-0.014	-0.014	-0.014	-0.014	-0.013
	-5.647	-5.408	-5.691	-5.675	-4.941
Black Market	-0.001	-0.001	-0.001	-0.001	-0.001
Premium[2]	-2.447	-2.480	-2.450	-2.458	-2.569
Private	0.037	0.035	0.041	0.042	0.041
Credit[2]	1.207	1.161	1.340	1.347	1.336
Political	-0.016	-0.016	-0.016	-0.016	-0.016
Events	-10.383	-10.321	-10.402	-10.405	-10.325
Ser FDI	0.004	-0.776	1.787	0.643	-0.663
	0.071	-0.986	1.097	0.858	-0.703
Ser FDI*HC		4.563			
		0.993			

Ser FDI*Gap			-0.306		
			-1.095		
Ser FDI*Finance				-1.064	
				-0.856	
Ser FDI*X					1.159
					1.394
Ser FDI*M					-0.947
					-1.422
R^2	0.660	0.661	0.661	0.661	0.662
Adj. R^2	0.652	0.652	0.652	0.652	0.652
No. of obs	416	416	416	416	416
Durbin-Watson	2.661	2.653	2.668	2.655	2.641

Notes: t-values are below estimates' coefficient values, the critical values for the t-statistics are 1.64 for 90% confidence, 1.96 for 95% confidence, and 2.33% for 99% confidence

(1) in the regression this variable is included as Ln (variable)

(2) in the regression this variable is included as Ln (1+variable)