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Shimaa Elkomy, Hilary Ingham and Robert Read

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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Shimaa Elkomy, Hilary Ingham and Robert Read

Shimaa Elkomy, Surrey Business School, University of Surrey, Guildford GU2 7XH, UK. e-mail: s.elkomy@surrey.ac.uk, tel.: +44 (0)1483 686623; fax +44 (0) 1483 686301.

Hilary Ingham, Department of Economics, Lancaster University, Lancaster LA1 4YX, UK. e-mail: h.ingham@lancaster.ac.uk, tel.: +44 (0)1524 593925; fax: +44 (0)1524 594244.

(Corresponding Author)

Robert Read, Lancaster University Management School, Lancaster LA1 4YW, UK. e-mail: r.read@lancaster.ac.uk, tel.: +44 (0)1524 594233, fax; +44 (0)1524 594244.

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Abstract

This paper is one of the first to investigate the sectoral dimension/perspective of FDI spillovers. It examines empirically the heterogeneous technology effects and efficiency gains of FDI across economic sectors in Egypt between 1990 and 2007. The results reveal many aspects of the aggregation bias of cross-country studies. In aggregate, inflows of FDI have no significant impact upon growth in Egypt; instead, growth is driven by government investment. The disaggregated analysis however, reveals that FDI has distinct sector-specific effects on the Egyptian economy that derive exclusively from investment in the Telecommunication & Information Technology. FDI in Services however, generates negative growth effects. The sectoral growth effects of FDI also depend upon the region of origin. Although the growth impact of FDI in Telecommunications from both the Middle East & North Africa (MENA) and Western economies is positive, the finding is primarily driven by investment from the latter nations. Further, there is some evidence to support the view that FDI into the Manufacturing & Petroleum sector from the MENA region has adverse growth effects. There is also limited evidence to suggest that ‘market-seeking’ Western (European and US) capital flows into the Services sector have conspicuous ‘crowding-out’ effects.

Keywords: Foreign Direct Investment Sectoral Spillovers, Egypt.

JEL Classification: F23, O11, O14, O47.

INTRODUCTION

In the years leading up to the global financial crisis in 2007, many developing countries experienced a significant upsurge in inflows of foreign direct investment (FDI). These investment flows were generally driven by the search for new supplies of natural resources, low-cost labour for export platform activities and consolidation in strategic markets. At the onset of the global crisis in 2007, High Income countries experienced a 46.6 per cent rise in net inflows of FDI while Low and Middle Income countries experienced increases of 84 and 42 per cent increases respectively (World Bank, 2012). Most of these inflows to the developing countries, often via mergers and acquisition, were a critical element in the organisational restructuring of the global activities of major international businesses.

The positive contribution made by FDI inflows to the economic growth process of host countries is now almost universally accepted by academics and policy-makers. At the very least, FDI increases the stock of physical capital in a host country. FDI is also likely to generate growth effects over and above those of 'pure' capital through the creation of direct local linkage and indirect efficiency and spillover effects. These additional effects accord with the emphasis of new growth theory on the critical roles of endogenous technological development and technical progress in driving long-run growth (Romer, 1990).

The indirect efficiency and spillover growth effects of FDI are productivity externalities generated by the activities of foreign firms in the form of disseminated technology and production knowledge that accrue to domestic firms (Blomström and Kokko, 1997; Meyer, 2004). The specific mechanisms through which these indirect efficiency and spillover effects of FDI are transmitted to a host economy however, are less well understood and empirical studies have yet to present conclusive evidence demonstrating the significance of such spillover effects, especially in the case of developing countries. Their magnitude is argued to be determined by the level of host country economic and institutional development, including the absorptive capacity of human capital, as well as the quality of domestic policy-making (see, for example, Lenhart, Benmamoun and Zhao, 2013; Elkomy, Ingham and Read, 2016).

The fundamental issue addressed in this article is the nature of the spillover growth effects of FDI inflows that are generated given the sectoral characteristics of the Egyptian economy. The study builds upon previous research by Khaliq and Noy (2007), Vu, Gangnes and Noy (2008) and Vu and Noy (2009), which analyse the output effects of FDI inflows in several developing countries across a subset of sectors, focusing principally on services. The research here extends

this approach by disaggregating the Egyptian economy into seven sectors and analysing the interplay between FDI inflows and economic growth at both the sectoral and economy-wide levels for the period 1990 to 2007. This extension offers greater and more comprehensive insights into the relative importance of FDI across all sectors of the Egyptian economy, including the critical sectors of resource extraction and services; the former, in particular, has tended to be omitted in previous studies.

Along with many other developing countries, Egypt has significantly altered its growth strategy in the last two decades to focus on attracting increasing inflows of FDI so as to upgrade its technological base and enhance domestic productivity. In 2006, Egypt was the largest recipient of FDI in Africa with an inflow of just over \$10bn out of a regional total of \$35.5bn, representing a share of 28.3 per cent (Table 1, p. 3, UNCTAD 2008a). In 2014, it ranked fourth in Africa terms of inflows, worth \$4.9bn, up by 14 per cent on 2013. Egypt's stock of FDI in 2006 of \$38.9bn was the third largest in the region (12 per cent) after South Africa and Nigeria (Figure 4, p.7, UNCTAD, 2008a). The sectoral distribution of FDI inflows to Egypt is broadly similar to that in Sub-Saharan Africa rather than in the rest of North Africa, with activities in the Primary sector taking 37.5 per cent, the Secondary sector 8.1 per cent and the Tertiary sector 38.4 per cent (Table 3, p. 9, UNCTAD, 2008a). Egypt was also ranked first of 178 countries in *Doing Business 2008* for business-oriented reform in 2006-07, reflecting substantial economic reform along with important changes to the domestic institutional environment (World Bank, 2009).

Notwithstanding some positive developments, Egypt is at a crossroads. As late as 2016, the country was still only ranked 122nd for overall ease of doing business, a rise of only four places since 2006. By the end of 2015/16 the country was forced to negotiate a financial assistance package from the IMF in the face of severe macroeconomic pressures. One year into the ambitious reform programme, Egypt's economic outlook is much improved. Growth has rebounded, inflation has peaked and capital inflows are increasing (IMF, 2018). In particular, FDI inflows are projected to reach four per cent of GDP by 2021/22.

The empirical analysis in this paper examines the heterogeneous impact of FDI inflows across economic sectors in Egypt. Disaggregating the sector level growth effects of FDI inflows reveals that the impact of FDI is concealed by country level aggregation effects and enables examination of heterogeneous spillover effects of the activities of foreign firms. The insights drawn from this study have important policy design implications aimed at attracting inflows to those sectors of economic activity sectors that exhibit the greatest benefits from FDI.

The first section of this article discusses the conceptual and theoretical underpinnings of the study and reviews the relevant empirical literature on the sectoral growth effects of FDI inflows. This is followed by an outline of the empirical model and the estimation method used in the study along with a brief summary description of the data set. The third section presents the findings of the study with regard to the growth impacts of FDI inflows in Egypt at both the economy-wide and sectoral level, including a consideration of home country effects. The final section presents some concluding remarks and policy implications.

SECTORAL EFFECTS OF FDI INFLOWS

Much of the existing empirical literature investigates the aggregate growth effects of FDI inflows using cross-sectional analysis, relying upon the critical assumption that such inflows are equally beneficial to all sectors of a host economy. This macroeconomic approach foregoes an important dimension of the effects of FDI; that is, that these inflows are distributed heterogeneously across the sectors of a host country. This implies therefore, that the magnitude – and therefore the importance – of the growth effects of FDI is primarily determined by the technological and skill characteristics of the economic sectors in which foreign firms are concentrated. Failing to take account of the sectoral heterogeneity of FDI inflows may therefore result in aggregation bias in generalising the impact of FDI on the economic growth of host economies (Görg and Strobl, 2005). It should be noted however, that microeconomic studies of FDI generally focus on the manufacturing sector and tend to rely upon industrial census data with or without information about ownership and equity structures. The dynamics of the interplay between FDI and output growth, both within and between economic sectors, are therefore insufficiently explored in the macroeconomic literature while microeconomic studies are often unable to account fully for all of the economic activities of foreign firms in a host economy. As such, this study is one of the first to examine the heterogeneous within-country growth effects of FDI across economic sectors.

The view that there are differentiated growth effects across economic sectors derives from Singer's argument that the concentration of FDI in primary and resource-based sectors in developing countries confines its impacts to short-run output growth because of the reliance on advanced technologies (Singer, 1950). In a similar vein, Hirschman (1958) contends that technology spillovers and productivity gains arising from FDI are contingent on the characteristics of the targeted sector and its inter-sectoral linkages.

These arguments imply that FDI inflows to the manufacturing sector might be expected to generate greater output effects relative to other sectors. This is because manufacturing is characterised by robust industrial linkages. The discrete nature of production and the divisibility of its output therefore create strong vertical linkages between foreign and domestic firms, both upstream and downstream (UNCTAD, 2001). The importance of these linkages in the dissemination of advanced technologies and knowledge capital is widely accepted in the empirical literature (Barbosa and Eiriz, 2009; Bwalya, 2006; Javorcik, 2004; Rodriguez-Clare, 1996). In addition, technological requirements and technical knowledge in manufacturing are expected to magnify the impact of FDI on output growth since foreign firms are perceived to introduce innovatory new processes and production techniques (Cohen and Levinthal, 1989).

Recent work by Kubny and Voss (2014) shows that the output gains of foreign firms in low technology sectors are almost imperceptible. Wang (2009) presents evidence that the growth effects of FDI in the manufacturing sector are three times higher than in non-manufacturing sectors. Similarly, Chakraborty and Nunnenkamp (2008) corroborate the presence of a bi-directional causal relationship between FDI and output growth in manufacturing while they find no evidence of significant FDI spillovers in the primary sector. Ben Hamida and Gugler (2009) show that efficiency spillovers of FDI in manufacturing are based on the technological capabilities of domestic firms, yet these results are less robust in the services sector. Alfaro (2003) finds that only manufacturing sector FDI inflows demonstrate positive growth externalities while resource-driven FDI in the primary sector exhibits a robust and significantly negative impact on economic growth. This is argued to be the result of FDI in the sector being financed primarily by domestic loanable capital rather than by equity, partly confirmed by the finding that FDI in the oil and petroleum sectors is often financed by intra-company loans at the expense of equity (UNCTAD, 2007). Adams (2009) finds that resource-driven FDI in the sub-Saharan African countries generates net 'crowding-out' effects in the credit and goods markets.

One of the first sectoral level studies of the impact of FDI is that of Khaliq and Noy (2007) on Indonesia from 1998 to 2006, although manufacturing was not included. The authors find support for the positive effect of foreign capital at the aggregate level but their findings were much weaker at the sectoral level. The only sector in which FDI enhanced growth was Construction while FDI was detrimental to economic performance in Mining & Quarrying. The latter effect was attributed to a variant of the 'resource curse' effect. Growth effects in Construction are expected to be triggered through backward linkages with Manufacturing and

Services (Ramsaran and Hosein, 2006) as well as the augmentation of labour skills (Mallick and Mahalik, 2010). Efficiency effects may also be generated by FDI in civil engineering projects which develop the infrastructure necessary to attract more technologically-oriented FDI (UNCTAD, 2008b).

The study by Vu, Gangnes and Noy (2008) looks at the impact of FDI in 12 sectors in China and nine in Vietnam over the period 1990-2004. The strongest positive growth effects in China were found again in Construction and four other sectors (Wholesale, Retail Trade & Catering, Real Estate, Social Services, Health Care and Sport & Social Welfare). For Vietnam, eight of the sectors exhibited positive growth effects with the largest being Oil & Gas. Only in Other Services was FDI found to have no effect. It is important to note that services activities are highly diverse such that they differ greatly in terms of their technology and human capital requirements. Some of the literature argues that Services incorporate more standardised production methods and technologies, such that the long-run growth effects of FDI in the sector is necessarily weak (e.g., Lee, 1996) or inconclusive (Alfaro, 2003), generating temporary spillovers that are not sustained in the long-run (Chakraborty and Nunnenkamp, 2008). Further, Dullien (2005) finds that FDI in the service sector tends to be market-seeking and ‘crowds-out’ domestic investment. Several studies (Arnold, Mattoo and Narciso, 2008; Kim and Kim, 2010; Fernandes and Paunov, 2012) however, find that transactional services with strong linkages with other sectors – such as Telecommunications, Information Technology, Finance and Banking – channel significant inter-sectoral technology and efficiency gains.

A somewhat broader approach is adopted by Vu and Noy (2009), who look at FDI in 12 sectors in six OECD countries (Denmark, Germany, The Netherlands, Spain, The UK and The United States). They find that FDI has a positive impact on growth on nearly all of the sectors. The largest effect is found in Real Estate – in direct contradiction to the findings reported above – while no significant effect is reported for either Construction or Trade & Repair. Agriculture & Fisheries is the only sector where a negative relationship is found.

Cipollina *et al.* (2012) adopt a far more disaggregated approach, insofar as they focus their attention on 14 manufacturing sectors over the period 2001-2014 for a sample of 22 developed and developing countries. Their results show a robust and significant effect of FDI on growth and that the impact is most pronounced in the more capital-intensive and technologically-advanced sectors.

While limited in number, there are certain studies that have focused on Egypt. Massoud (2008) covers the period 1974 to 2007 and presents separate analyses for three broad sectors; Agriculture, Manufacturing and Services. She finds that only for the second of these does FDI promote growth and that this only occurs when it is interacted with human capital. FDI inflows into Agriculture are revealed to depress growth while those into the Service sector appear to have no discernible effect at all. The author also stresses that foreign inflows into manufacturing generate tradeable commodities and increase the country's stock of physical capital; potentially a major growth driver. These results broadly concur with a regional analysis of the country undertaken by Hanafy (2015), although here FDI on its own is found to promote growth in the case of Manufacturing but no support is found for any positive effect when interacting it with human capital.

The limited number of empirical studies undertaken on the sectoral effects of FDI inflows means that it is difficult to draw clear conclusions or develop robust hypotheses with any confidence. No two empirical studies examine the same countries, thus rendering it impossible to discern the degree to which the findings are driven by the specific institutional context in which FDI inflows occur. Further, national definitions of sectors vary greatly and may be extremely broad, reflecting the structure of domestic economic activity. As such, the sectoral growth effects of FDI may differ greatly simply because sectors are defined inconsistently.

Home Country Effects in Host-Country FDI Inflows

Existing studies of the growth effects of inflows of FDI tend to focus on their overall impact on the host economy without considering the characteristics of the home country. Recent empirical studies however, support the view that analysing the impacts FDI inflows according to their origin reveals additional perspectives on the sources of spillover effects (Buckley, Wang and Clegg, 2007). This study therefore examines the heterogeneous effects of FDI by disaggregating sectoral FDI inflows by broad region of origin; namely, MENA and Western economies. This classification is particularly critical in the context of foreign investment in Egypt since MENA and Western inflows of capital can be expected to have different characteristics and motivation. Inflows of FDI to Egypt from Western economies are largely concentrated in the oil and petroleum sectors, taking a share of around 64 per cent of total FDI in the Manufacturing & Petroleum between 2002 and 2007. In contrast, MENA investment constituted around 80 per cent of FDI in Agriculture and 66 per cent in the Construction and

Telecommunication & Information Technology sectors. This categorisation by source region provides a further sectoral breakdown of the aggregation of the growth effects of FDI and provides additional insights into the sources of FDI spillovers in Egypt. Over a different period, covering 1974 to 2005, Massoud (2008) fails to uncover differences in the direction or magnitude of the estimated coefficients for investments from Western and MENA countries.

The Sectoral Growth Effects FDI Inflows: Issues for Egypt

There are a number of salient issues regarding the expected economic growth effects arising from inflows of FDI to Egypt. First, as a developing economy, Egypt suffers from a significant technological ‘lag’, particularly with respect to the leading Western economies. The transfer of technology and knowledge by Western investors is therefore more likely to be of benefit to more advanced sectors of the Egyptian economy. The potential gains from such transfers however, will only be maximised if domestic firms are able to absorb these advanced processes and this, in turn, is dependent upon the absorptive capacity of local human capital. Of particular interest in this study is whether there exists a robust relationship between FDI and economic growth in sectors such as Telecommunications & Information Technology, since this sector is a critical nexus for inter-sectoral linkages in more advanced economies. Foreign investment in Manufacturing has been the most important channel for enhancing economic growth performance in many developing and industrialising countries. The analysis of the manufacturing sector in Egypt however, is hampered by the inclusion of the petroleum industry in the sectoral classification data. Few, if any, significant benefits from FDI in Services are expected, given that foreign firms are likely to be market-seeking such that inflows of investment may simply ‘crowd-out’ domestic firms. Finally, it is unlikely that FDI in Egyptian agriculture will promote growth given that the technology requirements of this sector tend to be low in developing economies generally.

METHODOLOGY AND DATA

In order to investigate the sectoral growth effects of FDI, a neo-classical growth model is used which incorporates FDI as an additional source of capital accumulation. This method is standard in the literature on the growth effects of FDI and has been employed by, *inter alia*, Blomstrom and Persson (1983) and Kokko (1994). In this framework the growth function is specified as follows:

$$\begin{aligned}
GY_{it} = & \beta_1 + \beta_2 \ln EMP_{it} + \beta_3 \ln DI_{it} + \beta_4 \ln GE_{it} + \beta_5 \ln INF_{it} \\
& + \beta_6 \ln FDI_{it} + \sum_{i=1}^6 \theta_i S_i \ln FDI_{it} + v_i + e_t + \mu_{it}
\end{aligned}
\tag{Eqn. 1}$$

Where: i and t represent economic sectors and time, respectively. GY_{it} is the growth rate of sectoral output. Borensztein *et al.* (1998) take the ratio of FDI to GDP as a proxy for the proportion of foreign firms to the total number of firms operating in the domestic economy. Accordingly, FDI is measured by the ratio of the inflows of foreign-issued capital to output. The only available data for the sectoral allocation of FDI are the annual capital inflow figures for foreign equity, which is one of the key components of FDI inflows, besides reinvested earnings and foreign borrowing. The inflows proxy for FDI used by Alfaro and Charlton (2007) is therefore adopted. Equation 1 thus specifies an equation for the sectoral growth effects of FDI on the seven economic sectors in Egypt that comprise total private output: Financial & Retail Services (FR); Manufacturing & Petroleum (MP); Tourism (T); Construction (C); Services (S); Telecommunications & Information Technology (TI); and Agriculture (A).

Egyptian sectoral FDI can be further classified according to home region type; namely, MENA and Western countries. FDI originating from MENA countries is indicated by FDI_A while that originating from Western countries is indicated by FDI_W . S_i is the sectoral dummy variable with Financial & Retail being the reference sector. The θ_i depicts the relative effect of FDI in sector i compared to the reference sector.

The quantity of labour involved in the production process in each economic sector is measured by EMP . Domestic capital, measured by DI , is the share of domestic private investment in output. Given that macroeconomic empirical analyses of FDI-growth effects emphasise the relevance of fiscal policy variables, government investment (GE) and the rate of inflation rate for each economic sector (INF) are included in the empirical specification as relevant macroeconomic variables. In the analysis, GE is defined as the share of public investment in sectoral output. INF is calculated as the percentage change in the price level of sectoral output at prices fixed in 1982, with sectoral output being measured in current prices. Increases in sectoral price levels are expected to exhibit adverse growth effects, signifying higher production costs that are negatively associated with real increases in sectoral output (Alfaro, 2003).

The inclusion of a time dummy (e_t) controls for time-specific elements and goes some way to mitigating the autocorrelation problem. Sector-specific elements are controlled for by incorporating a sectoral dummy (v_i). μ_{it} reflects stochastic random error that indicates the intrinsic nature of sectoral growth patterns.

The source of sectoral FDI is unpublished data from *The General Authority of Free Zones & Investment* (GAFI) (Government of Egypt, 2008a). Data were obtained for sectoral output, employment, domestic investment and government spending from the 25-year report on *Time-Series Production, Investment, Employment & Wages* from the Egyptian Ministry of Economic Development (Government of Egypt, 2008b). All variables are in real terms and calculated using the 1992 GDP deflator from the *World Development Indicators* database (World Bank, 2012). The data set employed for the empirical analysis covers the period 1990 to 2007 with the end date of the analysis being determined by the fact that the political upheaval brought about by the Arab Spring in 2010 also had repercussions for agencies charged with data collection. Thus, although GAFI remains operational, it has been transformed into an investment promotional agency for Egypt and the sectoral FDI data used here do not exist post-2007. The window employed does however, have compensating advantages. First, the analysis is free from noise generated by the 2008 global financial crisis. Second, Egypt has faced severe economic and political difficulties over the last decade and the improved economic conditions and relative political stability conducive to foreign capital have only recently surfaced. It is therefore timely to investigate whether there are lessons that will help the country gain the greatest benefits from FDI.

The empirical work employs the traditional fixed-effects estimator with the following strategy applied to overcome various problems that are likely to be present in the model. First, it is likely that heteroscedasticity will be present and this would introduce imprecision into the significance levels, rendering inference problematic. The analysis is therefore based upon panel-corrected standard errors that control for the contemporaneous correlation of errors across sectors. Second, there is the problem of potential endogeneity/reverse causation of FDI itself. A standard procedure would be to adopt an instrumental variable (IV) technique. Finding IVs that are strongly correlated with FDI while, at the same, are uncorrelated with the contemporaneous error (an assumption that can never be tested) however, is highly problematic (Li and Liu, 2005). As a result, many IV estimators employ the two-stage least squares (2SLS) technique but Angrist and Pischke (2008) show that 2SLS can lead to biased estimators in small samples. More recently, GMM dynamic panel estimators have become increasingly popular in

the literature but, again, this methodology is not appropriate with the narrow panel available here (Roodman, 2009).

In order to avoid inconsistency in estimation in the case of reverse causality between output growth and its determinants for the same (t), the approach therefore follows Buckley, Wang and Clegg (2007) and Haskel, Pereira and Slaughter (2007) in adopting a lag structure to mitigate problems of potential endogeneity. The effect of FDI and other growth determinants are therefore estimated with a lag of one and two years. This invalidates the possibility of a bi-directional relationship between current output growth and the past values of factor inputs and FDI. Furthermore, Haskel, Pereira and Slaughter (2007) discuss the benefit of employing one- and two-year lagged values to allow for sufficient time for the benefit of any spillovers to be realised. This view is reinforced by Pack (1993), who argues that both productivity enhancement and technological spillovers require a period of time to materialise and have a perceptible impact on output.

The descriptive analysis and the correlation matrix for all explanatory variables are shown in Table 1. The average sectoral share of FDI is about 33 percent, although this figure conceals substantial differences in the share of FDI in each economic sector. The correlation coefficients mostly suggest a weak linear correlation between the growth determinants. The high negative correlation (-0.56) between *EMP* (sectoral employment) and *DI* (sectoral share of domestic capital) as well as *FDI* (-0.64) suggest that the capital intensity of foreign firms might have adverse effects on employment. This contrasts with the highly positive correlation coefficient between employment and domestic investment in China found by Buckley, Wang and Clegg (2007), suggesting a strong substitution effect of capital for labour.

[Table 1 here]

In terms of the principal hypotheses of this study, the existing literature offers little *a priori* guidance. In the aggregate sectoral analysis, where FDI is not delineated by source region, the following might be expected. First, in those sectors where Egyptian firms experience the greatest technological lag, the gains from inflows of foreign capital might be expected to be the greatest. This is likely to be the case in particular in advanced sectors, such as Manufacturing, Telecommunications & Information Technology and Financial Intermediation. Second, the Telecommunications & Information Technology sector, in particular, might be expected to generate extensive inter-sectoral growth spillovers (Arnold, Mattoo and Narciso, 2008; Francois and Hoekman, 2010; Kim and Kim, 2010), while the Petroleum sector is

expected to have few, if any, inter-sectoral spillover effects given its high degree of technology- and capital-intensity. Third, with regard to differences between investors from MENA and Western home countries, inflows of capital from the former might be expected to be more productive in the Petroleum sector, given their relative expertise in this area. It may well be the case however, that any differential growth impacts deriving from capital from the two regions can be attributed to the fact that intra-MENA investments are likely to be driven by non-economic factors, such as proximity and contacts as discussed by Bolbol and Fatheldin (2006). At this point, it needs to be stressed that, given that this is an exploratory analysis with few existing findings, this study is in effect an *ex ante* exploratory investigation regarding the sectoral distribution of the beneficial effects of FDI inflows to the Egyptian economy.

RESULTS AND ANALYSIS

The results of the estimation of the model analysing the economy-wide growth effects of FDI in Egypt between 1990 and 2007 are presented in Table 2. The baseline estimation of the model, shown in Column (1) of the Table, omits both sector and time dummies. The results reveal that the major driver of growth in Egypt appears to have been government investment. Somewhat perversely however, the parameter estimate on the employment variable – *EMP* – is negative and significant at the 1% level. The results from this baseline empirical specification do not support the beneficial role of FDI in the Egyptian growth process during this period, indicating an absence, on average, of any positive spillovers for the economy.

[Table 2 here]

In the second estimation, the model is augmented with sector-specific dummies – results shown in Column (2) of the Table – while the third estimation includes both sector and time dichotomous variables – results shown in Column (3). In certain respects, the results of these two estimations are broadly consistent with the baseline estimation. The importance of government investment in Egypt's growth is evident in both models, at the 1% level. The inclusion of the sectoral dummies in these two estimations leads to domestic investment emerging as a more important determinant of growth, significant at the 1% level in both models. In these two specifications, the employment parameter estimate also now attracts the expected positive sign which is both larger in magnitude and more significant when time-specific effects are present in the model. In both estimations however, FDI does not promote growth; it enters with a negative coefficient, albeit one that is insignificant. Furthermore, the

inflation variable fails to achieve statistical significance in any of the first three models in the table.

Much of the conceptual and theoretical literature stresses the importance of the interaction of FDI and human capital (or labour) for output growth (e.g., Vu, Gangnes and Noy, 2008; Vu and Noy, 2009). The fourth estimation of the model therefore includes the interaction term *EMP_FDI* to investigate the extent to which FDI in conjunction with employment stimulates growth. The results in Table 2 Column (4) however, show that the parameter estimate is actually negative and significant at the 1% level, although it is very close to zero. This result is in direct contrast to the positive coefficient, although small in magnitude, found for the OECD countries by Vu and Noy (2009). There are two possible explanations for this seemingly contradictory finding. First, it is, of course, possible that the negative result reported here has arisen because of the use of a quantity measure for labour – employment - rather than a quality one. The latter would have been a more accurate proxy for human capital but labour quality data is not available for Egypt. So, in effect, the argument here is whether or not a threshold value of employment is necessary before the positive effect of FDI can be realised. With the FDI variable itself failing to achieve statistical significance however, the finding here is that FDI is more detrimental to growth the higher is employment. A further complication arises with the implementation of the interaction term itself. Using a log-linear specification yields a correlation between *lnEMP* and the interaction term in excess of 0.98 necessitating the use of a modified interaction term - *lnEMP * FDI*. The results for the remaining parameter estimates in the fourth version of the model are similar to those for the second and third versions, although the negative inflation parameter is now significant, albeit only at the 10% level.

In sum, the results for the modified versions of the baseline model (Table 2, Columns 2, 3 and 4) highlight the importance of employment and investment – by both the private and the public sectors - in the growth of output in Egypt. This finding is hardly surprising given that Egypt is a developing country, such that labour is a low-cost abundant resource. Both domestic and foreign firms are therefore likely to seek to expand employment in order to increase output. Furthermore, since the coefficient on private investment (*DI*) is higher than that for the government (*GE*) in three specifications, there is little evidence of any ‘crowding-out’ effect of public investment, as reported for the Middle East & North African region by Bashir (1999). The intuition behind the positive role played by the Egyptian Government is that public investment in developing countries provides much-needed economic infrastructure and

alleviates critical bottlenecks. In addition, this investment also injects capital into sectors that promote social development; e.g., health and education.¹

A key rationale for this study is the proposition that the aggregate impact of FDI on growth in an economy may mask highly heterogeneous growth effects at the sectoral level. It is therefore necessary to examine the impact of FDI at a disaggregated sectoral level to obtain a more accurate indication of its contribution to economic growth within a host economy. The results of the estimations of the sectoral growth impact of FDI inflows in Egypt are presented in Table 3.

[Table 3 here]

The results of the first estimation looking at the impact of sectoral FDI on growth are shown in Column (1) of the table. In these results, a one-period lag captures the impact of foreign investment. The FDI parameter estimate itself is small and negative but insignificant, indicating that it makes little or no contribution to economic growth in Egypt. The strongest drivers of growth remain domestic investment by both the public and private sectors – which have positive coefficients that are significant at the 1% level – along with employment, which has a large positive coefficient, also significant at the 1% level. The employment/FDI interaction term also retained its small, negative and significant parameter estimate. In terms of the parameter estimates for the sectoral FDI variables there is a dearth of strong evidence. Although such investment into the Telecommunications & Information Technology and the Agriculture sectors was both positive and significant, this was only at the 10% level, thereby providing limited evidence of the beneficial impact of FDI for Egypt.

As discussed above, the time horizon over which FDI may promote economic growth is lengthened by introducing a two-year lag to the estimation procedure. The results of this exercise, reported in Column (2) of the table, show that the findings for employment and investment largely mirror those for the model employing a one-period lag, although the magnitude of the parameter estimates fall. In addition, the employment/FDI interaction term loses significance while the foreign investment parameter is now positive, although not significant. Only one of the sectoral FDI variables - *FDI_S* – is significant and negative,

¹ Given that the results presented in Table 2 do not provide evidence of the contribution of FDI *per se* in the economic development of Egypt, in any of the empirical specifications, we follow Haskel, Pereira and Slaughter (2007) and extended the time horizon over which FDI might promote economic growth by introducing a two-year lag to the estimation procedure. Again, the parameter estimate fails to achieve statistical significance.

indicating that foreign investment flows into the Service sector depresses output, although this effect is not apparent for two years. This is not out of line with the general findings of much of the empirical literature (discussed above) that FDI in services has negligible growth effects.

With the two-period lag, the somewhat problematic interaction term fails to achieve statistical significance. The second specification in the Table was therefore re-estimated without this variable, with the results being presented in Column (3). Two of the sectoral measures – Telecommunications & Information Technology and Services – are now significant at the 1% level, with the coefficient estimate for the former of these being positive while that for the latter is negative. A one per cent increase in FDI into the first of these two sectors leads to a 0.14 per cent increase in economic growth. Potentially this sector plays an important role since it provides critical infrastructure that generates key linkages both between and within all sectors of an economy, confirming the findings for Korea (Kim and Kim, 2010). The results here for Egypt support the view that FDI in this sector may generate additional growth effects that accrue to other sectors through spillovers. Conversely, a similar increase in FDI into Services serves to depress growth by 0.10 per cent, mirroring the result reported in Column (2). Here however, the statistical significance of this finding is stronger.

From an Egyptian economic growth and policy perspective, the finding that FDI appears to lack any positive impact on the economic growth in the Manufacturing & Petroleum sector is probably very disappointing. This sector is responsible for attracting the largest proportion of FDI inflows to the country – over forty per cent. Furthermore, some sixty per cent of FDI into the Manufacturing & Petroleum sector flows to oil-based industries for refining and the production of basic petrochemicals (UNCTAD, 2013). One possible explanation underpinning the lack of growth effects from FDI inflows into this sector is that foreign capital investments are primarily in upstream activities in the oil industry, such that strong linkages between foreign and domestic firms are much more difficult to develop. The lack of development of such linkages between foreign investors and domestic firms means that the technological know-how transferred as part of the FDI ‘package’ does not spillover to domestic firms (Alfaro, 2003; Khaliq and Noy, 2007).

The findings here demonstrate the potentially heterogeneous nature of the sectoral-level growth effects of FDI inflows. While the economy-wide growth impacts of FDI inflows in Egypt are shown to be insignificant in the previous section, these findings partially obscure the true picture. The sectoral-level analysis reveals a considerable asymmetry between the sectoral pattern of these inflows and their economic growth effects. The principal sector attracting the

greatest proportion of foreign investment is failing to capture the potential technological benefits that such capital brings with it. As such, this sectoral-level analysis delivers an important policy message; that Egypt should attempt to diversify the sectoral destination of its FDI inflows and target activities in those sectors of its economy where foreign investment is most likely to promote growth – notably in Telecommunications & Information Technology.

The specification of the sectoral model is then modified to estimate the separate growth effects of FDI inflows by geographic source, from Western and MENA economies – shown in Table 4, Columns (1) and (2) respectively. The results for the macroeconomic variables remain robust with respect to those reported in the second column of Table 3 and the magnitude of the associated parameter estimates for MENA and Western investors are very similar.

[Table 4 here]

Comparing the results in the two columns of the table, the most noticeable feature is that the both parameter estimates for the Telecommunications & Information Technology are positive and significant, although only at the 10% level for MENA FDI. This shows that the main beneficial effects of foreign investment flows into this sector derive from Western capital. This relationship strongly suggests that the demonstration effects of advanced technology in this sector are greater for FDI inflows from Western economies. This finding is somewhat at odds with the general view that less sophisticated transfers of technology to developing economies, such as Egypt – in this case by Arab as opposed to Western investors – can be more easily adopted by domestic firms (Bijsterbosch and Kolasa, 2010) owing to the limited absorptive capacity of their human capital.

In addition, a significant negative relationship (at the 10% level) is found between growth and FDI in the Services sector for Western investment, while the parameter estimate for FDI from MENA economies is insignificant. This finding weakly supports research by Dullien (2005), who reports that foreign investment into this sector is likely to trigger a high ‘crowding-out’ effect since overseas investors entering the service sector are generally driven by market-seeking motives. The results in Column (4) now show a negative impact on growth for MENA FDI in to Manufacturing & Petroleum, although the coefficient is only significant at the 10% level.

POSTSCRIPT AND CONCLUDING COMMENTS

Since the Arab Spring, developments in Egypt have not been wholly favourable. At the political level, the country's first democratically elected president, Mohammed Morsi, was overthrown by the military after one-year in office. Economically, the country faced low growth, high unemployment and a large budget deficit. Floating the Egyptian pound at the end of 2016 saw its value slump by 50% against the dollar, although this did improve the attractiveness of the country for inward investors. At the end of 2017, the IMF concluded an agreement with Egypt to provide \$12 billion of funding to help the country overcome the economic crisis.

There are now signs that economic conditions are improving; growth has rebounded and inflation has passed its peak. Going forward, foreign investment is seen as an important facet of the country's recovery and, in 2016/17, FDI rose to \$7.7bn, an increase of some 14%. Furthermore, according to IMF projections, such investment is projected to more than double, rising to four per cent of GDP in 2021/22 (IMF, 2018). In order to maximise the benefits of such capital injections, it is key that the Egyptian government actively seeks out foreign investment that will bring the greatest benefits to the economy.

In order to identify where these benefits are most likely to occur, this article analyses the sectoral growth effects of FDI inflows into the country using data for 1990-2007. Its key contribution lies in its use of sectoral level data to examine the economy-wide growth effects of inflows of FDI as well as the impact of FDI by home region, distinguishing here between investment from Western and Middle East & North African economies. The findings highlight the critical importance of examining the sectoral level impacts of FDI given that these may be highly heterogeneous across different sectors of an economy. While FDI is found to have no general positive impact upon growth in Egypt at the overall level of the economy, significant beneficial spillover effects are revealed in the Telecommunications & Information Technology sector, in particular those emanating from Western economies. The study also derives important policy implications regarding the need for developing countries, in particular, to attract FDI inflows to those sectors that generate greater output and spillover effects.

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Table 1 Descriptive Analysis and Correlation Matrix

Var.	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>EMP</i>	2338.91	2226.34	1											
2. <i>DI</i>	44.79	155.38	-0.56	1										
3. <i>GE</i>	281.2	1026	-0.08	0.54	1									
4. <i>INF</i>	19.18	102.96	-0.20	0.12	0.12	1								
5. <i>FDI</i>	32.83	196.08	-0.64	0.51	0.24	0.04	1							
6. <i>FDI_FR</i>	0.34	1.24	0.04	-0.32	-0.26	-0.03	0.14	1						
7. <i>FDI_MP</i>	0.57	1.64	0.13	0.10	0.05	-0.02	0.16	-0.08	1					
8. <i>FDI_T</i>	1.99	6.15	-0.57	0.20	-0.12	-0.01	0.45	-0.08	-0.15	1				
9. <i>FDI_C</i>	0.32	1.31	0.02	0.11	-0.10	-0.02	0.17	-0.03	-0.05	-0.05	1			
10. <i>FDI_S</i>	0.35	1.81	0.13	0.04	0.09	-0.01	0.21	-0.02	-0.03	-0.03	-0.01	1		
11. <i>FDI_TI</i>	29.18	196.53	-0.47	0.51	0.54	0.09	0.53	-0.05	-0.09	-0.10	-0.03	-0.02	1	
12. <i>FDI_A</i>	0.06	0.34	-0.30	0.20	0.07	0.03	0.58	0.06	0.12	0.12	0.04	0.03	0.07	1

Table 2: The Aggregate Growth Impact of FDI Inflows to Egypt, 1990-2007

<i>Dependent Variable (GY)</i>	(1)	(2)	(3)	(4)
<i>EMP</i>	-0.07587*** (0.02482)	0.21010** (0.09110)	0.48566*** (0.18231)	0.74188*** (0.14911)
<i>DI</i>	0.01325 (0.01354)	0.12024*** (0.03995)	0.12794*** (0.04856)	0.15056*** (0.03687)
<i>GE</i>	0.04878*** (0.01468)	0.09278*** (0.03138)	0.09085*** (0.03396)	0.13277*** (0.02503)
<i>INF</i>	-0.00039 (0.00033)	-0.00037 (0.00026)	-0.00030 (0.00028)	-0.00029* (0.00017)
<i>FDI</i>	-0.00823 (0.01649)	-0.03078 (0.02032)	-0.02663 (0.02713)	0.02580 (0.02013)
<i>EMP_FDI</i>				-0.00011*** (0.00003)
Within R ²	0.40990	0.55732	0.59999	0.69557
Sector-specific	No	Yes	Yes	Yes
Time-specific	No	No	Yes	Yes
No. of observations	104	104	104	104

Note: Standard errors in parentheses: ***, p < 0.01; **, p < 0.05; *, p < 0.10.

Table 3: Heterogeneous FDI Growth Effects in Egypt by Sector, 1990-2007

<i>Dependent Variable (GY)</i>	(1)	(2)	(3)
<i>EMP</i>	0.75720*** (0.15370)	0.43078** (0.17696)	0.42250*** (0.17690)
<i>DI</i>	0.15075*** (0.03778)	0.09603*** (0.03103)	0.09051** (0.03110)
<i>GE</i>	0.14697*** (0.02835)	0.07494** (0.03480)	0.06750** (0.03504)
<i>INF</i>	-0.00022 (0.00017)	0.00002 (0.00013)	0.00003 (0.00014)
<i>FDI</i>	-0.02123 (0.03009)	0.00331 (0.03009)	0.00585 (0.03012)
<i>EMP_FDI</i>	-0.00015*** (0.00004)	0.00004 (0.00004)	
<i>FDI_MP</i>	0.02391 (0.05703)	-0.04865 (0.03321)	-0.04739 (0.03321)
<i>FDI_T</i>	0.08294 (0.05648)	-0.03469 (0.06179)	-0.03769 (0.06141)
<i>FDI_C</i>	0.02557 (0.04883)	-0.00254 (0.04077)	-0.00356 (0.04090)
<i>FDI_S</i>	-0.00122 (0.04225)	-0.09530** (0.03725)	-0.09627*** (0.03717)
<i>FDI_TI</i>	0.11206* (0.06639)	0.07336 (0.06397)	0.01383*** (0.03898)
<i>FDI_A</i>	0.06784* (0.03724)	-0.01717 (0.03499)	-0.01818 (0.03463)
Within R ²	0.71	0.83	0.83
No. of RHS lags	1	2	2
Sector/time effects	Yes	Yes	Yes
No. of observations	104	97	97

Note: Standard errors in parentheses: ***, $p < 0.01$; **, $p < 0.05$; *, $p < 0.10$.

Table 4: Heterogeneous FDI Growth Effects in Egypt by Sector, 1990-2007

<i>Dependent Variable (GY)</i>	(1)	(2)
<i>EMP</i>	0.50502*** (0.18695)	0.65083*** (0.20995)
<i>DI</i>	0.07707** (0.03454)	0.09275** (0.03811)
<i>GE</i>	0.078703** (0.03420)	0.10195*** (0.03709)
<i>INF</i>	0.00000 (0.00017)	0.00013 (0.00020)
<i>FDI_W</i>	-0.00268 (0.01227)	
<i>FDI_{W_MP}</i>	-0.01319 (0.01927)	
<i>FDI_{W_T}</i>	0.07066 (0.05976)	
<i>FDI_{W_C}</i>	-0.00164 (0.02048)	
<i>FDI_{W_S}</i>	-0.03107* (0.01846)	
<i>FDI_{W_TI}</i>	0.12069*** (0.03340)	
<i>FDI_{W_A}</i>	0.01166 (0.0163239)	
<i>FDI_A</i>		0.02004 (0.01600)
<i>FDI_{A_MP}</i>		-0.04822* (0.02691)
<i>FDI_{A_T}</i>		0.04217 (0.04418)
<i>FDI_{A_C}</i>		0.01054 (0.02468)
<i>FDI_{A_S}</i>		-0.00051 (0.03637)
<i>FDI_{A_TI}</i>		0.14336* (0.07882)
<i>FDI_{A_A}</i>		-0.00934 (0.02125)
Within R ²	0.82	0.77
No. of RHS lags	2	2
Sector/time effects	Yes	Yes
No. of observations	97	98

Note: Standard errors in parentheses: ***, $p < 0.01$; **, $p < 0.05$; *, $p < 0.10$.