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Endogenous Specification of FDI and Economic Growth: Cross-Economies' Evidence

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ABSTRACT

By using panel data from the Economic and Social Commission for Western Asia (ESCWA) countries from 1980-2011, this article tests simultaneously for the endogenous association between Foreign Direct Investment (FDI) and economic growth by controlling FDI-growth deriving regressors. To control for the simultaneity bias, Two-Stage Least Squares (2SLS) estimators are used to test for our proposed simultaneous equation system. In addition, we verified the robustness of our results by using the Generalized-Method of Moments (GMM) by adding moment conditions under the assumption that the past value of the explanatory variables are uncorrelated with the error term. The results substantiated that FDI positively and significantly boosts growth and the growth rate stimulates positively FDI inwards as well. The results have some policy attributes including promoting the notion that broad based and sustainable economic growth can be achieved by increasing the share of FDI inwards.

JEL Classifications: C32, F43, O11, O16

Keywords: foreign direct investment; economic growth; export; endogenous relationship; simultaneous equation models

I. INTRODUCTION

In order to stimulate economic growth, most economies shift toward more liberalized polices and adopt liberal development oriented actions to attract more capital inflows or Foreign Direct Investment (FDI). These actions are deeply inspired by the latest statistical prospect in the global FDI inflow that reached, despite turmoil in the global economy, more than $1.2-$1.5 trillion in 2011 (a 17% rise compared to 2010), $1.6 trillion in 2012, headed towards $1.8 trillion in 2013 and has been expected to rise to $1.9 trillion in 2014.[1] Such statistical indicators encouraged most developing economies to promote liberalizing measures and relax tight economic policies in order to facilitate supplementary FDI inflows, hence, take advantage of globalization to achieve more integration with other wide-reaching economies.

The theoretical discussions of growth and FDI relationships are centered on two arguments involving a range of positive to negative relationships. Here we will discuss the two arguments and their merits. First, as per the FDI-growth nexus, the affirmative contribution of capital flow towards growth is obvious; however, the type of relationship between FDI and growth is still a debatable issue, since mixed results are reported in the literature. On the one hand, while testing whether FDI determines economic growth, the economic rationale demonstrates that FDI provides externalities in the form of technology transfer and business know-how to the host developing countries, reflecting the chance to have an extensive spillover effect for the whole economy, boosting its overall productivity. Proponents of the FDI-led growth phenomenon validated such an economic rationale, given the educational, technological as well as the infrastructure developments, in conjunction with labor efficiency enhancements and human capital developments achieved by most host countries, Tang *et al.* (2008), Alfaro *et al.* (2009), Sun (2011), Umoh *et al*. (2012) and Ray (2012). On the other hand, there is an expectation that FDI in the incidence of pre-existing trade and price, together with other alterations would affect negatively the allocation of resources, and hence slow down economic growth, Boyd and Smith (1992). Overall, opponents of the FDI-led growth phenomenon argue that FDI crowds out domestic investment and has an adverse effect on growth. In addition, FDI may cause competition deterioration and re-guide the development strategies of the host region/country according to its own course Huang (2003), and Fry (2003).

Second, as per the growth-led FDI nexus, proponents claim that higher growth rates stimulate more FDI inflow given the greater level of profitable possibilities based on a higher progression in demand, hence, economies with low levels of economic growth may also serve as profitable destinations for capital. This view counts economic growth as a determining factor of FDI where higher growth rates, as an indication of country attractiveness, would stimulate more FDI inflows to the host country. Furthermore, FDI would stimulate growth under certain policy conditions including economic stability, trade openness, adequate human capital, developed financial markets and liberalized financial enterprises, in addition to the presence of a well-educated workforce to allow for exploiting the FDI spillover, see Wang and Wong (2004) and Aghion *et al.* (2006). Moreover, while others believe that high-growth developed economies attract more FDI compared to low-growth developing economies, many studies concluded there exists a bi-directional interaction between the two

macroeconomic variables, e.g, Choe (2003), Mencinger (2003), Hansen and Rand (2006) for the former and Basu *et al*. (2003), Dritsaki et al. (2004) and Saha (2005) for the latter.

An overview of the literature reveals that, though there are few attempts to test for the FDI determinants? in the context of the Economic and Social Commission for Western Asia (ESCWA), none fully test for FDI-growth performance, given the impact of the targeted FDI-growth deriving factors, namely gross domestic saving, exports, human capital, gross fixed capital formation and population growth. These factors, though are extracted from the literature, can be implemented to stimulate economic growth through FDI. Further, these factors can improve the overall attractiveness of a particular region, mainly a developing region, to be considered as an investment destination.[2] This article argues that, whereas the common practice has been to identify both policy credibility and governance failures as main factors to justify FDI poor performance, the often-neglected elements of the named FDI-growth driving factors have a significant impact on the process of testing FDI inflows into the ESCWA economies. Our proposition at this stage is that even the ESCWA region is expected to continue to attract FDI flows in the medium term, but in the long-run more focus toward enhancing the above targeted factors is needed to promote innovation and maximize productivity, which then would encourage more FDI inflows.

The "FDI-growth nexus" has been tested by formulating a simultaneous equation system, which allows treating both variables, namely FDI and growth, endogenously. The endogenous relationship between the two variables is tested by controlling for the FDI-growth deriving factors. Nevertheless, the system allows us to test for the determinants of FDI and economic growth by using a panel dataset. We believe our methodology fully controls for simultaneity bias and extracts reliable and effectual estimates of FDI impact on growth and vise-versa. We use the standard two-stage Least Squares (2SLS) estimators to test the proposed simultaneous systems. In addition, the Generalized-Method of Moments (GMM) panel data are estimators for the model's robustness. By adding moment conditions under the assumption that past value of the explanatory variables are uncorrelated with the error term, we avoid spurious results.

The rest of this article is structured as follows: Section II provides an overview of the literature; Section III discusses the FDI inflows in ESCWA. Section IV presents the model specification including model identification and rationale of variables. Section V outlines the empirical analysis. Results and concluding remarks are given in Section VI, whereas study limitations and policy implications are outlined in Section VII.

II. LITERATURE REVIEW

In the literature growth is attributed to many factors.[3] Kelley (1988) has examined the impact of population growth on economic growth and concluded an inverse relationship, elaborating that economic growth, or higher per capita income, will be higher in cases of lower population growth rates.[4] De Mello (1997), as evidenced later by the OECD (2002), revealed that the level of education and infrastructure are important factors in determining FDI inflows. Borensztein *et al*. (1998) argued that the availability of a minimum threshold of human capital is essential for adopting any new technologies and management skills. In other words, he revealed that FDI inflow can ease the transferring of technology; however, the effectiveness of FDI depends on a threshold level of human capital in the host country. This result is supported by Balasupramanyam *et al*. (1999).

Xu (2000) asserted that a country needs to reach a minimum human capital threshold in order to benefit from technology transfer, and concluded that most Low Developed Countries (LDCs) do not meet this threshold. Lim (2001) concluded that infrastructure quality, among other factors, is an important determinant for FDI inflow, whereas, the World Bank Development Report (2001) reemphasized the importance of the infrastructure quality (telephone lines and paved roads) in addition to the quality of human capital (share of labor force with secondary education and percentage of population with access to sanitation) as crucial determining factors to attract FDI.

Bengoa and Sanchez-Robles (2003) argued that in order to benefit from long-term capital flows, the host country has to have adequate human capital, sufficient infrastructure, economic stability, and liberalized markets. Bucci (2003) examined the long-run association between population and per capital income and concluded that population growth exerts a negative impact on economic growth. Addison and Hesmati (2003) and Hansen and Rand (2006) focused on growth as a main determining factor of FDI inflow. They argued that growth may attract more FDI from Multi-National Companies (MNCs) as they locate new opportunities of investment. Halicioglu and Halicioglu (2006) concluded a positive and statistically significant relation between GDP and FDI, but the correlation coefficient between exports and FDI was found to be insignificant. Ozturk (2007) revealed that, in addition to other factors, the human capital base and infrastructure quality are important determinants for FDI hence, create a positive impact on overall economic growth of the host country. Noormamode (2008) provided no clear-cut evidence on the growth effects of FDI. Furthermore, he showed that the factors that cause GDP and FDI may be different according to the level of income of the country.

Anwar and Nguyen (2010) suggested a larger impact between FDI and economic growth if more resources were invested in education and training, financial market development and reducing the technology gap between local and foreign firms. Azzam *et al*. (2013) compared the effect of various degrees of foreign ownership on financial performance. They found that foreign ownership increases financial performance up to a level and then declines. The effect of foreign ownership is different from one sector to another.

Wijeweera *et al*. (2010) resolved that FDI inflows exert a positive influence on economic growth only in the presence of highly skilled labor. The positive effect of foreign ownership is attributed to the ability of foreign-owned firms to increase capital, transfer technology and R&D, and improve managerial skills (Islam *et al*. 2013). By using the Johansen approach, Tawiri (2010) identified the impact of domestic investment as a determining factor of growth and concluded there is a significant impact of domestic investment on per-capita GDP, particularly when adopting policies of openness. Umoh *et al*. (2012) revealed that FDI and economic growth were jointly determined in Nigeria and the existence of positive feed-back between FDI and economic growth. For India, while Ray (2012) suggested a positive relationship between FDI and GDP and vice versa, Guru-Gharana (2012) examined the impact on GDP as per the post-liberalization period relative to the pre-liberalization period, concluding strong support for the Export-led and FDI-led growth hypotheses only in the post-liberalization period.

On a regional basis, in the Sub-Saharan African (SSA) countries, many studies placed emphasis on the relevance of the type of polices and institutional variables as main determining factors for FDI inflows to the SSA economies, (Gastanaga *et al.* 1998) and

Naude and Krugell (2007). Morisset (2000) concluded that GDP growth and trade openness are both positively and significantly correlated with the African business climate, whereas the illiteracy rate, the number of telephone lines, and the share of urban population do not appear to have any influence on such FDI business environments. Noorbakhsh *et al*. (2001) reported the importance of human capital and its quality and the significant impact it has on increasing the volume of FDI inflows. Moss et al. (2004) focused on the importance of infrastructure, political background, and stability that deter FDI flow to Africa. Onyeiwu and Shrestha (2004) showed that growth, inflation, openness, international reserves, and natural resources are significant determinants, whereas political rights and infrastructure are not significant factors for FDI flows to Africa. Akinkugbe (2005) clarified the importance of level of income, return on investment, openness, and level of infrastructure as main determining factors. Oketch (2006) supported the significant influence of human capital on FDI inflows, while Suliman and Mollick (2009) added the incidence of war as additional determining factor of FDI inflows.

As for Latin America and Caribbean regions, Trevino and Mixon (2004), Quartey and Tsikata (2007) provided special emphasis on the importance of the economic and institutional factors and their significant impact made on FDI inflow. Regarding the Central Asian Economies (CAEs) over the post-Soviet era during the period from1989 to 2007, Savas (2008) found evidence of a long-run relationship between population and real per capita income, supporting the hypothesis that population was driving growth. Kevin (2010) advocated that FDI flow is affected by high debt, high inflation, and constraints on the executive, market size, and good infrastructure quality. For the Asian region, Tiwari and Mihai (2011) asserted that both FDI and exports enhance the growth of Asian economies, implying that Asian countries that are moving ahead with globalization might choose to continue in order to bring advanced technology to private homes. This is quite important particularly for countries that do not have sufficient resources. Sultan and Haque (2011) showed that only domestic investment has significant long-term as well as short-term impact on growth, while exports, though having a positive relation with growth, have an insignificant contribution. Thuku *et al*. (2013) examined the relationship between population growth and economic growth. Their results indicated that both variables are positively correlated in which an increase in the former will lead to an increase in the latter as for the short-term as well as long-term, supporting in turn the hypothesis that population is driving economic growth.

As for the Organization for Economic Co-operation and Development (OECD) countries, Turkcan and Hakan (2010) tested for the endogenous relationship between FDI growth and economic growth and concluded that FDI growth and economic growth are significant determinants of each other. They also revealed that export growth rate and human capital are statistically significant determinants of both FDI growth and economic growth, concluding that FDI growth and economic growth have an endogenous relationship. As per the Middle East and North African countries (MENA), René Sadni-Jallab *et al*. (2008) reported no independent impact of FDI on economic growth. But, while the growth-effect of FDI does not depend on degree of openness to trade and income per capita, the positive impact of FDI on economic growth depends on macroeconomic stability.

Overall, the mixed evidence provided in the literature regarding the FDI determinants may be justified by the differences among studies regarding the explanatory

variables used as determining factors of FDI inflow. Studies may also differ on methodological and data issues, proxies used to measure explanatory variables, different types of sample selection, different analytical tools, in addition to diversities in policy implications among countries. For example, what is suitable for one country/region many not be relevant for another. Further, economies differ in their economic sizes, economic reforms, economic growth rates in terms of GDP per capita, economy openness, privatization and globalization regimes of production, technological diffusion, nature of firms, polices pursued in each country, in addition to the certain host country characteristics necessary to allow FDI to contribute positively to economic growth. Additional contributing factors that cause divergences among studies toward the FDI determining factors include discrepancies among countries toward the sufficient absorptive capacity of spillovers and adopting FDI, also differences in economic structure and socio-political landscape are possible complicating factors.

This article, in the ESCWA context, contributes to the related literature by fully testing for the FDI-growth performance via controlling for the FDI-growth deriving factors, namely gross domestic savings, human capital development, exports, infrastructure and population growth on FDI-Growth performance. We argue that controlling for such main determining factors significantly influences FDI inflow toward the ESCWA economies thus stimulating long-run economic growth. Further, given the possibility of what is suitable for one country/region may not be relevant for another on the determinants of FDI inflow, this article provides sound policy implications while we consider a broader sample comprising all ESCWA economies for a period of more than three decades. Additionally, in terms of methodology, the current article applied a simultaneous system of two equations, which after applying FDI and economic growth as endogenous factors, fully controls for simultaneity bias and extracts effectual estimates of FDI-growth nexus.

III. FDI INFLOWS IN ESCWA

For the ESCWA countries, total FDI inflows to the member countries was $55.6 billion in 2006, an increase of 46% over 2005 and nearly five times the value in 2003 ($10.8 billion in 2003). This reflects a share of total FDI flows to developing countries more than doubling from 6.2% in 2003 to 14.6% in 2006.[5] The inflows of FDI to the ESCWA region continued to increase reaching a threshold of $64 billion in 2007, and heading to its peak in 2008 by more than $84 billion, (FDI report, 2009)[6]. In 2009, the FDI inflow dropped by 14% (from $84.2 billion to $72.5 billion). Regardless of such a drop, the ESCWA region improved moderately in 2009 relative to other developing countries. For example, the region increased its share in the total FDI received by developing countries steadily from 6% in 2003 to nearly 15% in 2009. Further, the region experienced an average growth of 3.4% and 4.5% in the years 2009 and 2010 respectively, despite the globe's unprecedented challenges characterized by financial instability and recession (FDI report, 2011).[7] Nonetheless, whereas these statistics considered the ESCWA countries as the fastest-growing destinations for FDI inflows worldwide, the evidence suggests that FDI inflows to these countries failed to establish an adequate and sustainable source of finance for long-term economic growth. So far, the percentage of FDI inflows remains small as a function of the ESCWA region's size relative to other emerging markets, indicating that the outstanding performance of the FDI flows to the

ESCWA economies would not persist against the ongoing instability in the international financial markets and the deterioration of the wide-reaching economic growth.[8] In this matter, while the UNCTAD (2009) shows a decline of 50% in global FDI inflows and 60% in FDI inflows to developing countries, the argument regarding what factors and conditions would support the absorption of FDI into the ESCWA economies typified a valid issue to be tested.

IV. SIMULTANEOUS EQUATION SYSTEM

In a host country our theoretical framework proposes a bi-directional relationship between FDI and economic growth. The FDI contributes positively to economic growth which, in turn stimulates the inflows of the FDI. In other words, we propose that FDI and economic growth are endogenous and jointly determined within a simultaneous system of two equations, one equation for FDI and another for economic growth.

Given our proposition, we know that the change in FDI affects growth, however, it is also true that changes in economic growth affect FDI to the host country, reflecting a feedback relationship between the two-macro variables. Because of such a feedback relationship which results because FDI and economic growth are jointly or simultaneously determined, we can show that $\text{cov}(FDI_i, e_i) \neq 0$. Yet the Least Square (LS) estimation will fail if applied to test for this relationship. This means regressing $GRTH_i$ as a function of FDI_i will fail if applied because of an endogeneity problem and the resulting simultaneous equations bias. In other terms, it is possible when specifying a dynamic model that the error terms be serially correlated, reflecting the necessity to test for serial correlation while specifying the dynamic model to avoid biasness and inconstancy. Given such a possibility, we used the Two Stages Least Squares (2SLS) estimation or the method of moments which is called the instrumental regressors estimation as an alternative to the LS estimator.[9]

The general behavioral or structural system with (*m*) simultaneous equations can be formatted as follows:

$$KY_t + \Gamma Z_t = U_t \tag{1}$$

where $Y = (Y_{1t}, Y_{2t}, Y_{3t,\ldots\ldots}, Y_{Nt})$ is reflecting a (ɱ x 1) vector of endogenous variables. $Z = (Z_{n1}, Z_{n2}, Z_{n3,\ldots\ldots}, Z_{Mt})$ is a (ɋ x 1) vector of exogenous predetermined variables. U is the (ɱ * 1) residuals vector (vector disturbances) with the following features i.e., zero mean, constant variance and zero covariance. K is the (ɱ x ɱ) matrix of coefficients for the endogenous variables, and the Γ is the (ɱ x ɋ) array matrix of coefficients for the exogenous predetermined variables (McFadden, 1999).

Following McFadden (1999), let $\sum$ denote (ɱ x ɱ) covariance matrix of U_t, then, in order to control for the simultaneity in the variables, equation (1) can be transformed from the structural form to the reduced form of the system.

$$KY_t = -\Gamma Z_t + U_t \tag{2}$$

$$Y_t = \frac{-\Gamma Z_t + U_t}{K} \tag{3}$$

$$Y_t = \frac{-\Gamma Z_t}{K} + \frac{U_t}{K} \tag{4}$$

$$Y_t = -K^{-1}\Gamma Z_t + K^{-1}U_t \tag{5}$$

Let $-K^{-1}Ü$ be Φ, and $K^{-1}U_t$ as έ, then equation (5) can be written to show the reduced form of the system:[10]

$$Y_t = \Phi Z_t + \acute{\varepsilon} \quad (6)$$

The covariance matrix of έ is $\Psi = K^{t-1}\sum K^{-1}$.

A. Identification

To estimate the parameters of the reduced form of the system (equation 6) we used the 2SLS method which is the most widely used technique. As per our case, in a system of 2 simultaneous equations, let the endogenous variables be Υ_1 and Υ_2 and let there be ٩ exogenous variables $\kappa_1,\kappa_2, \kappa_3.....$, κ_n. Considering the first structured equation within the system as: (Hill *et al,* 2007)

$$\Upsilon 1 = \delta 2\Upsilon 2 + \beta 1\kappa 1 + \beta 2\kappa 2 + \beta 3\kappa 3 + \beta 4\kappa 4 + \beta 5\kappa 5 + \varepsilon 1 \quad (7)$$

After identification, the parameters of equation (7) can be estimated in two stages. First, estimate the parameters from the reduced form equations (equation 8), then by LS we obtain the predicted values (equation 9). Stage two typified replacing the endogenous variables, Υ_2, on the right hand side of the structural equation (7) by their predicted values from (9), then, obtaining equation (10 and 11).

$$\Upsilon 2 = \Phi 12\kappa 1 + \Phi 22\kappa 2 + \Phi 32\kappa 3 + \Phi 42\kappa 4 + \Phi 52\kappa 5 + \cdots + \Phi q2\kappa q + \varepsilon 2 \quad (8)$$

$$\hat{\Upsilon} 2 = \hat{A}12\kappa 1 + \hat{A}22\kappa 2 + \hat{A}32\kappa 3 + \hat{A}42\kappa 4 + \hat{A}52\kappa 5 + \cdots + \hat{A}q2\kappa q \quad (9)$$

where $\hat{Y}=\Upsilon_2$ and $\hat{A}= \Phi$.

$$\Upsilon 1 = \delta 2\hat{\Upsilon} 2 + \beta 1\kappa 1 + \beta 2\kappa 2 + \beta 3\kappa 3 + \beta 4\kappa 4 + \beta 5\kappa 5 + \varepsilon 1 \quad (10)$$

$$\Upsilon 1 = \delta 2\left[\hat{A}12\kappa 1 + \hat{A}22\kappa 2 + \hat{A}32\kappa 3 + \hat{A}42\kappa 4 + \hat{A}52\kappa 5 + \cdots + \hat{A}q2\kappa q\right] + \beta 1\kappa 1 + \beta 2\kappa 2 + \beta 3\kappa 3 + \beta 4\kappa 4 + \beta 5\kappa 5 + \varepsilon 1 \quad (11)$$

B. Economic Rationale and Proxies of Variables

For testing purposes, growth is measured by GDP per capital growth, while FDI is measured by the ratio of net FDI as percentage of GDP. This measure is often used in the literature to capture the degree of integration in the worldwide market or globalization in particular cases, (Sadni-Jallab *et al.,* 2008). In addition, the estimable system includes the following FDI-growth driving factors, namely gross domestic savings % of GDP (SAV_GDP), exports of goods and services % of GDP (EXP_GDP), human capital development (HCD_G), gross fixed capital formation (K_GDP) and population growth (POP_G). These factors, though extracted from the literature, can be instigated to stimulate economic growth through FDI. In our case, the feedback relationship between GRTH and FDI is determined by the following dynamic simultaneous equation system.

$$\text{FDI\_GDP} = \alpha 1 + \beta 1\text{GDP\_G} + \beta 2\text{SAV\_GDP} + \beta 3\text{EXP\_GDP} + \beta 4\text{HCD\_G} + \varepsilon 1t \quad (12)$$

$$\mathrm{GDP_G} = \alpha 1 + \beta 1\mathrm{GDP_G} + \beta 2\mathrm{SAV_{GDP}} + \beta 3\mathrm{EXP_{GDP}} + \beta 4\mathrm{HCD_G} + \beta 5\mathrm{K\_GDP} + \beta 6\mathrm{POP\_G} + \varepsilon 1\mathrm{t} \quad (13)$$

The impact of Gross Domestic savings percent of GDP (SAV_GDP) on the FDI-growth nexus is ambiguous. One the one hand, given the traditional development theory, higher saving rates would speed up economic growth. The (SAV_GDP) variable may assist in maintaining improved growth rates through its influence on domestic investments and may act as a stimulus for attracting FDI, while deep reliance on external sourcing of funding may corrode competitiveness through an overvalued currency. On the other hand, growth rates may head savings growth rates (Saltz, 1992; Agrawal, 2001). Bi-directional association or no association between the two macroeconomic variables may exist as well (Sinha, 1996; Mavrotas and Kelly, 2001; Sinha and Sinha, 2007). The expected rationale sign of the SAV_GDP variable may be positive or negative.

The impact of the (EXP_GDP) variable, as measured by exports of goods and services' percent of GDP, on the FDI-growth nexus is also controversial. On the one hand, including the EXPT as an indication of trade openness in terms of trade liberalization would enhance economic growth performance through reducing anti-export bias, enhance productivity, and increase the international competitiveness of exports. In addition, more exports through trade openness polices would offer a larger market for domestic producers, reduce inefficiency in the production process and improve the efficiency of the economy, and hence, positively influence economic growth. On the other hand, the impact of (EXP_GDP) does not have a straightforward association with economic growth depending on whether trading partners are symmetric countries in the sense that they have substantially different technologies and endowments. The expected rationale sign of the EXP_GDP variable may be positive or negative.

The Human Capital development (HCD_G) variable is measured by schooling enrollment, secondary (percent gross). For the host developing regions or countries, given the endogenous growth theories, the FDI influence is expounded through knowledge externalities and human capital availability. Actually, spillover of knowledge, promoting experiential learning, and improving managerial skills can be reflected positively in human capital availability in host countries, reflecting a significant contribution towards the FDI inflow, causing improved rates of economic growth. We anticipate a positive relationship between FDI and HCD_G, supporting our proposition that through the human capital variable, FDI would stimulate growth more effectively.

For the growth determinants, we added the following regressors: Gross fixed capital formation (K_GDP) and population growth (POP_G). The K_GDP factor, formally domestic fixed investment, is used to proxy for domestic fixed investment. Given the implication of the new-classical growth models, domestic investment is one of the determinants of growth and has a crucial contribution in sustaining economic growth via increasing the production capacity. However, the positive impact of domestic investment may be reversed in cases in which continuous high rates of domestic investments may be at the cost of current consumption and may cause low rates of return while funding projects.

For the POP_G factor, a higher population variable may depresses economic growth via diminishing returns, since population growth is normally associated with insufficient income, hence poverty and hunger result forcing many countries to borrow offshore or resort to foreign aid to overcome such socio-economic attributes. High growth

rate of population may adversely affect human resources given their constraints on saving and export developments, in addition to placing pressure on the balance of payment. In contrast, given the classical model, economic growth is determined exogenously and that in the short-run population has a positive association with economic growth, typified by the per capita income. In the long run, population causes new progress through its association with technology advancements that are normally needed to meet increased demand for goods and services. Higher levels of population growth would increase the labor force availability, leading to lower costs of production, lower unemployment rates, leading to higher growth rates.

The data for economic growth and FDI, together with the proposed deriving control variables, are from the World Development Indicators (WDI), an online database provided by the World Bank. In fact, having one source of data insures consistency and avoids measurement problems. Our data covers the period 1980-2011 for 11 countries within the ESCWA region. Iraq and Palestine were eliminated from the analysis because of lack of data, resulting in a balanced data set with 2464 observations.

Table 1
Variables used

Variables	Abbreviation
Foreign direct investment, net inflows (% of GDP)	FDI_GDP
GDP growth (annual %)	GDP_G
Gross Domestic Saving (GDP)	SAV_GDP
Exports of goods and services (% of GDP)	EXP_GDP
School enrollment, secondary (% gross)	HCD_G
Gross fixed capital formation, private sector (% of GDP)	K_GDP
Population growth (annual %)	POP_G
Telephone lines (per 100 people)	T
Trade in services (% of GDP)	TL

Table 2
Descriptive statistics

	FDI_ GDP	GDP_ G	SAV_ GDP	EXP_ GDP	HCD_ G	K_ GDP	T	TL
Mean	1.74	4.83	20.74	42.50	70.91	22.3	11.36	25.69
Median	0.73	4.63	17.78	43.06	77.60	24.9	10.11	20.50
Maximum	22.65	46.50	69.61	92.65	111.24	49.0	33.66	103.19
Minimum	-10.36	-42.45	-66.95	7.87	8.28	10.1	0.21	6.33
Std. Dev.	3.65	8.62	22.67	18.38	20.96	4.2	8.33	18.00
Observations	236	272	225	262	205	223	324	187

V. EMPIRICAL ANALYSIS

To test the relationship between FDI as percentage of GDP (FDI_GDP) and economic growth (GDP_G) the test controls for the FDI-growth deriving factors, namely gross domestic saving as a percentage of GDP (SAV_GDP), exports of goods and services as a percentage of GDP (EXP_GDP), and human capital development indicated by school enrollment, secondary as a percentage of total gross enrollment ((HCD_G), gross fixed capital formation, private sector as a percentage of GDP (K_GDP) and population growth as an annual percentage change (POP_G). Empirically, as stated earlier, the FDI_GDP and GDP_G relation is investigated within the context of a simultaneous equation model using a Two-Stages-Least-Square (TSLS) method as per equations 12 and 13 above. Both K_GDP and POP_G are used as robustness tests in the model. A summary of these variables and their abbreviations are provided in Table 1. Descriptive statistics for these variables are displayed in Table 2. The differences between mean and median are so close except for FDI_GDP variable.

Before estimating the simultaneous equation model, we examine the data for endogeneity, and the Durbin-Wu-Hausman (DWH) test was applied to the data. The DWH test suggested by Davidson and MacKinnon (1993) can be conducted by including the residuals of each endogenous relationship as a variable with the right-hand variable of the original model. These tests indicate that there is a correlation between the error and independent variables.[11]

For FDI_GDP and GDP_G equations to be estimated simultaneously, an instrumental variables estimation is used. The most efficient way to combine multiple instruments is usually by applying the two-stage least squares. The major concern in using a 2SLS equation is the choice of the ideal instrumental variable. A requirement of good instrumental variables is that they be correlated with the right-hand variable, and that they are not correlated with the error term. To test this requirement, we examine both equations. Since we have more than one instrument, we test the joint hypothesis that the coefficients of these instruments are zero using an F-test with the alternative hypothesis that at least one of these coefficients is not zero. Another rule of thumb is that there need to be some exogenous variables that appear in the FDI equation but not in the GDP equation, and vice versa. All these conditions are clearly satisfied in both equations. The results of these tests indicate that the models are appropriately instrumented to ensure validity of the results obtained.[12] Finally, the estimated results are displayed in Table 3.

For the FDI_GDP equation, the estimated coefficient for the effect of GDP_G on FDI_GDP is statistically significant at the 10 percent level; the sign of the coefficient is positive indicating that an increase in GDP_G has a positive influence on FDI inflow. SAV_GDP has a negative and statistically significant coefficient at the 5 percent level. Both EXP_GDP and (HCD_G) are not significant. For the GDP_G equation, the estimated coefficient for the effect of FDI_GDP on GDP_G is statistically significant at the 10 percent level; the sign of the coefficient is positive indicating that the increase in FDI inflow has positive influences on growth. SAV_GDP has a positive and statically significant coefficient with a 5 percent significance level, indicating that savings has a clear influence on the growth. (HCD_G) has a negative and significant influence on GDP_G, when the EXP_GDP coefficient is not significant.

Table 3
Dynamic panel data estimation with two-stages least squire (2SLS) estimators

	FDI_GDP Equation		GDP_G Equation	
Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
FDI_GDP			0.6320	(1.8324)*
GDP_G	1.5823	(1.8324)*		
SAV_GDP	-0.1252	(-2.2221)**	0.0795	(1.7793)*
EXP_GDP	0.0973	(0.7799)	-0.0615	(-0.7695)
HCD_G	0.1263	(1.4096)	-0.0798	(-2.7724)**
K_GDP			0.1578	(1.3406)
POP_G			0.7168	(0.7168)
N		7		7
T		31		31
Ad-R^2		0.017		0.044

***, **, and * show significance at 5%. Values are rounded to three decimal digits.

Procedurally, by adding moment conditions under the assumption that the past values of the explanatory variables are uncorrelated with the error term (Wooldridge, 2001). This sentence does not make sense but I don't know what you're trying to say. GMM is a robust estimator in that, unlike the maximum likelihood estimation, it does not require the information of the exact distribution of the disturbances. The GMM estimator is typically used to correct for bias caused by endogenous explanatory variables. To obtain GMM estimates one needs the moment conditions to be an orthogonal condition between an expression including the parameters and a set of instrumental variables. The list of instruments for the GMM estimator need to be identified and there have to be at least as many instruments as there are parameters to estimate. All these condition are satisfied in our model. The dynamic form of the model is as follow:

$$y_{it} = \theta_i + \alpha_1 y_{it-1} + \alpha_2 + \varepsilon_{it} \quad (14)$$

where z_{it} is the row vector of all explanatory variables FDI_GDP and the other regressors and y_{it-1} which is the lag of y_{it}. θ_i is an observed country-specific effect, and $\varepsilon_{it}$is the error term. Using Arellnao and Bond (1991), the country-specific effect is eliminated by the first difference with moment conditions:

$$y_{it} - y_{it-1} = \theta_i + \alpha_1 \Delta y_{it-1} + \alpha_2 \Delta z_{it} + \Delta \varepsilon_{it} \quad (15)$$

The moment conditions are:

$$E(y_{it-J} \Delta \varepsilon_{it}) = 0 \text{ for } J \geq 2: t = 3, \ldots., T \quad (15.1)$$
$$E(Z_{it-J} \Delta \varepsilon_{it}) = 0 \text{ for } J \geq 2: t = 3, \ldots., T \quad (15.2)$$

Using these moment conditions we can use GMM with an assumed homoscedastic error term to avoid the two step estimator with downwards biased trends. The result from the GMM estimation was displayed in Table 4.

Table 4
GMM dynamic panel estimators

Dependent Variable: GDP_G				
Independent Variables	FDI_GDP	SAV_GDP	EXP_GDP	HCD_G
FDI_GDP	0.6320	0.0795	-0.06150	-0.0798
	(1.669)*	(1.7993)*	(-0.7695)	(-2.7725)**

***, **, and * show significance at 5%. Values are rounded to three decimal digits.

The results show that the estimated coefficient for the effect of FDI_GDP on GDP_G is statistically significant at the 10 per cent level; the sign of the coefficient is positive indicating that an increase in FDI inflow has positive influences on GDP_G. The SAV_GDP has a positive and statically significant coefficient at the 10 per cent level, indicating that saving has a clear positive influence on the growth. HCD_G has a negative and significant influence on GDP_G, where EXP_GDP is not significant. These results confirm the results provided by the simultaneous equation model in Table 3.

VI. RESULTS AND CONCLUDING REMARKS

Within the context of the ECWA region, this article tested simultaneously for the FDI-growth nexus, in which the endogenous relationship between the two macroeconomic variables is verified by controlling for the FDI growth deriving factors that are instigated to stimulate economic growth through FDI. Empirically, while the panel data set spans over the period 1980-2011, the standard Two-Stage Least Squares (2SLS) estimators are used to test for our proposed simultaneous equation system. Our technique controls for simultaneity bias and extracts reliable estimates of FDI impact on growth, and vise-versa. In order to test for the responsiveness of our estimates from using of 2SLS estimators, we re-estimate our model by using the GMM dynamic panel estimators. Both estimators converge towards the proposed circular association between the two variables.

The result substantiated our proposition of the bi-directional relationship between FDI and economic growth, where the results suggest that FDI positively and significantly boosts growth and the growth rate stimulates positively FDI inwards as well. Our result validates the endogeneity between the two macro variables, authenticating in turn our usage of the simultaneous equation system, where ignoring this endogeneity would result in misleading conclusions. Our result is consistent with many causality tests in the literature. It seems that during the sample period, given the globalization marvel, both macro variables have reinforced each other and their association has become increasingly endogenous.

For the FDI_GDP equation, the GDP_G result shows that growth determines FDI inflow to the host country; the impact is positive and statistically significant, indicating

the influence that can be made on the expected rate of return on capital and other related resources. Also the result supports the argument that divergences in FDI inflows may be elucidated by differential rates of return on capital investment. The SAV_GDP result indicates that domestic savings is not catching up with innovation, reflecting low levels of local entrepreneurial effort and low collateral attributes of saving to attract foreign investment inflow to the host country. The excessive build-up of external debt may justify the limited local saving in the ESCWA region.

The EXP_GDP indicates the intra role of export. We conjecture that EXP_GDP is critical in order to attract the positive influence of FDI on economic growth, and vise-versa, indicating the need to have export oriented strategies to attain positive FDI inflow towards host economies. In short, the positive impact of EXP_GDP designates how crucial it is for a country to trade globally and go beyond its borders and follow open trade regimes. A positive impact of HCD_G on FDI inwards is revealed, demonstrating that host countries with developing levels of human capital would be attractive as FDI destination. If this is the case, FDI would boost growth via experiential learning and knowledge or familiarity spillovers. However, countries with low levels of human capital which do not pass a targeted threshold would find that FDI has no significant growth effect. This may validate the rationale that only host countries with sufficient levels of human capital can exploit the high-tech spillover allied with FDI inwards, signifying that FDI can be the only growth enhancement vehicle in countries with low levels of human capital (low educational or schooling completion).

For the GDP_G equation, the undoubtedly positive and statistically significant FDI result demonstrates that more FDI inflows would stimulate higher levels of economic growth, supporting in turn the FID-led growth hypotheses. It seems that the ESCWA region has intensified its reform agendas given the introduction of a number of reforms in 2009, thereby enhancing their business framework by easing business start-ups, trade across borders and enhancing the efficiency of commercial dispute settlements (World' *Doing Business* Report, 2010). All these factors are supported by engaging in FDI-oriented development strategies, including reducing restrictions to inwards investments, offering tax incentives and subsidies, reducing the minimum capital requirements, and creating one-stop shops to save the registration time needed for new investment registrations. In other words, the results indicate FDI does exert an influence on economic growth, demonstrating a reliable association between FDI and growth, and vice versa. However, such an association may be interrupted with macroeconomic instability. These results imply the need to revisit government policies and the need for economic reforms to encourage more sustainable FDI inflows through tax and bureaucratic considerations, duty exemptions, profit remittances, credit privileges and foreign ownership.

The SAV_GDP result maintains the traditional development theory in which higher saving rates speed up economic growth. This is obvious when savings assist the domestic savings which may assist in upholding improved growth rates via their influence on domestic investments, while deep reliance on external sources of funding may corrode competitiveness through an overvalued currency. Although the EXP_GDP impact is not significant in stimulating growth as per the ESCWA case, the positive coefficient sign of the EXP_GDP signified that more trade openness would definitely boost economic growth, reflecting the need to accelerate trade liberalization strategies and focus more in trade diversification in terms of items' composition including

traditional commodities and technological and capital intensive items. The limited impact of EXP_GDP on growth may be attributed to limited domestic investment (K_GDP), mainly infrastructure investments, that would limit production and hence eliminate cost efficiency and export expansion and reduce competitiveness in the world marketplace. Such an integrated intra-relationship between the two variables (EXP_GDP and K_GDP) justifies the insignificant contribution that is made on economic growth and its sustainability. At this stage it is worthwhile to re-emphasis the intra association between domestic investment and domestic savings. Increasing local savings is a necessary (even if it is not sufficient) condition to maximize capital accumulation, which is essential to increase domestic investment and in turn economic growth.

Our conclusion for the positive HCD_G impact suggests that not only FDI promoting strategies boost GDP growth. An ambitious strategy aiming at increasing human capital endowment and upgrading human skills in conjunction with FDI elevation strategies boosts economic growth more effectively. This may indicate the importance of the contribution of human capital as a local source, while collectively learning from the offshore contribution, typified by FDI inwards. The influence of the HCD_G regressor may be justified when including population growth as an additional regressor, in which case the negative impact of HCD is attributed to high growth rates of population that force economies to use their scarce resources typically from savings to prepare human capital. This preparation of human capital does not reach the targeted threshold to contribute positively in boosting economic growth. Furthermore, it seems that rapid school infrastructural aging provides pressure on educational entities, causing a lower quality of education which negatively affects economic growth. For example, in developing economies, 33% of children of primary school age are not enrolled in school, and 60% of those who are enrolled are completing only three years of primary schooling (Savas, 2008). Another justification for the negative impact of human capital development on economic growth can be the inefficient workers' skills which intensify pressure on the labor market and limit the advantages that can be gained from absorbing advanced technology, supporting neoclassical growth in which population growth reduces economic growth because of capital dilution. The significant negative conclusion indicates that HCD_G contributes in a reverse manner economic growth as for the ESCWA region, reflecting the need to restructure the education framework to create skilled and effective human capital that can absorb technology advancement, and hence impact economic growth positively.

For the POP_GDP, the positive sign indicates that greater total population would yield greater per capita income (more economic growth) through greater levels of technological growth. This supports, in turn the "Population Push" model proposed by Simon (1977) who asserts that steady population growth has a positive impact on long-term economic growth. The positive association between population growth and economic growth supports the hypothesis that population is driving growth or at least can be considered as a deriving factor for economic growth. Overall, population growth assists a region's economy by boosting economic growth via technology enhancements. The insignificant impact of POP_GDP on economic growth may indicate that an increase in population failed to be associated with innovations, leading to a lower level of productivity and hence a limited influence on economic growth. As per the ESCWA case, the insignificant result may indicate that a high rate of population growth may slow down economic growth via attenuation returns. It seems that population growth is detrimental

to the ESCWA region's economy because of a variety of glitches such as overpopulation which place tremendous pressure on local resources resulting in poverty, hunger, and insufficient income. These problems may induce further difficulties as the population grows, particularly if there are limited resources insufficient to support human capital development.

The POP_GDP result may be quietly correct given the negative impact of human development on economic growth as per the ESCWA case. The insignificant impact of POP_GDP on economic growth may justify the insignificant impact of EXP_GDP on growth as well. As for developing countries, higher population growth associated with low levels of income is detrimental to production causing lower export and higher import levels and constraining human resources. The positive influence of K_GDP shows that FDI inwards competes with domestic investment, implying that an increase in domestic investment, particularly in infrastructure, can cause cost reductions, causing more export opportunities through price competitiveness. The insignificant impact of K_GDP may indicate low growth rates of domestic investment, reflecting low levels of production in the economy.

VII. LIMITATIONS AND POLICY IMPLICATIONS

In terms of limitations, the sample includes countries with different income levels; hence it can be recommended for future research to re-categorize the sample into sub-groups and test for the FDI-growth nexus on a country level or group level data set. Focus can be given to the number of cross-sections in the different samples together with the number of instruments to be used to avoid result bias. This would also account for limitations in scarce resources for some countries relative to other countries, and/or to what extent the host country can benefit from spillover, given the level of development in its financial system (markets) and its social and economic landscapes.

Our policy implications are straightforward. First, while the ESCWA region received an increasing share of FDI inwards, the bulk of such FDI inflow is directed towards natural resource extraction, hence limited success is achieved in promoting broad based and sustainable economic growth. Second, while the empirical results strongly support the FDI-growth theories in which both variables are endogenous, the deriving factors lead to more FDI inwards, thus providing the chance to boost further economic growth. Third, ESCWA governments have to provide more budgetary provisions to developing human capital as well as domestic physical investments. Fourth, these countries need to revisit their export reforms and follow export oriented strategies and deregulate controls to have more production efficiency. This has to be maintained by infrastructure investments and a diversification outlook in their industry base. Furthermore, such economies are supposed to have static effects in terms of comparative advantages, and dynamic effects that would be emanated from increased competition in order to participate effectively in global trade. Fifth, population growth strategies and economic growth policies, particularly human capital development strategies, have to be re-managed in order to complement each other, otherwise tremendous socio-economic barriers will emerge, limiting economic growth. For the population growth's insignificant influence on economic growth, it can be argued that legislation offered to control rapid population growth rates may have been fruitless.

ENDNOTES

1. See UNCTAD (2009) and (2010), Global Investment Trends, UNCTAD (2012), and the Twenty-Fifth Meeting of the IMF Committee on Balance of Payments Statistics, USA, January 14-16 (2013).
2. See Harms and Ursprung (2002), and Suliman and Mollick (2009).
3. This may be attributed to the fact that there are different FDI types that are normally affected by different factors, together with the difficulty of gathering accurate data regarding some of the determinants.
4. He identified that countries with population growth rates lower than 1% had per capita income increased by almost 2.5% on an annual basis. Mankiw *et al*. (1992) concluded that a 1% increase in population growth would lower per capita income by 2%.
5. The Economic and Social Commission for Western Asia (ESCWA) includes Saudi Arabia, United Arab Emirates, Egypt, Jordan, Bahrain, Lebanon, Qatar, Oman, Yemen, Kuwait, Syria, Iraq, and Palestine.
6. Several influential factors contributed to such an increase including increases in oil prices, stable macroeconomic conditions, economic and financial reforms, enhancement in the business climate, and privatization of state-owned enterprises. Regarding distribution, given some sort of differences among the ESCWA countries, ¾ of FDI inflow is concentrated in Saudi Arabia, UAE, and Egypt. Regarding categorization, the FDI Report of 2008, excluding Iraq, divided these countries to three categories in term of FDI performance and potential. The first category comprises high-performing countries and is considered to contain the largest economies and main recipients of FDI in the region, namely Saudi Arabia, United Arab Emirates and Egypt. According to the report, these countries were determined to have increased their share of FDI inflows, adopted a number of reforms, and improved significantly their overall infrastructure. As per the years 2006 and 2008, this category captured nearly 74% and 75.7% of total FDI inflows to the region, respectively. The second category comprises smaller, high-performing economies, namely Jordan, Bahrain, Lebanon, Oman, and Qatar. These countries are considered as favorable destinations for FDI flows and were successful in attracting FDI during the period 2003-2007. As per the year 2006, this category captured nearly 22% of total FDI inflows to the region. The third category comprises below-potential performing economies, namely Kuwait, Yemen, Syria, and Palestine. As per the year 2006, this category captured only 3.5% of total FDI inflows to the region, reflecting the need to engage in significant reforms in order to boost their investment climate and enhance their share of total FDI inflows to the region. As a percentage of GDP, there was a significant growth of the average ratio of FDI to GDP recording an ESCWA average of 6.3% in 2007 and 6.4% in 2008. The highest value was for Lebanon, followed by Jordan with rates of 12.6% and 9.7% for 2008. The smallest of the FDI inflows were for Yemen and Kuwait at rates of 1.7% and 0.05%, respectively. For the GCC in 2008, the average ratio of FDI to GDP was 8.41% for UAE, 8.20% for Oman, 8.19% for Bahrain, 4.67% for SUA, and 0.05% for Kuwait.
7. The bulk of these FDI inflows takes the form of Greenfield investment (investment that creates or expands production capacities) and is captured by the Telecommunications, banking and construction sectors.

8. For more details, see ESCWA, Foreign Direct Investment Report, United Nations, New York, 2009.
9. See Hill *et al*. (2007).
10. As reported by McFadden (1999), for equation (1) to be a well-defined system that determines Yt, it is necessary that Ƙ be non-singular.
11. The results for these tests are available upon request.
12. To save space, the results for weak instrument and valid instruments are available upon request.

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