GROWTH CONSEQUENCES OF FOREIGN DIRECT INVESTMENT: SOME RESULTS FOR TURKEY

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Turkey has become the dominant recipient of FDI inflows in the Western Asian region. We explore if such inflows have promoted growth as expected. Our analysis of the FDI/growth nexus focuses both on the long-and short-run relations and allows for the possibility that growth also responds to other factors. The results support the theoretical priors and support the existence of a robust long-run relationship linking real economic growth with FDI inflows, economic openness and human capital. Among the three growth ingredients, only human capital accumulation (good education) appears capable of stimulating economic growth in the short-run as well. The results further imply that programs to attract larger FDI inflows to Turkey should persist for some time before they can produce noticeable economic benefits.

Keywords: FDI Inflows, Economic Growth, Human Capital, Turkey
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1.   INTRODUCTION

Statistics from various international organizations (e.g., UNCTAD, World Investment Report 2007) indicate significant and persistent decline in recent years in the global flows of Foreign Direct Investment (FDI). While these flows were steadily growing through much of the 1990s, reaching a peak of almost $1.41 trillion in 2000, FDI flows fell by 41% in 2001 to $832 billion, declined again in 2002 by another 26% to reach $618 billion, and registered another 10% decline in 2003 to reach $558 billion. However, FDI flows began to show some strength in 2004, increasing by 27% to $711 billion and continued their ascension in 2005, rising by another 29% to reach $916 billion. Although

relatively a small fraction of these FDI inflows reach developing countries, FDI still represent the largest source of foreign private capital for these countries (much larger than bank loans, portfolio investment, and equity acquisitions).

Since FDI flows are usually perceived as an important force behind faster and genuine economic growth (OECD (2000), and UNCTAD (2007)) and developing economies intensely compete to attract foreign capital. However, both theory and evidence suggest that the ability of countries to attract FDI and the extent to which these FDI inflows enhance growth largely depend on several country-specific characteristics. Moreover, recent research also suggests that heavy dependence on foreign capital may be detrimental for the host country, especially when the FDI inflows are characterized by high volatility. Therefore, authorities and policy-makers in developing countries cannot simply assume that FDI inflows of any kind, and at any level, are necessarily growth-promoting that should be encouraged all the time and at any cost.

This paper purports to assess the experience of Turkey with FDI inflows. We focus on Turkey in this paper since Turkey dominates the Western Asian region (containing 11 countries) in terms of the size of FDI, averaging about 26% of total FDI inflows to that region. Over the six year period from 2000 to 2006, Turkey attracted more than $40 billion in FDI flows. While FDI inflows were relatively small in the early 2000 (averaging less than $2 billion a year), the government of Turkey has recently expended enormous efforts attempting to attract much larger FDI inflows, and such efforts seem to have succeeded. Turkey received almost $10 billion of FDI in 2005 and doubles that amount ($20 billion) in 2006. Naturally, such intensive governmental efforts to attract larger FDI inflows must have rested on the common perception that FDI inflows propagate higher economic growth. The main purpose of this paper is to empirically investigate if such a perception can be substantiated in a country that has expended enormous the case of Turkey.

2.   RELATED LITERATURE

The role of foreign direct investment in the growth process has been the subject of immense importance at least since the strong winds of globalization began to blow in the early 1980s. Over the last two decades, developing countries have persistently devoted a great deal of energy and attention to encouraging more FDI inflows expecting that these inflows would enhance growth in their domestic economies. The theoretical premise is straightforward and in fact quite simple. FDI is a composite bundle of capital stocks, know-how, and technology. Thus, attracting more FDI flows to a country should promote domestic economic development since such inflows supplement domestic capital stock, expand market access, provide positive technological spillovers for local industries, and help accumulate and improve human capital (see, for example, Blomstrom, Lipsey and Zejan (1994, 1996), Zhang (1999), Nair-Reichert and Weinhold (2001) and Alfaro *et al.* (2004)).

Nevertheless, empirical evidence on the growth consequences of FDI inflows in developing countries is ambiguous and mixed at best. The results greatly vary depending on many factors including the particular host country studied, the time period examined, the data used, among others (Borensztein *et al*. (1998), and Loungani (2002)). Some researchers, like Ram and Zhang (2002), and Singh (2003), also cast some theoretical doubts on the growth-promoting effects of FDI inflows. They argue that FDI inflows may not serve the developmental needs of many developing countries and could perhaps hamper (rather than promote) growth due to crowding out domestic saving, creating enclave economies, and adversely affecting the social and cultural fabrics of the host countries. The possibility of adverse effects resulting from FDI inflows are perhaps most pronounced if these inflows are characterized by a high degree of volatility (Lensink and Morrissey (2001)).

Prior research further suggests that the growth effects of FDI inflows in the host country may be time-varying and, as such, it is useful to distinguish between short- and long-run effects. This is particularly important in light of recent evidence reported by Kentor and Boswell (2003) indicating that the growth effects of FDI inflows are temporary in nature and tend to vanish over the long-term horizon. Furthermore, neo-classical growth models typically ascribe negligible long-run growth effects for FDI inflows and, with its usual assumption of diminishing returns to physical capital, these inflows can only have short-run impacts on the level of income, leaving long-run growth unchanged. Yet, FDI inflows can be growth-enhancing in the long-run through externalities and productivity spillovers (De Mello (1997)). Therefore, it appears that the debate of whether FDI inflows are growth-enhancing (or growth-retarding) in the short- and the long-run remains largely an empirical question.

Another issue of considerable importance in this area relates to whether FDI inflows can contribute to reducing poverty in the host country. Here, too, research is scant and most of the work dealing with this issue implicitly assumes that, by promoting growth and employment in the host country, FDI will reduce poverty. Again, research shows that this presumption may not hold for all countries at different stages of development. For example, if a large portion of FDI inflows is targeted for buying privatized firms, the surge of more foreign capital inflows will likely fail to increase the employment level, and if foreign firms compete with local firms, employment may even be reduced elsewhere domestically (ODI (2002)). Thus, the net effect of FDI inflows on employment and, by implication, on poverty reduction depends on the stage of economic development of the particular country studied as well as on the time period examined.

3.   RESEARCH DESIGN AND DATA

This research examines the economic impact of FDI inflows in Turkey. Thus, the two basic variables in our empirical analysis are real economic growth (measured by the percentage change in real GDP) and real FDI inflows. Besides FDI inflows, growth can

also respond to other factors, including the degree of economic openness, the accumulation of physical and human capital and liberalization policies and regulatory reforms.[1] It is widely believed that economic openness is beneficial to growth as integration with the global economy enhances domestic productivity through competition and better access to foreign technologies (Krueger (1990, 1997), Hahn and Kim (2000), Soysa and Neumayer (2004), and Jin (2006)). Accumulation of physical capital has been considered a key growth factor in the classical and neo-classical growth theories and even though modern growth theory assigns relatively more weight to accumulation of human capital, the former still plays a crucial role in the process of economic growth.[2] A rapid accumulation of human capital can also spur economic growth and numerous studies provide support for this contention (Romer (1989), Barro (1991), Mankiw *et al.* (1992), Benhabib and Spiegel (1994), Bashir and Darrat (1994), Sala-i-Martin (1997), and Darrat and Yousef (2004)). These authors show that improved educational levels enable the population to acquire more knowledge and sharper skills that provide economic benefits both to the individual (higher earning and job security), as well as to the society at large (higher productivity and sustained economic growth). We measure economic openness by the ratio of foreign trade (both imports and exports) to GDP, and the accumulation of human capital by the rate of adult literacy in the country. Unfortunately, reliable data on physical capital dates back only to 1987 for Turkey. To avoid bias in the results due to the brevity of the series, we exclude physical capital from the analysis. As to liberalization policies and regulatory reforms, we use dummy variables to represent episodes of major regulatory changes in Turkey. In so doing, we use the chronology of important financial, economic and political events in emerging markets compiled by Bekaert and Harvey.[3] Following Mehrez and Kaufmann (1999), we select 1980 as the starting date of liberalization in Turkey whereby interest rate ceilings on loans and deposits were removed. Given the relative brevity of our sample, we could not incorporate other liberalization episodes in the model.

The basic growth model to be estimated in this paper takes the following form (all variables, except for the dummy variable, are expressed in natural logarithms):[4]

$$RY_t = \alpha + \beta RF_t + \gamma EO_t + \delta HC_t + \lambda LB_t + \mu_t , \qquad (1)$$

where *RY* is real GDP, *RF* is real FDI, *EO* is economic openness measured by the ratio

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[1] Of course, we make no claim here that these factors are the only growth determinants.

[2] See Barro and Sala-i-Martin (1995) for an excellent exposition on classical and neo-classical growth theories.

[3] See http://www.duke.edu/%7Echarvey/Country_risk/chronology/chronology_index.htm.

[4] Entering the variables in natural logarithms can smooth out the underlying variances thus inducing homoskedastic errors. The use of natural logarithms also directly converts the estimated coefficients into elasticity measures.

of foreign trade to GDP, *HC* denotes human capital measured by the adult literacy ratio, *LB* denotes the liberalization dummy (taking the value of unity for all years since 1980 and zero otherwise), and μ is a white-noise error term. All coefficients are expected to be positive by the underlying theory.

Our sample for Turkey is annual, covering 37 years from 1970 to 2006 (the maximum period for which consistent data on all variables of interest are available). Data for GDP, prices and foreign trade are compiled from *OECD Main Economic Indicators* and data for FDI inflows come from *UNCTAD* (United Nations Conference on Trade and Development), while data on literacy come from the *United Nations Statistics Division*. Figure 1 depicts the movements of real GDP, real FDI inflows, the degree of openness and adult literacy rate from 1970 to 2006. The figure shows that while real GDP and openness grew relatively smoothly and followed similar ups and downs over the years, the inflow of FDI is marked with more volatility. The inflow of FDI showed an increasing trend since mid-1980s as a result of economic liberalization processes initiated in 1980.
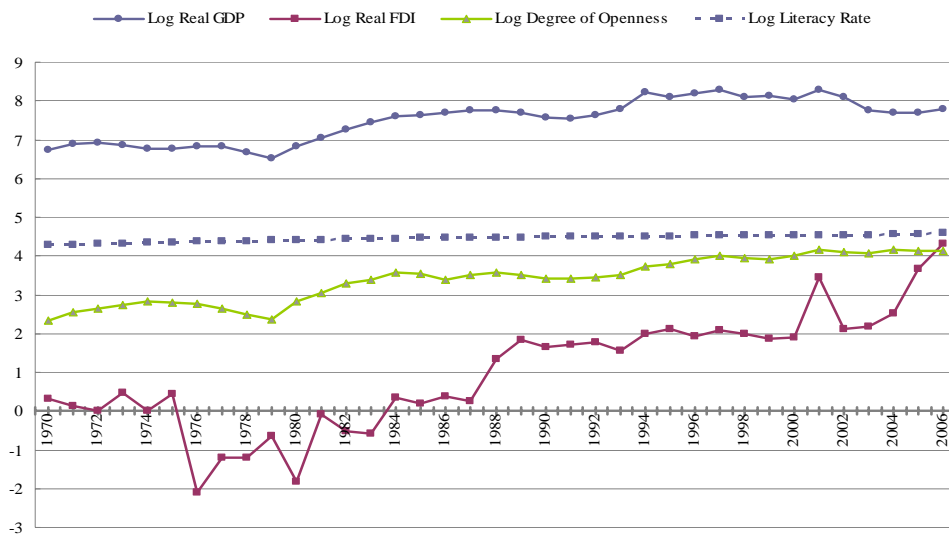

Figure 1. The Movements of Real GDP, Real FDI Inflows,
The Degree of Openness and Adult Literacy Rate from 1970 to 2006

To investigate the economic impact of FDI inflows on growth in Turkey, we integrate any short-run relationship between FDI inflows and growth with long-run impacts that FDI may have on economic development. Unlike previous studies that focus on the FDI/growth link in either the short-run or the long-run, we argue that a better conceptual framework is to integrate both effects in a unified model. This

approach should receive further acceptance in light of recent findings reported in Kentor and Boswell (2003) that the effects of FDI on growth are time varying and substantially vary in the short run and the long run. Thus, we ascertain whether such effects are short lived, or instead persist for some time and influence the domestic infrastructures and long-run economic growth performance.

The basic empirical methodology used in this research relates to the cointegration and error-correction modeling (ECM) approach that has become very popular in recent applied econometrics (see, for example, Harris (1995) and Stock and Watson (2003)). When two or more time series have a common stochastic trend, these series are said to be cointegrated or possess a long-run (equilibrium) relationship. Examples of possibly cointegrated variables are short-term and long-term interest rates, prices and wages, money and prices, and consumption and income. The concept of cointegration was first introduced by Granger (1981) and later operationalized by Engle and Granger (1987). Testing for cointegration is useful to shed light on the empirical validity of theoretical contentions. In this regard, the Johansen and Juselius (1990) multivariate procedure is perhaps the most powerful approach to test for cointegration in economic and financial time series. Several recent studies provide evidence showing the superiority of the Johansen-Juselius (JJ) approach over several other alternatives (see, for example, Cheung and Lai (1993) and Gonzalo (1994)).

In a seminal paper, Granger (1986) demonstrates that the dynamic relation among cointegrated variables can be represented by an ECM. This approach has gained a great deal of popularity in recent applied econometrics since it integrates long-run relationships among the variables with short-run dynamics necessary to restore equilibrium when departures occur. Since estimates from ECMs are sensitive to the particular lag profiles chosen, we rely on Akaike's Information Criterion (AIC) and Schwarz's Information Criterion (SIC) to determine the proper lag orders in the estimations. A necessary prelude to testing for cointegration is to investigate the stochastic properties of the time series. To do that, we use several unit root tests (the Augmented Dickey-Fuller, Phillips-Perron, and KPSS) to check the order of integration in the series. Given the critical importance of stationarity for the reliability of results, we employ several unit root tests to ensure that our conclusions are not sensitive to the particular test used.

4.   EMPIRICAL RESULTS

Our empirical analysis begins with testing for the presence of unit roots in the series. Table 1 assembles the test results from the three alternative unit root procedures. As is clear from the table, all three tests (ADF, Phillips-Perron and KPSS) suggest that all variables appear non-stationary in their log-level forms. However, using the first-difference operator converts each variable to a stationary series. Thus, each variable is integrated of order one. This sets the stage for testing the presence of cointegration

among the variables of the model. Since the log-levels of the variables exhibit unit roots, we need next to examine if these non-stationary variables share one or more unit roots, in which case they can be considered cointegrated.

Table 1.   Unit Root Test Results

In levels			
	ADF	Phillips-Perron	KPSS
Real GDP	0.9857	0.9857	0.1251
	(0.9110)	(0.9110)	(stationary at 5%)
Real FDI	-3.3456	-3.1845	0.1102
	(0.0752)	(0.1035)	(stationary at 10%)
Econ. Openness	-2.1971	-2.4810	0.0688
	(0.4768)	(0.3350))	(stationary at 10%)
Literacy Rate	-4.4019	-4.0708	0.1829
	(0.0069)	(0.0149)	(stationary at 1%)
In first differences			
	ADF	Phillips-Perron	KPSS
Real GDP	-4.7723	-4.7723	0.1817
	(0.000)	(0.000)	(stationary at 5%)
Real FDI	-8.7301	-8.8475	0.4442
	(0.000)	(0.000)	(stationary at 5%)
Econ. Openness	-4.3351	-4.3232	0.0825
	(0.001)	(0.0001)	(stationary at 5%)
Literacy Rate	-4.018	-2.4520	0.1900
	(0.0175)	(0.1357)	(stationary at 1%)

Notes: The numbers in parentheses in the first and second columns denote MacKinnon's (1996) one-sided *p*-values. The ADF tests are based on the Schwarz criterion.

Table 2 reports the results from the JJ cointegration test. These results unambiguously suggest that there is one significant (non-zero) cointegrating vector binding the four variables.[5] This verdict is robust since both versions of the Johansen test (the trace and the maximal eigenvalue statistics) reject the null hypothesis of no cointegration and they do so at least at the 5% level of significance. Therefore, it can be concluded that real economic growth in Turkey is reliably linked in the long-run to FDI inflows, economic openness, and the accumulation of human capital.

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[5] Note that economic openness and the literacy rate entered the cointegrating vector exogenously.

Table 2.   Johansen's Cointegration Test Results

Trace Statistics	5% Critical Value	Null Hypothesis	Alternative Hypothesis
18.50^{**}	12.32	$r = 0$	$r \geq 1$
3.16	4.13	$r \leq 1$	$r \geq 2$
Eigen value Statistic			
15.34^{**}	11.22	$r = 0$	$r \geq 1$
3.16	4.13	$r \leq 1$	$r \geq 2$

Notes: Endogenous variables: Log Real GDP, Log Real FDI; Exogenous variables: Log Openness, Log Literacy Rate. A ** denotes rejection of the null hypothesis of non-cointegration at the 0.05 level.

According to Granger's (1986) Representation Theorem, the presence of a robust long-run (equilibrium) relation implies that there must be causality among the variables of the model flowing in at least one direction. Hence, we turn our attention next to estimating an error-correction model (ECM) of real GDP growth that incorporates short-run dynamics of the variables.[6] In the context of ECMs, the statistical significance of the coefficients on the lagged independent variables indicate the presence of short-run Granger-causality, while the significance of the coefficient on the lagged error-correction term reflects long-run Granger causality (Darrat (1998)). Since our primary focus in this paper is on the economic consequences of FDI inflows, we discuss below our results from estimating an ECM for real GDP. To the variables in their first-differenced (stationary) forms, the ECM adds the error-correction term lagged once. As to determining the lag profile of other independent variables in the equation, we use the Hendry General-To-Specific approach whereby we initially assume a maximum lag of three years on each variable[7] and then delete any lagged coefficient that proves statistically insignificant (see Gilbert (1986), and Hendry (1995)).

Table 3 displays our results from estimating the ECM. We note that results from testing the cointegrating vector and from the Hendry general-to-specific approach suggest the need to drop three independent variables from the estimated ECM; namely, the lagged dependent variable, real FDI and economic openness.[8]

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[6] We estimate an ECM, rather than a vector error-correction model (VECM), since our primary task here is to examine the growth consequences of FDI inflows and other factors. Note also that we only include lagged explanatory variables and, as such, feedback (endogenous) effects are avoided.

[7] It is common to assume a maximum lag length equal to the cube root of the number of observations, in our case 3.3 $(\approx \sqrt[3]{37})$. Thus, three lags can be considered reasonable.

[8] The absence of real FDI from the growth model is particularly revealing since it implies no short-run economic effects from FDI flows. Attempts to impose non-zero lag restrictions on the FDI variable in the estimated ECM failed to produce meaningful results.

Table 3. Estimates from the Vector Error-Correction Model

Δ(Real GDP)$_t$	EC_{t-1}	Δ(Literacy rate)$_{t-1}$	Lib. dummy
	-0.0351[***]	12.0418[***]	0.2903[***]
	(-3.6494)	(2.7977)	(3.8467)
R-squared	0.3239		
Adj. R-squared	0.2817		
S.E. equation	0.1389		
Sum sq. residuals	0.5851		
Log likelihood	21.9360		
Serial correlation *LM*-Stats (*p*-values in parentheses):			
Lag 1	8.11 (0.09)		
Lag 2	0.89 (0.93)		
Lag 3	2.31 (0.68)		
Joint Normality Test: χ^2 stat (2 *d.f.*): (*p*-values in parentheses)	4.22 (0.12)		
Joint Res. Heteroskedasticty Test: χ^2 stat (15 *d.f.*) (*p*-values in parentheses)	7.77 (0.93)		

Notes: The long-run (equilibrium) relationship is: *Real GDP -1.4633*Real FDI = ε* . *t*-statistics are in parentheses. A *** denotes statistical significance at the 0.01 level.

These empirical results suggest several important conclusions. First, the regression results from the ECM decisively support our earlier evidence regarding the presence of strong long-run relation binding real economic growth in Turkey with real FDI inflows, economic openness, and human capital accumulation. This is because the coefficients of the EC term in the estimated ECM bears the correct negative sign and it is also statistically significant at better than the 5% level of significance. This evidence accords with De Mello (1997) who contends that FDI inflows promote growth in the long-run. Second, and perhaps equally important, our results fail to support any significant *short-run* causal effects from FDI inflows and economic openness to growth. Therefore, contrary to Kentor and Boswell (2003), our empirical results suggest that neither FDI inflows nor economic openness represent a significant causal force to spur short-run growth in Turkey. Thirdly, and unlike FDI inflows and economic openness, human capital accumulation is significantly linked to growth both in the *short- as well as in the long-run.* This finding attests to the profound importance of the accumulation of human capital to the growth process in Turkey. Finally, the ECM estimates also suggest that economic liberalization and regulatory reforms (represented by the dummy variable) have in fact improved macroeconomic performance in Turkey.

5.   CONCLUDING REMARKS

This paper investigates the role of FDI inflows in the economic growth process in Turkey. In addition, the consequences of economic openness and human capital accumulation are also examined. Economic theory suggests that these factors are key growth ingredients. The paper first checks for the presence of long-run relation between growth and its possible determinants and then analyzes the underlying short-run dynamics.

Results from cointegration tests support the theoretical priors and consistently suggest that there exists a robust long-run (equilibrium) relationship linking real economic growth with FDI inflows, economic openness and the accumulation of human capital. This finding received further support from estimating the associated ECM. Such results attest to the critical importance of these factors in promoting faster economic growth in Turkey. However, the ECM regression results also indicate that, among the three growth factors, only human capital accumulation can stimulate economic growth in the short-run in addition to its significant long-run causal impact. These results lend strong support to the notion that good education is a prerequisite for a genuine and sustained growth in Turkey, both in the long-run as well as in the short-run horizons. Our evidence for no short-run economic gains from FDI may deceive policy-makers into thinking that FDI inflows are irrelevant to growth in the country since the economic effects of these inflows are rather slow to materialize. However, our empirical results unambiguously suggest that FDI inflows are a key growth ingredient in Turkey, and that programs to attract larger FDI inflows to Turkey should persist before they produce noticeable economic benefits.

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