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Source: *American Journal of Agricultural Economics*, Vol. 86, No. 3 (Aug., 2004), pp. 795-801

Published by: Oxford University Press on behalf of the Agricultural & Applied Economics Association

Stable URL: <https://www.jstor.org/stable/3697825>

Accessed: 11-03-2019 21:56 UTC

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IMPACT OF FOREIGN DIRECT INVESTMENT AND TRADE ON ECONOMIC GROWTH: EVIDENCE FROM DEVELOPING COUNTRIES

SHIVA S. MAKKI AND AGAPI SOMWARU

Foreign direct investment (FDI) and trade are often seen as important catalysts for economic growth in the developing countries. FDI is an important vehicle of technology transfer from developed countries to developing countries. FDI also stimulates domestic investment and facilitates improvements in human capital and institutions in the host countries. International trade is also known to be an instrument of economic growth (Frankel and Romer). Trade facilitates more efficient production of goods and services by shifting production to countries that have comparative advantage in producing them.

Even though past studies show that FDI and trade have a positive impact on economic growth, the size of such impact may vary across countries depending on the level of human capital, domestic investment, infrastructure, macroeconomic stability, and trade policies. The literature continues to debate the role of FDI and trade in economic growth as well as the importance of economic and institutional developments in fostering FDI and trade. This lack of consensus limits our understanding of the role of FDI and trade policies in economic growth processes and restricts our ability to develop policies to promote economic growth.

This article analyzes the role of FDI and trade in promoting economic growth across selected developing countries and the interaction among FDI, trade, and economic growth. We examine data from sixty-six developing countries over the last three decades. Our

results suggest that FDI, trade, human capital, and domestic investment are important sources of economic growth for developing countries. We find a strong positive interaction between FDI and trade in advancing economic growth. Our results also show that FDI stimulates domestic investment. The contribution of FDI to economic growth is enhanced by its positive interaction with human capital and sound macroeconomic policies and institutional stability.

Review of Literature

Studies based on the neoclassical approach argue that FDI affects only the level of income and leaves the long-run growth unchanged (Solow, De Mello). They argue that long-run growth can only arise because of technological progress and/or population growth, both considered exogenous. Thus, according to neoclassical models of economic growth, FDI will only be growth advancing if it affects technology positively and permanently. More recent endogenous growth models, on the other hand, imply that FDI can affect growth endogenously if it generates increasing returns in production via externalities and spillover effects. In these models, FDI is considered to be an important source of human capital and technological diffusion. FDI introduces new management practices and organizational arrangements in addition to providing labor training in the host country production facilities. FDI encourages the incorporation of new inputs and technologies in the production systems of host countries.

Applying endogenous growth theory to a cross section of forty-six developing countries, Balasubramanyam, Salisu, and Sapsford show that the growth-enhancing effects of FDI are stronger in countries that pursued a policy of export promotion rather than import substitution. Their econometric analysis indicates that

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The authors gratefully acknowledge helpful comments received from Demcey Johnson, Mike Trueblood, Suchada Langley, Mary Bohman, and V.V. Chari.

The views expressed herein are those of the authors and not necessarily those of the Economic Research Service or the U.S. Department of Agriculture.

This article was presented at the ASSA winter meetings (San Diego, CA, January 2004). Articles in these sessions are not subjected to the journal's standard refereeing process.

Amer. J. Agr. Econ. 86(3) (August 2004): 795–801
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the elasticity of output with respect to FDI exceeds that of domestic capital investment, which implies that FDI is the driving force in the growth process.

Borensztein, Gregorio, and Lee examine the role of FDI in promoting economic growth using an endogenous growth model. They analyzed FDI flows from industrial countries to sixty-nine developing countries during 1970–1989. Their results also show that FDI is an important vehicle of technology transfer, contributing more to economic growth than domestic investment. They make a case for a minimum threshold stock of human capital necessary to absorb foreign technologies efficiently.

Several other studies, including Feder, Ram, and Salvatore and Hatcher, have analyzed the export-led economic growth hypothesis. They argue that exports increase factor productivity because of better utilization of capacity and economies of scale. They also argue that exports are likely to alleviate foreign-exchange constraints and thereby facilitate importation of better technologies and production methods. Grossman and Helpman argue that open-trade regimes go hand-in-hand with good investment climates, technology externalities, and learning effects.

Empirical studies by Dollar, Sachs and Werner, and Lipsey generally support the view that open economies grow faster. There are other studies, however, that question the wisdom of trade openness. Rodriguez and Rodrik, for example, present a critical view of the link between open-trade policy and economic growth. They argue that past studies fail to account for institutional differences among countries resulting in an upwardly biased estimate of trade and other policy restrictions. Their analysis shows that the relationship between average tariff rates and economic growth is only slightly negative and nowhere near statistical significance.

The question of whether FDI and trade trigger economic growth or the economic development brings FDI and trade is an unresolved issue. Past studies either analyzed the impact of trade and FDI on economic growth (Borensztein, Gregorio, and Lee; Balasubramanyam, Salisu, and Sapsford) or analyzed the effects of economic growth on FDI (Barrel and Pain, Lipsey). A positive effect of FDI and trade on economic growth may simply reflect the fact that FDI is attracted to countries that are expected to grow faster and follow open-trade policies. It is, therefore,

important to understand the interrelationships among FDI, trade, and economic growth. Since theory is unclear, this issue has been the subject of empirical studies.

Methodology and Data

Our econometric model is derived from a production function in which the level of a country's productivity depends on FDI, trade, domestic investment, human capital, and initial gross domestic product (GDP) per capita. The model is based on endogenous growth theory, in the tradition of Balasubramanyam, Salisu, and Sapsford and Borensztein, Gregorio, and Lee, where FDI contributes to economic growth directly through new technologies and other inputs as well as indirectly through improving human capital, infrastructure, and institutions (see Borensztein, Gregorio, and Lee for the theoretical derivation of this model approach). To assess empirically the effects of FDI and trade on economic growth, we specify the following basic formulation:

$$(1) \quad g = a + b_1\text{FDI} + b_2\text{TRD} + b_3\text{HC} \\ + b_4K + b_5G_0 + c_1\text{FDI} * \text{TRD} \\ + c_2\text{FDI} * \text{HC} + c_3\text{FDI} * K \\ + d_1\text{IRT} + d_2\text{TX} + d_3\text{GC} + e$$

where g is the per capita GDP growth rate; FDI, the foreign direct investment; TRD, the trade (exports plus imports) of goods and services; HC, the stock of human capital; K , the domestic capital investment; G_0 , the initial GDP (initial stock); IRT, the inflation rate; TX, the tax on income, profits, and capital gains in the host country expressed as percentage of current revenue; and GC is government consumption. The variables FDI, TRD, K , GC are measured as ratios to GDP. Our model extends the work of Borensztein, Gregorio, and Lee to include the decade of the 1990s when FDI and trade grew rapidly in the developing countries. We also account for interaction of FDI with trade and domestic investment, in addition to human capital.

Past empirical studies have indicated that FDI, trade, human capital, and domestic investment have a positive impact on economic growth in developing countries. We expect the estimated coefficients for these variables to be positive. We also expect positive interactions between FDI and trade and FDI and domestic capital investment in promoting economic growth.

The stock of human capital in a host country is critical for absorbing foreign knowledge and an important determinant of whether potential spillovers will be realized. We postulate not only a positive relationship between FDI and the GDP growth rate but also a positive interaction between FDI and human capital in advancing economic growth. The application of advanced technologies embodied in FDI requires a sufficient level of human capital in host countries. That is, the higher the level of human capital in a host country, the higher the effect of FDI on the country's economic growth.

One of the key questions regarding FDI and economic growth is: "What is the interaction between FDI and domestic investment"? The answer to this question seems to be less controversial in theory than in practice. As argued before, FDI is an important vehicle for the transfer of capital, technology, and knowledge to host countries, thereby generating high-growth opportunities. In practice, however, the growth-enhancing impact of FDI depends critically on the absorptive capacity of a host country and whether FDI "crowds out" its domestic investment. Thus, an important question to be addressed is: "What is the extent to which FDI substitutes for or complements domestic investment"? In our empirical model, we include FDI and domestic investment separately as well as an interaction term between FDI and domestic investment ($FDI * K$). The interaction term estimates the combined impact of FDI and domestic investment on growth and indicates the nature of the relationship between the two. A positive coefficient for the interaction term would suggest that FDI and domestic investment (K) reinforce (complement) each other in advancing economic growth.

The initial GDP, measured in terms of constant U.S. dollars, controls for preexisting economic and institutional conditions in the host economy. We expect the initial GDP (expressed in logarithms) to be negatively related with GDP growth rates. The inflation rate is a key indicator of fiscal and monetary policies of a country. A lower inflation rate should mean a better climate for investment, trade, and, therefore, economic growth (Fisher and Modigliani, Froot and Stein). Government consumption and tax on income, profits, and capital gains are proxies for institutions and infrastructure in the host countries. Since our objective is to quantify the effects of FDI and trade on economic growth, we focus on developing countries.

Data for our analysis are obtained from the World Development Indicators (WDI) database. The WDI database, published by the World Bank and International Monetary Fund, includes variables such as GDP, per capita income, GDP growth rates, FDI, trade in goods and services, domestic capital investment, human capital, market openness, inflation rate, tax income, and government consumption. The data cover sixty-six countries for the years 1960 through 2000. However, we limit our analysis to 1971 through 2000 because the flow of FDI to most developing countries began in 1970s. All variables represent the average over the following decades: 1971–1980, 1981–1990, and 1991–2000.

We estimate a system of three equations, where the dependent variables are the mean values of per capita GDP growth rates in each decade. We estimate the system of equations using the seemingly unrelated regression (SUR) method as well as instrumental variable (three-stage least squares, TSLS) approach. The SUR estimation allows for different error variances in each equation and for correlation of these errors across equations (Greene), while the instrumental variable technique allows us to overcome potential biases induced by endogeneity problems between FDI and economic growth.

Empirical Results

The purpose of our empirical investigation is to analyze the effects of FDI and trade on economic growth and to examine how FDI interacts with trade, human capital, and domestic investment in advancing economic growth in developing countries. We control for preexisting economic conditions by including initial GDP as one of the explanatory variables. We also account for differences in macroeconomic policies and institutions in the host countries by including variables, such as inflation rate, tax burden, and government consumption.

We test the effects of FDI and trade on economic growth in a framework of cross-country equations utilizing data from sixty-six developing countries over the last three decades—1971–1980, 1981–1990, and 1991–2000. The system has three equations, where the dependent variables are the per capita GDP growth rates (mean value) in each decade. We constrained the model such that all three equations yield the same coefficients in the

Table 1. Interrelationship between GDP Growth and FDI and Trade: Econometric Results

Independent Variable	SUR Estimates			
	Dependent Variable: Per Capita GDP Growth Rate			Dependent Variable: Domestic Investment
	1.1	1.2	1.3	1.4
Intercept	0.5444 (0.4844)	0.6232 (0.4654)	1.0360 ^a (0.4293)	0.7005 ^a (0.1757)
FDI	0.1856 ^a (0.0697)	0.0475 (0.0942)	0.0792 (0.0793)	0.0716 ^a (0.0238)
Trade	0.0126 (0.0115)	0.0111 (0.0111)	0.0059 (0.0096)	0.0031 (0.0038)
Human capital	0.0089 ^c (0.0055)	0.0086 ^c (0.0053)	0.0095 ^b (0.0047)	−0.0020 (0.0023)
Domestic investments	−0.0364 (0.0938)	−0.0937 (0.0975)	0.0419 ^b (0.2013)	
Initial GDP per capita	0.0187 (0.0213)	−0.0005 (0.0195)	−0.0184 (0.0167)	0.0087 (0.0081)
FDI * Trade		0.0050 ^a (0.0017)	0.0045 ^a (0.0013)	0.0011 ^c (0.0007)
FDI * Human capital		−0.0035 (0.0109)	0.0058 (0.0106)	−0.0016 (0.0034)
FDI * Domestic investment		0.0455 ^c (0.0258)	0.0036 (0.0225)	
Inflation rate			−0.0047 ^a (0.0009)	−0.0001 (0.0003)
Tax rate			−0.0040 ^b (0.0021)	−0.0001 (0.0007)
Government consumption			−0.0574 ^a (0.1932)	0.9018 ^a (0.0299)
System <i>R</i> ²	0.0698	0.1175	0.2560	0.8903

^a99% confidence level.
^b95% confidence level.
^c90% confidence level.

three time periods with the exception of the intercepts.

Table 1 presents the econometric results and compares alternative specifications. Regressions 1.1, 1.2, and 1.3, different variants of equation (1) above, are estimated using the SUR method. Regression 1.1 is our basic specification with explanatory variables of FDI, trade, human capital, domestic investment, and initial GDP. Regression 1.2 extends 1.1 to include interaction of FDI with trade, human capital, and domestic investment. Regression 1.3 (final specification) builds on regression 1.2 by controlling for inflation rate, tax burden, and government consumption. Our results show that most coefficients have the expected signs, particularly in specification 1.3. Note that signs change for some coefficients across specifications. The estimated *R*² are generally low but reasonable given the cross-sectional nature of the data used.

Regression 1.1 reveals that FDI and trade have a positive impact on economic growth after controlling for human capital, domestic investment, and initial income (table 1). The estimated coefficient for FDI is positive and statistically significant while the estimated coefficient for trade is not statistically significant. Since the coefficient of FDI is larger than the coefficient of trade, it indicates the differential impact of FDI in the host country's economic growth. The coefficient for human capital is positive, implying that human capital contributes positively to economic growth (significant only at a confidence level of 88%). The coefficients for domestic investment and initial income are not statistically significant.

Including interactions between FDI and trade, FDI and human capital, and FDI and domestic investment not only improves the overall performance of the estimation but also allows us to capture their interaction effects

on economic growth (table 1). In regression 1.2, the interaction of FDI and trade yields a positive and statistically significant coefficient while the effects of FDI and trade, by themselves, are positive but not statistically significant. Regression 1.2 also reveals that the FDI interacts positively with domestic investment in advancing economic growth. The estimated coefficient for domestic investment is positive and statistically significant at a confidence level of 90%. The estimated coefficients indicate that host countries benefit positively both from FDI, itself, and through FDI's positive interaction with trade and domestic investment. The interaction between FDI and human capital, although positive, is not statistically significant.

Regression 1.3 includes additional variables to control for macroeconomic policies and institutional stability that could have a significant impact on FDI and trade and, thus, on economic growth. Recent literature indicates that FDI is greatly influenced by host country policies, such as monetary, fiscal, and open-market policies. We include inflation rates, tax income, and government consumption to be proxies for monetary and fiscal policies, as well as institutions in the host nations. Inclusion of these policy variables significantly increases the explanatory power of the estimated system (table 1).

The results of regression 1.3 reveal that FDI and trade contribute positively to economic growth, but the estimated coefficients are not statistically significant (table 1). The stock of human capital and domestic investment, on the other hand, have positive and statistically significant coefficients. The results also indicate that FDI positively interacts with trade, human capital, and domestic investment. But only FDI–trade interaction is statistically significant. This implies that FDI and trade complement each other in advancing growth rate of income in developing countries. This result is consistent with the idea that flow of advanced technology brought along by FDI can increase the growth rate of the host economy by interacting with that country's trade.

The diverse experiences from developing countries suggest that FDI and trade, by themselves, may not guarantee economic growth. A country's economic growth is also affected by its macroeconomic policies and institutional stability. Sound macroeconomic policies and institutional stability are necessary preconditions for FDI-driven growth to materialize. The estimated coefficients for the three pol-

icy variables—inflation rate, government consumption, and tax on income, profits, and capital gains—are negative and statistically significant. This implies that lowering the inflation rate, tax burden, and government consumption would promote economic growth. Lower inflation rates would indicate that the host country's macroeconomic policies are stable and disciplined. Lower tax burden would make the investments, both foreign and domestic, more profitable. Decreasing the government consumption would leave more money for investments.

FDI "Crowds-In" Domestic Investment

One of the important questions raised in the literature is whether FDI augments a host country's capital investment or crowds out domestic investment. Even though not statistically significant, the positive interaction between FDI and domestic investment in regression 1.3 implies that domestic investment is unlikely to be crowded out in developing countries.

To further strengthen our argument, we estimate the contribution of FDI to domestic investment after controlling for trade, human capital, initial income levels, and various macroeconomic policy variables. Regression 1.4 in table 1 presents the results of this estimation using the SUR method. The results indicate FDI has a positive effect on domestic investment, as the estimated coefficient is positive and statistically significant. This positive relationship implies that FDI stimulates or crowds-in domestic investment. This finding is consistent with Borensztein, Gregorio, and Lee. Even though trade, by itself, is not statistically significant, trade interacts positively with FDI on domestic investment. The estimated coefficient for the FDI–trade interaction term is positive and significant at the 90% confidence level.

Endogeneity Problems

The correlation between FDI and growth rate could arise from an endogenous determination of FDI. That is, FDI, itself, may be influenced by innovations in the stochastic process governing growth rates (Borensztein, Gregorio, and Lee). For example, market reforms in host countries could increase both GDP growth rates and the inflow of FDI simultaneously. In this case, the presence of correlation between FDI and the country-specific error term would bias the estimated coefficients.

Table 2. Interrelationship between GDP Growth and FDI and Trade: Instrumental Variable Estimation

Independent variable	TSLS Estimates Dependent Variable: Per-capita GDP Growth Rate		
	2.1	2.2	2.3
Intercept	0.5490 (0.4873)	0.6271 (0.4690)	0.9965 ^b (0.4321)
FDI	0.1806 ^b (0.0698)	0.0427 (0.0946)	0.0805 (0.0794)
Trade	0.0115 (0.0116)	0.0098 (0.0112)	0.0066 (0.0096)
Human capital	0.0096 (0.0057)	0.0093 ^c (0.0055)	0.0094 ^b (0.0049)
Domestic investments	−0.0361 (0.0942)	−0.0912 (0.0980)	0.0444 ^b (0.2025)
Initial GDP per capita	0.0195 (0.0215)	0.0008 (0.0197)	−0.0188 (0.0169)
FDI * Trade		0.0049 ^a (0.0018)	0.0043 ^a (0.0013)
FDI * Human capital		−0.0036 (0.0110)	0.0065 (0.0105)
FDI * Domestic investment		0.0456 ^c (0.0259)	0.0027 (0.0225)
Inflation rate			−0.0043 ^a (0.0009)
Tax rate			−0.0042 ^b (0.0021)
Government consumption			−0.0600 ^a (0.1950)
System <i>R</i> ²	0.0704	0.1175	0.2421

^a99% confidence level.
^b95% confidence level.
^c90% confidence level.

The endogeneity problem is addressed by using the instrumental variables (see Borensztein, Gregorio, and Lee for more details). One of the major problems with the instrumental variable estimation method is the difficulty in identifying instruments that are highly correlated with FDI (or trade) but not with the error term. We use lagged values of FDI, lagged values of trade, and log value of total GDP as instruments in a TSLS method. The results of the TSLS model (reported in table 2, regressions 2.1–2.3) show that the instrumental variable estimation yields qualitatively similar results as those obtained by the SUR method. The estimated coefficients on FDI and trade, by themselves, are positive but statistically insignificant. The interactive term of FDI and trade is positive and statistically significant. This alternative estimation also suggests that our results are robust.

Summary and Conclusions

This paper analyzes the role of FDI and trade in economic growth of developing countries within the endogenous growth-theory framework. Using cross-section data relating to a sample of sixty-six developing counties over three decades, we show that FDI and trade contribute toward advancing economic growth in developing countries. There is a strong, positive interaction between FDI and trade. FDI is often the main channel through which advanced technology is transferred to developing countries. Our results imply that the benefits from such investment would be greatly enhanced if the host country has a better stock of human capital. We also show that FDI stimulates domestic investment. Sound macroeconomic policies and institutional stability are necessary preconditions for FDI-driven

growth to materialize. Our results imply that lowering the inflation rate, tax burden, and government consumption would advance economic growth in developing countries.

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