Causality Between Direct Foreign Investment and Economic Output in Ghana*

John A. Karikari*

This study examines causality between direct foreign investment and economic output in a developing country. Using data for Ghana, from 1961 to 1988, the results are that direct foreign investment did not affect economic output, but increases in economic output did cause a slight decrease in the inflow of direct foreign investment. The latter result is likely if direct foreign investment takes the form of market-development, which is partly in response to a government's policy such as an import substitution strategy.

I. Introduction

The issue of how developing countries can accelerate their economic growth is of considerable importance. Most developing countries use various policies to attract direct foreign investment (DFI) because it is expected to increase economic output. DFI, by filling in the savings-investment gap, gives a developing country access to productive capacity, technology, and management resources. In particular, it is expected that DFI will increase the domestic stock of real capital, which, in turn, is expected to increase real output.[1] DFI can also increase economic output in

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[1] Apart from supplementing the host country's productive resources, it has been suggested that DFI can also play the role of "tutor" by teaching skills (for example, technological, management, and marketing) to the local people; see Kojima (1983). Also, a government may promote direct foreign investment for the purpose of establishing key industries for defense or for even prestige.

a developing country because foreign subsidiaries may have higher labor (and capital) productivity than their domestic counterparts. See, Radhu (1973). Also by playing a large role in the exports of manufactured goods, foreign subsidiaries may promote economic growth in the host country. See, Riedel (1975). Using cross-country data for the 1950s and 1960s, Papanek (1973) found that DFI promotes economic growth; however, the results were highly sensitive to extreme observations.

But, DFI could adversely influence economic output. For instance, if DFI results in a non-competitive market structure, then industrial concentration may increase and the degree of competition in the long-run may be seriously impaired, even though, in the short-run, competition may be enhanced. Generally, DFI may be inefficiently allocated in most developing countries because market prices are seriously distorted by various policies such as trade protection, extensive tax and subsidy measures, substantially over-valued exchange rates, and a wide range of direct controls on prices, production, and factor use. An objective of this paper is therefore to empirically investigate the nature of the relationship between DFI and economic output in a developing country.

On the other hand, there have been suggestions that economic growth can influence DFI. See, for example, Papanek (1973), Reuber (1973). This is because the size and growth of the market in the host country will encourage DFI (particularly, investments which are based on the demand in the host country). This is referred to as market-development DFI.[2] A study by Dunning (1981) indicated that there is generally a relationship between a country's international investment position and its stage of economic development. In particular, it is suggested that, as the economic situation of a country improves, it changes the ownership and internalization advantages of its local firms relative to foreign firms and the relative locational advantage of the country in attracting direct foreign investment. This, in turn, affects the net international direct investment position of the country. Thus, it is expected that increases in economic output will affect DFI.[3,4] The issue that economic output may cause DFI is im-

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[2] The main characteristics of market-development DFI are "(i) the output of the projects is intended primarily for sale in the host country, and (ii) the investment is made primarily in response to underlying economic considerations such as the size of the local market and its long run potential, local production costs..." (Reuber, 1973, p. 74). Another major form of DFI is export-oriented investments.

[3] Dunning (1981) argues that there is a direct foreign investment — development process or cycle. In general, developing countries are in the early stages where economic development is associated with increased net inflows of DFI, and advanced countries are in the latter stages where net DFI outflows increase as the economy grows. The ownership-locational-internalization approach (Dunning 1977) is an eclectic theory of DFI which seeks to inte-

portant because it implies that economic output may be a prerequisite for inflows of DFI. Another objective of this study is to find out if changes in economic output affect DFI in a developing country.

This study therefore examines the direction of causality between DFI and economic output in a developing country. The study is important for policy-makers because there has been no systematic empirical research on the causality between DFI and economic output in a developing country despite the numerous suggestions and some evidence indicating a two-way relationship.[5] The strategic implications of examining a two-way relationship between DFI and economic output cannot be overemphasized.

The causality approach is used to analyze a possible two-way relationship between DFI and economic output for various reasons. First, our incomplete knowledge of the process of economic growth and the determinants of economic expansion make the causality test a promising method of investigating the relationship between economic output and another macroeconomic variable. Second, even if a complete model of economic growth can be specified, the lack of data in most developing countries would make the estimation of such a model virtually impossible. Third, by using time-series data, unlike cross-country data, we avoid the problem of imposing equal parameter restrictions on countries which have different economic structures or are at different stages of their economic environment.

The rest of the paper is organized as follows. Section 2 outlines the causality test, based on Granger. Section 3 presents the results of the test of causality between DFI and economic output, using data on Ghana, from 1961 to 1988. Section 4 comprises concluding remarks.

II. Causality Test

Granger (1969) proposed a test of causality between two variables

grate both micro-oriented (firm-specific) factors and macro-oriented (country-specific) factors. The internalization theory (Rugman, 1981) is a micro-oriented theory of DFI. For an assessment of macro-oriented theories of DFI, see Gray (1982).

[4] Root and Ahmed (1978) confirmed the result that increases in economic output will affect DFI. For a list of other variables that could influence direct foreign investment in manufacturing sectors in developing countries, see, for example, Agodo (1978), Reuber (1973), and Lee (1980). Goldsborough (1979) found out that, in developed countries, DFI flows are strongly influenced by changes in the real levels of demand and changes in relative competitiveness.

[5] Using data for 23 developing countries, Reuber (1973) found evidence which suggests a positive two-way association between the level of income and the stock of private direct foreign investment.

which can help to avoid spurious correlation.[6] Consider two time-series variables, X_t and Y_t. The Granger test indicates that if X improves the prediction of Y, then X (Granger) causes Y. This test will be used to test for causality between DFI and economic output.

Following Granger (1969), let $\bar{U}_t$ represent all the information accumulated since time $t-i$; and let $\bar{U}_t-\bar{X}_t$ denote all the information, excluding the specified series X_t. Then X_t causes Y_t (that is, $X \Rightarrow Y$), if

$$(1) \qquad \sigma(Y_t \mid \bar{U}_t) < \sigma^2(Y_t \mid \bar{U}_t-\bar{X}_t)$$

where $\sigma^2 (Y \mid A)$ represents the variance of the minimum variance unbiased predictor of Y given the information set A.

Similarly, there is a feedback if X_t causes Y_t, and Y_t causes X_t (that is, $X \Leftrightarrow Y$).

The econometric model corresponding to Equation (1) is as follows. Let X_t and Y_t be stationary time series with zero means. Then,

$$(2a) \qquad Y_t = \sum_{i=1}^{m} a_i Y_{t-i} + \sum_{i=1}^{n} b_i X_{t-i} + e_t,$$

$$(2b) \qquad X_t = \sum_{i=1}^{o} c_i X_{t-i} + \sum_{i=1}^{p} d_i Y_{t-i} + u_t.^{[7]}$$

It is assumed that each random error term (e_t, u_t) is identically and independently distributed with mean zero and finite covariance matrix. The test of causality can be obtained using Equations (2a) and (2b) as follows:

   (i) X_t causes Y_t, if some $b_i \neq 0$ in Equation (2a).
   (ii) Y_t causes X_t, if some $d_i \neq 0$ in Equation (2b).

If both (i) and (ii) hold, then there is a feedback.

III. Data and Test Results

Before discussing the data and the results, it is very important to note that the empirical results on causality would be very sensitive to the time period used in the analysis. That is why the data, based on Ghana for the

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[6] Granger's (1969) test is used because it conserves degrees of freedom, and it is also simple. See Pierce and Haugh (1977), and Sims (1972) for other sets of causality.

[7] The effect of contemporaneous innovations in X or Y can be considered using an instantaneous causality test. See Pierce and Haugh (1977). No such test is done in this paper because it is not plausible.

period 1961 to 1988, are for the time period for which the latest data are available.

DFI is measued by the flow of direct private investment as reported in the balance of payments data in the International Financial Statistics, IFS (various issues).[8] Data on capital flows are used because there are no data available on the stock of direct foreign investment. Except for a couple of years, all the flows of DFI are positive, meaning that Ghana is a net receiver of DFI. It is important to remark that DFI is different from portfolio (indirect) foreign investment. To help distinguish between portfolio and direct investment, direct investment is usually regarded to imply some control of decision-making in the production process in the host country. DFI also involves long-term investments, while portfolio investment is short-term (liquid) investments.

Economic output is measured by the gross domestic product (GDP) as reported in the national accounts data of the IFS (various issues).[9] This is because the data on gross national product is not available for each period from 1961 to 1988.

Both the DFI and GDP data are measured in real terms. GDP is in terms of 1975 price. The DFI data are constructed as follows. Direct foreign investments, which are in U.S. dollars, are converted into the local currency using the exchange rate. They are then divided by the level of total investment (gross fixed capital formation). Finally, the DFI flows are deflated to 1975 constant-price using the wholesale price index. (All the data are from the IFS).

In testing for causality between direct foreign investment and economic output, GDP is regressed on its own past values and on the past values of DFI, including a constant term. Similarly, DFI is regressed on its own past values and on the past values of GDP, including a constant term. The levels of the variables are used.

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[8] The concept and measurement of DFI is ambiguous. DFI is, in the balance of payments data, defined as "a capital movement which results in the acquisition of an ownership share greater than some predetermined threshold in a firm or subsidiary operating in a foreign country." (Kojima 1990, p. 10). A commonly used benchmark is, for example, 10 percent. But conceptually, DFI involves a degree of control of a foreign subsidiary or majority participation. Also the data may sometimes be based on DFI which is approved by the host government rather than actual DFI. For more information on the concept and measurement of FDI, see Kojima (1990, pp. 10-11). Other forms of foreign capital flows are portfolio and bank lending, export credits, and official flows (grants and loans).

[9] The GDP data from 1967 to 1971 were constructed using the data in Huq (1989, Table A, 4, p. 290). This is because there are no data available on constant-price GDP in the IFS prior to 1968.

One of the problems in causality test is the determination of the appropriate lengths of the lags specified in Equations (2a) and (2b). The length of a lag will depend on the type of data being used (for example, monthly, quarterly, yearly), the speed with which information flows through the economy, and the sample size. See Granger (1969). Given these conditions, the length of a lag was initially limited to one period for each for the predictors in the regression Equations (2a) and (2b). The Durbin h-test for autocorrelation is then calculated.[10] If the test fails to reject the null hypothesis of no autocorrelation in either equation, the lag length is set to one. If the null is rejected in either equation, then the equation is re-estimated using additional lags. (See Jung and Marshall (1985) for a similar procedure). Each regression equation was then estimated using a maximum likelihood correction for possible first-order autocorrelation of the residuals.

Given the limited data used for the analysis, considerable caution is needed in interpreting the results. The test results of causality between DFI and GDP are presented in Table 1. In all the regressions, the length of the lags were established at one, using the Durbin h-test. In Table 1, the t-statistic which tests the null hypothesis that the coefficient of the lag of GDP is zero in the DFI equation shows that the null can be rejected at the 5 percent level of significance. This indicates that economic output significantly causes direct foreign investment. Since the coefficient of the GDP lag in the DFI equation is negative it means that increases in economic output reduce the inflow of direct foreign investment. However, the magnitude of the decrease was small.

Several plausible explanations for the observation that economic growth in Ghana reduced the inflow of direct foreign investment are offered.[11] First, as an economy grows there is generally less pressure for trade protectionism. This implies that there is laxity in the enforcement of the existing trade barriers or the barriers may even be reduced. A possible effect of reducing trade barriers is a decline in the inflow of direct foreign

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[10] The Durbin h-test is calculated as $h = (1-d)/2)\sqrt{T/(1-Ts_b^2)} \sim AN(0,1)$, where d is the Durbin-Watson d-statistic, T is the number of observations, and s_b is the estimated variance of the least squares regression coefficient on the lagged dependent variable. If $Ts_b^2 > 1$, then h cannot be computed. An alternative test is to regress $\hat{e}_t$ on $\hat{e}_{t-1}$ and all the independent variables in Equation (2a), and test for the significance of $\hat{e}_{t-1}$ using standard least squares procedures. See, for example, Greene (1990).

[11] This result seems to be inconsistent with Dunning's (1981) level of development approach to explaining DFI. According to that theory, given the stage of economic development of Ghana, economic development should increase the inflow of direct foreign investment. When GDP per capita was used instead of GDP, it was found that there was no causality between DFI and economic development.

Table 1

EMPIRICAL RESULTS

| | Dependent Variable | |
	DFI	GDP
GDP$_{t-1}$	−0.002	0.789
	(0.024)	(0.0001)
DFI$_{t-1}$	0.465	−22.86
	(0.014)	(0.454)
Constant	0.010	1.204
	(0.021)	(0.151)
Durbin's-h	1.230*	1.806
	(0.23)	(0.07)
R^2	0.50	0.77

Prob-values are in brackets (two-tailed).

* The t-value for the lagged coefficient of the residuals using the alternative test for auto-correlation. See footnote 10.

investment. This is bacause a reason for international direct investment, which takes place through the activities of multinational corporations, is the existence of market imperfections which include tariffs and other trade barriers. Thus, it is likely that economic growth will lead to a reduction in the inflow of direct foreign investment as trade barriers are reduced.

Trade measures have been used in Ghana when various governments pursued import substitution policies as a means of promoting economic growth and development, and as a response to foreign exchange difficulties.[12] See Leith (1974), and Steel (1972). In Ghana, increased activities of multinational corporations in the consumer-related industries (for example, bread, biscuits, footwear, and concrete blocks) in 1966, and thereafter, have been attributed to the tariff structure which generally had higher duties on imports into consumer goods industries but low rates on

[12] As reported in Reuber (1973), the manufacturing sector in Subsaharan Africa has been highly dependent on DFI. In most countries, manufacturing involved very rudimentary import-substitution industries such as textiles, footwear, cigarettes, matches, cement, and plastic products. There were few activities in advanced manufacturing sectors such as automobile accessory manufacturing, light assembly of vehicles, pesticides and fertilizer plants. The new countries which managed to advance either had larger domestic markets (Ghana, Nigeria, and Zaire) or they acted as subregional supply centers (Ivory Coast, Senegal, Kenya).

capital goods; see Steel (1972). Thus, DFI had mainly taken the form of market-development investment, partly in response to the different governments' policies of import substitution. In Ghana, export-oriented direct foreign investments have been rare (except for those related to extractive industries). A major exception is the large foreign-owned aluminum plants. However, recently, there has been more emphasis on export promotion compared to import substitution as a development strategy as part of the economic recovery program which was initiated in 1984 largely as a product of the World Bank — IMF conditionality for assistance.

Second, there is evidence that economic development determines the ability of developing countries to expropriate direct foreign investment. See Minor (1990). From 1968 to 1976, Ghana ranked highly in terms of the extent of expropriation in natural resouces; see Jodice (1980). The expropriation might have had the effect of discouraging direct foreign investment, although Ghana's rank dropped a lot in the period from 1977 to 1985; see Minor (1990).

Third, even though direct foreign investment is an important source of new investment in LDCs, its potential drawbacks include the perception that it is a threat to political sovereignty and independence of the host country and to the independent development of social and cultural life. Also, economic activities in a country could be disrupted if foreign firms hold a dominant position in a strategically important industry because they might not be able to receive the required inputs (for example, raw materials, intermediate products, and even managerial expertise) due to some unforeseen events in their parent countries. Therefore, a government may try to limit the inflow of direct foreign investment when the economy experiences growth. This is because growth enables a country to finance its investments internally, and thus avoid putting production completely into the hands of foreign firms. Increasingly, a lot of governments are using the so-called 'new forms' of DFI which include production sharing contracts, technological and marketing cooperation contracts; see Oman (1984). Also, as the economy grows, a developing country tends to relax restrictions on the repatriation of profits from direct foreign investment. Thus, the combined effects of the government limiting direct foreign investment and allowing more repatriation of profits, when the economy is growing, is to reduce the inflow of direct foreign investment.

In Table 1, we fail to reject the null hypothesis that DFI does not affect GDP. This result suggests that the potential benefits of DFI have not been realized in Ghana. The contribution of direct foreign invesment in financing total investment (measured by the ratio of DFI to gross fixed

capital formation) has been erratic and generally low. Apart from 1965 and in 1970, when DFI was more than 25 percent of total investment, the contribution of DFI has generally been less than 5 percent since 1961. From 1975 to 1988, DFI has been less than 3 percent of total investment.[13]

IV. Concluding Remarks

In most developing countries, direct foreign investment is regarded as an important input into the development process because of the lack of capital for investment. Direct foreign investment is thus expected to promote economic growth and development. On the other hand, economic growth in a country is expected to attract direct foreign investment.

This study examines the implied causality between direct foreign investment and economic output. The data used for Ghana, from 1961 to 1988. Given the limited data used for the analysis, the evidence is suggestive, but hardly conclusive. Also, becuse the data are for only one developing country, the results have limited implications. But, the results might have greater reliability since it avoids the problems of cross-country analysis. Given these caveats, the main conclusions of the study are as follows.

First, it is obtained that direct foreign investment did not affect economic output. This is like due to the generally small size of direct foreign investment during the period. Second, increases in economic output did cause a small reduction in the inflow of direct foreign investment. A rationalization for this result is that as an economy grows there is an increased tendency towards freer trade which, in turn, discourages direct foreign investment because protected markets is a major factor which attracts direct foreign investment in developing countries. This result is likely if direct foreign investment takes the form of market-development, which is partly in response to a government's policy such as an import substitution strategy.

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[13] Root and Ahmed (1978) classified Ghana, from 1966 to 1970, in the group of countries that attracted only moderate levels of DFI.

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