THE IMPACT OF FOREIGN CAPITAL ON GROWTH: EVIDENCES FROM ASIAN DEVELOPING COUNTRIES

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I. INTRODUCTION

THE impact of foreign capital on economic growth of developing countries as well as the relative significance of the various types of foreign capital vis-à-vis trade, are controversial. Assuming that every dollar in foreign inflows augmented resources available for capital formation by a dollar and further that such inflows did not influence the incremental capital-output ratio, early writers [21] [2] showed that foreign capital had a favorable effect on growth. More recently both of these assumptions have been challenged [1] [9] [14] [24]. Foreign capital could substitute for domestic saving for two reasons. First, the inflow of foreign capital could induce governments to relax their tax efforts, increase their consumption expenditure, and/or liberalize imports. Second, foreign private investment could crowd out domestic investment and if savings is determined by available investment opportunities, this could cause domestic savings to fall. Foreign capital could also contribute to inefficiency by introducing inappropriate techniques and technology and managerial systems. Under these circumstances, foreign capital could have an adverse effect on growth.

Meanwhile, the question on the relative significance of the various types of foreign capital and trade in the economic growth of developing countries has also figured prominently in the recent North-South dialogues. While the South has recognized the contribution that trade can make to growth, it has placed more emphasis on the need for a massive inflow of concessional resources from the North to stimulate rapid growth and eradicate widespread poverty. Some industrialized countries have rejected this claim and emphasized the importance of self-help and well-functioning market mechanisms to promote development. The major components of the self-help procedures are trade and exchange liberalization and policies to attract private foreign investment.

Available research indicates that while foreign capital is a partial substitute for domestic saving [19] [1] [10] [17] [24] [12] [6] these inflows have nevertheless made a positive contribution to economic growth [23] [18] [22] [4] [8]. The

evidence is less clear-cut regarding the relative importance of various types of foreign capital flows as contrasted with other factors (e.g., the degree of export orientation, saving performance, etc.), and whether foreign capital improves or hinders economic efficiency [3] [1] [23] [8].

These studies have two major shortcomings. First, as we shall argue below, growth performance should include the domestic saving rate, foreign capital, and export performance as explanatory variables; while foreign capital, per capita income, growth rate, and export performance are important determinants of savings behavior. Regression estimates will be biased if any of these variables are omitted. Second, the savings, foreign aid, and growth nexus had heretofore been studied in a single equation framework and, therefore, considered only the direct effects of exogenous variables, which Gupta [11] and Gupta and Islam [12] being the sole exceptions. There is, however, a significant amount of evidence, both theoretical and empirical, that savings and growth are embedded in a simultaneous system; total effects (direct plus indirect) could, therefore, be quite different from direct effects alone. To remedy these problems, a simple two-equation model is constructed consisting of a growth and a saving equation including export performance. Also in order to examine issues raised in the North-South debate, net financial flows is disaggregated into foreign aid and foreign private investment components.[1]

The rest of the paper is organized as follows: Section II presents the two-equation model; Section III contains the estimation results using pooled cross-section and time-series data from Asian developing countries; and, Section IV presents the summary and conclusions.

II. THE MODEL

Consider the simultaneous model contained in equations (1) and (2):

$$GR = a_0 + a_1 \cdot AID + a_2 \cdot FPI + a_3 \cdot S + a_4 \cdot CX + a_5 \cdot CLF + u_t, \tag{1}$$
$$(a_1 \lessgtr 0, \ a_2 \lessgtr 0, \ a_3 > 0, \ a_4 > 0, \ a_5 > 0)$$

$$S = a_6 + a_7 \cdot AID + a_8 \cdot FPI + a_9 \cdot CX + a_{10} \cdot GDPN + a_{11} \cdot GR + v_t, \tag{2}$$
$$(a_7 \gtrless 0, \ a_8 \lessgtr 0, \ a_9 > 0, \ a_{10} > 0, \ a_{11} > 0)$$

where

GR = growth rate of GDP,
AID = foreign aid as percentage of GDP,
FPI = foreign private investment (including long-term borrowing) as percenage of GDP,
S = gross domestic saving as percentage of GDP,
CX = change in export as percentage of GDP,

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[1] Unlike Papanek [18], Gupta [11], and Gupta and Islam [12], short-term flows are not considered because they comprise primarily of errors and omissions and are not, strictly speaking, policy variables.

CLF = change in labor force,

$GDPN$ = GDP per capita, and

u, v = stochastic error terms.

The model consists of a growth equation and a saving equation.[2] The former is derived from a two-sector model comprising export and non-export sector (see [20]),[3] and the latter is the standard-type saving function augmented by the export variable, per capita income, and rate of growth. The export variable is included in the growth equation for at least four reasons. First, exports enable countries to specialize in the production of commodities in which they have a comparative advantage; resources which are saved in this way can then be used for investment. Second, trade provides a vent for surplus commodities which bring otherwise unemployed resources into use. Third, trade can expand production possibilities through its effect on such factors as competition, access to new knowledge, technology, and ideas; these are the so-called dynamic gains from trade. Fourth, trade enables countries to purchase goods from abroad. If there are no domestic substitutes, the ability to import can relieve bottlenecks in production and thus increase savings and investment; and imports may simply be more productive than domestic resources.

Export performance is also expected to influence the saving rate for several reasons. First, exports (especially of primary products) often produce highly concentrated income and standard savings theory shows that the propensity to save from such income is high [12]. Second, countries whose export performance is good tend to face fewer foreign exchange constraints on investment and therefore tend to provide more of an incentive to save. Third, to the extent that trade taxes are a major source of revenue, exports tend to increase government savings.

The inclusion of the growth rate and per capita income in the saving equation is fairly standard (see [16]). The growth rate variable is justified on the ground that rapid growth leads to changes in relative income and life-time consumption patterns and increases in transitory income in relation to permanent income; the former influences the saving rate more than the latter. The per capita income variable reflects the state of development of a country and is expected to have a favorable influence on the saving rate.[4]

The model consists of two endogenous variables (GR and S) and five exogenous variables (AID, FPI, CX, CLF, and $GDPN$). The expected signs of the parameters are given in parentheses below the equations. Given the controversy between economists, the sign of a_1 and a_2 and a_7 and a_8 could be either positive or negative.

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[2] An attempt was made to estimate a bigger model by specifying a foreign aid and export equation, but the results were not encouraging.

[3] In the two-sector model, following Feder [5], the output of each sector is a function of factor allocations, and in addition, the output of non-export sector is dependent on the volume of exports produced. This reflects the beneficial external effects of exports on the other sector, such as the development of efficient and internationally competitive management, introduction of new production techniques, etc.

[4] Another commonly included variable, the dependency ratio, was excluded, as it was highly correlated with per capita income.

The reduced form of the model can be written as:

$$GR=\pi_0+\pi_1\cdot AID+\pi_2\cdot FPI+\pi_3\cdot CX+\pi_4\cdot CLF+\pi_5\cdot GDPN+\varepsilon_t, \qquad (3)$$

$$S=\pi_6+\pi_7\cdot AID+\pi_8\cdot FPI+\pi_9\cdot CX+\pi_{10}\cdot CLF+\pi_{11}\cdot GDPN+\eta_t. \qquad (4)$$

The incorporation of the indirect effects from the reduced form solution of (1) and (2) in (3) and (4) shows that consideration of the structural coefficients alone can be misleading in two ways. First, the direct and total effects can be qualitatively different. This means that while the direct effect is positive the total effect could be negative and vice versa. Since generally $1>a_3>0$, and $1>a_{11}>0$, this occur when $a_7<0$. Second, the direct effect and total effect could be quantitatively different. This can happen either when $a_7>0$ or when $a_7<0$. While in the former case the direct effect underestimates the favorable effect of foreign capital on growth, in the latter case the direction of the bias is not certain.

III. ESTIMATION RESULTS

The two-equation model specified in the previous section is exactly identified and so was estimated by the indirect least squares technique.[5] Two problems, both linked to data sets, were encountered in the estimation: (1) low quality of data and (2) lack of sufficiently long time series. While nothing could be done regarding the first problem, the second problem was resolved by pooling cross-section and time-series data from nine developing countries in Asia during the period 1965–82.[6] Lack of data prevented the inclusion of additional countries. In order to adjust for annual fluctuations and lagged relationships, the data were expressed as three-year averages before pooling yielding a total of fifty-four observations.

The pooling procedure is valid only if the reduced form saving and growth equations are the same over time and across countries. In order to remedy this problem an error component model was developed by assuming that the error terms in each of the two equations were formed of a country-specific random error term, a time-specific random error term, and an independently distributed random error term; and each of these error terms had zero mean and constant variance. This model was then estimated by the Fuller and Battese [7] technique.[7]

[5] If the AID and FPI variables are endogenous the results contain a specification bias. However, using data from the sample countries, Iwasaki [13] has shown that in most cases "causality" (in the Pierce-Haugh-Granger sense) when detected ran from foreign capital to the saving and growth rate rather than the other way around.

[6] Burma, Republic of China, India, Republic of Korea, Nepal, Philippines, Singapore, Sri Lanka, and Thailand. The data on financial flows were from OECD, *Geographical Distribution of Financial Flows* (various issues); all others were from Asian Development Bank, *Key Indicators of Developing Member Countries of ADB* (various issues). Foreign aid included "ODA grant," "ODA loan," and "other official," while foreign private investment was "private flows." Several end-point observations were missing and were replaced by the averages.

[7] Although the model is estimated by the error components method, it is still useful to test whether the data should be pooled. For this purpose the sample was split into "low income" (Burma, India, Nepal, Sri Lanka) and "middle income" (Republic of China,

TABLE I

REDUCED FORM ESTIMATES OF THE TWO-EQUATION MODEL:
FULLER-BATTESE PROCEDURE, 1965–82

Endogenous Variable	Constant	Exogenous Variables					MES
		AID	FPI	CX	CLF	GDPN	
GR	5.248****	0.009*	0.768***	0.185*	0.438**	0.001	0.081
	(3.765)	(1.044)	(2.065)	(1.455)	(1.994)	(1.872)	
S	11.575****	−0.084*	0.492*	0.124	0.224	0.004****	0.132
	(4.994)	(−1.318)	(1.008)	(0.731)	(0.782)	(3.935)	

Notes: Asymptotic t-statistics are shown in parentheses. MSE is the mean square error of the transformed regression.
**** Significant at 1 per cent level.
*** Significant at 5 per cent level.
** Significant at 10 per cent level.
* Marginally significant (i.e., estimated coefficient was larger than the standard error).

TABLE II

DIRECT AND TOTAL EFFECTS OF FOREIGN CAPITAL AND
EXPORTS ON GROWTH RATE, SAVING RATE, AND
INCREMENTAL OUTPUT-CAPITAL RATIO

	Direct Effect			Total (Direct plus Indirect Effect)		
	AID	FPI	X	AID	FPI	X
GR	0.230	0.945	0.154	0.009	0.768	0.185
S	−0.099	0.099	0.029	−0.084	0.492	0.124
IOCR	−1.5	1.7	−0.6	−1.2	1.6	−0.7

The results are presented in Table I.[8]

The results are quite satisfactory, both from the perspective of the signs and significance of the coefficients and from the mean square errors of the equations. Broadly speaking the results show that foreign investment and growth of labor force have a favorable and statistically significant effect on the growth of the Asian developing countries. While the effect of foreign aid and export performance is also favorable, these variables are only marginally significant (i.e., the coefficient is larger than the standard error). The results of the saving equation is less promising with only the per capita GDP variable being statistically significant, the foreign aid and foreign investment variables being marginally significant.

Republic of Korea, Philippines, Singapore, Thailand) countries. The F-statistics were 1.2 and 1.0 for the growth and saving equations respectively. This was less than the tabulated F values with 6.63 degrees of freedom and the hypothesis of homogeneity cannot be rejected.

[8] The reduced forms were also estimated by assuming fixed-effect country-specific and time-specific terms. The results obtained were, however, similar to those in Table I.

While the aid variable appears to have a substitutive effect on saving,[9] the foreign investment variable complements domestic saving.

Based on the parameters of the reduced forms, the direct and total effects of foreign capital and exports on the growth and saving rate of the sub-samples can be calculated (see Table II).[10] Table II also presents the effects of foreign capital and exports on the incremental output-capital ratio (IOCR) which is a rough but commonly-used proxy for investment efficiency.[11]

The results suggest that except for the effect of aid on saving, the effect of foreign capital and exports on growth and saving rate, in general, have been favorable. This broadly supports the conclusions drawn from earlier studies. The impact of these variables on investment efficiency is mixed—foreign private investment has increased efficiency of investment, but aid and exports have tended to reduce it. While the finding related to export performance is questionable because it is based on parameter estimates that are not statistically significant, the negative aid coefficient suggests that aid has either introduced inappropriate technology or financed capital-intensive projects [23].

Table II also shows that in many cases total effects which incorporate indirect effects are quite different from direct effects alone implying that the results of earlier studies which focussed solely on direct effects were misleading. In fact, the results suggest that studies which focus on direct effects alone tend to exaggerate the influence of foreign capital on growth and saving rate and investment efficiency—when the impact is positive (negative) they overestimate (underestimate) it. In the case of export performance, however, the direct effects tend to underestimate the overall impact.

In addition to the impact of foreign capital, another topic which has become important in recent years is the relative contribution of aid, foreign investment, and exports to the growth of developing countries. Such a comparison can be made by considering the total effects of the various variables in Table II. The findings indicate that foreign private investment has by far contributed the most to growth followed by exports and foreign aid.[12] The relatively high effect of foreign investment reflects the finding that such inflows have augmented resources available for capital formation and improved investment efficiency.

Another topic which is of interest is the relative contribution of foreign capital contrasted with a broader set of other factors (e.g., export performance, domestic saving rate, and change in labor force). For this purpose various impact and elasticity multipliers at the mean values of the endogenous and exogenous variables

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[9] The coefficient of the aid variable is less than unity in absolute terms, so aid inflows augment resources available for investment.

[10] Total effects are the reduced form coefficients and direct effects are the structural coefficients.

[11] $IOCR = (\Delta Y/Y)/(I/Y) = \overline{GR}/(S + \overline{AID} + \overline{FPI})$, where the bars above the variables indicate mean values. The partial derivatives of IOCR with respect to $\overline{AID}$, $\overline{FPI}$, and $\overline{CX}$ can, therefore, be derived using the coefficients of the structural and reduced forms equations —the former yields direct effects and the latter total effects.

[12] The findings that foreign private investment has contributed more than foreign aid supports the findings of Gupta [11] and Gupta and Islam [12].

TABLE III

IMPACT MULTIPLIERS

	AID	FPI	CX	CLF	GDPN	GR	S
GR	0.083	0.155	0.093	0.192			0.731
S	−0.013	0.005	0.006		49.847	0.174	

TABLE IV

ELASTICITY MULTIPLIERS

	AID	FPI	CX	CLF	GDPN
GR	0.003	0.126	0.111	0.221	0.242
S	−0.011	0.028	0.026	0.039	0.331

were calculated and are presented in Tables III and IV (see [12]).[13] The impact multipliers are based on structural coefficients and, therefore, consider only the direct effects, while the multipliers are based on reduced form coefficients and incorporate indirect effects as well.

These findings suggests that the saving rate contributed, by far, the most to the growth of Asian developing countries,[14] followed by the contribution of change in the labor force. Similarly, the data on elasticity multipliers in Table IV show the GDP per capita and change in labor force variable as contributing the most to the growth of the Asian developing countries. In both cases, the contributions of the foreign capital variables were relatively less important.

IV. CONCLUSION

The basic objective of this paper was to develop a simultaneous equation system to examine the effect of foreign capital on growth of a sample of nine Asian developing countries. This is because integrating the growth rate and the saving rate in a single model yields results which are richer than those reported for single equation models. Despite the limitations of data, the two-equation model performed rather well. Mean square errors of the equations were low and most of the coefficients had the correct signs and were statistically significant.

The major finding of the paper is that foreign capital flows have made a positive contribution to the growth of Asian developing countries. While foreign direct investment has contributed to growth both by augmenting resources available for capital formation and by improving investment efficiency, foreign aid has contributed only by aiding in capital formation. The evidence implies it has

13 The structural and reduced-form coefficients could not be compared directly because the variables were measured in different units.

14 An elasticity multiplier could not be determined for the saving rate because it is an endogenous variables.

tended to reduce investment efficiency. This finding suggests that aid may have been used to finance projects which were unnecessarily capital intensive. It may have also introduced in appropriate technology. However, further exploration of this topic is recommended.

The other major finding of the paper is that export performance, growth of the labor force and domestic saving rate have also contributed favorably to growth. In relative terms, foreign private investment and export performance have contributed more than aid, supporting the North's position on self-reliant approaches for developing countries. Also the growth of the labor force and higher domestic saving have contributed more than foreign capital flows.

These findings have several policy implications for both recipient and donor countries. In the case of the recipient countries, the most important implication is that if the countries wish to achieve rapid economic growth, maximum efforts will have to be directed towards increasing the productivity of the labor force and towards mobilizing domestic resources. These tasks may involve difficult choices and tough policy measures, but there is no escaping the implication that reliance on foreign capital does not offer the solution for high and rapid growth. They should, however, continue to accept foreign capital in those areas where domestic resources do not provide an adequate substitute.

The recipient country should be careful in deciding which type of foreign capital to encourage and the type of trade policy to adopt. The analysis of this paper shows that based on relative productivity, Asian developing countries should attempt to attract foreign private investment (including long-term commercial credit), improve their export performance, and rely relatively less on aid. Whether the recipient countries possess much freedom of choice, of course, depends upon the supply considerations (i.e., institutional setup in which the donor countries operate and the motivations of donor countries). In this context the North's emphasis on self-help procedures based on trade and exchange liberalization and policies to attract foreign private investment are of particular relevance.

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