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# The Causal Relation Between Foreign and Domestic Savings in Four Southeast Asian Economies

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**Abstract.** The empirical basis of the thesis that foreign savings substitute for domestic savings has been inappropriate in establishing what is obviously a causal relation. In this paper, we evaluate the above thesis using a bivariate Granger causality model and annual data on four southeast Asian economies between 1950/60s and 1992. Our findings present a mixed picture: Foreign savings may leave domestic savings unaffected or cause it to rise or fall. We also found that the causal relation can be reverse, implying that foreign savings cannot be presumed exogenous.

## 1. Introduction

The main issue being addressed is this paper is whether foreign capital inflows enhance the economic growth of the receiving countries. This issue first became of interest to scholars and policymakers alike in the 1950s and 1960s as they debated on what would be a better way to assist LDCs in their pursuit of economic growth. In particular, the debates centered around the relative effectiveness of foreign aid and trade in enhancing the growth of real income in LDCs. Later works on the subject moved away from focusing on foreign aid (as the significance of foreign aid as a component of total capital inflows diminished by the 1970s) and analyzed total foreign capital inflows instead and their effect on real income growth.

One source of complication on the above issue is raised by the possibility that foreign savings may be replacing or substituting for domestic savings. Hence, instead of enlarging the total savings available to the receiving country, this pool may remain the same or worse, may actually decline. This provided a basis for a debate which began in 1964 and inquired into whether foreign and domestic savings are complements or substitutes. The consensus is one that accepts the validity of the substitution thesis: that foreign savings do substitute for domestic savings. The majority of work in this literature focus on the degree of this substitution.

One aspect of this debate which has not been confronted empirically, with one exception, is the implicit assumption of a causal relation between foreign and domestic savings: Higher foreign savings cause domestic savings to fall. Although it is well known that a correlation test does not imply a causal relation and several authors raised the issue (Weisskopf, 1972; Papanek, 1972, 1973), only one work (Bowles, 1987) subjected the thesis to generally accepted causality tests. The present paper is a further attempt to apply Granger causality test to the relation between foreign and domestic savings in light of recent developments on this technique. Of particular concerns are the issues that both variables may be cointegrated in which case the standard causality test must be `corrected' accordingly.

The paper is organized as follows. Section 2 presents the theoretical and empirical basis for the substitution debate. Section 3 reviews the literature on this subject to evaluate the state of existing empirical evidence and the appropriateness of the methodologies used in the analysis. Section 4 presents the Granger causality test used in this paper and applied this test to four southeast Asian economies: Indonesia (1965-1992), Malaysia (1966-1992), Philippines (1955-1992), and Thailand (1957-1992). Section 5 discusses the results of the empirical tests. Section 6 concludes the paper and includes suggestions for further research.

## 2. The Basis for the Foreign Savings-Domestic Savings Relation

The early analysis of the effect of foreign capital inflows (and foreign aid, in particular) was based on theoretical arguments derived from standard growth models of the Harrod-Domar or neoclassical type. These models suggest that the growth of real income of a country is determined positively by the productivity of capital and the
savings rate, the latter being an indication of the resources available to finance investment. That is,

$$g = \alpha (s + f) \qquad (1)$$
$$i = s + f, \qquad (2)$$

where $g$ is the growth of real income, $\alpha$ is the marginal productivity of capital, $s$ is the domestic savings rate, $f$ is the foreign savings rate (i.e., foreign capital inflows as a
proportion of income), and $i$ is the gross domestic investment rate.

The implication of these models is that foreign capital inflows will increase the amount of total savings (foreign savings will add to domestic savings) which the receiving country will use to pay for investment. For a given labor force and technology growth, the higher is the investment rate, the faster will be the growth of real income.

The above conclusion has been challenged by several authors, beginning in 1964 when Griffin and Ffrench-Davis argued that foreign capital inflows (or aid, in particular) may not increase economic growth when foreign savings simply substitute for domestic savings, i.e., higher inflows of foreign capital will lead to lower domestic savings.[1] This objection to the prediction of the above model was what came to be known as the "substitution thesis".

This thesis was first tested empirically by Rahman (1968) who referred to it in his paper as the 'Haavelmo's hypothesis' which says that domestic savings do not only depend on income but (negatively) on foreign savings, as well. His test consisted of estimating a domestic savings function, $s = a + b f$, using OLS and focusing on the statistical significance of $b$ which was estimated at -0.2473 (p.137). He used 1962 cross-sectional data for 31 countries.

In 1970, Griffin, and Griffin and Enos provided both theoretical arguments and empirical evidence in support of the substitution thesis. Several mechanisms by which foreign savings will substitute for domestic savings were suggested by them. These included, first, the tendency for private entrepreneurs to save less when foreign savings become available to them as finance for their investment activities. It may also be that, when foreign savings come in the form of direct foreign investment, foreign entrepreneurs will reduce the profitable investments available to local entrepreneurs and thus reduce the incentives for the latter to save. Second, foreign savings will allow the receiving country's government to delay

fiscal reforms (i.e., to increase public consumption and/or reduce taxes or tax efforts). Third, the greater availability of foreign savings will make available finance for consumer imports or support an overvalued exchange rate which reduces the incentives to export while cheapening imports.

In terms of empirical evidence, the above authors estimated the same regression function as that used by Rahman and found the effect of foreign savings on domestic savings to range between -0.73 (from cross-sectional data between 1962 and 1964 for 32 countries) and -0.84 (for time-series data for Columbia between 1950 and 1963) (pp. 105-6 in Griffin and pp. 321-2 in Griffin and Enos).[2]

## 3. Review of Existing Empirical Tests of the Substitution Thesis

Weisskopf (1972) started by distinguishing between a behavioral function and an accounting identity. This motivated him to classify countries into three: type I are those countries with domestic savings constraint; type III are those with foreign exchange constraint; type II are those that are in-between I and III. A pooling of 17 type I countries (with data from 1953-66) gave rise to the following estimate of a domestic savings function, $S = a + b\,F + c\,Y + d\,E$, where $Y$ is income, $F$ is foreign capital inflows, and $E$ is exports. As regards the above thesis, he found $b = -0.227$ which suggests that higher inflows of foreign capital reduce domestic savings (p. 37).

Gulati (1978) approached the debate by estimating the effect of foreign savings rate on the growth of real income. He used 1960s data on 38 countries and found a positive relation (0.26) between foreign savings rate and economic growth rate (p. 566). He further noted this result to be true only for countries which Galbraith classified as suffering from a lack of capital and not for countries which lack a "minimum cultural base".

Bowles (1987) subjected the causal relation between domestic savings and foreign aid[3] in an attempt to investigate whether a negative correlation between them holds for time-series data. If it does, he tested for causality using a standard Granger test. As noted above, Bowles' work is the first application of causality tests to evaluate the substitution thesis. Using data for the period 1960-1981 for 20 countries and allowing for one lag order in each variable, he estimated the domestic savings function, $s = a + b'\,f_{-1} + c\,s_{-1}$. He found evidence to support the thesis in only four cases[4] out of 20 and obtained estimates of $b'$ which ranged from -0.61 and -1.4 (p. 796). In one case (i.e., Burma), the estimate was positive (Table 1, p. 792).[5]

Rana and Dowling (1988) tested a system of simultaneous equations of growth and domestic savings rates using indirect least squares. Data were for nine countries and covered 1965 through 1982. They found a positive effect of direct foreign investment rate on economic growth (due to both higher domestic

investment volume and efficiency) but not on domestic savings rate. As regards foreign aid (relative to income), it does not affect economic growth nor domestic savings rate (Table I, p. 7).

Vos (1988) tested the thesis in his attempt to empirically assess the extent of capital markets integration. He used a savings function, $s = a + bf$, and found $b$ to range between -0.54 to -1.363 (Table 7, p. 329), regardless of country-group (such as DCs, LDCs which borrowed primarily from private foreign lenders, or LDCs which borrowed mainly from official sources).

Morriset (1989) estimated a savings function of the form tested by Rahman and Vos for four Latin American countries (using data during 1960-81 and 1973-81) and found $b$ ranges from -0.61 and -0.92 (Table 2, p. 1711). He further specified a savings function for Argentina and found no significant influence of foreign capital inflows (using four alternative measures) on domestic savings.

Snyder (1990) questioned the nature of the negative correlation between domestic and foreign savings. When the domestic savings function, $s = a + bf$, was estimated, $b$ was found to be -0.40. However, he showed that such correlation is spurious, one that resulted from the omission of at least one variable (per capita income, in particular) from the above function. When this omitted variable was included, estimate of $b$ became insignificant while the coefficient of per capita income was found to be statistically significant (Table 1, p. 177). He concluded that the negative correlation between domestic and foreign savings is spurious in nature.[6]

Hence, the picture which emerges from the existing empirical evidence is mixed. Authors such as Weisskopf, Vos, and Morriset found evidence in support of the thesis while Gulati obtained the opposite result, and results found by Rana and Dowling and Snyder neither support nor dispute the thesis. Results from some countries in Bowles' sample supported the thesis, while others did not. This lack of consensus on the empirical front pointed to several methodological issues which differentiated one author's approach and hence results from another author's. An excellent and more complete discussion of these issues is found in White (1992).

Most approaches to estimation used an OLS approach which yielded correlation coefficients. The most immediate criticism made on these approaches is the question of causality. These were raised by Weisskopf (1972) and Papanek (1972, 1973) but were not employed by either authors. These authors also questioned the direction of causality which correlation tests cannot address. In order to justify the formulation of the traditional domestic savings function, a test of exogeneity of foreign savings must be performed. Otherwise, there is no guarantee that foreign savings is the explanatory variable (the 'cause') and domestic savings is the 'effect.' Among the papers surveyed, Bowles' (1987) was the first one to use a standard Granger causality test to determine causality and exogeneity. Vos' (1988) model came close to addressing the exogeneity issue as

he set up a bivariate model from pairwise combinations among domestic investment, domestic savings, and foreign savings. Similarly, Snyder (1990) considered the influence of per-capita income, not only on domestic savings, but also on foreign aid.

The possibility of spurious causality was raised by Papanek, Rana and Dowling (1988), Morriset (1989), and Snyder (1990) as they considered the effects of exogenous factors or omitted variables on both domestic and foreign savings rates. What this would require is that both domestic and foreign savings functions be correctly specified (i.e., that each function must include other explanatory variables which significantly affect the behavior of the dependent variable). For instance, the domestic savings function may take the form used by Fry (1987) and those surveyed by him in testing the financial liberalization hypothesis while the foreign savings function will be formulated according to a theoretical model (e.g. an open-economy ISLM model where variables such as domestic and foreign income levels and interest rate parity condition are significant in determining foreign capital inflows or, its counterpart, current account deficits). Snyder verified that the negative correlation between foreign and domestic savings was spurious which vanished when real income per capita was included as an explanatory variable in the domestic savings function.

Related to the above, but not addressed, is the effect of a time trend on variables used in time series analysis. It is known that when variables are non-stationary (i.e., they are responding to a time variable), they may appear to exhibit a causal relation even when such relation does not really exist. Usually, when variables are made stationary, such relation will disappear.[7] Only Bowles (1987) must have addressed this issue in his use of Granger causality test for the relation between domestic and foreign savings.

In connection to these methodological shortcomings, this paper will attempt to test the substitution thesis by determining whether a causal relation exists between domestic savings and foreign savings and, if so, by inquiring into the direction of this causal relation. In doing this, a Granger causality test will be used which, first, requires a test of stationarity to rule out any spurious causality which a time trend can create. Furthermore, if this test suggests that the variables may be cointegrated, appropriate modifications to the Granger causality test will be made.

## 4. A Causality Test of the Relation Between Foreign and Domestic Savings

The econometric approach used in this paper follows closely the procedure taken by Giles, Giles, and McCann (1992). They tested the causal relation between the growth of income, on the one hand, and the growth of seven export categories, on the other hand, in New Zealand. In their paper, they clarified that the standard Granger causality test requires the stationarity of time series, except

when they are found to be integrated of order one and can be combined linearly such that the linear combination becomes integrated of order zero. In this case, the series are said to be 'cointegrated' and may be regressed as non-stationary series, as long as the system of equations employed in the standard test is modified by introducing an error correction term. A detailed exposition of this procedure follows.

In this paper, two time series (namely, domestic savings rate ($s_t$) and foreign savings rate ($f_t$)) are used for each country. First, each series is subjected to an augmented Dickey-Fuller (ADF) test to determine whether they are stationary.

*Test of Stationarity*

For each series, say $x_t$, the following equation is regressed using OLS:

$$\Delta x_t = c_0 + c_1 t + c_2 x_{t-1} + \sum_{i=1}^{n} c_{3i} \Delta x_{t-i} + e_t, \qquad (3)$$

where $\Delta x_t$ is the first difference of $x_t$, $t$ is a time trend, and $e_t$ is the regression error term. The null hypothesis $H_o$: $c_2 = 0$ is tested against the alternative $H_a$: $c_2 < 0$. F-tests are calculated and compared with the appropriate ADF critical values. If the null hypothesis is not accepted, then $x_t$ is integrated of order zero I(0) or, equivalently, $x_t$ is a stationary series. Otherwise, one must test the statistical significance of $c_1$.[8] If $c_1$ is not significantly different from zero, then $t$ is dropped from equation (3):

$$\Delta x_t = c_0 + c_2 x_{t-1} + \sum_{i=1}^{n} c_{3i} \Delta x_{t-i} + e_t, \qquad (4)$$

Equation (4) is regressed to once again test $H_o$: $c_2 = 0$ against $H_a$: $c_2 < 0$. If the null hypothesis is not accepted, then $x_t$ is a stationary series. Otherwise, one must test the statistical significance of the constant term $c_0$. If $c_0$ is not significantly different from zero, then it is dropped from equation (4):

$$\Delta x_t = c_2 x_{t-1} + \sum_{i=1}^{n} c_{3i} \Delta x_{t-i} + e_t, \qquad (5)$$

Once again, test $H_o$: $c_2 = 0$ against $H_a$: $c_2 < 0$. If the null hypothesis is not accepted, then $x_t$ is a stationary series and proceed with the test of causality. Otherwise, $x_t$ is integrated of order d, I(d), where $d \geq 1$ and its first difference will be subjected to the above procedure. Further, if $s_t$ and $f_t$ are both integrated of order one, then one must also test whether these two series are cointegrated. The test of cointegration is discussed below.

*Test of Cointegration*

Suppose that $s_t$ and $f_t$ are found to be I(1) processes. They are cointegrated when a they can form a linear combination that is I(0). To test for this, begin with a linear combination of the following form:

$$s_t = d_0 + d_1 f_t + d_2 t + z_t, \qquad (6)$$

where $z_t$ is the regression error term. Equation (6) is regressed to obtain estimates of $z_t$, say $w_t$. The test of cointegration entails a regression of

$$\Delta w_t = h_1 w_{t-1} + \sum_{i=1}^{n} h_{2i} \Delta w_{t-i} + u_t, \qquad (7)$$

where $\Delta w_t$ is the first difference of $w_t$, $u_t$ is the regression error term and a test of $H_0$: $h_1 = 0$ against $H_a$: $h_1 < 0$. The appropriate ADF critical values are used in this test. If $H_0$ cannot be accepted, then $s_t$ and $f_t$ are cointegrated and, according to Granger's Representative Theorem, there exists a causal relation between them. Otherwise, $s_t$ and $f_t$ are not cointegrated and must enter the system of equation in the test of causality in first-differenced transformation.

*Test of Causality*

If $s_t$ and $f_t$ are stationary, then one can set up the following bivariate system of equations and test the existence and direction of causality:

$$s_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} s_{t-i} + \sum_{i=1}^{n} \alpha_{2i} f_{t-i} + \varepsilon_t \qquad (8)$$

$$f_t = \beta_0 + \sum_{j=1}^{n} \beta_{1j} s_{t-j} + \sum_{j=1}^{n} \beta_{2j} f_{t-j} + \eta_t, \qquad (9)$$

where $\varepsilon_t$ and $\eta_t$ are regression error terms, and n is the optimal lag order.

If $H_o$: $\alpha_{2i} = 0$ (for some $i$) cannot be accepted, then '$f$ Granger causes $s$.' Similarly, if $H_o$: $\beta_{1j} = 0$ (for some $j$) cannot be accepted, then '$s$ Granger causes $f$.' If both null hypotheses cannot be accepted, the there exists a bidirectional Granger causality between $s$ and $f$.

Note that, if $s_t$ and $f_t$ are found to be I(1) but not cointegrated, they must enter the above system in first-differences. If they are integrated of the order d higher than one, then they must first be differenced d times before entering the above system.

On the other hand, if $s_t$ and $f_t$ are cointegrated, then the above system is modified to include an error correction term.

$$s_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\, s_{t-i} + \sum_{i=1}^{n} \gamma_{2i} f_{t-i} + \sum_{i=1}^{n} \nu_{t-i} + \mu_t \qquad (10)$$

$$f_t = \phi_0 + \sum_{j=1}^{n} \phi_{1j}\, s_{t-j} + \sum_{j=1}^{n} \phi_{2j} f_{t-j} + \sum_{j=1}^{n} \omega_{t-j} + \theta_t \qquad (11)$$

where $s_t$ and $f_t$ are I(1) processes and $\mu_t$ and $\theta_t$ are regression error terms. $\sum_{i=1}^{n} \nu_{t-i}$ is the error correction term for $s_t$, given by the estimated residuals from the regression of $s_t$ on $f_t$. Likewise, $\sum_{j=1}^{n} \omega_{t-j}$ is the error correction term for $f_t$, derived from the regression of $f_t$ on $s_t$.

## 5. Empirical Results

The above test procedure was employed to assess the causal relation between domestic savings rates ($s_t$) and foreign savings rates ($f_t$) in Indonesia (1965-1992), Malaysia (1966-1993), the Philippines (1955-1992), and Thailand (1957-1992). The same tests were also performed during the subperiod between 1973 and 1992 to allow for greater comparability among the four economies.

Domestic savings rates are given by the ratio of domestic savings to income. Domestic savings is approximated by the residual from subtracting private and government consumption from income (given by GDP). Foreign savings rates are calculated by dividing foreign savings (the sum of direct foreign investment, portfolio investment, private and official unrequited transfers, and other capital) by GDP. Data are taken from *International Financial Statistics Yearbook* 1972 and 1995, published by the International Monetary Fund. Averages of these variables are reported in Table 1.

Using an ADF test of stationarity, the results reported in Table 2 are obtained.

From the above test, it was found that $s_t$ and $f_t$ are stationary time series for Malaysia and Thailand.[9] Hence, no further transformation is required on these series and, in their original form, they were used in the Granger causality test described above. In contrast, both $s_t$ and $f_t$ were found to be each integrated of order one (i.e., I(1) processes) but not cointegrated. As a result, each variable entered the Granger causality test in its first difference. None of these systems of equations for causality tests required an error correction term. A summary of these results are reported in Table 3.

Table 1

Annual Averages of Domestic and Foreign Savings Rates

(in percentages per year)

| *Economy* | *Domestic Savings Rates* | | *Foreign Savings Rates* | |
|---|---|---|---|---|
| | *Entire Period* | *1973-1992* | *Entire Period* | *1973-1992* |
| Indonesia | 19.94 | 29.27 | 4.18 | 5.13 |
| Malaysia | 26.82 | 31.85 | 5.46 | 6.26 |
| Philippines | 12.59 | 17.89 | 3.56 | 5.13 |
| Thailand | 19.54 | 25.27 | 4.51 | 5.92 |

Source: IMF, *International Financial Statistics Yearbook* 1972, 1995. Own calculation. Annual data are available in Appendix I.

Table 2

F- statistics from ADF Test of Stationarity

| *Regression Equation* | *Indonesia 1965-1992* | *Malaysia 1967-1992* | *Philippines 1955-1992* | *Thailand 1957-1992* |
|---|---|---|---|---|
| $s_t$ | 4.74 | 6.06 | 4.72 | 5.80 |
| $f_t$ | 4.32 | 27.34 | 4.15 | 10.01 |
| sample size | 28 | 27 | 38 | 36 |
| ADF critical value* | 7.18 | 7.20 | 6.98 | 7.02 |

Note: Regression equation is given by equation (3) where $x_t = s_t, f_t$. * Own interpolation based on Greene (1993), Table 19.1, p. 565. A print-out of the ADF regression can be found in Appendix II.

Table 3

Results of Test of Cointegration

| *Economy* | $s_t$ | $f_t$ | *Are $s_t$ and $f_t$ cointegrated?* |
|---|---|---|---|
| Indonesia | I(1) | I(1) | No |
| Malaysia | I(0) | I(0) | N/A |
| Philippines | I(1) | I(1) | No |
| Thailand | I(0) | I(0) | N/A |

Note: N/A = not applicable because variables must be I(1) in order for them to be potentially cointegrated.

Due to limited length of observations, the test for the appropriate lag order was waived and a maximum lag order of three was applied to all countries.

The above tests suggest a lack of cointegration between domestic and foreign savings rates for all countries. This finding is hardly surprising as one expects the relation between them to hold only in the short run (i.e., occurring when a country has lack of domestic savings and eventually disappearing as domestic savings increase as a result of higher income growth and the reliance on foreign savings is eliminated). There is no reason to expect a long-run relation between the two variables.

Results for the tests of causality for each economy are reported below and summarized in Table 4.

For Indonesia, results over the entire period 1965-1992 fail to support the substitution thesis. Instead, it was found that $s$ and $f$ are statistically independent, i.e., foreign savings neither reduce nor increase domestic savings and vice versa.[10] However, for the subperiod 1973-1992, there is evidence to support the thesis. It was found that foreign savings rate (three-periods lagged) reduces domestic savings rate by 0.64 percent. Despite the differences in technique used, the magnitude of this estimate is consistent with those obtained by Griffin, Vos, and Morisset. Bowles, who used a more comparable technique, obtained estimates of similar magnitude (p. 794). His sample, however, did not include Indonesia. During the same subperiod, $f$ was found to be exogenous of $s$. Hence, one is able

to determine that, at least for the subperiod 1973-1992 in Indonesia, *f* causes *s* to fall.

Table 4

Summary of Granger Causality Tests

| *Economy* | *f Granger causes s* | *s Granger causes f* |
|---|---|---|
| Indonesia (1965-1992) | No / Yes ($\alpha_{23}$= -0.64), t= -2.06)* | No |
| Malaysia (1966-1992) | Yes ($\alpha_{21}$= +0.30, t=2.10) | No |
| Philippines (1955-1992) | No | Yes ($\beta_{12}$= -0.31, t=-2.53) |
| Thailand (1957-1992) | No | Yes ($\beta_{11}$= +0.15, t=1.76) |

Note: A validation of the substitution thesis requires that '*f* Granger causes *s*' and that the estimates of $\alpha_{2i} < 0$ for at least one *i*. *No support is found for entire period but some (for Indonesia) during the subperiod 1973-1992. A complete print-out of the regression results can be found in Appendix III.

For Malaysia, the results contradict the causal relation put forward by the substitution thesis as foreign savings were found to increase domestic savings. In particular, a one-percentage increase in *f* causes *s* to increase by 0.30 percentage point. This is true for both the entire period 1966-1992 and the subperiod 1973-1992. One possible explanation for this result returns to the main question of whether foreign capital inflows increase economic growth. This result suggests that a greater flow of foreign capital enhances income growth which, in turn, raises the domestic savings rate. On the other hand, it was found that foreign savings are not influenced by domestic savings, i.e., *f* is exogenous of *s*. This result allows one to reject the existence of a bidirectional causality or a feedback relation and, instead, to claim that the causal relation between the savings rates runs from *f* to *s*. In other words, one can say that *f* causes *s* to increase.

For the Philippines, causality tests showed a lack of support for the substitution thesis as it was found that domestic savings rates are not influenced by (or, equivalently, exogenous of) foreign savings rates.[11] Hence, *f* neither reduces nor increases *s*. On the other hand, a unidirectional causal relation was found which ran from domestic savings rates to foreign savings rates. In particular, a

one-percentage point increase in $s$ reduces $f$ by 0.31 percentage point in 1955-1992 (and by 0.45 in 1973-1992). This suggests that, for a given level of investment rate, the country required lower inflows of foreign capital (relative to income) during years when domestic savings rates were higher. Hence, an increase in $s$ reduced $f$.

For Thailand, causality tests showed that domestic savings rates were neither enhanced nor reduced by foreign savings during the entire period 1957-1992 and the subperiod 1973-1992. This result fails to support the substitution thesis. This also means that $s$ is exogenous of $f$. This allows one to establish a unidirectional causal relation which runs from domestic savings rates to foreign savings rates, i.e., higher domestic savings actually increase foreign savings. This is suggestive of the importance of income in transmitting the causal relation between the two variables: Higher domestic savings rates increase the growth and level of income which increases Thailand's imports without necessarily increasing exports. The resulting larger current account deficits give rise to higher foreign savings rates. This result is also consistent with the explanation that higher domestic savings can be taken as a signal of economic and political stability or as a proxy of adequate infrastructure in the receiving country which, in turn, attracts foreign savings.

In addition, Bowles' sample included two of the countries above, namely, the Philippines and Thailand, during the period between 1960 and 1981. He found no causality between domestic savings and foreign aid in both countries. An attempt was made to check for the consistency of the above results with those of Bowles. However, total foreign capital inflows, instead of foreign aid, are used in the estimation. The lag order was limited to one.

During the same period, the direction of causality was reverse for the Philippines (from $f$ to $s$) and the impact was positive (+0.47) while no causality was found for Thailand. The result for Thailand is consistent with Bowles' finding. This suggests that neither foreign aid (in Bowles' model) nor total foreign savings which include foreign aid (in this study) influence domestic savings, or vice versa. For the Philippines, during 1960-1981, foreign savings contributed positively to economic growth and, in turn, increased domestic savings. Together with Bowles' result, it suggests that the positive effect of foreign savings on domestic savings is attributable to non-aid categories of foreign capital inflows.[12] This is also consistent with the findings of Fry (1996) who focused on foreign direct investment and found it to positively affect (national) savings and economic growth of Pacific Basin countries.

## 6. Conclusion

In this paper, an attempt was made to assess the substitution thesis: that foreign savings substitute for domestic savings, or equivalently, foreign savings cause domestic savings to fall. A bivariate Granger causality test was employed to evaluate the above thesis. In addition, attempts were made to inquire into the nature and direction of the causal relation between foreign and domestic savings. A number of conclusions can be made from the above exercise.

First, evidence which supports the substitution debate was not found in any of the four southeast Asian economies analyzed during the entire period for which data can be obtained. Results either showed that the two forms of savings were independent of each other (true for Indonesia (1965-1992), Philippines, and Thailand) or that foreign savings enhanced domestic savings (for Malaysia) through induced income growth. During the subperiod 1973-1992, the above conclusion held for all economies, with the exception of Indonesia for which some evidence in support of the thesis was found.

Second, the above results can be used to support the hypothesis that countries for which the foreign savings positively influence domestic savings tend to experience higher income growth. In this study, it can be argued that Malaysia's better use of foreign savings allowed it to attain a higher income growth (with an annual average of 7.10 percent) than did the other countries, with the exception of Thailand (whose income grew at 8.02 percent per year, on average).[13] This exception highlights the importance of not only the volume of productive resources (be it labor, capital, or land) available to a country but, more importantly, their quality which affects their ability to augment income (i.e., their productivity). Thailand's higher income growth also reflects its higher productivity of its labor input.[14]

Third, this study fails to capture the effects of different forms of foreign savings (e.g., foreign direct investment, portfolio investment, foreign loans, and foreign aid and grants) on domestic savings. One must not presume that these different forms affect domestic savings in the same manner or equal magnitudes. Disaggregating total foreign savings and analyzing each form's impact on domestic saving would be desirable as it can provide a guideline in the design and evaluation of countries' incentives programs aim at attracting foreign savings. To the extent that these programs use up resources, the net benefits from them must be non-negative. Studies which identify which form of foreign savings is most contributory to economic growth can serve as a concrete target for these programs.

Fourth, one must keep in mind the limitations of the technique used to derive the above conclusions. Most importantly, the system of equations employed in this paper is standard in its formulation. However, what must be considered in future work on this subject is a system of equations where the domestic and foreign savings equations are more appropriately specified. This study found the not surprising role of income in transmitting the causal relation between domestic and foreign savings. On the one hand, higher foreign savings can increase income level and growth which, in turn, will increase domestic savings. On the other hand, higher domestic savings can enhance income level and growth which will induce imports and worsen the current account (the counterpart of foreign savings flows).

Nothing new is gained from the finding that income is an important determinant of domestic savings. In fact, earlier specifications of domestic savings functions did include real income level (e.g., one based on the Keynesian theory ) and, for some, its growth rate as explanatory variables. What is new and important is the need to specify a foreign savings function. This, by itself, is in sharp contrast with the earlier assumption that foreign savings are exogenous of domestic savings. This study suggests real income to be one important determinant of this function. Others may be included on the basis of some theory (such as that underlying an open economy ISLM model).

Morriset (1987) recognized this shortcoming and constructed a model wherein he specified both domestic and foreign savings functions to depend on internal factors (such as money growth and public deficit) and external factors (changes in the terms of trade and foreign interest rates). He applied his model to the Argentinian economy using data between 1960 and 1981. Works of a similar nature can provide useful insights on the validity of the thesis that started the debate three decades ago, i.e., the thesis that foreign savings do substitute for domestic savings.

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# NOTES

[1] They also argued that economic growth may decrease further because capital imports lower the productivity of capital (or equivalently, increases the capital-output ratio).

[2] Griffin's estimates of *b* also include -0.82 for 13 Asian and Middle East countries, -0.67 for 18 Latin American countries.

[3] Foreign aid is given by the net disbursements of concessional assistance by DAC countries and multilateral agencies combined (p. 791).

[4] These four countries are India, Taiwan, Tanzania, and Turkey.

[5] In three cases (i.e., Nigeria, Somalia, and Bolivia), the causality ran from domestic savings to foreign aid and in two cases (i.e., Greece and Paraguay), the causality was bidirectional.

[6] Snyder also estimated a foreign aid function with domestic savings and per capita income as explanatory variables and found per-capita income to have a significant negative effect (of approximately -0.65) on foreign aid (Table 1, equations (3) and (5), p. 177).

[7] For a discussion of these and other related issues on Granger causality, see Liverakos (1994).

[8] Giles, Giles, and McCann used the normal critical t-values to test the statistical significance of the parameter estimate instead of the ADF critical values but they set the level of significance at one percent.

[9] In both cases, $f_t$ was found stationary after regressing equation (3) as can be seen from sufficiently high F-values reported in Table 2. $s_t$ in both cases were found stationary only after the trend variable was considered (refer to section IV for more details).

[10] Both variables are in first-differences.

[11] Both variables are in first-differences.

[12] For the period 1960-1981, ADF tests indicated that $s$ is I(1) and $f$ is I(0) for the Philippines and I(0) and I(1), respectively, for Thailand. Bowles' found a no correlation for the Philippines and a negative correlation for Thailand between foreign aid and domestic savings. This study found positive correlations between total foreign capital inflows and domestic savings for both countries.

[13] Average for the period 1961-1992 for Malaysia and 1952-1992 for Thailand. Average income growth is 5.83 percent for Indonesia for 1961-1992 and 4.54 percent for Philippines for 1950-1992.

[14] This also allowed Thailand to fix its nominal exchange rate while maintaining or improving upon its international competitiveness.