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The Inverse Relation between Saving and Aid: An Alternative Explanation

M.A. Taslim and A. Weliwita*

A persuasive theoretical justification for extending foreign assistance to developing countries was provided by the now famous 'two gap' theory. It proclaimed that these countries might not in general be able to achieve a target rate of growth because of persistent balance of payments problems and a paucity of investable funds. Both these problems could be dealt with simultaneously by an injection of resources from overseas in the form of foreign aid. An implication of the two gap theory was that foreign aid would be complementary to domestic saving effort: it will raise investment by providing additional resources, and also increase saving by raising the level of income through the multiplier process. However, a number of studies have found that instead of supplementing domestic saving, foreign aid has actually supplanted it in many countries. One explanation, which has attracted some attention, is that by making resources easily available, foreign aid permitted a relaxation in saving effort and encouraged an increase in consumption. This paper takes the view that the observed inverse relationship between foreign aid and domestic resource mobilization could be also explained in terms of an entrepreneurial constraint. Many developing countries like Bangladesh suffer from an acute shortage of entrepreneurial skill. Given the existing stock of entrepreneurial skill, these nations are unable to invest any more than a small proportion of their income. Injection of foreign material and technical aid is, therefore, unlikely to be fully reflected in an increase in investment; part of it will actually replace domestic private investment. This paper develops a theoretical framework to explain this interaction and applies cointegration analysis to test it with time series data of Bangladesh.

I. Introduction

A well-known hypothesis spawned by the voluminous literature on the problems of development in low-income countries in the post-Second World War years is that investment in these countries is constrained by their limited capacity to save. This is enshrined in both the 'vicious circle of poverty' theory and the 'two-gap' theory espoused by Chenery and Strout (1966). According to the former, poverty is both a cause and consequence of poverty.[1] Poor countries with limited capital stock can save very little, as their incomes are barely

* University of Dhaka, Dhaka, Bangladesh and Kyoto University, Kyoto, Japan, respectively. Generous assistance of F. In, T. Islam, A. Ramboldi and a referee is gratefully acknowledged.

1. See M. Todaro (1985, pp. 88-91).

enough to ensure subsistence needs. Low savings imply a low level of capital accumulation in these countries. This in turn implies that productivity of labor stagnates at the low level such that incomes remain low. They are, therefore, trapped in a vicious circle of poverty that can be broken only by some exogenous interventions. The 'two gap' theory states that investment effort in poor developing countries in the early stages of development is limited by two constraints.[2] First, these countries may be unable, perhaps due to poverty, to save sufficiently from current income to provide for investment needed to achieve a target rate of growth. Investment (and output growth) could also be limited by the unavailability of sufficient amounts of imported inputs due to a balance of payments constraint. The paucity of both saving and foreign exchange (to pay for imported materials) could be overcome by an inflow of foreign aid. By providing additional resources, aid would raise investment beyond the limit of domestic saving. The latter could also rise as the realized incremental investment raises domestic output through higher productive capacity as well as the multiplier effect in the case of underutilized capacity. This was, and continues to be, one of the most forceful arguments in favor of a continued flow of foreign aid to developing countries.

Although very persuasive, there are at least two empirical facts that are difficult to explain by either of these theories. First, if poverty were the real cause of low saving, it would be paradoxical that some of the poorer developing countries actually save and invest much larger proportion of their incomes than some of the more affluent countries. As Table 1 shows, Pakistan's per capita income was about 17 per cent higher than that of China and 35 per higher than that of India at the beginning of the eighties. And yet Pakistan's saving ratio during that time was only 40 per cent of China's and 59 per cent of India's saving ratio. Kenya's per capita income was twice the per capita income of India, but its saving ratio was less than three-quarters of that of India. Even starker is the case of Haiti, Sierra Leone and Somalia, all of which had a per capita income higher than that of India and comparable to China. But the saving ratios of these countries were hardly one-fifth of the saving ratio of China and just over one-quarter of that of India. If poverty were the only, or even the dominant, cause of low saving these findings would be difficult to rationalize.[3]

Furthermore, there is some evidence that some developing countries actually save less when they become relatively more affluent. Kenya, Sierra Leone and Somalia in Table 1 fall in this category. An interesting example that is of some interest to this paper is the case of Bangladesh. It had a respectable saving ratio when it was a part of Pakistan, but soon after independence its saving ratio declined dramatically to only 1.02 of GNP (in 1975). It rose to 3.92 per cent in 1980 but fell back to around 2 per cent for the rest of the decade. If poverty were the dominant cause of low savings, one must wonder how the country had saved about 8 times more during the sixties than it had in the recent years when the per capita income was significantly higher.

2. See Chenery and Strout (1966).

3. Lewis was also very skeptical that low income was responsible for low saving in the developing countries. He argued forcefully that "No nation is so poor that it could not save 12% of its national income if it wanted to: poverty had never prevented nations from launching upon wars, or from wasting their substance in other ways." See *The Theory of Economic Growth*, Allen & Unwin, London (1955, p. 236).

The second empirical fact that casts some doubt on these theories is the finding by a large number of authors that in many countries aid flows seem to be inversely related to the domestic saving ratio.[4] If investment in developing countries were really constrained by an incapacity to save a substantial fraction of their meager income, then an increase in aid flow should fully raise investment. The consequent increase in income should also be conducive to an increase in the saving ratio. Hence, what one expects to find is a complementary relationship between foreign aid and domestic saving. But the studies mentioned above actually indicate a substitute relationship between aid and saving. Schmidt-Hebbel, Serven and Solimano (1992) report finding of a recent study by P. Boone that for a sample of 82 developing countries whose aid receipts are less than 15 per cent of GNP, all aid is spent on consumption (p. 100). Contrary to the implications of the two-gap theory, a part (sometimes a large part) of the foreign aid receipts actually financed consumption rather than investment in many developing countries, and had a negative effect on domestic saving.[5]

This paper contends that the apparent conflict between the empirical findings mentioned above and the theories which regard saving effort to be the only, or the dominant, constraint on investment arises because of the inadequate attention to entrepreneurship as a vital ingredient of investment. It is interesting that Chenery and Strout did mention entrepreneurship as a crucial input in the productive process and foresaw that a shortage of entrepreneurial skill could *limit* investment. However, they did not include entrepreneurial skill in the formal modeling presumably because they regarded this to be of lesser importance than the other two constraints. The role of entrepreneurship in development is usually underestimated so much so that it hardly ever merits more than a cursory mention in much of the literature.[6] This paper negates this attitude and emphasizes its central role in investment and growth of the economy.[7] Specifically, it demonstrates that, contrary to the general perception, *it is the level of investment that limits saving* in some developing countries such as Bangladesh.[8]

4. See for example, Rahman (1967) and Weisskopf (1972).

5. A more worrisome aspect of foreign aid is that it does not foster growth in the overwhelming majority of the developing countries (Schmidt-Hebbel, Serven and Solimano (1996)). An inverse relation between saving and growth also exists for Bangladesh. However, this is not the focus of this study.

6. Among the notable exceptions are Leibenstein (1968) and Schumpeter (1934).

7. Griffin and Enos (1970) also emphasize the critical role of entrepreneurship in the development process. They categorically state that " …growth ultimately depends less on expanding development finance than on developing a vigorous, local, private and public entrepreneurial group." For a similar argument see chapter 5 in Kalecki (1976).

8. Sundrum (1990) argues " …savings do not depend only on incomes but, as Lewis himself has argued, on the opportunities for profitable investment. Without such opportunities, rising incomes are mostly spent on unproductive and conspicuous consumption … But when such opportunities arise, required savings will be forthcoming from various sources."

II. Model

When we look at the process by which national output is divided between various claimants, it should be apparent that saving is unlikely to be a dominant constraint on the modest rate of investment that occurs in many developing countries. The first call on the national output is made by the government; and its share need not be limited by any underlying propensities of the private sector. Whatever remains after the government has taken its bite is divided between consumption and investment. Consumption spending is dependent upon current income of the consumers, but investment decisions are taken independently of current income of the firms.[9] They are based more upon expectations of future profits. The actual act of investment is normally undertaken with bank loans rather than profit income of investors. This implies that investment decisions of firms are made independently of the saving decisions of households.

This should not be construed to mean that the amount of investment actually undertaken in an economy could diverge from saving. This is, of course, not possible *ex post* in an closed economy since the total output net of government spending must be divided up between consumption and investment, implying that *ex post* investment must equal *ex post* saving in each period. However, the demand for investment need not equal desired saving. If there is a discrepancy, relative prices and output will change to bring about the equality between the two. It is important to understand the process by which any discrepancy between the two is resolved in the market place. Suppose, under current market conditions, the demand for investment is less than desired saving. At the aggregate level this implies an excess supply condition which would tend to reduce output and prices, particularly the interest rate. The reduction in the interest rate would stimulate investment demand while the reduction in output would tend to reduce saving such that the equality between saving and investment is ultimately restored. However, if the interest rate is repressed or already very low in real terms (the liquidity trap syndrome) as is the case in many developing countries, the interest rate mechanism in the adjustment process does not work. With investment demand exogenously determined, the onus of adjustment in this situation falls on output which contracts and thus brings about the necessary reduction in saving (recall the paradox of thrift). It is also possible that finding their saving effort frustrated, households may reduce their propensity to save. Whichever is the case, saving would adjust to investment.[10]

If investment demand is greater than desired saving under the existing conditions, the aggregate demand for output exceeds the supply. This excess demand will force up the prices and output. If the interest rate were market determined, it would also rise which would dampen investment demand to some extent. But when interest rate is repressed, this is prevented from happening. The market restores balance through changes in output and price only. An increase in output increases the supply of saving. An increase in price also

9. Consumers in developing countries are usually liquidity constrained. They are thus prevented from maintaining a smooth consumption profile as implied by the life cycle theory. Current consumption is 'excessively' sensitive to current income.

10. For a similar argument see chapter 5 in Kalecki (1976).

contributes to augment saving. Inflationary price rise usually redistributes income in favor of the wealthy at the expense of ordinary fixed income wage earners. To the extent the former has a higher propensity to save than the latter, saving would rise. Perhaps more important is the impact of the so-called inflation tax. A price hike at a given level of real income and interest rate increases the demand for nominal money. In order to replenish the inflation-eroded stock of money, households and firms are forced to 'buy' additional cash with temporary excess saving. Total saving rises and the gap between saving and investment is reduced and ultimately eliminated. Therefore, when interest rate is not fully flexible what seems plausible is that saving would adjust to, rather than constrain, investment.

A number of reputed economists have recognized that saving cannot possibly constrain investment as argued in this paper. For example, Keynes stated categorically that "[t]he investment market can become congested through shortage of cash. *It can never become congested through shortage of saving*. This is the most fundamental of my conclusions .." (1939, p. 572, emphasis added). However, he did not regard entrepreneurship to be a scarce factor. His reasoning was based on the multiplier analysis. Any new investment will increase income by an amount necessary to generate sufficient saving to match the incremental investment. He argued "Increased investment will always be accompanied by increased saving, but it can never be preceded by it. …It is the parent not the twin of saving.[11] Lewis (1982, pp. 105-6) held a similar view that "[t]he saving ratio is not an obstacle. …In a mature economy, productive investment gets the first call on savings, in the sense that entrepreneurs can always raise the money needed for finance productive investment," The view of this paper is the same in this respect; however, it probes further why new investment may not occur even when profitable opportunities exists.

Private investment is undertaken by private entrepreneurs. Investment in the public sector also requires a modicum of entrepreneurial quality if it is to be efficient. This paper explicitly recognizes the role of the entrepreneur in all branches of business operation such as planning, production and marketing. However, to keep the analysis simple, the contribution of entrepreneurship is captured through its effect on production. Entrepreneurial and organizational skill is included in the production of function as an important argument.[12] Output, q, produced by a firm, therefore, depends on both the capital stock, k, and labor, l, employed for current production as well as the business skill of the entrepreneur, $e: q = q(k, l; e)$ where $q_e > 0$. In principle, entrepreneurs could be hired. But in practice there is seldom any market for entrepreneurship in developing countries because of the monumental moral hazard and adverse selection problems that arise due to the poor quality of information and the difficulties of contractual enforcement. Hence entrepreneurship may be regarded as nontradeable. It must be provided by the owners of, and utilized in, the firm. For any firm the skill of its entrepreneur is given, and hence, the production function above reduces to the standard production function of the neoclassical analysis. The former is assumed to exhibit the same properties as the latter. Furthermore we assume that $q_{ke}, q_{le}, q_{ee} > 0$, i.e., marginal products of all inputs increase with an increase in the

11. Keynes (1937, p. 669).

12. The model utilized here is adopted from Taslim (1995).

entrepreneurial skill. Profit earned by the firm, Π, is : $\Pi = pq(k, l; e) - rk - wl$, where p is the price of the output, r is the rental cost of capital and w is the nominal wage rate. Profit maximization by the individual firm implies:

$$pq_k - r = 0,$$
$$pq_l - w = 0,$$

where the subscripts denote first partial derivatives. These two well-known first order conditions that the value marginal product of each input is set equal to its price may be solved for the input demand functions: $k^* = k^*(p, r, w; e)$ and $l^* = l^*(p, r, w; e)$. Assuming that the output price, rental cost of capital and wage rate remain constant we may shorten the input demand functions and write, $k^* = k^*(e)$ and $l^* = l^*(e)$. The demand for labor and capital stock are functions of entrepreneurial skill alone. Under the assumptions made above it can be easily shown that an increase in entrepreneurial skill will increase the desired capital stock, $dk^*/de > 0$.[13] To derive the investment demand of the firm it is assumed that when the actual capital stock is less than k^*, the firm invests in order reduce or eliminate the discrepancy between the actual and the desired capital stock,

$$i = \alpha(k^* - k), \qquad 0 < \alpha \leq 1, \tag{1}$$

where i is the level of investment and α is the adjustment factor which depends, among other things, on the costs of adjustment. Assuming these costs to be constant we may rewrite Equation (1) as

$$i = \alpha(k^* - k) = i(e), \qquad \text{and} \quad i' > 0. \tag{2}$$

Investment of each firm is determined, *ceteris paribus*, by the amount of entrepreneurial input it possesses.[14] Summing over all firms, the total investment demand of the economy, I, can be expressed as

$$\sum_j i = I = \sum_j i(e_j), \tag{3}$$

where the subscript j identifies the firm. Let us assume that it is possible to aggregate over entrepreneurial skill of all firms and express Equation (3) as

13. The standard results that an increase in output price and wage, and a reduction in rental cost raise the desired capital stock also hold.

14. A similar result is also obtained by the more rigorous Jorgenson procedure to derive investment functions: Max $[p(t)q(l(t),k(t),e(t)) - w(t)l(t) - I(t)]\ exp(-rt)dt$ subject to $k = I(t)\ and\ F(q, l, k, e) = 0$

$$I = I(e), \qquad I' > 0. \tag{4}$$

where e is the some measure of aggregate entrepreneurial skill. Just as the demand for investment of the individual firm is limited by the skill of its entrepreneur, the total investment demand of the economy is limited by the total availability of entrepreneurial skill in the economy. Since, in the aggregate saving equals investment, this implies that a country with limited entrepreneurial talent cannot increase saving, even if it wanted to, beyond that implied by the aggregate investment function above.[15] In such a situation saving will be constrained by investment. As entrepreneurial talent tends to be scarce in the early stages of development, poor countries are likely to have a low saving ratio not because they cannot save more, but mainly because they cannot profitably invest more.

The analysis above assumed a closed economy. To explain why foreign aid may reduce saving let us take a close look at the national income accounting identity for an open economy,

$$I(e) - S \equiv CAD, \tag{5}$$

where I is gross domestic investment, S is gross national saving and *CAD* is the current account deficit. To maintain balance of payments in balance, *CAD* must be matched by an equal amount of capital inflow, *KAS* (capital account surplus). If there is no private foreign investment in or out of the country then $CAD \equiv KAS \equiv A$ where A is the foreign aid inflow. We can split up I into government and private investment and rewrite Equation (5) as

$$I_g(e_g) + I_p(e_p) - S = A, \tag{6}$$

where the subscript g and p stand for government and private sector respectively. e_g is the amount of entrepreneurial skill absorbed by the government sector and e_p that remaining for private investment.

In order to undertake investment projects for which resources have been made available by foreign aid, the government must find people with sufficient entrepreneurial and organizational skill. They could, in principle, be hired from overseas. If we rule out this possibility then they must be attracted form the existing pool of entrepreneurial talent. Aid-financed projects may be lucrative (as they are in Bangladesh) in which case they would draw away entrepreneurs from less lucrative private ventures. Foreign aid opens up many rent-seeking trading opportunities with the prospect of very high profits, but which require very little social investment.[16] Entrepreneurs currently engaged in less profitable businesses

15. If the residents of the country are permitted to invest their savings overseas, this constraint is not binding. However, many developing countries including Bangladesh impose stringent controls on private capital outflows.

16. There could nonetheless be substantial private investment by aspiring entrepreneurs who may have to spend

as well as *potential* entrepreneurs may be enticed into these quick profit ventures leaving fewer entrepreneurs for the private sector.[17] If we retain the assumption of a fixed stock of entrepreneurial skill, the increased government investment will draw away entrepreneurial skill to the public sector equal to what the private sector loses.[18] Taking the differential of Equation (6) we get,

$$I_p' \, d\epsilon_p = dA + dS - I_g' \, d\epsilon_g , \tag{7}$$

where a prime denotes the first derivative of the function. Utilizing the condition that $d\epsilon_g \equiv -d\epsilon_p$ and rearranging we have,

$$\frac{dS}{dA} = I_g' \, \frac{d\epsilon_g}{dA} - (1 + I_p' \, \frac{d\epsilon_g}{dA}). \tag{8}$$

The first term on the right side is the increase in government investment due to a dollar increase in foreign aid. By assumption, the magnitude of this term is at most unity. The second term in parentheses is obviously greater than unity. Hence, an increase in aid flow reduces national saving.

It is likely that a unit of entrepreneurial skill would organize a larger volume of government investment than private investment. The penalty of business failure in government enterprises being minimal, the management may spend more freely than an entrepreneur in the private sector. This would make I_g' greater than I_p' . Let $I_p' = \lambda I_g'$ where $0 < \lambda \leq 1$. Then Equation (7) reduces to

$$\frac{dS}{dA} = (1 - \lambda) I_g' \, \frac{d\epsilon_g}{dA} - 1 < 0. \tag{9}$$

As long as $\lambda < 1$, foreign aid substitutes for national saving only partially. Ironically, the smaller the value of λ , i.e., the more inefficient the public sector, the less would be the substitution of national saving by a given amount of foreign aid as fewer entrepreneurs will be drawn to aid-financed government projects.

III. Evidence

The main argument of this paper is that a developing nation's capacity to invest is limited by its entrepreneurial stock. A lack of sufficient investment in turn may restrict domestic saving should *ex ante* saving exceed investment. Hence, a more intense saving

large sums of money in perks and grafts to local and foreign officials to get a share of the aid money.

17. The proliferation of NGO activities does not leave any room for doubt that entrepreneurs are enticed into aid-induced activities. For the purpose of this paper NGO activities could be included in the public sector.

18. Management skill could also be subsumed under the rubric of entrepreneurial skill.

effort alone is unlikely to raise the level of gainful investment and saving. Any direct test of this hypothesis is not possible since entrepreneurship is not an observable variable. One could perhaps construct some proxies, such as the educational qualifications of the entrepreneurs or their business experience, but these would be open to analytical criticisms and also run into data problems. An indirect test that is only suggestive is reported below. The theory outlined above implies that an increase (decrease) in entrepreneurial skill would lead to a rise (fall) in investment and hence, saving.[19] If we can find countries that had a sudden change in the amount of entrepreneurial skill, that would offer an opportunity to test the theory. A reduction (or increase) in entrepreneurial skill should be accompanied or followed by a decline in investment and saving ratios if the hypothesis is correct. Two countries, viz. Bangladesh and Uganda, offer such an opportunity for an indirect test of the hypothesis.

At the time of the liberation war in 1971, the entrepreneurial class in Bangladesh comprised mostly people from the then West Pakistan and refugees of Non-Bengali origin who steadfastly sided with (West) Pakistan in their atrocious war against the Bengalis. Almost all of these entrepreneurs were either expelled or fled the country when Bangladesh emerged as a sovereign nation on December 16, 1971. This created a huge shortage of entrepreneurial skill leading to a chaotic situation in the business sector that wreaked havoc in the national economy. Such a shortage of entrepreneurial skill also meant that the capacity of the country to invest was severely limited. Investment declined very markedly after 1971 as shown in Table 2.[20] Domestic saving declined even more precipitously as the greater part of investment of the country was financed by a generous inflow of foreign aid that made domestic saving largely redundant. The country still suffers from a shortage of entrepreneurial skill.[21] Investment and saving are, therefore, still pitifully low.

Table 2 Investment and Saving Ratios of Bangladesh and Uganda

	Bangladesh		Uganda	
Year	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio
1970	17.40	16.65	13.83	17.02
1971	8.23	3.79	15.16	11.26
1972	4.7	−3.36	10.97	13.43
1973	8.71	3.40	8.20	11.39
1974	7.37	0.73	10.68	10.38

19. An exception to this would be the case where the government assumes the responsibility of investment in infrastructure, public utilities and business. However, if the public sector is not endowed with committed entrepreneurial management people, such investment would be inefficient. The capital-output ratio would tend to be high and productivity low. A high rate of investment and saving would not lead to a high rate of productivity and growth.

20. The unstable political condition, no doubt, also contributed to the lack of business investment during the initial years. What is suggested here is that saving and investment declined more than what could be attributed to political instability.

21. This is now being increasingly recognized in the country.

Table 2 (Continued)

	Bangladesh		Uganda	
Year	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio
1975	6.15	0.94	7.61	5.47
1976	9.91	−2.98	5.55	6.79
1977	11.52	6.18	7.78	2.88
1978	11.54	1.62	6.39	8.20
1979	11.20	1.52	6.05	−0.42
1980	14.87	2.11	5.62	−0.37
1981	15.90	3.44	7.34	1.01
1982	15.30	1.06	8.91	3.87
1983	13.36	1.20	7.56	5.35
1984	12.22	1.64	7.62	5.88
1985	12.78	1.88	9.78	6.92
1986	12.28	2.39	11.64	6.09
1987	12.53	3.58	10.46	3.91
1988	12.03	2.80	10.19	2.23
1989	12.23	1.99	11.21	−0.88
1990	12.08	2.20	12.01	−1.18

The government of the other country, Uganda, headed by Idi Amin, started a campaign in the early seventies to expel from the country people of Asian origin who held British passports. Asian business people at that time comprised a large proportion of the Ugandan entrepreneurial stock. Their expulsion must have caused a sudden depletion of this stock. The country's capacity to invest, therefore, also declined. As shown in Table 2, Uganda's investment ratio started a downhill slide at about that time. By 1977, it declined to about one-quarter of its level in 1972. The decline in investment went hand in hand with a sustained decline in domestic saving.

A more rigorous test of the model is performed with aggregate time series data of Bangladesh covering the period 1959-60 to 1994-95. As mentioned earlier, the country is believed to suffer from a shortage of entrepreneurial skill. Given that such skill is a limiting factor, there is a maximum amount of investment that can be made efficiently in any period. This amount can be financed from domestic saving and/or foreign aid. An increase in aid will displace some domestic saving if unaccompanied by at least a proportionate rise in entrepreneurial skill.[22]. Therefore, domestic saving may be inversely related to aid in such a situation. On the other hand, if aid supply remains constant, but the entrepreneurial stock increases with an increase in profitable business opportunities, investment will rise and the incremental investment will be financed by an increase in domestic saving. In this case there would be a direct relationship between domestic saving and investment.[23]

22. It is assumed that the capital-output ratio does not change. One of the ways unprofitable investment would show up is an increase in the capital-output ratio without any increase in labor productivity.

23. If the country permits free flow of capital, incremental saving need not bear any relationship to incremental

The standard consumer theory suggests that income is one of the most important determinants of household saving. In consideration of this and what has been discussed above, we posit the following linearized behavioral relationship:

$$GDS_t = a_0 + b_0 GDP_t + c_0 Aid_t + k_o GDI_t + u_t , \qquad (10)$$

where *GDS* = gross domestic saving, *GDP* = gross domestic product, *GDI* = gross domestic investment, *Aid* = foreign aid disbursement, u is a random error term and t is the time subscript. If the hypothesis advanced above is correct, the expected sign of b_0 and k_0 is positive while that of c_0 negative for a country with a limited entrepreneurial stock. Thus the significance of c_0 and k_0 provides a test of the hypothesis.

Data on these variables for the pre-independence period 1959-60 to 1969-70 have been adopted from Alamgir and Berlage (1974). Post independence data were gleaned from various issues of *Economic Trends* (Bangladesh Bank) and *Statistical Yearbook* (Bangladesh Bureau of Statistics). Since no reliable data exists for the period 1970-71 and 1971-72, that includes the liberation war, these years were dropped from the analysis. In interpreting the results the problems of missing observations should be borne in mind.[24]

Estimation of Equation (10) in levels suffers from a serious shortcoming. An OLS regression in levels could give spurious results since all the variables in the equation are generated by time series processes. To guard against this problem, it is necessary to test for the stationarity of the variables. Augmented Dicky-Fuller (ADF) test was performed on *GDS*, *GDI*, *Aid* and *GNP* in both levels and first differences. The results are presented in Table 3.

Table 3 ADF Test Results

	Level		First Difference	
Variable	ADF[1]	ADF[2]	ADF[1]	ADF[2]
GDS_t	−0.77	−0.91	−4.68**	−4.99**
GNP_t	2.21	0.11	−2.63*	−3.35*
AID_t	−0.67	−3.45*	−4.62**	−4.49**
GDI_t	−0.47	−2.58	−4.52**	−4.46**

Notes:

$$ADF^1 \text{ tests } H_0: \beta = 0 \text{ in } \Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{j=1}^{m} \gamma Y_{t-j} + \varepsilon_t \qquad (1)$$

$$ADF^2 \text{ tests } H_0: \delta = 0 \text{ in } \Delta Y_t = \theta + \delta Y_{t-1} + \sum_{j=1}^{m} \lambda Y_{t-j} + \rho t + \mu_t \qquad (2)$$

** and * indicate statistical significance at the 95, and 90 percent levels, respectively. The critical values for the ADF test can be found in MacKinnon (1991). Optimum lag length (m) in the ADF equation was chosen based on the Akaike's Final Prediction criterion.

investment.

24. The results obtained from the estimation of Equation (10) with only post-independence data are qualitatively similar to those reported below for the entire period.

These clearly show that all the series have unit roots. To confirm these findings, we also performed the Phillips-Perron tests (Phillips (1988) and Phillips and Perron (1988)). These results are presented in Table 4. Although half of the Phillips-Perron test statistics indicate that *Aid* and *GNP* are stationary, the other statistics show they have unit roots. For *GDS* and *GNP*, all the test statistics except one, $(Z(\rho_1))$, show that they have unit roots. Based on these tests we conclude that all the variables are first difference stationary. Hence, the cointegration approach is appropriate for estimation of the coefficients.

Table 4 Phillips-Perron Test Results

Variable	$Z(\tilde{\alpha})$	$Z(t_{\tilde{\alpha}})$	$Z(\Phi_3)$	$Z(\alpha^*)$	$Z(t_{\alpha^*})$	$Z(\Phi_1)$
GDS_t	−9.65	−1.97	2.61	−8.65	−1.75	1.65
GNP_t	−0.42	−0.16	2.14	1.32	2.05	19.44*
AID_t	−28.21*	−4.67*	11.12*	−1.64	−1.21	3.73
GDI_t	−20.75*	−3.77*	7.11*	−2.51	−1.06	1.33

Notes : Testing for the presence of a unit root with Phillips-Perron tests (Phillips (1988) and Phillips and Perron (1988)) involves estimating the following equations by OLS:

$$Y_t = \mu^* + \alpha^* Y_{t-1} + \varepsilon_t^*, \quad \textit{and} \tag{3}$$

$$Y_t = \tilde{\mu} + \tilde{\beta}\left(t - \frac{T}{2}\right) + \tilde{\alpha} Y_{t-1} + \tilde{\varepsilon}_t, \tag{4}$$

where ε_t^* and $\tilde{\varepsilon}_t$ are error terms and T is the sample size. Using the regression results of (3) and (4), we compute the following test statistics:

(1) $Z(\alpha^*) - H_0 : \alpha^* = 1$ in (3),
(2) $Z(t_{\alpha^*}) - H_0 : \alpha^* = 1$ in (3),
(3) $Z(\Phi_1) - H_0 : \mu^* = 0$ and $\alpha^* = 1$ in (3),
(4) $Z(\tilde{\alpha}) - H_0 : \tilde{\alpha} = 1$ in (4),
(5) $Z(t_{\tilde{\alpha}}) - H_0 : \tilde{\alpha} = 1$ in (4),
(6) $Z(\Phi_3) - H_0 : \tilde{\mu} = \tilde{\beta} = 0$ and $\tilde{\alpha} = 1$ in (4).

In each case, the H_0 that Y_t has a unit root is tested against the alternative that Y_t is stationary. Since these statistics are asymptotically equivalent to the corresponding Dickey-Fuller tests, the critical values from Fuller (1976) and Dickey and Fuller (1981) can be used in testing. * denotes statistical significance at the 95 percent level.

The Johansen and Juselius maximum likelihood method is utilized to test for the presence of cointegration between the variables in Equation (10). This is the preferred method since it is capable of identifying all cointegrating relationships in a multivariate context. Within this context Equation (10) could be written in the first difference vector autoregressive form:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \cdots + \Gamma_{k-1} \Delta X_{t-k-1} - \Pi X_{t-k} + \varepsilon_t \qquad (t = 1, \ldots, T) \tag{11}$$

where X is a column vector of the endogenous variables and Γ_i's are the parameter vectors. This equation differs from the standard VAR model by the presence of the last term

that is in levels rather than in first difference. This term contains information about the long run equilibrium relationship between the variables in X. If the rank of the Π matrix r is $0 < r < m$, then there are two matrices α and β each with dimension $m \times r$ such that $\alpha\beta' = \Pi$. The number of cointegrating relationship among the variables in the vector X is given by the value or r. The matrix β contains the elements of r cointegrating vectors and has the property that the elements of $\beta' X$ are stationary. The error correction parameters that measure the speed of adjustment in ΔX are represented by the vector α.

Before Equation (10) is tested for cointegration, the optimum lag length for the variables (i.e., k in Equation (11)) should be determined. To do this, the procedure outlined in Haffer and Jansen (1991) is adopted. Firstly, Equation (11) is estimated as an unrestricted model with k arbitrarily set equal to 5. The unrestricted model is then tested against a restricted model with $k = 4$ by a likelihood ratio test (distributed as χ^2 with 16 degrees of freedom in this case). The test was conducted sequentially by reducing the lag length by one each time. The procedure was repeated until the restriction could be rejected at 5% significance level. The value of k in the unrestricted model, when the restriction is rejected, is taken to be the optimum lag length for the model. The optimum lag length thus found for Equation (11) was 4. Having determined the optimum lag length we performed the trace test and the maximum eigenvalue test for the presence of cointegrating vectors. Both tests indicated the existence of only one cointegrating vector at the 5% significance level. The cointegrating vector normalized on *GDS* is presented in Table 5. While the coefficients of *GNP* and *GDI* are positive, that of *Aid* is negative. All the coefficients are statistically significant at 1% level. A highly significant negative coefficient of *Aid* suggests that aid and saving in Bangladesh bore a long run inverse relationship.

Table 5 Johansen-Juselius Cointegration Tests

Trace Test			Maximum Eigenvalue Test		
H_0			H_0		
$r = 0$	111.56*		$r = 0$	56.97*	
$r \leq 1$	54.59*		$r = 1$	36.57*	
$r \leq 2$	18.02*		$r = 2$	14.44*	
$r \leq 3$	3.57		$r = 3$	3.57	
Cointegration Vector Normalized on GDS_t					
Constant	GNP_t		AID_t	GDI_t	
−1777.98	0.188* (0.006)		−2.074* (0.056)	0.378* (0.044)	
Critical Values for Trace Test			Critical Values for Maximum Eigenvalue Test		
H_0	95%	99%	H_0	95%	99%
$r \leq 0$	47.21	54.21	$r = 0$	27.07	32.24
$r \leq 1$	29.68	35.65	$r = 1$	20.97	25.52
$r \leq 2$	15.41	20.04	$r = 2$	14.07	18.63
$r \leq 3$	3.76	6.65	$r = 3$	3.76	6.65

Notes: Critical values for the Trace test and the Maximum Eigenvalue test are from Table I, Osterwald-Lenum (1992). Figures in parentheses are standard errors. * indicates statistical significance at the 95 percent level.

Next, the direction of causality between saving and investment was examined by estimating an error correction model. The hypothesis we tested was that (due to the shortage of the entrepreneurial stock) investment was the limiting factor that constrained saving. This implies a causality running from investment to saving. On the other hand, if saving were the limiting factor, as believed by many, causality would run the other way. In a more mature economy one would expect a bi-directional causality. We tested this hypothesis by estimating an error correction model that involved regressing the first difference of *GDS* on the current and lagged first differences of all the explanatory variables, lagged values of ΔGDS and one period lagged residuals from the cointegrating regression. Granger causality implies that as long as two or more variables are cointegrated, a causality will exist in at least one direction. Testing for Granger causality requires testing whether the coefficient of the error correction term is significantly different from zero. Even if the coefficients of the lagged terms are not significant, Granger causality still exists as long as the adjustment coefficient is significantly non-zero (Choudhry (1995)). An important matter is the choice of the appropriate lag length used in the error correction model. Hendry's general to specific modeling strategy (Gilbert (1986)) is followed for this purpose. Error correction models with three lags in each variable were first estimated. The non-significant terms were then removed to obtain a more parsimonious model. The estimates of the error correction models are shown in Table 6. One model had ΔGDS as the dependent variable while the other had ΔGDI as the dependent variable. The statistical fit of both models was good with high R-squares. The F-test clearly rejected the non-significance of all the regressors in each model. Several diagnostic tests were conducted to check for the robustness of the models and functional stability. These tests did not reject the null hypothesis of no serial correlation, no ARCH effects, no functional misspecification, homoscedsticity, and the normality of residuals. CUSUM tests were employed to test for parameter stability. In both cases, the plots for the tests showed that at 5% level of significance the boundary lines were not breached, suggesting the absence of structural breaks during the sample period. The coefficient of the error correction term was significant only in the model with ΔGDS as the dependent variable implying that causality existed *only* in the direction from investment to saving. The significance of the error correction term suggests that ignoring the cointegrated nature of the relationship would lead to a misspecification of the dynamic relationship.

Table 6 Error Correction Model Regression Results

Variable	Dep. Variable = ΔGDS_t	Dep. Variable = ΔGDI_t
Constant	−163.46	388.03
	(−1.31)	(1.78)
EC_{t-1}	−0.74*	−0.24
	(−2.60)	(−1.24)
ΔGDS_t	-	0.48*
		(2.01)
ΔGDS_{t-1}	−0.23	0.08
	(−1.32)	(0.25)

Table 6 (Continued)

Variable	Dep. Variable = ΔGDS_t	Dep. Variable = ΔGDI_t
ΔGNP	-	0.22
		(1.56)
ΔGNP_{t-1}	0.23*	−0.07
	(−2.23)	(−0.45)
ΔGDI_t	0.38*	-
	(3.73)	
ΔGDI_{t-1}	-	−0.43*
		(−2.35)
ΔAID_t	−1.14*	-
	(−3.51)	
ΔAID_{t-1}	0.66	−1.84*
	(1.42)	(−2.23)
ΔAID_{t-2}	-	−1.20
		(−1.92)
ΔAID_{t-3}	-	−0.74
		(−1.34)

Diagnostic test statistics for ΔGDS_t					
$R^2 = 0.68$	$Q_{10} = 12.6$	$F = 9.34$	$Z_1 = 5.04$	$Z_2 = 0.71$	$Z_3 = 0.0$
$Z_4 = 1.64$	$Z_5 = 14.19$				
Diagnostic test statistics for ΔGDI_t					
$R^2 = 0.65$	$Q_{10} = 3.5$	$F = 4.47$	$Z_1 = 0.80$	$Z_2 = 0.05$	$Z_3 = 1.45$
$Z_4 = 0.63$	$Z_5 = 19.57$				

Notes: * denotes statistical significance at the 95 percent level. Figures in parentheses are t-ratios. EC_{t-1} is one period lagged error correction term, Q_{10} is the Ljung-Box test statistic for serial correlation, F-test tests the null hypothesis that all regressors as a group, except the constant, have zero coefficients, Z_1 is the Jarque-Bera test statistic for normality, Z_2 is the Breush-Godfrey test statistics for first order serial correlation, Z_3 is the Lagrange Multiplier test statistic for first order ARCH residuals, Z_4 is the Ramsey's RESET for functional misspecification and omitted variables (degree one), and Z_5 is the White test for heteroscedasticity.

The findings of the empirical analysis lend some support to the hypothesis advanced in the paper. The coefficient of the aid variable is negative and statistically highly significant. The magnitude of the coefficient of *Aid* in the long run cointegrating relation does raise some concern. It indicates that every dollar of aid coming into the country has depressed domestic saving by about twice that amount. Even if all aid were spent on consumption the coefficient should have been insignificant. Such a large value could be possible if aid had led to widespread rent-seeking and significant distortions in the economy. Casual observation would tend to support such a view.

The inverse relation between saving and aid was found to be a very robust relation that

held for several different specifications of the saving equation and for different sample sizes (although the coefficients differed in magnitude). There seems little doubt that aid had a large negative influence on saving in Bangladesh during the study period, and consequently did not significantly promote investment. It is, therefore, not surprising that aid has not played much of a positive role in the economic development of the country.

IV. Concluding Remarks

The inverse relation between saving and aid is well known in the literature. The arguments advanced to explain this phenomenon are usually based on such subjective factors as a lack of effort, government imprudence and profligacy due to an easy access to foreign saving. This paper suggests that a recognition of entrepreneurship as an important input in business can provide an additional/alternative explanation of why some countries show a relaxation of saving effort with an increase in foreign aid inflow. Effective utilization of such aid in these countries requires a concerted effort to develop local entrepreneurial and organizational talent. Domestic resource mobilization will no doubt substitute for, and reduce dependence on, foreign aid; but it may not raise investment unless the supply of entrepreneurship rises simultaneously. This appears to have been the case in recent years. At the behest of the donor agencies, the government made more earnest effort to raise domestic saving. The saving ratio rose, but the rise only compensated for the reduction in aid receipts as shown by the scissors shaped graph in Figure 1. Investment did not show a sustained increase.

It has been suggested that entrepreneurial talent in the early stages of development tends to be concentrated in only a handful of labor-intensive low-skill industries like garments the products of which are exported mostly to developed countries due to a lack of effective demand at home.[25] Hence, one of the way of quickly developing entrepreneurial skills in developing countries is to encourage the growth of such industries.[26] This requires not only appropriate domestic policies as emphasized by multilateral organizations, but also an international trade regime that permits the products of these industries to enter the markets of the developed nations relatively freely. The greatest harm that can be done to the development of entrepreneurship in, and the economic growth of, the poor countries of the world is the imposition of protective tariffs or non-tariff barriers by the rich nations. Indeed, freer access of products of poorer nations into the markets of the developed nations could substantially reduce the need for foreign aid of the former and hence, lessen the budgetary burden of the latter.

25. See Taslim (1995). Lall also sates that: "Where there is a modicum of skills, … simple labour-intensive activities will start …" (1996, p. 117). He further suggests that these skills need to be nurtured and improved upon, perhaps with government help, if more advanced business opportunities are to be exploited.

26. It may not be a mere coincidence that the East Asian NICs had a relatively free access to western markets in the early stages of development when they were producing mainly labor intensive low skill products.

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Table 1 Investment and Saving Ratios of Selected Countries (per cent)

	1970		1975		1980		1985		1990	
Country	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio	Investment Ratio	Saving Ratio
Nepal (US $150)	5.89	4.02	9.15	6.25	15.53	9.84	22.59	13.84	18.18	9.30
Bangladesh (US $170)	17.40	16.65	8.09	1.02	16.34	3.92	12.78	1.88	11.80	1.92
India (US $260)	17.40	16.65	20.83	19.40	23.60	20.14	25.60	22.47	23.17	20.39
Sierra Leone (US $280)	16.9	12.11	15.92	4.56	1.70	−0.32	10.14	8.91	11.46	5.07
Somalia (US $280)	11.72	6.60	18.23	4.15	16.09	4.01	26.31	−12.14	15.50	21.51
China (US $300)	28.50	28.71	30.33	30.56	30.63	29.55	38.68	34.46	39.08	42.61
Haiti (US $300)	6.51	3.76	14.88	5.58	14.20	5.44	14.38	6.12	10.93	1.09
Pakistan (US $350)	15.79	8.97	16.06	5.87	16.35	11.86	18.63	6.39	18.64	11.54
Kenya (US $420)	25.33	20.65	18.87	9.97	30.00	14.96	26.50	25.40	23.67	18.43
Uganda	13.83	17.02	7.56	5.33	6.10	−0.40	10.05	7.89	12.25	−0.70

Source: World Bank (1992), *World Tables*.