FINANCIAL DEEPENING AS A PREREQUISITE TO INVESTMENT GROWTH: EMPIRICAL EVIDENCE FROM FIVE EAST ASIAN ECONOMIES

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I. INTRODUCTION

A GOOD deal of literature in the last five years has been devoted to the role of money and capital markets in the development process ([15] [18], the entire *Journal of Development Studies,* Vol. 13, No. 2 [January 1977]). The most common approach by policy makers in the developing nations since World War II is best described as money and capital market "simulation," in which funds are raised through a wide variety of taxes and directed to investors through "development banks" at "below equilibrium" rates of interest. However, Ronald McKinnon and Edward Shaw suggested quite a different approach in 1973—in that such policies, however well motivated, were inherently inefficient, promoted the use of inferior technologies, repressed the development of genuine money and capital markets, and thereby limited growth in investment and real output.

Related approaches have been formulated on two fronts, which unfortunately have developed quite separately from each other. On the theoretical front Vicente Galbis [8] has compared the McKinnon-Shaw approach to the structuralist approach most often associated with Hollis Chenery. In another effort, Galbis [9] has offered a theoretical scenario for the liberalization school which is perhaps more closely attuned to the development landscape than the original works by McKinnon and Shaw, notably in the explicit recognition of technological and institutional dualism. Basant Kapur [13] investigated stabilization strategies associated with a prototype McKinnon-Shaw economy and found the deposit rate to be the most convenient policy instrument for short-run stabilization. In each case, however, the performance of investment aggregates and the performance of real financial aggregates (as measured, say, by the money supply in units of domestic output) are closely and positively linked.

On the empirical front, the contribution to real output of "financial deepening," defined as growth in the ratio of an appropriately deflated monetary aggregate to the level of real output, has been examined in two largely descriptive econometric efforts. In a cross-section study, Y. C. Jao [12] found some support for the McKinnon-Shaw hypothesis by regressing the growth rate in per capita real output on the growth rate of per capita real money balances and on the ratio of real money balances to real output. On the other hand, R. J. Bhatia and D. R. Khatkhate [2] found little or no support for the hypothesis in simple cross-country correlations between the ratio of real money balances to real output

or in the growth rates of real output or in the level of real output per capita. Their reasoning was that risk-averse intermediaries were biased in favor of foreigners with track records in business, and loans to indigenous entrepreneurs were avoided. Both the Jao and the Bhatia-Khatkhate studies, unhappily, used statistics in a purely descriptive fashion. M. J. Fry [7] tested the McKinnon hypothesis that investment-output ratio, other things being equal, increases the demand for money balances. He found no support for the hypothesis. But an effort by the present author (forthcoming) finds some support for the same hypothesis in a test run of selected Asian economies.

Here, I am applying an entirely different approach to the question of financial markets and development in five Asian economies: Korea, Taiwan, Thailand, the Philippines, and Malaysia. The model grows out of the two-gap heritage of Chenery-Bruno, but makes convenient use of a financial deepening argument. Estimation results suggest that financial performance, at least as measured in the money market, can make a substantial difference in capital formation and investment content of output. The second section modifies the traditional two-gap model for present purposes, and estimation results follow in Section III. A conclusion summarizes.

II. A MODIFICATION OF THE TRADITIONAL SAVINGS CONSTRAINED TWO-GAP MODEL

Isolating the effects of anything less than perfect intermediation on the workings of other markets is difficult in any macro model, be it of the developed or of the developing economy. Researchers frequently resort to simply adding financial aggregates to investment demand functions (see [1, pp. 90–98]), or they will even regress investment demand on savings aggregates [6, Chap. 8]. Such approaches at least recognize finance as a major determinant of ex post capital formation, even if the methods employed are not rigorous—the explanatory power of adding a financial aggregate to an investment function is only as good as the model's maintained hypotheses on transmission mechanisms. The researcher of developing economies has, however, at least one technique at his disposal which tries to wed capital formation to finance explicitly, without the necessity of assumptions regarding structure, in the form of the two-gap problem.

Unfortunately, in acknowledging that financial constraints bind growth, the two-gap approach assumes that variations in *domestic* financial aggregates can be safely ignored when estimating the parameters of a two-gap model, even while maintaining savings as an effective constraint on capital formation. The approach admits the possibility that intermediation does make a difference but does not allow measurement of its marginal contribution to capital formation by deleting variables which might account for variations in the intermediation component of the two-gap problem. Perfect intermediation does not preclude the existence of a savings-investment gap, but the omission of a financial aggregate as one of its determinants does preclude the possibility that insufficient intermediation, other things equal, could inhibit capital formation.

The two-gap literature is extensive (frequently cited are Chenery and Bruno [4], McKinnon [14], Stout [19] [20], Chenery and Strout [5], Strout [21]; more recent papers include Weisskopf [22] [23], Blomqvist [3], and Michalopoulous [16]). Assumptions on the nature of the developing economy sufficient to ensure the existence and independence of savings and trade gaps are (a) capital specificity and (b) insufficient technical substitutability in aggregate production between imported and domestic inputs. Rather than dealing with the sources of the two-gap problem, however, most of the literature offers other embellishments. In a paper attempting classification of economies as either saving or foreign exchange constrained, Weisskopf attributed investment performance to a moving average of net capital inflows and varying marginal propensities to save out of export and nonexport income. Another paper by Weisskopf and one by Blomqvist expanded on the classification problem.

In another approach, Michalopoulous [16] considered the issues of technical substitutability—see (b) above—asking whether substitutability was generally sufficient to cause a trade gap. Using Argentina as a case study he found that generally, the elasticity of substitution between domestic and imported inputs was higher than previously thought. The direction taken was rather different from that of Weisskopf and Blomqvist in the sense that Michalopoulous directly examined the trade gap source. Here, the intermediation problem is treated as a partial determinant of the savings gap.

For ease of reference, a simple two-gap model can be developed. Suppose that gross fixed capital formation is comprised of potential domestic savings and a fraction of net capital inflow that constitutes foreign savings whereby,

$$I_t = S^*_t + F^*_t, \tag{1}$$

where S^*_t is unobservable ex ante domestic savings, F^*_t unobservable ex ante foreign savings, and I_t gross fixed capital formation, each in period t. Ex post, where S_t represents realized domestic savings and F_t represents the realized capital inflow,

$$I_t = S_t + F_t, \tag{2}$$

so that

$$S_t + F_t = S^*_t + F^*_t. \tag{3}$$

Whenever $S_t < S^*_t$, we have $F^*_t < F_t$.[1] An increment in F_t, when $S_t < S^*_t$, is redundant in terms of changing gross fixed capital formation. On the other hand, when potential savings are fully utilized, and saving is an operative constraint, an addition to F_t can improve domestic investment considerably.

Within this model, money markets are not given any mechanism for more effective recruitment of savings or a more efficient channel of savings of entrepreneurs. The McKinnon-Shaw devotee, however, would hold that investment performance succeeds or fails according to the (real) performance of a monetary aggregate which represents money market activity. Where the traditional two-gap approach expresses ex post investment as the sum of potential domestic savings

and a fraction of the inflow of foreign capital, allowances for the liberalization approach require the inclusion of a monetary aggregate as a determinant of the gap between potential and actual savings.

If we suppose that increments in potential savings are some fraction, α, of increments in output-income and that the proportion of a given capital inflow channeled to the domestic capital market is γ, we have, in first differences,

$$\Delta I_t = \alpha \Delta Y_t + \gamma \Delta F_t , \tag{4}$$

where $\Delta S_t^* = \alpha \Delta Y_t$ and $\Delta F_t^* = \gamma \Delta F_t$. Incorporation of a monetary aggregate is appropriate if (4) is incomplete—that is if ΔI_t can vary, for given values of ΔY_t and ΔF_t, according to variations in money market activity, as measured by ΔM_t. Designating that portion of an increment in the money stock responsible for improved investment growth as δ, we have $\Delta M_t^* = \delta \Delta M_t$, and

$$\Delta I_t = \alpha \Delta Y_t + \gamma \Delta F_t + \delta \Delta M_t . \tag{5}$$

The additional assumptions of constancy for sample α, γ, and δ, and division by ΔY_t, with subsequent addition of a disturbance term, u_t, suggest

$$\left[\frac{\Delta I_t}{\Delta Y_t}\right] = \alpha + \gamma\left[\frac{\Delta F_t}{\Delta Y_t}\right] + \delta\left[\frac{\Delta M_t}{\Delta Y_t}\right] + u_t , \tag{6}$$

where $\Delta M_t / \Delta Y_t$ obviously resembles the McKinnon-Shaw indicator of financial deepening.

The estimation of an analogue to (4) and the parent model by which it is generated was treated in the Weisskopf and Blomqvist papers. Using a set of regressions which omitted a financial deepening shift variable, they attempted to show that a majority of thirty-three economies were classifiable as savings constrained. Though it will be argued below that Weisskopf and Blomqvist used a biased classification procedure, it is nevertheless useful to point out that none of the economies considered were classified as foreign exchange constrained. Taiwan, the Philippines, and Korea were unambiguously classified as savings constrained, while Thailand eluded classification (Malaysia was not considered). So on the basis of existing evidence there appears to be no difficulty in applying (6), which presumes an effective savings constraint, to any of the economies under consideration here.

The resulting estimates, $\hat{\alpha}$, $\hat{\gamma}$, and $\hat{\delta}$, are, respectively, the marginal savings rate, the marginal rate of foreign resource use, and the marginal tendency of increments in money stock to promote capital formation. The application of OLS should be sufficient, since variables are detrended and descaled by the division of ΔY_t. It is therefore reasonable to assume that u_t represents some zero-mean white noise, in which case OLS is optimal.[1]

[1] In fact, the stochastic heritage of (6) is somewhat dubious, since it consists of the ratios of first differenced series in relationship to each other. Frequently, it is assumed that such variables are produced by some parent stochastic process. I shall consider (6) as the process which generates $\Delta I_t / \Delta Y_t$ throughout the paper, however, partly for sheer convenience, and partly as a way around an even more dubious econometric exercise, that of

McKinnon, however, suggests that demand for money in the developing economy depends partially at least on the investment content of real output, a proposition produced by the "lumpiness" of investment outlays and the incomplete monetization of the economy [15, p. 59]. This suggestion implies that any increment in u_t, which directly increases $\Delta I_t/\Delta Y_t$, also causes an increases in $\Delta M_t/\Delta Y_t$. In that case u_t and $\Delta M_t/\Delta Y_t$ are positively correlated, and an instrumental variables estimator (IV, hereafter) spares the coefficient estimates of the inconsistency associated with OLS. In the absence of any final verdict on McKinnon's hypothesis, however, both OLS and IV estimates will be considered here.[2]

Another problem associated with estimating (6) revolves around the choice of a suitable monetary aggregate. In practice, M_1 may be too narrow a choice [15, Chap. 1] since it fails to accurately register the growth of institutions in the money market, M_2 may be more appropriate. Estimates using both are considered here. In addition, since development banks (which may be termed "quasi-private") are an active part of the official money market and give money holders an alternative instrument to genuinely private claims, another monetary aggregate will be considered here—that generated by the addition of deposits with development banks to the normally defined M_2. Let this new aggregate be M_*. In some instances, the use of M_* may be more advantageous than M_2, owing to preferential deposit rate allowances denied the privately generated deposits which comprise M_2. The choice of a monetary aggregate generally makes extremely small differences in coefficient estimates, however.

What does any given set of parameter estimates imply? An estimate of δ which is sufficiently positive to warrant rejection of the null hypothesis, H_0; $\delta = 0$, in favor of the one-sided alternative that δ is positive, suggests that investment growth is constrained by another gap operating in the financially regressed developing economy, that of insufficient intermediation. "Savings constrained" might well be divided into two further categories, "savings constrained due to insufficient intermediation" and its complement, "savings constrained for non-financial reasons." A strong entrepreneurial class presumably increases the likelihood that the economy will be in the former category, for in such an economy the other prerequisites of successful investment growth are present, thus ensuring that credit, rather than entrepreneurship, is the constraint on capital formation. At the other end of the spectrum, if $\hat{\delta}$ turns out to be significantly negative, intermediation will generate gaps. An argument by Bhatia-Khatkhate suggests that a significantly negative $\hat{\delta}$ is probably something other than a statistical fluke; intermediation could rechannel finance away from inexperienced indigenous

estimating entire macro-econometric models for each country.

However, it should be noted that first differencing does generate a disturbance which is intertemporally uncorrelated if the parent disturbance is a random walk (see Granger and Newbold [10]); division by ΔY produces a homoscedastic disturbance if the parent disturbance has a variance proportional to ΔY.

[2] See Prachowney [17, p. 82] for further justification. For instrumental variable estimation, $\Delta G/\Delta Y$ and $\Delta\pi/\Delta Y$ (where G represents real general government consumption and π the official exchange rate) were used as instruments for their obvious value as policy indicators.

entrepreneurs, though a more general explanation will be provided below. It is conceivable, however, that financial markets could function in this way—persistently denying the benefits to domestic investors of "learning by doing."

It should be noted that the omission of $\Delta M/\Delta Y$ as a variable in (6), if it in fact belongs, generates bias in the remaining coefficient estimates. The inclusion of $\Delta M/\Delta Y$ in (6), if irrelevant, renders the remaining coefficient estimates unnecessarily inefficient. In Alan Strout's study done on the Korean economy [21], the marginal savings rate was estimated at 39 per cent in a regression where $\Delta M/\Delta Y$ was omitted as a variable. In the following results, this estimate will be revised downwards considerably. If the McKinnon-Shaw argument is applicable to Korea, Strout's estimates of the Korean savings rate would be biased upwards, attributing successful capital formation to a savings record which did not exist. If, on the other hand, the McKinnon-Shaw argument is not applicable, the estimates of the Korean savings rate presented in this study are provided with inefficient (though *unbiased*) estimators.

Finally, although the estimation of (6) can explain the degree to which financial deepening contributes to investment growth, given potential savings, and actual foreign capital inflows, no attempt is made here to explain variations in $\Delta M/\Delta Y$. Rather, this paper is directed towards analyzing the effects of $\Delta M/\Delta Y$ on $\Delta I/\Delta Y$, given that changes in $\Delta M/\Delta Y$ do occur.

III. OLS AND IV RESULTS

OLS and IV estimates were made from data in IMF, *International Financial Statistics: Supplement* (May 1977), covering essentially the entire post-Korean War period (1953–76). Additional data were obtained from subsequent issues. The variable F is defined as the annual amount by which imports exceed exports.

For the period under consideration, the sample mean of $\Delta I/\Delta Y$ was highest for Malaysia, at 0.6908, and lowest for the Philippines, at 0.0563. Between the extremes were Korea, 0.4955, Taiwan, 0.3520, and Thailand, 0.2878. It should be kept in mind that these figures represent the ratio of first differences rather than simple averages. For the variable $\Delta F/\Delta Y$, sample means were 1.3923 for Malaysia, 0.1274 for Korea, 0.0681 for Thailand, 0.0530 for Taiwan, and -0.1380 for the Philippines. While cross-country sample means for $\Delta I/\Delta Y$ and $\Delta F/\Delta Y$ exhibit substantial variation, sample means for $\Delta M/\Delta Y$ (using M_2 as the monetary aggregate), were quite similar, ranging from 0.5321 for Korea to 0.3132 for Taiwan. Estimates of coefficients for each country were generated by applying both OLS and IV for the three monetary aggregates mentioned above.

OLS estimates are provided in Appendix Tables I, II, and III. Appendix Table I presents results from estimates generated with the use of M_1 as the monetary aggregate, Appendix Table II uses M_2, and Appendix Table III uses M_*. Generally, the broader the monetary aggregate, the smaller the associated estimate of the marginal savings rate for each country. Taiwan and Malaysia regressions provide slight exceptions. The estimate for α dropped from 16 per

cent to −4 per cent for Korea when M_1 was replaced by M_2, for example.[3] The estimates for Thailand were 29 per cent (with M_1), 31 per cent (with M_2), and 22 per cent (with M_*). For the Philippines, the estimates were 27 per cent, 20 per cent, and 17 per cent. But the changes for Taiwan were from 10 per cent (M_1) to 17 per cent (M_*), and for Malaysia from 54 per cent (M_1) to 63 per cent (M_*). The vast majority of t-statistics were in excess of 2.50, and strengthened by the use of broader monetary aggregates for Malaysia and Taiwan. For the other countries in the sample, the t-statistics slightly weakened. Coefficient estimates for $\Delta F/\Delta Y$ suggest that the Philippines, Taiwan, and Thailand made the greatest marginal use of foreign resources for capital formation (though the sample values of $\Delta F/\Delta Y$ were numerically highest for Korea and Malaysia). Generally, the broader the monetary aggregate, the larger numerically the coefficient estimate for $\Delta F/\Delta Y$.

Evidence regarding the role of intermediation in the capital formation process is provided by the t-statistics associated with $\hat{\delta}$, the estimated coefficient of $\Delta M/\Delta Y$. Appendix Tables I to VI indicate the level of confidence at which the null hypothesis can be rejected in each case. On the basis of OLS estimates alone, it appears that intermediation was an effective constraint on investment growth in Taiwan and Korea, but was gap-generating in Malaysia.

The signs of the coefficients were always positive for Korea and Taiwan (respectively, using M_1: 0.8983 and 1.2032; using M_2: 1.0280 and 0.4990; using M_*: 0.4260 for Taiwan) with strong supporting t-statistics (exceeding 5.90 in all cases). For Thailand and the Philippines, signs were usually negative, with one insignificant exception, ranging from −0.4184 to 0.0078. The strongest t-statistic recorded, however, was merely 1.8670. For Malaysia, all signs were negative, ranging from −0.7412 to −0.4503, and the t-statistics were strong, going to a high in absolute value of 4.0962.

Generally, the broader the monetary aggregate, the smaller the absolute numerical value of the estimated coefficient. Some t-statistics grew larger (Malaysia), while some diminished (the Philippines).

Instrumental variable estimates, incorporating McKinnon's suggestion on demand for money, are provided in Appendix Tables IV, V, and VI (using M_1, M_2, and M_*, respectively), and are qualitatively the same as those provided by OLS. Again, Korea and Taiwan are the countries that have made maximum use at the margin of their financial growth. The IV estimates for Korea were virtually the same as those provided by OLS when M_1 was used as the monetary aggregate. When M_2 replaced M_1, the coefficient estimates associated with $\Delta M/\Delta Y$ grew numerically larger and the estimated marginal savings rate decreased. Virtually the same thing happened for the Taiwan regressions when M_1 was used for the monetary aggregate, but coefficient estimates provided by IV for $\Delta M/\Delta Y$ fell when M_2 was used. When M_* replaced M_2, the coefficient estimate rose to its former levels, and the estimated marginal savings rate fell to 9 per cent. In all cases, associated t-statistics exceeded 4.50.

[3] An insufficient series for Korea was available to generate M_*.

The use of an IV estimator made virtually no difference for the Malaysia regressions, and the same was true for the Thailand regressions, except that the results deteriorated somewhat when M_* was the monetary aggregate in that the marginal savings rate was considerably overstated (estimated as 94 per cent). This deterioration indicates either that the McKinnon hypothesis does not hold for Thailand, or that M_* is not an appropriate monetary aggregate. The Philippine regressions, however, gave further support for the liberalization argument when IV replaced OLS as the estimation technique. When M_1 and M_* were used as the monetary aggregates, the estimated marginal savings rates fell to 6.4 and 7.5 per cent (where the OLS estimates had been 27 and 17 per cent), and the estimated coefficient for $\Delta M/\Delta Y$ ranged from 67 to 70 per cent (where the OLS estimates had been -42 and -2 per cent). When M_2 was used as the monetary aggregate, however, the regression fared poorly, perhaps suggesting that M_2 is not the appropriate monetary aggregate. A case can be made, however, for the supposition that if McKinnon's suggestions on demand for money are valid, the Philippines may have benefited from intermediation in much the same way as Korea and Taiwan. This particular result, however, is contingent on McKinnon's hypothesis.

What both OLS and IV estimation do suggest is that the inclusion of a variable like $\Delta M/\Delta Y$ can make a substantial and systematic difference in regressions run for a given country. Of the sixteen regressions produced in Appendix Tables I through VI for Korea, Taiwan, and Malaysia, no fewer than twelve instances have the coefficient associated with $\Delta M/\Delta Y$ earning an estimate higher in absolute value than any other variable in the regression, constant term included. More important, perhaps, is the fact that the null hypothesis for $\hat{\delta}$ is invariably rejectable. On these grounds, the omission of a variable like $\Delta M/\Delta Y$ is difficult to justify, and its apparent influence impossible to dismiss. Variations in financial performance appear to be an important factor in explaining the level of investment growth. It also follows that omission of $\Delta M/\Delta Y$ as an explanatory variable biases remaining coefficient estimates, namely, those of the marginal savings rate and the marginal contribution of foreign resources. The degree of bias is associated with the magnitude of the coefficient of $\Delta M/\Delta Y$ such that the higher the δ value, the greater the probability of overestimating the marginal savings rate, thus falsely attributing investment performance to a marginal savings propensity which does not, in fact, exist. (As a special case, estimates of remaining coefficients are unbiased only if the true value of δ is zero). If intermediation does make a difference, it is useless to assume that it automatically channels savings to most efficient use. The omission of $\Delta M/\Delta Y$ can be legitimate only if intermediation is perfect, in which case its effects can safely be ignored.

IV. CONCLUSIONS

Following the development of the model and its estimation, it appears that of the five economies considered in this study, Korea and Taiwan benefited most dramatically (in capital formation) from the sort of enriched money market

activity which was financially deepening. This result is supported by both OLS and IV estimations. It follows also that previous studies overestimated Korea's and Taiwan's marginal savings by omitting an intermediation variable when explaining investment growth.

It is probably no accident that of the sample countries considered here, Korea and Taiwan have the strongest classes of indigenous entrepreneurs. Economies with agents who possess entrepreneurial skills may have investors who lack only credit to undertake successful investment projects, and therefore benefit from increased money market activity in the financial deepening sense. For such economies, it can be argued that intermediation, rather than savings or foreign exchange, is the binding constraint on investment growth, and that such economies therefore fit the definition of "financially repressed," in the sense that improved intermediation, ceteris paribus, would be sufficient to raise the investment content of real output.

For Malaysia, the effects of financial deepening may be quite the reverse. Intermediation may tend to channel resources in other directions, perhaps, as Bhatia-Khatkhate suggest, because risk-averse intermediaries are biased against indigenous entrepreneurs. More generally, it may be that the lack of a strong entrepreneur class makes investment performance a function of intervention in financial markets,[4] whereupon liberalization shifts the investment content of output back to its lower steady state value.

There is nothing in the results here to suggest that Thailand is savings constrained due to insufficient intermediation, but the Philippines' case is harder to classify, and appears contingent on McKinnon's hypothesis. If McKinnon is correct about the demand for money in the developing economy, OLS estimates are biased, and the IV results should be employed in classifying the Philippines. On the basis of IV results, the Philippines appear to be classifiable as savings constrained due to insufficient intermediation. If McKinnon is wrong, IV estimators are uncalled for and OLS results ought to be employed in classifying the Philippines. But on the basis of OLS results, the Philippines do not appear to be classifiable as savings constrained for financial reasons. It is worthwhile to note that conclusions on Korea, Taiwan, and Malaysia are not contingent on the validity of McKinnon's hypothesis, since both OLS and IV estimators provide the same evidence.

The implication of results for Malaysia is, of course, that financial liberalization may not steer a developing economy to higher steady state levels of output and capital formation. The key to the benefits of liberalized intermediation is whether or not credit, rather than savings, foreign exchange, or entrepreneurial skills, is the binding constraint on capital formation.

As a final empirical note, it is reasonable to ask whether or not the inclusion of a monetary aggregate in a model like that considered by Blomqvist and Weisskopf might have produced a different set of classifications for the thirty-three economies they examined. More specifically, it is easily argued that their

[4] The Philippines usury laws are an example.

results are inconclusive due to a specification bias which overstates saving performance for economies classifiable as financially repressed, and understates saving performance for others. A more complete classification procedure than any developed thus far may be necessary before classification problems can be confidently dealt with.

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APPENDIX TABLE I

OLS ESTIMATES WITH M_1 AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea, 1954–77	0.1628	0.2074	0.8983[a]	0.8107	1.8409	0.0831
	(1.5309)	(1.0351)	(6.1214)			
Taiwan, 1954–76	0.0959	0.5293	1.2032[a]	0.6838	1.7122	0.0959
	(0.9086)	(3.2800)	(6.5268)			
Thailand, 1953–76	0.2856	0.6602	−0.2786[d]	0.5074	1.6508	0.1007
	(3.5078)	(4.3264)	(1.8387)			
Philippines, 1953–77	0.2650	0.7890	−0.4184[e]	0.9402	2.1015	0.0100
	(3.0930)	(6.9539)	(1.6480)			
Malaysia, 1955–76	0.5357	0.1957	−0.7412[d]	0.5651	2.2568	0.1125
	(2.9250)	(4.8347)	(1.7265)			

Source: IMF, *International Financial Statistics: Supplement,* May 1977.

Notes: 1. Figures in parentheses are the absolute values of t-statistics, as estimated.
2. R^2, DW, SE refer to usual interpretations. R^2 unadjusted for degrees of freedom.
3. Each regression was run under the assumption that the disturbance was a zero-mean white noise, uncorrelated with explanatory variables.
4. The only DW statistics throughout the tables to cast doubt on the nature of the disturbance term are those for Thailand in Appendix Tables II, IV, V, and VI, and for Korea in Appendix Table II. The test for zero autocorrelation in these instances is inconclusive, however. For all other cases, the null hypothesis is acceptable at a confidence level of 95 per cent.
5. Letters superscripting coefficient estimates for $\Delta M/\Delta Y$ indicate that rejection of the null hypothesis in favor of a one-sided alternative is warranted at a confidence level of a=0.995, b=0.990, c=0.975, d=0.950, e=0.900, and f=0.750.

APPENDIX TABLE II

OLS ESTIMATES WITH M_2 AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea, 1954–77	−0.0487	0.3994	1.0280[a]	0.8856	1.5315	0.0810
	(0.5144)	(2.4281)	(8.6650)			
Taiwan, 1954–76	0.1582	0.7078	0.4990[a]	0.6763	2.0459	0.0938
	(1.5280)	(3.8348)	(6.4147)			
Thailand, 1953–76	0.3080	0.5981	−0.1484[f]	0.4544	1.4965	0.1016
	(3.1272)	(3.3871)	(1.0057)			
Philippines, 1953–77	0.1985	0.9445	−0.0252[f]	0.9336	2.3322	0.0117
	(2.5725)	(16.1767)	(0.6876)			
Malaysia, 1955–76	0.6192	0.2474	−0.5434[a]	0.7377	2.1363	0.0757
	(4.3287)	(7.1006)	(4.0962)			

Source: See Appendix Table I.
Note: See Appendix Table I.

APPENDIX TABLE III

OLS ESTIMATES WITH M_* AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea—insufficient series available						
Taiwan, 1954–76	0.1723	0.6861	0.4260[a]	0.6411	2.0638	0.0989
	(1.5866)	(3.5297)	(5.9281)			
Thailand, 1963–76	0.2228	0.8296	0.0078[d]	0.6520	2.5820	0.0843
	(2.9208)	(3.1554)	(1.8670)			
Philippines, 1954–74	0.1725	0.9388	−0.0238	0.9352	2.0214	0.0117
	(2.0788)	(15.6818)	(0.6323)			
Malaysia, 1955–75	0.6317	0.2392	−0.4503[a]	0.7322	1.9201	0.0810
	(4.3382)	(6.9783)	(4.0086)			

Source: See Appendix Table I.
Note: See Appendix Table I.

APPENDIX TABLE IV

INSTRUMENTAL VARIABLE ESTIMATES WITH M_1 AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea, 1954–77	0.1935	0.1129	0.8138[a]	0.8075	1.8649	0.0835
	(1.7746)	(0.5344)	(5.1534)			
Taiwan	−0.0608	0.9101	1.9232[a]	0.4426	1.9461	0.1211
	(0.3994)	(3.4743)	(5.2355)			
Thailand	0.2726	0.5723	−0.1548[f]	0.4918	1.4942	0.1301
	(3.2618)	(3.2682)	(0.8064)			
Philippines, 1953–77	0.0643	1.2171	0.6708[f]	0.8852	2.5704	0.0371
	(0.4342)	(4.9504)	(1.1257)			
Malaysia, 1955–76	0.7899	0.2644	−2.9495	0.2046	2.6153	0.1719
	(2.5145)	(3.6656)	(2.2969)			

Source: See Appendix Table I.

Notes: 1. Each regression was run under the assumption that the disturbance was a zero-mean white noise, correlated with $\Delta M/\Delta Y$. Instruments used included $\Delta G/\Delta Y$ and $\Delta\pi/\Delta Y$, where G and π represent real general government consumption and the official exchange rate.

2. See also notes 1, 2, 4, 5, under Appendix Table I.

APPENDIX TABLE V

INSTRUMENTAL VARIABLE ESTIMATES WITH M_2 AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea, 1954–77	−0.3500	1.0688	1.6030[a]	0.7512	1.7265	0.0911
	(1.6418)	(2.4723)	(4.5325)			
Taiwan, 1954–76	0.0764	1.0418	0.0736[a]	0.5644	2.2289	0.1078
	(0.6162)	(4.1920)	(5.9221)			
Tailand, 1953–76	0.3036	0.5865	−0.1357[f]	0.4542	1.4825	0.1419
	(2.9280)	(2.9923)	(0.7781)			
Philippines, 1953–77	0.9368	0.3853	−1.7528	0.6515	2.8879	0.0249
	(0.1914)	(0.1094)	(0.1568)			
Malaysia, 1955–76	0.6828	0.2755	−0.7481[a]	0.7030	1.9492	0.0809
	(4.4004)	(6.9934)	(4.3680)			

Source: See Appendix Table I.

Note: See Appendix Table IV.

APPENDIX TABLE VI

INSTRUMENTAL VARIABLE ESTIMATES WITH M_* AS THE MONETARY AGGREGATE

Country, Period	Coefficient Estimates of			Summary Statistics		
	Constant	$\Delta F/\Delta Y$	$\Delta M/\Delta Y$	R^2	DW	SE
Korea—insufficient series available						
Taiwan, 1954–76	0.0900	1.0383	0.6152[a]	0.5167	2.2856	0.1105
	(0.6935)	(3.9738)	(5.6222)			
Thailand 1963–76	0.9442	3.8297	−0.1047	0.3007	1.3720	0.1994
	(0.2026)	(0.1981)	(0.1451)			
Philippines, 1955–75	0.0750	1.1670	0.6995[f]	0.8452	2.1439	0.0714
	(0.4627)	(4.0420)	(0.8459)			
Malaysia, 1955–75	0.7060	0.2664	−0.6351[a]	0.6919	1.6294	0.0835
	(4.4137)	(6.8507)	(4.2891)			

Source: See Appendix Table I.
Note: See Appendix Table IV.