MACROECONOMIC ADJUSTMENT AND PRIVATE INVESTMENT IN INDONESIA IN THE EIGHTIES

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A marked pattern in the adjustment process in the 1980s has been the inability of many developing countries to sustain investment rate. The same goes for Indonesia. Changes in policy during the period 1981-1988 in Indonesia have lowered the total amount of capital formation.

To assess the impact of those policy changes whose impact can in fact be quantified, a simple model of Indonesia's private investment behavior has been developed which is essentially a variant of the flexible accelerator model adapted to incorporate some of the policy variables expected to affect Indonesia's private investment during the adjustment process. More specifically, this study concentrated on government's investment policies from a macroeconomic point of view.

The results show that the government's policies had a marked impact on private investment behavior in Indonesia during the sample period. In other words, changes in government policy are responsible for Indonesia's private investment behavior during the eighties.

1. Introduction

Since 1981, Indonesia has been adversely affected by an external development which is the sharp decline in oil prices. After achieving a peak in 1982/83, the price began to slide steadily until 1985, and then collapsed in 1986; it recovered during 1987, before dipping again in 1988.

The impact of the sharp decline in oil prices on Indonesia's macroeconomy may be quantified in three ways. First, with oil and liquid natural gas (LNG) exports accounting for two-thirds of Indonesia's merchandise exports, the recent fall in oil prices has brought about a large decline in export revenues. The decline amounted to Rp3.3 billion, which is equivalent to about one-half of the country's non-oil export earnings, or 3 percent of the 1985/86

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real GDP, and then Rp3.5 billion, equivalent to about two-fifths of the country's non-oil export earnings, or 3.6 percent of the 1986/87 real GDP. Second, the decline in oil earnings has an adverse impact on government budgetary revenues. A useful benchmark in this context is the level of revenue inflows in the official budget for 1986/87. The total revenues from oil and LNG were about Rp9.8 trillion, 43 percent less than the previous year's. Government savings (the difference between its own revenues and current expenditure) in 1986/87 fell dramatically by about Rp4.7 billion, equivalent to 5 percent of the 1985/86 GDP. The government became the major source of demand for foreign savings, and therefore it became the major source of imbalance in the external sector. Third, the oil price collapse has also led to a deterioration in Indonesia's terms of trade. By 1982/83, Indonesia's current account deficit had widened to US$7.3 billion, compared with US$2.7 billion in the preceding year.

The losses from falling oil prices were intensified by the adverse effect of international currency fluctuation on debt service payments since 1985. The combination of lower oil prices and the adverse effects of international currency fluctuation has seriously eroded the country's resource position.

In cognizance of this situation, with the prospects for oil prices being highly uncertain both in the short- and medium-term, the Government has undertaken macroeconomic adjustments through fiscal and monetary policy, exchange rate management and some deregulation measures to ensure stability in the balance of payments and the government budget, and to pave the way for a recovery of economic activity when the resource constraints begin to ease.

However, like many other developing countries (see Chiber and van Wijnbergen, 1980), this adjustment process has made Indonesia's economy unable to maintain its investment rate. Indeed, through coordinated monetary and fiscal policies, realistic management of the exchange rate, and a series of deregulation measures in several sectors, Indonesia's economy succeeded in coping well with external challenges in 1987/1988 but, this has inevitably been accompanied by corresponding costs in the form of reduced public and private investment.

It can be concluded, therefore, that the changes in policy regimes in key areas during the period 1981-1988, due to the

external shocks to the economy, constituted the macroeconomic environment of Indonesia's private investment behavior in the eighties.

To assess the impact of those policies whose impact can in fact be quantified, this study will develop a simple model of private investment which is essentially a variant of the flexible accelerator model adapted to incorporate some of the institutional and structural characteristics of Indonesia's economy during the period under study.

Put simply, the main purpose of this study is to examine analytically how those changes in macroeconomic policies have influenced private investment in Indonesia during the eighties. Thus, this study concentrates on government's investment policies from a macroeconomic point of view.

It should be noted that in considering the various determinants of private investment in Indonesia, attention is paid not only to the theoretical significance but also to the availability of data.

The next section sets up the model of determination of private investment used for conducting the empirical analysis. Section 3 presents the estimation results. Finally, in Section 4 the summary and conclusions are presented.

2. Private Investment Model: Indonesia, 1981-1988

2.1. Theoretical Preliminaries

The model used to explain the behavior of Indonesia's private investment in this study is presented in this section including the variables designed to capture the constraint and structural characteristics that typically applied to Indonesia's economy during the macroeconomic adjustment.

Before turning to the mathematical formulation of the model, some theoretical grounds in developing the model can be made regarding the determinants used in the model.

There are several channels through which macroeconomic adjustment policies can affect private investment.

First, restrictive monetary or credit policies aimed at reducing the current account deficit may affect investment through the rise in the real cost of bank credit, and through the increase in the opportunity cost of retained earnings. Both are important sources of investment in developing countries due to the higher real interest rate (Serven and Solimano, 1989). In a repressed financial market, credit policy affects investment directly through the stocks of credit available to firms with access to preferential interest rates and through interest rates for firms operating through the unofficial money market (van Wijnbergen, 1983 and 1983a).

Second, fiscal adjustment, in the form of reduced public investment, some of whose components may be complementary or substitutable with private investment, can affect private investment. Blejer and Khan (1984) and Musalem (1989) in their study on developing countries find evidence of complementarity between private and public investment while Balassa (1988) shows that public and private investment are negatively correlated, with a one percent increase in public investment being associated with a 0.55 percent decline in private investment.

Finally, a real depreciation may affect investment through the profitability of investment through its impact on the relative price of capital in the economy. Buffie (1986) shows that if capital goods have an import content, then a devaluation raises the supply price of capital in terms of home goods; *ceteris paribus*, this effect tends to depress investment in the home goods sector. The empirical confirmation of the presumption that a real depreciation reduces investment (in the short run) is provided by Musalem (1989) and by Chiber and Shafik (1989). Their conclusion is that, in the short run, devaluation hurts private investment because higher real import costs for capital and intermediate goods limit private sector profitability.

2.2 The Model

Gross private investment, I_p is defined as equal to net investment plus depreciation of the previous capital stock:

(1) $I_t = (K_t - K_{t-1}) + dK_{t-1}$

where d stands for the proportional rate of depreciation. Applying the lag operator, equation (1) can be written as:

(2) $\quad I_t = [1 - (1 - d) L] K_t$

As in many other accelerator models, the desired private investment in this model is assumed as a linear function of expected output

(3) $\quad K^*_t = a Y^e_t$

where K^* is the capital stock that the firm wishes to have in place in future periods, Y^e is the corresponding expected level of output, and a is the coefficient of investment response to the rate of expected output.

To work with expected values for output we will use the relationship between actual and expected value arising from the adaptive expectation hypothesis, that is

(4) $\quad Y^e_t = Y^e_{t-1} + B(Y_{t-1} - Y^e_{t-1})$

where Y^e_t denotes the expected output, Y_t, the actual output, and B, the adjustment coefficient; and the rational expectation

(5) $\quad Y^e_t = Y_t + u_t$

where Y_t denotes the actual output at time t, and Y^e_t is expected output at t given all the relevant information of past variables available at time $t-1$, and u_t is the disturbance term. Stepwise regression is used, so the variables retained in the equation are only those which are jointly significant at the 5 percent level.

Since it takes time to plan, build and install new capital, firms can not adjust their capital stocks to the long-run desired level instantaneously. This lag in the adjustment of actual investment can be introduced through a partial adjustment mechanism:

(6) $\quad I_t - I_{t-1} = B(I^*_t - I_{t-1})$

where I_t is the actual private capital stock; I_{t-1} is the capital stock at the end of last period; $(I_t - I_{t-1})$ is net private investment; and B is the coefficient of adjustment.

The speed at which private investment responds to the gap between desired and actual investment, as measured by B, depends

in this formulation on: (1) credit availability, (2) the cost of borrowing, (3) import constraint, and (4) the public sector investment.

To incorporate all these effects, the adjustment coefficient is specified, in a way similar to Blejer and Khan (1984), as:

$$(7) \quad B_t = b_o + \frac{1}{(I_t^* - I_{t-1})}(b_1\,CA_t + b_2\,IC_t + b_3\,R_t + b_4\,GI_t)$$

This equation states that all policy variables affect the level of desired capital stock indirectly through the time structure of investment process, B_t, rather than directly.

Substituting equation (7) into (6), and then (2) into the resultant equation, that is (8), we have equation (9)

$$(8) \quad I_t - I_{t-1} = [b_o + \frac{b_1\,CA_t + b_2\,C_t + b_3\,R_t + b_4\,GI_t}{(I_t^* - I_{t-1})}]\,(I_t^* - I_{t-1})$$

$$= b_o\,(I_t^* - I_{t-1}) + b_1\,CA_t + b_2\,IC_t + b_3\,R_t + b_4\,GI_t$$

$$(9) \quad = b_o\,([1 - (1-d)\,L]K_t^* - I_{t-1}) + b_1\,CA_t$$
$$+ b_2\,IC_t + b_3\,R_t + b_4\,GI_t$$

and, by substituting (3) into (9) we obtain

$$(10) \quad I_t = b_o a\,[1 - (1-d)\,L]\,Y_t^e + b_1\,CA_t + b_2\,IC_t$$
$$+ b_3\,R_t + b_4\,GI_t + (1 - b_o)\,I_{t-1}$$

where CA is credit availability, IC is import constraint, R is real interest rate, and GI is real investment by government. In estimating equation (10) we would expect the coefficient b_1 to be positive, b_2 would be negative, b_3 would be negative, and b_4 would be negative if private and government investment are substitutes, and positive if they are complementary.

3. Empirical Results and Policy Implications

The model developed in this study was tested on annual basis during the period 1975-88 by using ordinary least squares (OLS)

method. Two approaches have been used to measure expected output, namely: the adaptive expectation and the rational expectation. The estimated results under alternate specifications are presented in Tables 1 and 2.

The results, first of all, show that the fit of the equation under adaptive expectation can be considered better than others because with the same explanatory variables the adjusted R^2 is higher. Now we will focus our attention on all of the policy variables.

The results show that the real interest rate emerges as the most important explanatory variable in all of the equations. Clearly, the real cost of borrowing exerts a highly significant influence on private sector investment in Indonesia during the sample period. Thus, the results accept the hypothesis that the high real interest rates in Indonesia have been an important factor behind the somewhat lackluster performance of private sector investment. The most plausible explanation in the Indonesian context for the higher real lending rates is that these are a reflection of the deregulation of domestic interest rate to restrain capital flight and to increase private savings, particularly after the oil-era, through positive real interest rate, and the efforts of government to maintain the low budget deficit, which has helped to contain inflation.

The coefficient of credit availability is never significant and it has an unexpected negative sign in equations (1) and (2) under rational expectation. This insignificant effect may be due to its correlation with real interest rate. The fact that there is financial liberation supports this. Besides, it should be noted that the definition of the domestic credit in Indonoesia is indeed somewhat complicated by the existence of a dual financial market up to 1983 due to the intervention of government in the capital market. The analysis of such policies is beyond the scope of this study.

In equations (2), (4), (6), and (8) we separate the components of credit availability and then estimate the independent effects of the different categories. The results show that the separation of DC and FIC surprisingly does make a significant difference in the gooodness of fit of the equation which indicates that both of the variables exert their influences on private investment independently. The results under equation (8) also show that the coefficient of FCI is significant. This may be because the domestic capital formation is crowded out by foreign investment in the competing industries

Table 1 - Estimates of Private Investment Equations

Equation	Constant	YE	CA	DC	FCI	R	IC	GI	P(-1)	DUM	$\bar{R}^2$	D-W
Rational Expectations												
(1)	0.42***	0.03	-0.09			-0.50***	-0.001	-0.02	-0.91*	0.03	0.37	1.48
	(3.40)	(1.05)	(0.40)			(-3.22)	(-1.21)	(-0.06)	(-3.28)	(0.89)		
(2)	0.35***	0.03		-0.05	-1.57	-0.52***	-0.0004	0.15	-0.74***	0.01	0.60	1.85
	(2.68)	(0.95		(-0.21)	(-0.57)	(-2.98)	(-0.57)	(0.29)	(-2.58)	(0.44)		
Adaptive Expectations												
(3)	0.04	0.54*	0.07			-0.51**	-0.003	0.57	-0.84	0.11*	0.53	2.83
	(0.41)	(1.70)	(0.30)			(-1.97)	(-1.52)	(1.00	(-1.14)	(1.87		
(4)	0.18	0.36		0.11	-4.92	-0.68***	-0.002	0.67	-1.10	0.06	0.63	3.76
	(1.46)	(1.10)		(0.39)	(-1.36)	(-2.59)	(-1.02)	(1.13)	(-1.52)	(0.95)		

Table 2 - Estimates of Private Investment Equations

Equation	Constant	YE	CA	DC	FCI	R	IC	GI	P(-1)	DUM	R^2	D-W
Rational Expectations												
(3)	0.37***	0.04*	0.009			-0.51***	-0.07*	-0.13	-0.75***	0.02	0.37	0.95
	(4.46)	(1.82)	(0.04)			(-4.05)	(-2.18)	(-0.38)	(-3.34)	(0.61)		
(4)	0.33***	0.04		0.02	-1.24	-0.52***	-0.05	0.001	-0.70***	0.01	0.60	1.17
	(3.73)	(1.42)		(0.10)	(-0.59)	(-3.70)	(-1.44)	(0.00)	(-2.87)	(0.22)		
Adaptive Expectation												
(7)	-0.17	0.54**	0.11			-0.36**	-0.15**	-0.15	-0.11	0.07**	0.56	3.11
	(-1.25)	(2.41)	(0.53)			(-1.99)	(-2.18)	(0.34)	(-0.31)	(2.24)		
(8)	-0.01	0.48*		0.19	-5.33*	-0.66***	-0.14*	0.46	-0.78*	0.05	0.72	2.61
	(-0.05)	(1.92)		(0.82)	(-1.75)	(-3.22)	(-1.84)	(0.97)	(-1.95)	(1.16)		

Note: *** 1 percent, ** 5 percent, * 10 percent level of significance.

I = gross fixed private investment
Y^e = expected output
CA = credit availability
DC = domestic credit
FCI = foreign capital inflow
IC = relative price of imported investment goods
R = real interest rate
GI = government investment

due to the competitive advantage of the foreign investors caused by, for example, their technology superiority.

As shown in Table 2, the presumption of the significant effect of import restriction on private investment seems to be confirmed statistically when we use domestic price of import investment goods as a proxy. Thus, it is the supply constraint, reflected in higher domestic price, that affects the private sector investment rather than the relative price. This is probably a reflection of the dominance of quantitative controls, the strict limitation on import-related and commercial credit, and any other regulation in this area.

Finally, the results also show that government investment appears to have no significant effect on private investment. The reason could be that, during the period under study, apart from financing a large expansion of infrastructure facilities, government also directly engaged in many production activities where it was in competition with private sector. Therefore, the crowding-out and crowding-in effects offset each other.

In general, the above empirical investigation of the relationship between private investment and its determinants — policy variables — provides a strong case for proper macroeconomic management. The improved macromanagement, therefore, should provide a supportive macroeconomic environment for a faster investment response to the gap between the desired and actual levels of capital. The detailed formulation and design of such policies and their instrumentalities and mixes are beyond the scope of this study, but given the past trend of private investment in Indonesia, which has shown a significant response to lending rates, there is little doubt that expansionary credit policy needs to be targeted to encourage investment demand, rather than fiscal policy. In this respect, an investment tax credit scheme for new investment represents a desirable option because it helps to offset, to some degree, the adverse impact of the 1985 bank liberation on the cost of capital.

The potential for encouraging private business investment through efforts to stimulate export activities needs also to be explored, especially since foreign exchange requirements become vital to capital goods investment. The observation that such a channel has been important in the past (1986-87) should be used as consideration of its future potential.

4. Summary and Conclusions

Since 1981 Indonesia has experienced a severe deterioration in its external terms of trade, primarily due to the collapse of oil price, and further intensified by the adverse effects of international currency fluctuations on debt service payments since mid-1985. As a result, on average, Indonesia suffered an income loss equivalent to 9 percent of its annual GNP over 1983-1988.

In response to these external shocks, beginning in 1983, the government has initiated a broad range of adjustment measures which have stepped up since the collapse of oil prices in 1986. In broad terms, two types of policy adjustment have been made namely: (1) austere macroeconomic policies to restore financial stability, and (2) the restructuring of the economy aimed both at reducing Indonesia's heavy dependence on oil as a source of foreign exchange and budgetary revenue and improving economic efficiency.

The close coordination of exchange rate, fiscal, and monetary policy, and a series of deregulation measures in several sectors have succeeded in coping well with external challenges in 1987/88. This, however, has entailed a substantial cost in terms of investment.

To assess the impact of those policies, this study has developed a simple model of private investment which is essentially a variant of the flexible accelerator model adapted to incorporate all those policy variables expected to affect Indonesia's private investment during the macroeconomic adjustment period. In other words, this study has concentrated on government's investment policies from a macroeconomic point of view.

In line with the theories at hand and the studies on private investment behavior that have been conducted for developing countries, this study hypothesized that the downward trend of private investment level observed in Indonesia's economy during the eighties would be explained to a large extent by the following factors: (1) credit availability, (2) import constraint, (3) real lending rates, and (4) public investment.

While the overall explanatory power of the equation was a little low, the results showed that the government's policies had a marked impact on private investment behavior in Indonesia during the 1981-1988 period through a variety of channels. Among these,

the real lending rates and import constraint appeared to be the most powerful factors affecting private investment. Thus, to stimulate the private sector investment, government macro-policy focus should facilitate the private sector's decision-making process over investment. The role of fiscal policy as a tool for purposes other than just restoring macro-imbalance needs careful study.

The model developed in this study, however, is not a complete model of private investment behavior. It would be foolhardy to predict either that the removal of import constraints would lead to a sustained rise on private investment according to the magnitude indicated by the equation results, or that the reduction in interest rate would have a similar effect.

The private business sector's investment behavior is (unfortunately) much more complex than that, and the government will have to deal with a range of other factors (such as animal spirits and investment incentives) in supporting an investment recovery. It should be noted that the strength of this relationship between private investment and some of those policy variables probably derived in part from the nature of the macroeconomic during the sample period. At any rate, this study suggests that the greatest stimulus to private investment will come from a balanced mix of monetary, fiscal and exchange rate management.

APPENDIX
Definitions and Data Sources

Except for relative price and real interest rate, all variables are expressed as a percentage of real GDP. The definitions of the variables are as follows:

I = gross fixed private investment
Y^e = expected output
CA = credit availability as the sum of domestic credit and net foreign capital inflow
CD = total outstanding loans from banking system
FIC = net foreign capital inflow as a sum of direct and portfolio investment

IC = import constraint, proxied by (a) domestic price of imported investment goods, defined as exchange rate multiplied by US capital equipment price index; and (b) relative price, defined as point (a) divided by Indonesian GDP deflator

R = real interest rate, bank lending rate minus rate of inflation.

GI = government capital expenditure

DUM = dummy variable to capture the oil-era, which adopts a unit value for the period of oil-era and a zero value for the post-oil-era

The main sources of the data used in this study are the *International Financial Statistics* (IFS), *Government Finance Statistics*, World Bank reports, and national sources.

References

Balassa, B. (1988), "Public Finance and Economic Development," *PPR, WPS* 31, World Bank.

Bischoff, C.W. (1971), "Business Investment in the 1970's: A Comparison of Models," *Brookings Papers on Economic Activity,* 1: 13-63.

Blejer, M. and Khan (1984), "Government Policy and Private Investment in Developing Countries," *IMF Staff Paper* 31, pp. 379-403.

Buffie, E. (1986), "Devaluation, Investment and Growth in LDCs," *Journal of Development Economics,* 20: 361-379.

Chibber, A. and van Wijnbergen (1989), "Public Policy and Private Investment in Turkey," *PPR WPS* 120, World Bank.

Chibber, A. and Shafik, N. (1990), "Does Devaluation Hurt Private Investment? The Indonesian Case," *PPR WPS* 418, World Bank.

Clark, J.M. (1917), "Business Acceleration of the Law of Demand: Theoretical Factor in Economic Cycles," in Jorgenson, D.W. (1971).

Clark, P.K. (1979), "Investment in the 1970's: Theory, Performance, and Prediction," *Brookings Papers on Economic Activity,* 1: 73-124.

Chenery, H.B. (1952), "Overcapacity and the Acceleration Principle," In Jorgenson (1971).

Dailami, M. (1989), "Policy Changes that Encourage Private Investment in Columbia," *PPR WPS* 266, World Bank.

Dailami, M. and Walton, M. (1989), "Private Investment, Government Policy and Foreign Capital in Zimbabwe," *PPR WPS* 248, World Bank.

Gelb, A. and Honohan, P. (1989), "Financial Sector Reforms in Adjustment Programs," *PPR WPS* 169, World Bank.

Jorgenson, D.W. (1963), "Capital Theory and Investment Behavior," *American Economic Review*, 53: 24-57.

Jorgenson, D. (1971), "Econometric Studies of Investment Behavior: A Survey," *Journal of Economic Literature*, 9: 1111-47.

Koyck, L.M. (1954), "Distributed Lags and Investment Analysis," in Jorgenson (1971).

Lizondo, J.S. and Montiel, P.J. (1989), "Contractionary Devaluation in Developing Countries: An Analytical Overview," *IMF Staff Paper*.

Musalem, A.R. (1989), "Private Investment in Mexico: An Empirical Analysis," *PPR WPS* 183, World Bank.

Nabi, J. (1989), "Investment in Segmented Capital Markets," *Quarterly Journal of Economics*, CIV: 453-462.

Serven, L. and Solimano, A. (1989), "Private Investment and Macroeconomic Adjustment: An Overview," *PPR WPS* 339, World Bank.

Solimano, A. (1989), "How Private Investment Reacts to Changing Macroeconomic Conditions: The Case of Chile in the 1980s," *PPR WPS* 212, World Bank.

Sundararajan, V. and Thakur, S. (1980), "Public Investment, Crowding Out, and Growth: A Dynamic Model Applied to India and Korea," *IMF Staff Papers*, 27: 814-55.

Tinbergen, J. (1971), "Statistical Evidence on the Acceleration Principle," in Jorgenson (1971).

Tun Wai, U. and Wong, C. (1982), "Determinants of Private Investment in Developing Countries," *Journal of Development Studies*, 19: 19-36.

Tybout, J.R. (1984), "Interest Controls and Credit Allocation in Developing Countries," *Journal of Money, Credit and Banking*, pp. 474-487.

Van Wijnbergen, S. (1983), "Credit Policy, Inflation and Growth in a Financially Repressed Economy," *Journal of Development Economics*, 13: 45-65.

Van Wijnbergen, S. (1983a), "Interest Rate Management in LDCs," *Journal of Monetary Economics*, 12: 433-52.

World Bank (1986), "Indonesia Adjusting to Lower Oil Revenues," Report No. 6201-IND. May 20, World Bank.