

Capital Mobility : The Case of Indonesia

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Introduction and Motivation

In the literature, the issue of international capital mobility originated by Feldstein and Horioka (FH) (1980) and Feldstein (1983) is by now well established (Wong 1990). They examined the issue by the relationship between the saving ratio and the investment ratio across countries using cross-section data. If the saving and the investment ratios are uncorrelated (coefficient=0), it indicates that there is perfect world capital mobility. On the other hand, if both ratios are perfectly correlated (coefficient=1), it indicates that all the incremental saving in each country remains there. So there is no capital mobility.

Definition

Capital mobility may be defined as free trade in financial assets, and therefore it is referred to as financial market integration. Under this definition, similar assets should earn a similar rate of return after adjusting for exchange rate risk provided that the tax and regulatory barriers to financial trade are negligible. According to Goldsborough and Teja (1991 : 6), "the real capital mobility focuses on the ability of a country to freely engage in intertemporal trade. Under this notion of capital mobility, a country wishing to invest more than it saves should be able to do so by borrowing abroad". Frankel (1989) also mentioned the following distinct definitions of perfect capital mobility.
Real interest parity : international capital flows equalise real interest rates across countries.

Uncovered interest parity : Capital flows equalise expected rates of return on countries' bonds, despite exposure to exchange risk. Covered interest parity : capital flows equalise interest rates across countries when contracted in a common currency.

Literature Survey

FH (1980) : FH said, "with perfect world capital mobility, there should be no relation between domestic saving and domestic investment : saving in each country responds to the world-wide opportunities for

investment while investment in that country is financed by the world-wide pool of capital" (FH 1980 : 317).

Regarding the determination of optimal savings policy FH argued that in a closed economy, the national return on additional saving is the domestic marginal product of capital that should influence the national saving policy. Because the nation as a whole receives both the after tax yield and the tax revenue though the net yield that individual investors receive is lowered by taxes on capital income.

In contrast, in the case of perfect capital mobility the yield to the home country on the additional saving is only the net of tax return received by the investor and not the pretax marginal product of capital because the foreign government collects the additional tax revenue if the additional saving is invested abroad. So the optimal savings policy is influenced by the net of tax return received in this case.

FH computed the savings-GDP ratios and the investment-GDP ratios averaged over the period 1960-74 for a sample of 16 OECD countries. A regression of the investment ratio on the saving ratio yielded a coefficient of 0.887 which is significantly different from zero, but not significantly different from unity. The estimate based on net saving and investment also yielded very similar results (coefficient=0.938). Based on these regression results, the authors concluded that capital mobility is not perfect and most of the increment to national saving only augments the domestic capital stock. The strong policy implication drawn from this interpretation is that policies to encourage domestic saving will have an effect on domestic investment that is essentially one for one (Obstfeld 1986 : 67).

FH also mentioned that they found no evidence of varying correlation between saving and investment in relation to either the size of the economy or the importance of international trade. They also found no major difference among household saving, corporate saving and government saving in their contribution to total investment.

Feldstein and Bacchetta (FB) (1989) : FB's analysis is an extension of earlier work by FH regarding capital mobility. They also found that an increase in domestic saving has a substantial effect on the level of domestic investment although a smaller effect than would have been observed in the 1960s and 1970s. Regarding government policies, they argued that because of capital income taxes, a persistent capital outflow diverts domestic savings to investment abroad that has a lower return to the originating nation, if a tax change that encourages private saving is offset by an increase in the government budget deficit, there is no rise in capital formation. If, however, there is a government tax policy to stimulate private investment until it absorbs all of the increase in domestic saving, the tax induced rise in saving does get converted into greater domestic capital formation.

Dividing domestic savings into two components, private saving and government saving (-deficit), they ran a regression for 13 countries for

the period 1971 through 1986 and found that domestic investment (I) responds equally to private saving (PS) and to a budget deficit (DEF). Their results are as follows :

$$I/Y = 0.019 - 0.89DEF/Y + 0.88PS/Y \\ (0.012) \quad (0.14) \quad (0.10)$$

[Figures in parenthesis are standard errors].

Where DEF and PS are both inflation adjusted (FB 1989:22).

To consider a dynamic adjustment process they ran a regression as follows :

$$I_t/Y_t - I_{t-1}/Y_{t-1} = d_0 + d_1 (I_{t-1} - S_{t-1})/Y_{t-1}$$

For 23 OECD countries for the period 1961 through 1986 they found the coefficient of - 0.227 (with a standard error of 0.026) which implies that an investment gap of one percentage point of GDP causes the investment GDP ratio to fall by approximately a quarter of a percentage point in the following year. For the corresponding saving equation the coefficient is - 0.036 which is small both absolutely and relative to its standard error 0.024 and of the wrong sign. The data thus imply no response of the saving rate to the investment saving gap.

Goldsborough and Teja (1991) : They showed that the upsurge in the gross financial flows (between 1970-1989) has not resulted in significantly larger net inflows of foreign savings for Asian developing countries as a group although it represents a massive expansion in the international trading of risk and maturity transformation. Rather, the most significant impact of increasing financial globalisation on economic growth in developing Asia is likely to stem from more efficient investment.

They argued that saving and investment will hardly be independent of each other if real interest rates are not equalised across countries. For example, a shortfall in domestic savings normally pushes domestic interest rates up which, under perfect capital mobility, is eliminated by an inflow of foreign savings. Their results of 17 Pacific Basin economies over the period 1980-87 suggest a significant degree of financial integration (for which tests of covered interest parity are used) and a modest degree of capital mobility (saving investment correlation coefficient is 0.6).

Frankel (1989) : Frankel supported the FH's finding of capital mobility and tried to mitigate some of the criticisms raised against FH analysis. Regarding the endogeneity problem, he said that FH actually made an effort to handle the econometric endogeneity of national saving, and to handle other sources of endogeneity; they used demographic variables as instrumental variables for the saving rate.

The other econometric critique is that if the domestic country is large in world financial markets, a shortfall in domestic savings will drive up the world interest rate, and thus crowd out investment in the domestic country as well as abroad. In reply to this, Frankel argued

that the large-country argument does not create a problem in cross section studies, because all countries share the same world interest rate r^* . Since r^* simply goes into the constant term in a cross section regression, it cannot be the source of any correlation with the right-hand side variable.

Frankel also noted that perfect capital mobility does not imply the international equalisation of real interest rates. The interest arbitrage condition of integrated capital markets refers to nominal interest rates only.

Dooley, et. al. (1987) : Regarding endogeneity of national savings, it is said that both saving and investment depend on the rate of growth of national income as determined, for example, by population growth or productivity growth. The authors mentioned that one solution that has been applied is to add the rate of growth as a second explanatory variable.

They argued that it is important to realise how general the endogeneity argument is. Any economic variable, in addition to the cost of capital that influences the investment rate, will probably be correlated with the national saving rate. If factors, other than the cost of capital, that determine investment happen to be uncorrelated with national saving, then there will be no econometric problem.

Based on the above literature survey, it can be said that although the FH results are criticised on several grounds, they are strong enough to withstand the criticism. Their finding is confirmed by many subsequent studies. With few exceptions, industrial and developing countries with relatively high levels of, or changes in, average saving ratios over the 25 years have also had relatively high levels of, or changes in, investment ratios (Dooley, et. al. 1987).

Objectives and Methodology of the Study

The objective of this paper is to examine the level of capital mobility in Indonesia, referring mainly to the FH approach but based on time series data. The issue will be examined from both short and long-run perspectives. Additional issues such as the dynamic nature of the model and the separate effects of private and government savings on domestic investment will also be considered.

The issue of capital mobility is analysed in the light of the definition of Goldsborough and Teja (1991). The estimation method in the selection of the preferred model is Ordinary Least Squares (OLS) throughout. The investment ratio is regressed on the government saving ratio and the private saving ratio, or the investment ratio is regressed on the aggregate saving ratio only, or the investment ratio is regressed on the saving ratio, the lagged saving ratio, the lagged investment ratio, the net long-term capital inflow ratio and the growth rate. Different estimated results are shown below. In our preferred model, the estimation is carried out on the basis of annual data for the period

1960-1989 and the investment ratio is regressed on the saving ratio and the lagged investment ratio.

Data Issues

All required data for this case study have been obtained from the STARS Database. The source of data is the World Bank and all data are annual. Data on gross domestic product, gross domestic savings, gross domestic investment and the GDP deflator are obtained for 30 years (from 1960 to 1989) for time series analysis. But data on government current budget balance (government savings) and net long-term capital inflow are only available for 17 years (from 1972 to 1988) and 20 years (from 1970 to 1989) respectively. All data are obtained as current prices in US\$. These have been transformed into constant prices in US\$ by dividing by the GDP deflator. There is no separate data on private savings. Government savings have been subtracted from gross domestic savings in order to get private savings.

Specified Economic and Econometric Model

As mentioned earlier the issue of capital mobility will be examined based on the correlation between saving and investment ratios. So specification of a correct regression model is required. With this objective in mind, we take the model envisaged by FH as our starting point.

Estimation with 30 Years Data (1960-1989) :

Following FH, a simple linear equation of the following form has been estimated.

$$(I/Y)_t = a + b(S/Y)_t$$

where $(I/Y)_t$ = the ratio of the gross domestic investment to gross domestic product in period t , $(S/Y)_t$ = the corresponding ratio of the gross domestic saving to gross domestic product in period t , a = constant and b = the coefficient of the saving ratio. Estimated results are as follows :

$$(I/Y)_t = 0.050 + 0.715 (S/Y)_t \\ (0.010) \quad (0.043)$$

(Figures in parenthesis are standard errors)

R squared = 0.90, R-Bar squared = .90, DW = 1.24

The model shows that there is a serial correlation problem.

To overcome this problem and make the model dynamic a separate regression has been estimated adding (one year) lagged dependent variable as an explanatory variable¹. Some explanation for the dynamics are : they allow for various kinds of forward looking behaviour (reaction to expectations) and adjustment costs; and also the serial correlation problem might be solved. Regression results are :

$$\begin{aligned} (I/Y)_t &= 0.032 + 0.43(S/Y)_t + 0.41(I/Y)_{t-1} \\ &(0.012) \quad (0.11) \quad (0.15) \end{aligned}$$

(Figures in parenthesis are standard errors)

R squared = 0.93, R-Bar squared = 0.92, DW = 1.97

All the coefficients are significant with correct sign and also there are no serial correlation or heteroscedasticity problems. Normality of data is also acceptable (detailed results will be shown latter). So this is the specified economic and econometric model which is the basis of our analysis of capital mobility.

Effects of private savings (PS) and Government savings (GS) on Investment.²

An attempt has been made to see the separate effects of private and government savings on gross domestic investment (like the FB model). Because of lack of data, a regression has been estimated for only 17 years (1972-1988). Regression results are shown below.

$$\begin{aligned} (I/Y)_t &= 0.019 + 0.26(GS/Y)_t + 0.21(PS/Y)_t + 0.68(I/Y)_{t-1} \\ &0.054) \quad (0.27) \quad (0.18) \quad (0.20) \end{aligned}$$

(Figures in parenthesis are standard errors)

R squared = 0.64, R-Bar squared = 0.55, DW = 2.76

It is observed that government and private savings have almost similar effects on investment but the coefficients of both variables are insignificant here. Also the model suffers from serial correlation problem. The reason for these drawbacks of the model may be that data for only 17 years are not sufficient for time series analysis.

It is noted that the analysis focuses on gross saving and investment rather than savings and investment net of depreciation for two basic reasons. First, it is the gross flow of savings that is, in principle, free to move from country to country in response to yield differentials. Secondly, the accounting definitions of depreciation are very imperfect, especially for a country like Indonesia where there was high inflation in the 1960s and 1972-74 (Nasution 1983). Errors of measurement in the depreciation estimates would therefore cause a spurious correlation between net saving and investment.

Diagnostic Tests of the Specified Model

The detailed results of the specified model are presented below.

$$\begin{aligned} (I/Y)_t &= 0.032 + 0.43(S/Y)_t + 0.41(I/Y)_{t-1} \\ &(0.012) \quad (0.11) \quad (0.15) \end{aligned}$$

(Figures in parenthesis are standard errors)

R squared = 0.93, R-Bar squared = 0.92, F(2, 26) = 164.82,

DW = 1.97, LM : CHI-SQ (4) = 1.82, Durbin h=0.14

Functional Form, LM : CHI-SQ (1) = 0.44

F: F (1,25) = 0.38

Heteroscedasticity, LM : CHI-SQ (1) = 0.07

$$\begin{aligned} F : F(1, 27) &= 0.07 \\ \text{Normality, CHI-SQ (2)} &= 5.89 \end{aligned}$$

From the DW, Durbin h and LM statistics (up to order 4) presented above, it is clear that the model does not have any serial correlation problem. It is also seen that the test statistics for heteroscedasticity, functional form and normality do not indicate any problems.

To test for the stability of the coefficients both the CUSUM and CUSUMSQ tests are performed. It is found that both the CUSUM and CUSUMSQ tests remain within the critical bound at the 5 percent significance level, which implies that the coefficients are stable.

Interpretation and Explanation of the Results

$$\begin{aligned} \text{Our model is : } (I/Y)_t &= a + b(S/Y)_t + c(I/Y)_{t-1} \\ \text{or } (I/Y)_t &= 0.032 + 0.43(S/Y)_t + 0.41(I/Y)_{t-1} \\ &(0.012) \quad (0.11) \quad (0.15) \end{aligned}$$

(Figures in parenthesis are standard errors)

Here short run multiplier³ = b = 0.43

$$\begin{aligned} \text{Long-run multiplier} &= b/(1-c) = 0.73 \\ &(0.07) \end{aligned}$$

Therefore, the short-run coefficient is 0.43 which implies that, ceteris paribus, an increase in the domestic saving of \$1 will raise the domestic investment by 43 cents. This coefficient is significantly different from zero and it is also significantly different from one. So we can say that, based on the FH interpretation, there was capital mobility in the short-run, though this mobility was not perfect.

The long-run coefficient (0.73) implies that, ceteris paribus, an increase in the domestic saving of \$1 will raise the domestic investment by 73 cents. This coefficient is significantly different from zero and also significantly different from one (but less than one). So in the long run, capital mobility was not so evident. That is, long-run capital mobility is lower than short run capital mobility, and this is relevant to the economic theory that in the short run governments have to borrow from abroad if a budget deficit occurs, but in the long run, the economy has to manage the deficit domestically.

From the above analysis, it can be said that Indonesia's savings went abroad and investment was also financed by borrowing from abroad both in the short and long runs. That is why the short-run and long-run effects of the saving ratio on the investment ratio are not one. This capital mobility can be explained based on the economic situation during this period.

From the early 1960s to 1967 and in 1972-74 the economy experienced hyperinflation due to large budget deficits financed by bank credit. In November 1978, the rupiah was devalued by 50%. Also in the 1970s the financial policy was repressed (for example, the interest rate was lowered). All these reasons caused domestic savings to

go abroad and this was very prevalent at the end of the 1970s (Nasution 1983). This implies that there was no direct restriction in capital exports.

The periods between 1967-72 and 1974-78 are considered to be the stabilisation and rehabilitation periods. The economy grew at a respectable rate; inflation was controlled and the foreign exchange system was liberalised. These measures helped the real interest rate to be positive and an inflow of foreign capital occurred (Nasution 1983). But in the early 80s and onward, foreign investment declined again (Robison 1986).

In 1983 and 1986, two large devaluations of the rupiah occurred. The rapid deterioration in the oil market beginning early in 1986 worsened Indonesia's balance of payments and budget position (Rasyid 1992). These situations might also have induced capital mobility.

Endogeneity of the Saving Ratio

The question of the saving ratio being endogenous may arise. So the test for endogeneity of the saving ratio is necessary; because if the saving ratio is endogenous, then there is a correlation between the saving ratio and the error term. In such a situation, OLS is not a good estimation procedure.

The Hausman test is performed for endogeneity of the saving ratio. The constant term, the lagged saving ratio and the lagged investment ratio are used as instruments. The use of other instruments suggested by several authors, such as labour force, population growth, unemployment benefit etc., was not possible because of data limitations.

The test involves regressing the saving ratio on all the instruments. This gives us an estimated (or fitted) saving ratio. The Hausman test then involves regressing the investment ratio on the original explanatory variables and the estimated saving ratio. The test for the endogeneity problem is equivalent to the test for the significance of the coefficient of the estimated saving ratio (Maddala 1989 : 331). The coefficient of the estimated saving ratio is found to be 0.22 with a standard error of 0.28 which clearly indicates that this coefficient is insignificant. There is, therefore, no endogeneity problem of the saving ratio.

Conclusion

The FH procedure of measuring the degree of capital mobility is generally criticised on the grounds of the endogeneity problem and the static nature of the analysis. These issues have been considered in this paper. The study finds that the saving and investment ratios are correlated both in the short and long runs in Indonesia, and the correlation between these two ratios is higher (but less than one) in the long run than in the short run. This indicates that, in the light of the FH

interpretation, there was international capital mobility, though not perfect, and this capital mobility is higher in the short run than in the long run. A literature survey on Indonesia's economic and financial situations during this period (1960-1989) also points out that capital mobility was present.

However, the FH interpretation that a high correlation between saving and investment ratios implies a low capital mobility is not unanimously acceptable (Obstfeld 1986). There might exist other variables - such as the existence of a non-traded sector as mentioned by Wong (1990) and government policy pointed out by Bayoumi (1990) - which would make saving investment ratios correlated even if capital is perfectly mobile.

Notes

1. As both saving and investment rates depend on the rate of growth of GDP, this growth rate has been added as an explanatory variable to overcome the endogeneity problem as suggested by Dooley et al. (1987). The one year lagged saving ratio has also been included as an explanatory variable as investment might depend on lagged saving. But these two variables have been found jointly insignificant.
2. To see the effect of net capital inflow on investment, a separate regression has been estimated by adding this variable. But this variable has been found insignificant. One explanation for this might be that data of 20 years, which are available, are also not sufficient for time series analysis.
3. The short run multiplier is change in investment ratio due to change in savings ratio holding other things constant in the model and the long run multiplier is obtained from the analysis of function(s) of parameter(s) using microfit. The standard error of long run multiplier is 0.07.

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