Estimating saving and investment functions in Pakistan

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Abstract

This paper estimates simultaneously the saving and investment functions for Pakistan for the period 1960-2003. Compared with other Asian countries, Pakistan has not experienced adequate growth in national savings. Growth of real GDP, real per capita income, foreign capital inflow and investment are found to be the major determinants of savings. The findings support the "displacement hypothesis". On the other hand, macroeconomic stability, inflation, availability of domestic credit, exchange rate, and foreign and national saving have been found to be the most crucial factors influencing the investment environment. Macroeconomic stability and the pursuit of sound macroeconomic policies can augment both saving and investment.

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1. Introduction

The need to raise savings and thus attract investments in order to accelerate economic growth is universally acknowledged. Most development plans, especially in developing countries, therefore target these two factors to play dominant roles in jumpstarting economic growth.

High rates of domestic saving are important because savings provide most of the funds for investment (Schmidt-Hebbel et al. [1996]). Empirical evidence for East Asia shows that there is a strong positive correlation between domestic saving and investment rates. It is accepted by all schools of thought that investment is a necessary condition for growth. It is difficult to find any country that was able to grow at a high rate for a long period without experiencing high rates of capital formation and/or high rates of saving (Qureshi et al. [1999]).

Table 1 shows that Pakistan lags behind in both saving and investment relative to other countries in the region except Bangladesh. Pakistan has not only under-

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saved but has also under-invested, unlike its neighbours which had experienced sustained high growth. National savings recorded a perceptible increase during 2000-03 mainly due to significant improvement in the current account balance, which reduced the need to rely on foreign savings to finance domestic investment. Foreign savings decreased during the same period. Total investment also declined (see Table 2). Overall, Pakistan has one of the lowest saving rates in Asia. According to the 2002 *Asian Development Outlook*, the domestic savings in Pakistan in 2002 was 14.6 percent of GDP as compared to 23.6 percent in India, 20.7 percent in Bangladesh, 23 percent in Indonesia and 38 percent in China.

A number of studies have investigated the various factors affecting saving in Pakistan using both time-series and cross-section data. Qureshi [1981], Abbot and Derosa [1984], and Khan [1988b] used time-series data to study the various determinants of household and national savings. Qureshi [1981] investigated the relative explanatory power of permanent income versus current income to explain variations in the rate of household saving in Pakistan. The study showed that the permanent income model provides a much better explanation of the variation in household saving. The study reported a strong positive relationship between real interest rate and household saving rate, and the negative impact of inflation on the household saving rate in Pakistan. Abbot and Derosa [1984] studied the financial sector of the economy and summarized the findings of various studies on resource mobilization in Pakistan. Burney and Khan [1992] and Akhtar [1986, 1987], using Household Income and Expenditure Surveys (HIES) for the years 1984-85 and 1979 respectively, analyzed the impact of various socioeconomic and demographic factors on household saving behavior in Pakistan. The dependency ratios, various categories of education and age structure of the household, in addition to income, have been reported to influence household savings.

Khan [1988b] has analyzed the behavior of savings in the context of the McKinnon-Shaw model of financial repression. According to this model, it is not the cost of capital but rather the lack of financial resources that limits investment in financially repressed economies. They emphasized a positive relationship between investment and the real rate of interest. This is because an increase in real rate of interest induces more saving which in turn raises the level of investment by relaxing the financial constraints. The study found strong support for the McKinnon-Shaw model. Khan et al. [1992] examined the determinants of the national saving rate in Pakistan. Their study showed that income, real interest rate, changes in term of trade and the openness of the economy positively influenced national savings while foreign capital inflow discouraged national savings.

Hussain [1996] studied the determinants of private saving in terms of demographics, growth, and financial deepening for the period 1970-1993. The study found the private saving ratio to be related to the financial deepening variable and the time trend. They reported that the variables not included in the estimation such as net wealth and net government debt also influenced long-term movement

Table 1. Investment and saving rates: 1976-1995

Country	Investment	National Saving	Domestic Saving	Net Factor Income	Foreign Saving	Saving-Investment Gap
Bangladesh	12.6	5.6	3.4	2.6	7.0	-9.6
China	36.5	30.0	36.9	0.1	-0.5	0.5
India	22.9	22.0	22.7	-8.0	1.1	-0.2
Indonesia	29.5	27.4	31.7	-4.3	-	2.2
Korea	32.9	30.3	32.4	-2.0	2.3	-0.6
Malaysia	32.7	30.1	35.6	5.5	-	2.9
Pakistan	17.9	15.9	11.0	4.9	2.4	-6.9
Philippines	24.6	21.5	21.7	-0.3	3.4	-2.8
Sri Lanka	24.9	12.3	14.1	-1.8	12.6	-10.8
Taiwan	24.9	31.8	30.7	1.0	-6.8	5.8
Thailand	32.9	27.6	29.0	-1.4	-	-3.9

Source: Andrew T. Hook [1997] *Savings in Pakistan: Practice and Policy*. State Bank of Pakistan Karachi.

Table 2. Investment and savings in Pakistan (percent of GDP)

Period	1970s	1980s	1990s	2000-03
Total Investment	17.1	18.7	18.3	15.4
National Savings	11.2	14.8	13.8	16.4
Foreign Savings	5.8	3.9	4.5	3
Domestic Savings	7.4	7.7	14	15.63

Source: Pakistan economic survey 2002-03 (Statistical Appendix pp.2-3)

in the rate of private saving. Their most important conclusion was that demographic factors did not influence private saving.

Finally, Qureshi et al. [1999] concluded that domestic savings in Pakistan have been low and have increased very slowly, with public savings being the major problem area in the past. Their study showed that private savings would increase gradually as a result of rising per capita income, falling dependency burden and macrostability. If public savings remain low, however, private savings are not expected to finance the high growth target needed to alleviate poverty and to improve general living standards.

There is no controversy over the benign role of domestic savings in economic growth. However, there is tremendous theoretical and empirical controversy over

the role of foreign savings in economic growth. The two-gap model pioneered by Chenery and Strout [1966] distinguished three major constraints on economic growth in developing countries, namely: a) scarcity of human skill; b) limited domestic saving; and c) limited foreign exchange earnings. They advocated that net capital inflow (including aid) would supplement the domestic saving that would lead to a rise in domestic investment, which in turn would accelerate the economic growth. This approach came under severe criticism, both on theoretical and empirical grounds, in the development literature (Naheed and Rahim [1993]). The end of concessional foreign aid and the emergence of massive foreign investment have necessitated the increase in domestic saving and investment.

The objective of this study is to estimate the saving and investment behavior simultaneously for Pakistan in order to guide the formulation of policies designed to achieve macroeconomic stability and poverty alleviation. The plan of the study is as follows: Section 2 deals with methodology and data while the results are reported and discussed in Section 3. Policy implications and conclusions are presented in the final section.

2. Methodology and data

The studies mentioned above have contributed to the understanding of the saving behavior in Pakistan. Except Shabbir and Mahmood [1992], all other studies have used single-equation models. Though Shabbir and Mahmood used a simultaneous equations model, they concentrated on the relationship between foreign private investment and saving in Pakistan.

Besides other problems discussed by Mikesell and Zinser [1973], many of the econometric studies of saving in less developed countries (LDCs) have used single-equation models, of course with certain exceptions (Gupta [1975]; Leff and Sato [1975, 1988]). Further, single-equation models in a clearly multi-equation context can lead to simultaneity bias.

Leff and Sato [1975:1218] have pointed out that saving (S) and investment (I) are connected by the relation $S = I - F$, where F denotes foreign capital inflows. Consequently, it is necessary to consider the simultaneous determination of saving and investment in order to avoid bias in the parameter estimates of the saving functions. Moreover, there is also an identification problem, which has usually been ignored. This is unfortunate for both analytical and econometric reasons. Due to this problem, it is not at all clear that the coefficients estimated could in fact be identified as the structural parameters of a saving function or whether they relate to investment or other functions. Keeping in view the above limitations, we estimate the following saving and investment functions for Pakistan in a simultaneous equations framework.

The gross domestic product identity is

$$Y = C + I + X - M \tag{1}$$

where Y = GDP, C = consumption (private and public), I = gross domestic investment, X = Exports and M = imports.

Equation (1) can be written as

$$I = S + F \tag{2}$$

where S is national savings defined by

$$S = I + X - M \tag{3}$$

and F is foreign savings defined by

$$F = M - X = I - S. \tag{4}$$

Economic theory says that saving is an increasing function of income. However, in a macroeconomic context, savings, like other economic variables, depend on a numbers of factors. Saving is expected to depend on the overall health of the economy represented by the growth of real GDP because growth and savings are closely related in the virtuous circle of saving-investment-growth-saving, and this process also depends on how savings are efficiently channelled into productive investment. Moreover, level of per capita income, and expected inflation rate[1] are also important determinants of saving.

The exchange rate and interest rate are also important variables that can influence saving and investment behavior considerably. An increase in the rate of interest induces more saving, which in turn raises the level of investment by relaxing the financial constraints; also, a stable exchange rate promotes saving because frequent devaluation breeds inflation. Savings also depend on the investment environment that constitutes the demand side, and may also be influenced by the lagged savings that may serve as a guide for current saving.

Therefore, the saving function can be specified as follows:

$$S = \alpha_0 + \alpha_1 DY + \alpha_2 EP + \alpha_3 r + \alpha_4 NER + \alpha_5 FKI + \alpha_6 Yp +$$
$$\alpha_7 Inv + \alpha_8 S_{t-1} + \varepsilon_t \tag{5}$$

where:

   S = national savings as percentage of GDP (both in current prices) defined by equation 3

   DY = growth of real GDP of Pakistan

   EP = expected inflation measured by consumer price index (CPI)

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[1]It discourages savings because the purchasing power of money falls, and the importance of foreign savings increases, and foreign savings may "complement" or "displace" savings.

r = nominal rate of interest on savings deposits

NER = nominal exchange rate (Rs/US$)

FKI = foreign capital inflow as a percentage of GDP defined by equation 4

Yp = real per capita income

S_{t-1} = lagged saving

Inv = real investment

ε_t = error term

The expected signs of the coefficients are positive for: α_1, α_3, α_6, α_7 and α_8; negative for α_2 and α_4; and positive or negative for α_5.

It has been theorized that investment is positively related to income and negatively related to the interest rate. Investment is also expected to be a function of the health of the economy represented by the growth of real GDP, expected inflation, foreign capital inflow (as it is likely to increase the funds for investment), and the availability of domestic credit (as firms in the developing countries rely heavily on domestic credit). The exchange rate as an explanatory variable has important implications for both saving and investment. Exchange rate movements impact investment through the import of machinery and raw materials, and rupee savings through substitution between rupee and dollar savings and capital flight. Moreover, saving and investment are closely linked and investment is also likely to be affected by the lagged investment. Thus the investment function can be specified as:

$$Inv = \beta_0 + \beta_1 DY + \beta_2 EP + \beta_3 NER + \beta_4 DC + \beta_5 FKI + \beta_6 S + \beta_7 Inv_{t-1} + \xi_t \quad (6)$$

where:

Inv_{t-1} = Lagged investment

DC = Domestic credit

ξ_t = Error term

The expected signs of the coefficients are positive for: β_1, β_4, β_5, β_6 and β_7; and negative for β_2 and β_3.

Data on GDP, savings, foreign capital inflow, investment, inflation and per capita income have been taken from the *Pakistan Economic Survey* (various issues) for the period 1960-2003. The data on domestic credit have been taken from line 32 of the *International Financial Statistics* (various issues). Data on nominal exchange rate were taken from IFS for the early years (1960s and 1970s) and from the State Bank of Pakistan Annual Reports (various years) for 1980s, 1990s and 2000s. All the variables are in domestic currency (rupees). Investment, GDP,

and per capita income are in constant prices (1989-90 = 100). Data on interest rate on savings deposits, which constitute more than 40 percent of the different categories of deposits, were obtained from State Bank of Pakistan's *Monthly Statistical Bulletin* (various issues).

3. Results and discussion

Two-stage least squares (2SLS) was used to estimate equations 5 and 6 using Eviews 3.1. Saving and investment are endogenous and both the equations are over-identified. Fair [1970] has shown that lagged dependent and independent variables must be in the instruments list to obtain consistent estimates. The instruments used in the saving function include a constant, imports, government expenditure, exports, and lagged consumption in addition to few lagged right-hand side variables. The instruments in the investment function include: a constant, industrial sector growth, imports, exports and some lagged values of the right-hand side variables.

Saving function

The estimated saving function[2] is:

$$S = -1.11 + 0.15DY - 0.39EP + 0.47r - 0.38NER - 0.22_{FKI} + 0.76Y_P +$$
$$\quad (2.39) \quad (0.060)^* \quad (0.26) \quad (0.26)^{**} \quad (0.2)^{**} \quad (0.08)^* \quad (0.35)^*$$

$$1.53Inv + 0.09S_{t-1}$$
$$(0.39)^* \quad (0.13)$$

$$R^2 = 0.87 \qquad D.W. = 2.27$$

All the coefficients in the saving function have the correct and expected signs. The estimation results show that the performance of the economy represented by the growth of real GDP, real per capita income, foreign capital inflow and investment are the major determinants of saving as their coefficients are highly significant. The significant and positive coefficient of real per capita income shows that an increase in real per capita income will lead to an increase in national savings. Though Pakistan, China and India have almost similar per capita income levels, the saving rate in Pakistan is much lower than those of the said countries, as earlier mentioned. The unorganized "black economy" whose savings are not recorded in the official statistics; the "feudal outlook" characterized by wasteful consumption; consumerism; higher inflation rates than rates of return on savings deposits; decreasing returns on saving schemes; high population growth rate and thus increasing dependency, are the important factors most likely to have influenced Pakistan's uninspiring saving performance.

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[2] Figures in parentheses are standard errors. * and ** show 5 percent and 10 percent levels of significance respectively for both saving and investment functions.

Expected inflation has the correct and expected sign; though it is not significant, it does influence the saving behavior adversely as people make frequent purchases to avert a further rise in prices. The negative coefficient for expected inflation shows that inflation acts as a sinking weight on saving because inflation reduces the purchasing power of money. To keep real money balances unchanged, as people have to meet their important transactions, they demand more income. In the 1970s and 1990s, inflation had been very high in Pakistan (Economic Survey 1997-98 & 1999-2000). Another variable, exchange rate, has the correct and expected sign. Depreciation of the domestic currency (rupee) has an adverse impact on saving, as devaluation is normally inflationary. Critics argue that devaluation is stagflationary, reduces real output, and increases the domestic rate of inflation. Devaluation increases the price of traded goods that feeds into the general price level (see Edwards [1986]; Bird [1983]).

The coefficient of the nominal interest rate is positive and significant. Khan et al. [1992] and Shabbir and Mahmood [1992] got positive and significant coefficients (0.002 and 0.003 respectively) for real rate of interest; this implies that the substitution effect dominates over the income effect. In this study, experimentation with real rate of interest yielded a negative (-0.08) but insignificant coefficient, which means that the income effect is more dominant. Keeping in view the culturally induced bias of consumption and other factors responsible for low savings as mentioned above, this evidence appears to be more pragmatic. The coefficient of foreign savings is negative and significant and thus supports the "displacement hypothesis." This result is in agreement with other studies (Naheed and Rahim [1993]; Kemal [1992]; Khan et al. [1992]; Mahmood and Qasim [1992]; Shabbir and Mahmood [1992]), which have studied the saving behavior in Pakistan in the context of foreign capital inflow that include both foreign aid and foreign private capital inflows. All of the above studies have reported a negative relationship between savings and foreign capital inflows.

Khan et al. [1992] reported that a 1 percent rise in foreign capital inflows reduces national savings by 0.21 percent. They concluded that most of the foreign aid has been used for consumption purchases and that it has discouraged the saving effort of both the private and public sectors in Pakistan. Shabbir and Mahmood [1992] found negative coefficients for both foreign private investment (FPI) and foreign aid, thus supporting the displacement hypothesis which posits that foreign financial flows discourage saving and resource mobilization efforts.

Though the said studies have supported the displacement theorists' hypothesis, the role of FKI in promoting economic growth and saving is inconclusive, as the experiences of East Asian countries do not support the said hypothesis (Krueger [1987]). Kemal [1992] has reported positive but insignificant coefficient between public savings and foreign capital inflows.

Investment function

The estimated investment function[3] is:

$$Inv = -1.15 + 0.70DY + 0.51EP - 0.36NER + 0.09DC +$$
$$\quad (1.001) \quad (0.18)* \quad (0.16)* \quad (0.13)* \quad (0.04)**$$

$$0.14_{FKI} + 0.50S_t + 0.28Inv_{t-1}$$
$$(0.03)* \quad (0.06)* \quad (0.21)$$

$$R^2 = 0.90 \qquad DW = 1.54$$

The estimation results for the investment function show that the growth of GDP has a positive influence on the investment environment. Thus investment will increase if the prevailing macroeconomic environment is stable and consequently promotes growth.

The positive and significant coefficient for expected inflation shows the importance of the domestic inflation in influencing the investment behavior in Pakistan. This finding is in agreement with Leff and Sato's [1988] results for Latin American countries. They argue that as inflation increases, firms tend to increase their investment as they have the incentive to raise prices. Their argument may imply that a firm's investment decisions will not be influenced much by inflationary expectations if the future profit prospects are certain. This does not imply that inflation is desirable as inflation has a depressing influence on saving, as discussed above.

However, the foregoing unexpected result is not supported by actual events. Inflation in Pakistan was very high during the period 1972-77 and the 1990s, imposing tremendous costs to the economy. No investor, be it national or foreign, will like to invest in the wake of high and rampant inflation. Inflation is the most dreadful enemy of investment as it raises the costs of production due to increasing labor, energy and raw material costs. A high cost of production leads to market instability and makes investment less attractive. The falling investment in the 1990s in Pakistan (see GOP [1999-2000]) substantiates this scenario.

Exchange rate has the expected and correct sign. It is negative and significant, suggesting that a rise in the exchange rate (domestic price of the foreign currency) will discourage investment as Pakistan's industrial sector has relied heavily on imports (Kemal [1998]). A realistic exchange rate policy will help promote investment, particularly encouraging domestic investors. A stable and predictable exchange rate is conducive to a stable macroeconomic environment. The significant and positive coefficient for domestic credit shows that investment greatly depends on the availability of domestic credit. This is in agreement with studies on investment behavior (see Blejer and Khan [1988]; Khan [1988a]; Leff and Sato [1988]). The significant and positive coefficient of foreign savings indicates that this variable contributes to investment in a more decisive way. This is to be expected

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[3] Figures in parentheses are standard errors.

as foreign savings adds to the supply of available funds for investment. Since its independence, Pakistan has relied heavily on foreign aid to finance its ambitious investment plans due to the low level of savings as well as low export earnings (Afzal [1990]). The highly significant and positive coefficient of saving in the investment function authenticates the crucial importance and role of saving in promoting and augmenting investment. Lagged investment, though positive, is not significant, suggesting that the current investment is not influenced perceptibly by past investment

4. Conclusions

Compared with other Asian countries, Pakistan has not had adequate growth of national savings. Growth of real GDP, real per capita income, foreign capital inflow and investment are the major determinants of savings as their coefficients are highly significant. Exchange rate and interest rate are also important factors that influence the saving behavior in Pakistan. Foreign savings exert a negative and significant effect, thus supporting the "displacement hypothesis" put forward by other studies. Concessional foreign aid has acted as a strong factor influencing national savings, as various governments did not make serious efforts to mobilize domestic resources. An adequate reduction in non-development expenditure would release resources for productive investment that would raise production and employment and would result in the virtuous circle of saving-investment-growth-saving. The interest rate and the exchange rate do influence saving and a prudent management of these macroeconomic variables is likely to raise savings.

Macroeconomic stability, inflation, availability of domestic credit, exchange rate, foreign and national savings have been found to be the central factors influencing the investment environment. Provision of good infrastructure, creation of a favorable investment climate, political stability and good industrial relations are also important factors for raising the rate of investment. To increase both saving and investment, Pakistan can benefit from the East Asian experience (World Bank [1993]; Qureshi et al. [1999]). Overseas Pakistanis and foreigners will certainly be encouraged to invest in Pakistan if the confidence of the domestic investor is restored and maintained.

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