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THE IMPACT OF BANK BRANCHES, RURAL INCOME  
AND DEPOSIT INTEREST RATES ON RURAL DEPOSITS IN SOUTH ASIA

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## INTRODUCTION

In October, 1984 APRACA held a workshop in Manila on the subject of rural deposit mobilization. Over a dozen country papers were presented describing rural deposit trends, policies and problems in Asian countries. Most of the papers described national policies believed to be important in affecting rural deposits, but data limitations and other factors prevented the authors from conducting formal statistical tests to determine the relative impact of the determinants of deposits (APRACA).

The purpose of this paper is to report the statistical results obtained in a study to quantitatively determine the relative importance of access to deposit-taking institutions, rural income and real rate of interest paid on deposits in determining rural deposits. The study covers the five South Asian countries of Bangladesh, India, Nepal, Pakistan and Sri Lanka. These countries were selected for analysis because they have emphasized rural banking, they have strong similarities in their economic, cultural and political background, and they furnished reasonably consistent data. The paper includes a short discussion of major issues related to deposit mobilization, the empirical model, the results and some implications.

### Determinants of Rural Deposits

The literature on rural banking identifies a large number of factors expected to influence the volume of rural deposits mobilized by deposit-taking institutions. Generally these

factors in one way or another influence the ability and willingness of households to make financial investments. We feel that amongst these several factors, three are especially important and the purpose of this study is to investigate their relative importance.

The most important nonfinancial factor affecting rural deposits is likely to be rural income. The higher the income of rural households, the greater will be their ability to acquire temporary surpluses that can be held in the form of deposits. Furthermore, the higher the income, the greater will be the need to hold financial assets as a means of payment. Also income should be correlated with a wide variety of other important factors related to rural banking such as monetization, urbanization and education. Unfortunately, these factors are not ones that policymakers can do much about in the short run to increase rural deposits. There are two financial variables, however, that governments can influence more easily to improve rural deposit mobilization.

The first financial variable is location of deposit-taking institutions. Conveniently located institutions can increase rural deposits by reducing the transaction costs of financial management. No studies have been found that document transaction costs of making and withdrawing deposits from a financial institution, but there are several studies that document the cost of borrowing money from a financial institution. Borrowing cost studies tend to show that noninterest costs may be as high or higher than interest charges, especially for small loans (Cuevas

and Graham). These costs are high because of the implicit and explicit costs of travel and time spent in making several trips to the lender to negotiate a loan. Although there are fewer reasons for institutions to discourage small deposits as they do with small loans, transaction costs for holding deposits will be high if the depositor has to travel a considerable distance to a financial institution. Increasing the access to these institutions can reduce transaction costs and, thereby, increase the net return earned on deposits.

An extensive network of financial institutions in rural areas can also speed the adoption of banking habits. Rural people need time to adjust to the idea of substituting formal institutions for face-to-face informal relations. Exposure to a rural bank in the community, getting acquainted with bank staff who are community members, and observing other people safely using financial institutions may encourage potential depositors to place some of their savings in a financial institution.

The second financial variable is level and variability of real interest rates. The impact of interest rates on aggregate savings is controversial. The income and substitution effects of interest rate changes need to be evaluated. Some studies tend to conclude that the substitution effect outweighs the income effect so that an increase in interest rates is associated with an increase in savings. The impact on household financial savings of an increase in interest rates should be unambiguously positive, because such savings can substitute for physical capital, cash and inflation hedges in the household's investment portfolio.

One problem in evaluating the relation between deposits and interest rates is that many countries repress financial markets by controlling interest rates at below equilibrium levels. Interest rate reforms have often been too small and short-lived to determine their true impact.

The demand for funds by financial institutions is also likely to influence rural deposits. When demand is high, institutions can be expected to aggressively seek new depositors, provide customers with the best service available, and streamline procedures so transaction costs are reduced. Several government policies influence the eagerness of financial institutions to compete for deposits. Governments license bank branches and frequently provide strong incentives for opening rural branches. This positive effect of improved access to banks can be offset, however, by other policies. Interest rate regulations may establish margins between lending and deposit rates that are too narrow to cover costs of bank operations. Reserve requirements may be set at high levels so the effective cost of mobilized deposits is much higher than the nominal interest rate paid. Recognizing these disincentives for deposit mobilization may lead governments to provide cheap central bank rediscount funds with the hope that lending targets will be met even if deposits are not mobilized.

Interest rate controls on loans often create a disequilibrium situation with excess demand for funds (more funds demanded than will be supplied at that price) so lenders must resort to nonmarket rationing of loans. In this situation,

changes in rural deposits associated with changes in deposit interest rates are likely to represent different points along the supply curve of funds provided to institutions. This fact permits using single equation estimation techniques for studying the supply of funds provided to deposit-taking institutions in rural areas.

#### EMPIRICAL MODEL AND RESULTS

The empirical model used in this study to explain the supply of funds provided to deposit-taking institutions in rural areas in these countries was specified as follows:

$$D = F(Y, r, i, B)$$

where D = nominal value of rural deposits,

Y = agricultural GDP,

r = nominal interest rate paid on deposits,

i = rate of inflation, and

B = number of bank branches/offices in rural areas.

The relationship between deposits and agricultural GDP and number of branches was expected to be positive. All five countries under study have experienced nominal and real increases in agricultural GDP although the growth rate has been fairly low in Nepal. Although these countries have actively pursued the spread of banking services, by 1982/83 the number of rural bank offices per 10 thousand inhabitants was still only 0.35 in Bangladesh, 0.40 in India, 0.25 in Nepal, 0.45 in Pakistan and a relatively high 1.07 in Sri Lanka.

The interest rate variable was expected to have a positive sign. During the 1970-1981 period, real deposit rates of interest for twelve-month time deposits, as estimated by Fry, were negative for several years for both India and Pakistan; in some years they were a negative 3 to 5 percent. Real deposit rates were also frequently negative for Bangladesh, Nepal and Sri Lanka but became positive after they liberalized interest rate policies (1980 in Bangladesh, 1973 in Nepal, and 1979 in Sri Lanka). Following reforms, rates varied in the positive 2 to 5 percent range with Sri Lanka tending to have the highest rates.

The model was fitted to pooled time-series cross-section data covering the years 1970-1981 for India, Nepal, Pakistan and Sri Lanka, and 1972-83 for Bangladesh. Data on nominal interest rates, rural deposits and branches were obtained from the five country papers presented by Joshi, Motwani, Mridha, Quaraishi, and de Silva at the APRACA Workshop. There are some definitional differences among the papers with the chief one being that the Sri Lankan data covers only rural banks and credit societies as no data exist on commercial bank deposits in rural areas. Estimates of real interest rates and expected inflation were taken from Fry (1981, 1984). Data on agricultural GDP at constant factor cost, implicit GDP deflators, and official exchange rates were taken from the World Bank World Tables, 1983. Rural population estimates were obtained by interpolating population census data reported in various issues of the U.N. Demographic Yearbook.

Ordinary least square regressions were run with various specifications of the basic model. F-tests were applied to the residual sums of squares of models that included country dummy variables, and interactions between them and each of the explanatory variables. The hypothesis of overall homogeneity of the regression was rejected. Coefficients for the country dummy variable and interaction between the dummy variable and the branching variable were statistically significant. A per capita specification of the variable in real terms was used to control for scale effects across the countries. The model was estimated in double-log form so the coefficients of the independent variables could be interpreted as elasticities.

Two empirical models were tested. The first one was specified as:

$$(1) \ln D = a_0 + a_1 \ln Y + a_2 \ln B + a_3 \ln(r-i) + b_1 D_1 + b_2 D_2 + b_3 D_3 + b_4 D_4 + c_{31} U_1 + c_{32} U_2 + c_{33} U_3 + c_{34} U_4$$

where D = per capita real rural (demand and savings) deposits,

Y = per capita agricultural GDP at constant factor cost,

r-i = real rate of interest on twelve-month time deposits, and

B = number of bank branches/offices per thousand inhabitants in rural areas,



$D_i = 1$ ,  $i = 1, 2, 3, 4$  for Sri Lanka, Nepal, Pakistan, and Bangladesh, respectively, 0 otherwise. India was selected as the country of reference.

$U_i = D_i \ln B$ ,  $D_i$  = dummy variable for the respective countries.

This model implies that households react directly to real interest rates. An alternative formulation permitted a differential response to changes in nominal rates and inflation. The response lag to changes in nominal rates might be shorter than the lag in response to changes in inflation because the latter are filtered through the process of expectation formulation. Therefore, the second model was specified as follows:

$$(2) \ln D = a_0 + a_1 \ln Y + a_2 \ln B + a_4 \ln r + a_5 \ln i + b_1 D_1 + b_2 D_2 + b_3 D_3 + b_4 D_4 + c_{31} U_{12} + c_{32} U_2 + c_{33} U_3 + c_{34} U_4$$

The sign for the coefficient of nominal interest rate was expected to be positive, while the sign for the inflation variable was expected to be negative.

Table 1 presents the results for the two equations. In the first model, the coefficients for all variables were of the predicted sign and all were statistically significant. The explanatory power of the model was high and the F-value for the regression was significant. The elasticities for branches and real deposit rates were both greater than one. A 10 percent increase in the number of rural branches is associated with a 13

Table 1. OLS Coefficients of the Deposit Function<sup>a/</sup>

Parameter (Independent Variable)	Equation (1)			Equation(2)		
	Estimate	t-ratio <sup>b/</sup>	Standardized Estimate	Estimate	t-ratio <sup>b/</sup>	Standardized Estimate
a <sub>0</sub> (intercept)	-3.115	-6.437**	--	-3.017	-5.033**	--
a <sub>1</sub> (lnY)	0.590	5.951**	0.263	0.715	3.962**	0.319
a <sub>2</sub> (lnB)	1.328	15.559**	2.072	1.311	12.394**	2.046
a <sub>3</sub> (ln(r-i))	2.536	5.364**	0.143	--	--	--
a <sub>4</sub> (ln(r))	--	--	--	0.134	1.029	0.057
a <sub>5</sub> (ln(i))	--	--	--	-0.677	-1.677*	-0.046
b <sub>1</sub> (D <sub>1</sub> )	-4.318	-9.637**	-1.843	-4.183	-7.561**	-1.786
b <sub>2</sub> (D <sub>2</sub> )	-1.320	-1.858*	-0.563	-1.066	-1.204	-0.455
b <sub>3</sub> (D <sub>3</sub> )	-3.573	-7.933**	-1.525	-3.483	-6.301**	-1.487
b <sub>4</sub> (D <sub>4</sub> )	-3.575	-6.693**	-1.526	-2.845	-4.452**	-1.214
c <sub>31</sub> (U <sub>1</sub> = D <sub>1</sub> lnB)	-0.612	-5.339**	-0.895	-0.580	-4.072**	-0.849
c <sub>32</sub> (U <sub>2</sub> = D <sub>2</sub> lnB)	-0.297	-1.928*	-0.616	-0.232	-1.231	-0.481
c <sub>33</sub> (U <sub>3</sub> = D <sub>3</sub> lnB)	-0.676	-1.982*	-0.242	-0.592	-1.397	-0.211
c <sub>34</sub> (U <sub>4</sub> = D <sub>4</sub> lnB)	-0.897	-6.957**	-1.556	-0.692	-4.551**	-1.200
$\bar{R}^2$	0.977	--	--	0.966	--	--
F-Value	238.481**	--	--	144.603**	--	--

<sup>a/</sup>N=60. D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub> are dummy variables where

D<sub>1</sub> = 1 for Sri Lanka, 0 otherwise,

D<sub>2</sub> = 1 for Nepal, 0 otherwise,

D<sub>3</sub> = 1 for Pakistan, 0 otherwise,

D<sub>4</sub> = 1 for Bangladesh, 0 otherwise.

<sup>b/</sup>Levels of significance: \* = 0.10; \*\* = 0.01.

percent increase in rural deposits, while a similar increase in real deposit rate is associated with a 25 percent increase in deposits. The income variable was less elastic with a value of 0.5. The coefficients for the interaction variables between countries and branches were all negative and significant for the four countries suggesting that branching has a somewhat greater impact on deposits in India than in other countries.

In the second model, the magnitudes of the coefficients for the common variables were similar and the explanatory power of the model was only slightly less than the first model. The coefficients for the interest rate and inflation variables had the expected sign but only the latter was significant. This result suggests that rural depositors respond to real interest rates rather than formulate separate expectations of nominal interest rates and inflation.

Standardized regression coefficients were calculated to account for differences in standard errors of the estimates, and to evaluate the relative importance of the explanatory variables. These coefficients show that changes in transaction costs represented by branch density are relatively more important than changes in agricultural GDP and real interest rates in explaining the variation in rural deposits.

#### CONCLUSIONS AND IMPLICATIONS

The statistical results conformed to our expectations about the importance of rural income, bank branches and real interest rates for rural deposits. In these five countries, rural

deposits can be expected to increase as rural incomes rise, as bank branches expand, and as real interest rates increase. There is little that policymakers can do in the short run to raise agricultural incomes. However, they can have a short-term impact on the two financial variables that they control: bank density and interest rates. Branching appears to have the greatest impact because of the effect of accessibility on transaction costs of depositors. The importance of convenience in making and withdrawing deposits swamps the importance of real interest rates at this level of financial development in these countries. The importance of attractive deposit rates is expected to increase once depositors have convenient access to deposit-taking institutions. Interest rates are probably relatively more important for wealthier households with access to a variety of non-financial investments than for poorer households.

Rural deposits can become an important source of funds to finance rural lending. APRACA's interest in and concern for deposit mobilization is timely. Before deposit mobilization can become a successful strategy, however, several policy issues need to be reviewed and perhaps APRACA can take the lead in stimulating analysis and debate about them. For example, the narrow spreads authorized between lending and deposit rates, the high reserve requirements often set for mobilized resources, and the abundant supplies of cheap rediscount funds frequently provided by central banks can destroy incentives for financial institutions to aggressively mobilize deposits. Furthermore, it is clear that mobilizing deposits in low income rural areas may be

expensive for full-service financial institutions. More experimentation and innovation is required to identify the type of simple institution that can be cost effective in these situations, yet provide depositors with enough security so they are encouraged to hold their financial savings in institutions.

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