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THE DETERMINANTS OF
RURAL DEPOSITS IN BANGLADESH

by

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ABSTRACT

A simultaneous relationship between interest-bearing deposits and rural bank branch density exists in Bangladesh. Permanent income directly affects bank density and indirectly affects deposits. Bank density and availability of roads and vehicles affect depositor behavior through their effect on transaction costs. Transitory income and literacy also positively affect deposits.

THE DETERMINANTS OF RURAL DEPOSITS IN BANGLADESH

INTRODUCTION

Recent literature on rural finance argues that rural areas have savings that can be mobilized through rural financial markets, refuting the neo-classical assumption that rural people cannot save because of low income (e.g. Adams; Meyer; Von Pischke). Saving mobilization efforts in developing countries have frequently been limited to urban areas, thereby limiting their effectiveness and increasing dependency on foreign aid for development finance. The failure of the traditional supply-leading approach to rural finance coupled with limited supplies of foreign aid have now forced international agencies and local governments to place more emphasis upon rural savings mobilization.

Although some rural finance research concerns rural household savings, there are few comprehensive studies of the determinants of rural deposit behavior in developing countries. Most studies have been devoted to the relationship between financial liberalization and savings mobilization following the McKinnon and Shaw models. A few recent studies on rural deposits provide some information to policymakers and suggest areas for further research (e.g. Srinivasan and Meyer, 1986; Vasquez).

Rural deposits can be both interest-bearing and non-interest bearing. This paper presents the results of the analysis of the determinants of

interest-bearing deposits at the district level in Bangladesh.^{a/} The analysis emphasizes the overlooked interrelationships between permanent income, bank density and transaction costs. Bangladesh is one of the poorest countries in the world with a high population density (1,566 people per square mile), low rate of literacy (26 percent), an average annual population growth of 2.6 percent and per capita income of approximately US \$100. If significant amounts of rural deposits can be mobilized in such a low income country, they should be that much more abundant in richer countries.

DETERMINANTS OF INTEREST-BEARING DEPOSITS

In this paper we use the perspective of the demand for interest-bearing deposits by rural households. This is analogous to the supply of deposits provided to deposit-taking institutions. Income has a positive effect on interest-bearing deposits: the higher the income of rural households, the greater will be their ability to demand interest-bearing deposits. Because of the variability of rural household income, the "permanent income" hypothesis is expected to better explain the influence of income on interest-bearing deposits than does the "absolute income" hypothesis. The empirical validity of the "permanent income" hypothesis has been established in the literature on savings (e.g. Canh; Friend and Taubman; Gupta; Williamson). We test the permanent versus the absolute income hypothesis in this paper.

^{a/} District is an intermediate administrative area in Bangladesh that ranks between a division and an upazilla.

McKinnon and Shaw demonstrated that low nominal interest rates discourage potential depositors in a situation of high inflation rates, yet the effects of real interest rates on deposits/savings are controversial. Lanyi and Saracoglu, using available evidence from Asian and Latin countries, suggest that the substitution effect of interest rate changes is more important than the income effect in affecting savings. Several studies have found a significant and positive relationship between interest rates and deposits (Fry; Giovannini; Gupta; Srinivasan and Meyer, 1986). Wai argued that financial savings may not always be responsive to interest rates, however, because of low income levels, socio-religious restrictions, low market rates of interest, and income effects greater than substitution effects.

In many LDCs, nominal interest rates are fixed below equilibrium levels which discourages potential depositors, particularly when transaction costs are high. Such costs are reduced by proximity to bank branches, financial innovations and the availability of roads and vehicles (Burkett and Vogel; Chandavarkar; Dadzie, Dunson and Akaah), but no study has been found that explicitly measures the relative significance of bank branches and transaction costs on savings. Bank branch density has been used as a proxy for transaction costs for depositors (Burkett and Vogel; Cuevas and Graham; Rana; Srinivasan and Meyer, 1986). The significant positive coefficients obtained imply that branches located conveniently to depositors are likely to generate more deposits than those located farther away. Similarly, a greater availability of rural roads and vehicles reduces transaction costs leading to greater deposits.

The awareness of rural people about banks and their services is another factor typically assumed to influence demand for interest-bearing deposits. Most rural people have limited knowledge about bank services and lack confidence in non-local employees. Deposits are demanded not only as investments, but also to ensure the safety of money, and banks provide both services. Increased awareness about banking is expected to increase demand for deposits, but the limited evidence available is conflicting (e.g. Koropecy; Vasquez).

A concept not fully explored in the literature concerns the relationship between permanent income, bank density and transaction costs. On the one hand, bank density affects transaction costs, especially for rural households where travel time and distances are significant. On the other hand, bank branch density is influenced by economic factors, an important one being the income of an area served by a branch which affects deposit potential. Therefore the possibility exists that the most important direct effect of income is through bank density with an indirect effect on deposits. For this reason, we test for two-way causality between deposits and bank density in Bangladesh in this paper.

Little literature has been found on the determinants of rural bank branching in developing countries. It is suggested that bank branches are determined by income and level of competition (Doyle et. al.; Spong and Hoenig). Given Central Bank procedures to license bank branches and the motivations of banks, it is hypothesized that the density of bank branches in rural areas in Bangladesh is determined by several factors. Permanent income is expected to have an important positive influence, while high inflation rates reduce the level of potential real deposits and are

expected to discourage new branches. Deposit-taking institutions expanded their rural banking facilities at the direction of the government to disburse 10 billion taka^{b/} of agricultural credit during the period 1978-81, so the volume of rural credit is expected to positively influence branch expansion. Finally, the availability of rural roads and vehicles should encourage branching because they reduce transportation costs of bank funds and staff.

The Empirical Model

A simultaneous equations model with two endogenous variables-- interest-bearing deposits and bank branches--was developed to study the determinants of interest-bearing deposits. Based on the conceptual discussion, the model was specified as follows:

$$\begin{aligned} \ln(\text{DINT}/\text{POP}) = & \ln A + \alpha_1 \ln \text{PYP} + \alpha_2 \ln \text{PYT} + \gamma \ln P + \lambda \ln L \\ & + \beta_1 \ln \text{BF} + \beta_2 \ln \text{RT} + U_1, \end{aligned} \quad (1)$$

$$\begin{aligned} \ln \beta F = & \ln B + \alpha_1 \ln \text{PYP} + \gamma \ln P + \beta_2 \ln \text{RT} + \eta \ln \text{CR} \\ & + \theta \ln(\text{DINT}/\text{POP}) + U_2 \end{aligned} \quad (2)$$

^{b/} US\$1 = approximately Taka 30.

where,

(DINT/POP) = per-capita district interest-bearing deposits;

PYP = per-capita district permanent agricultural GDP at constant factor cost;

PYT = per-capita district transitory agricultural GDP at constant factor cost;

P = district inflation rate;

L = district literacy rate;

BF = per-capita district rural bank branches;

RT = district index of roads and vehicles;

CR = per-capita district rural credit outstanding.

The mathematical form of the model was a power function which was linear in the parameters in log form. A per-capita specification of the variables was used to adjust for scale differences across districts. The model was estimated in double-log form so the coefficients of the pre-determined variables are elasticities.

The conceptual discussion which yields equations (1) and (2) excludes CR from equation (1) and L and PYT from equation (2), which satisfies the order conditions. Two-stage least squares (2SLS) was used to estimate the coefficients of the structural equations.

The model was fitted to pooled data from 20 districts for 1983 and 1984. Data on number of rural bank branches, loans outstanding, and deposits mobilized by the most important rural institutions (four nationalized banks and one agricultural bank) were obtained from Central Bank data tapes. Data on other variables--literacy, agricultural GDP, inflation, and roads and vehicles--were obtained from the Bangladesh Statistical Year Book, 1985, and District Statistics, 1983.

The permanent and transitory components of agricultural GDP were estimated from 1976-84 GDP data by regressing GDP on time; trend values were treated as permanent agricultural GDP, and the residuals as transitory agricultural GDP. Inflation data available for six districts were used as a proxy for all districts. Literacy was defined as the percentage of people who can read and/or write relative to the total population above 5 years of age. Banking facilities were measured as the number of rural bank branches per 1,000 people. Density of roads and vehicles was measured in an index as:

$$RT_j = \left[\frac{R_j}{TA_j} \cdot \frac{T_j}{POP} \right] \cdot 100 \quad (3)$$

where RT_j is a weighted index of roads and vehicles in j^{th} district; R_j is mileage of roads in j^{th} district; TA_j is total geographical area of j^{th} district; T_j is number of vehicles in j^{th} district, and POP is total district population in thousands. Districts with a large number of vehicles and mileage of roads per 1,000 people have a high index. Vehicles were defined to include buses, private cars, and rickshaws (a tricycle designed to carry two passengers widely used in rural areas).

EMPIRICAL RESULTS AND ANALYSIS

The results obtained for the interest-bearing deposit and bank branch equations are presented in Tables 1 and 2. Results for the absolute income hypothesis are presented with those of the permanent income hypothesis. The F-ratios of all equations are significant. The coefficients for the explanatory variables in the interest-bearing deposit equation of the permanent income model have the expected signs and, except

Table 1

Estimated Parameters of the Double-Log
Interest-Bearing Deposit Function

Variable	<u>Permanent Income Hypothesis</u>		<u>Absolute Income Hypothesis</u>	
	Second-Stage Statistics	T-Ratio	Second-Stage Statistics	T-Ratio
Intercept	6.06	.884***	10.992	1.428**
BF	.985	1.785*	1.626	1.586**
PYP	.057	.083	-	-
PYT	2.40	1.260**	-	-
PY ¹	-	-	-.341	-.590
L	.185	.849***	.169	.758
P	.058	.230	.287	1.760
RT	.219	2.333*	.167	2.194*
F-ratio	11.91	-	16.35	-
R-Square	.684	-	.706	-

¹ Per-capita absolute income
 * Significant at 0.05 level.
 ** Significant at 0.10 level.
 *** Significant at 0.20 level.

Table 2

Estimated Parameters of the Double-Log Bank
Branch Function in the Interest-Bearing Deposit Model

Variable	<u>Permanent Income Hypothesis</u>		<u>Absolute Income Hypothesis</u>	
	Second-Stage Statistics	T-Ratio	Second-Stage Statistics	T-Ratio
Intercept	-7.893	-12.762*	-7.577	-10.959*
PYP	.478	3.096*	-	-
py ¹	-	-	.415	1.864*
P	-.155	-3.591*	-.173	-4.208*
RT	.022	.294	-.007	-.061
CR	.107	1.487**	.071	.864***
DINT/POP	.158	1.624**	.252	1.679**
F-ratio	26.20	-	29.15	-
R-Square	.794	-	.811	-

- ¹ Per-capita absolute income.
* Significant at 0.05 level.
** Significant at 0.10 level.
*** Significant at 0.20 level.

for inflation rate and permanent income, are statistically significant. The bank branch equation explains 80 percent of the variance and, except for roads and vehicles, all coefficients are significant.

The significant cross-coefficients of bank branch and interest-bearing deposits in the equations are important because they confirm the expected simultaneity between bank branches and interest-bearing deposits. The coefficient for bank branches in the interest-bearing deposit function was estimated at 0.985, significant at the 0.05 level, while in the bank branch function, the interest-bearing deposit coefficient was 0.158, significant at the 0.10 level.

These results suggest that, contrary to conventional views, permanent income has a direct effect on bank branches and an indirect effect on deposits. District inflation also has a direct effect on branches and an insignificant effect on deposits. Per capita credit outstanding also has a significant positive effect on branch density. Therefore, district income, inflation and expansion of loans appear to directly affect bank density, while rural branch density, literacy and the density of rural roads and vehicles directly affect interest-bearing deposits.

The positive and significant coefficients for the variables representing the density of bank branches and rural roads and vehicles reflect the importance of transaction costs in affecting rural deposits. As banks, roads and vehicles expand in rural areas and are scattered geographically throughout the districts, the net return earned by depositors for any given rate of interest paid on deposits should rise. For small size deposits, the transaction costs may be large relative to the interest earned, as often occurs with loans.

Columns 1 and 3 in Tables 1 and 2 show the comparative results of using permanent versus absolute income to explain deposits and branches. The results for absolute income are significant and positive in the branch equation, but negative and insignificant in the deposit equation. The permanent income variable is positive in both equations but significant only in the branch equation. The transitory income variable is significant in the deposit equation with an elasticity over 2 suggesting that deposits will be highly sensitive to unexpected changes in variations in income. This result is consistent with the view that households use financial assets to even out variability in income.

Few studies have considered the role of and need for increasing the awareness of rural people about banking. These results show that literacy significantly increases the demand for interest-bearing deposits, perhaps because of the greater awareness of banking that occurs through literacy.

CONCLUSION AND POLICY IMPLICATIONS

Three important findings emerged in this study of rural interest-bearing deposits in Bangladesh. First, the study supported other research which has concluded that transaction costs are important in explaining rural depositor behavior. Only the indirect measures of the density of rural branches and rural roads and vehicles were available for use as proxies of transaction costs. Future research should explore depositor transaction costs more directly. Furthermore, the quality of bank service which could not be measured in this study, may also be a significant determinant of transaction costs of depositors.

The other two major findings are that there is two-way causality between the density of rural branches and interest-bearing deposits, and

that permanent income influences deposits indirectly through branch density. Outstanding credit, district inflation and interest-bearing deposits also influence branch density. Therefore, the factors that affect the number and location of rural bank branches can be expected to have a significant impact on rural deposit mobilization in Bangladesh. Bank density and geographic distribution in turn affects transaction costs.

Central banks, through effective rural bank branching policies, can encourage banks to open new rural branches and, through flexible interest rate policies, can ensure a positive return on deposits. Similarly, if roads and vehicles are expanded and if bank branches are located geographically close to depositors, interest-bearing deposits are likely to increase because of the reduction in depositor transaction costs. In addition, an increase in awareness about banks, better bank service, and cordial interaction with bank employees will likely encourage rural households to demand bank deposits.

Past Bangladesh policies have emphasized the expansion of rural banking to expand rural lending. It appears that the banks distributed their branch network considering factors such as district income, inflation, loans outstanding and deposit potential. The expansion in branch density contributed to increased deposits. Economic studies are now needed in Bangladesh to determine if the volume of deposits and loans handled by the typical branch justify the cost of operating the rural branches. There is some evidence emerging that the authorized spreads for deposits and loans are too low to cover non-financial resource costs and default risks (Srinivasan and Meyer, 1987). Efforts to mobilize rural deposits, therefore, may be jeopardized if these problems are not solved.

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