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AN EMPIRICAL EXAMINATION OF THE RELATIONSHIP BETWEEN COMMERCIAL BANKS AND CREDIT UNIONS IN A SMALL OPEN ECONOMY

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Abstract

This study empirically examines the relationship between commercial banks and credit unions using panel data in a typical small open economy. Unlike previous studies, which were largely static in nature, the paper accounts for the dynamic interaction between commercial banks and credit unions using an autoregressive distributed lag framework. Two hypotheses are examined: first, whether commercial bank competition influences credit union activity and second, whether credit union competition impacts on commercial banks' decision making processes. The study found that credit unions and banks are not directly competitive, in the sense that the actions of credit unions do not influence commercial banks' reactions and vice versa.

JEL classification: L4, L1

Keywords: Credit unions, competition, commercial banks, panel models

Introduction

This paper presents an empirical analysis of the relationship between commercial banks and credit unions in a small, open, developing economy. A credit union is a financial co-operative that is owned and controlled by its members. Therefore, its primary objective is to serve its members. Members are encouraged to save principally through the purchase of shares in the union, thus contributing to a pool of funds from which low-cost loans can be made available to all members. On the other hand commercial banks are profit maximisers, with the

difference between the interest received on loans and paid on deposits providing the main source of income. Given their structure credit unions don't have such an objective function, as they are unlikely to simultaneously maximise the dividend paid to members, while simultaneously minimising the rate on loans.

Despite these differences, commercial banks and credit unions compete for the same pool of depositors and prospective borrowers. Testimony to this is given by the constant complaints of bankers regarding the growth of credit unions (see Section 1 below. Yet, there is surprisingly little evidence of competitive tension between credit unions and the banking sector. In fact, most of the research of the interaction between credit unions and commercial banks has been undertaken using data from the United States (US). Emmons and Schmid (2000) who estimated a dynamic theoretical model of competition between banks and credit unions, made two intriguing predictions: some households respond to increased concentration among local banks in the current period by transferring accounts to credit unions in the next period, ceteris paribus, and that the higher the participation rate at credit unions in a given year, the larger the concentration in the commercial banking market in the following year, all else held constant. In short, credit unions and banks in the US are direct competitors in the local household deposit market. Feinberg (2001), utilising a modified version of the dominant firm-price leadership model, concentrates on the impact that credit unions have on the market power of commercial banks. Using a similar panel data methodology as Emmons and Schmid, his results revealed that the unsecured rates of banks are negatively influenced by the share of market deposits held by credit unions in the US.

In an earlier US study, Rhoades (1987), though not dealing strictly with bank-credit union interaction, but rather with bank-non-bank tension, found that when he regressed bank profitability on three Hirshman-Herfindahl indices of concentration, *inter alia*, a weak

relationship existed between commercial banks' profit performance and the various indices of concentration, which attempted to measure the presence and importance of non-bank depository institutions. Similarly, Mushinski (1999), in the only available study on a developing country (Guatemala), argues that banks and credit unions serve distinct markets and the markets catered for by credit unions, would not be served in their absence. He found that credit unions appear to lend more to households with less desirable forms of credit and therefore are not direct competitors for commercial banks.

This paper adds to this sparse empirical literature by examining the relationship between commercial banks and credit unions in the Caribbean island of Barbados, utilising panel data. The major contributions of the study are that it undertakes the analysis using data from a typical small open economy and accounts for the dynamic interaction between commercial banks and credit unions using an autoregressive distributed lag framework. Nearly all the previous work was based on data from the US and were essentially static models.

The structure of the paper is as follows. Section 1 provides some background analysis of the development of credit unions and banks in Barbados. Section 2 outlines the conceptual framework utilised in the study, while Section 3 describes and analyses the data. Section 4 discusses the empirical results and Section 5 summarises the main findings.

1. Background

Commercial banks are the most important lenders in the Barbadian financial system, followed by mortgage lenders and finally credit unions (see Table 1). However, in examining the loans' shares over time it is clear that credit unions' growth has exceeded that of both banks and mortgage institutions, especially during the 1980s when a combination of central bank

restrictions on the commercial banking sector and tax incentives for credit unions led to credit unions' loans, as a percentage of commercial banks' loans, expanding from 0.8% in 1980 to just under 10% in 1990. This rise in credit unions' share of the lending market continued into the 1990s- albeit at a significantly reduced rate - with total credit unions' loans reaching 11.2% of total commercial banks' loans by the end of 2000. However, the 1990-92 recession led to a sharp decline in the credit unions' rate of expansion, as a combination of high unemployment, salary cuts, and the introduction of new products by the commercial banks resulted in a moderation of asset growth. A similar pattern is revealed in examining the deposits data with unions' share of total deposits rising from a negligible 0.2% in 1980 to 2.5% by 2000. Credit union membership growth rates are even more dramatic, increasing from under 7% of the total labour force in 1980 to 68% at the end of 2000. Indeed, Williams (1996, pp.11) has argued that "one of the major outcomes of the performance of commercial banks in the Caribbean has been the loss of market share to non-banks." The growth of the credit union movement has attracted the regulatory attention of the Central Bank of Barbados, with some officials arguing for enhanced regulation of the credit union sector (Hinds and Chase, 1997). Hinds and Chase assert that while still endeavouring to meet the needs of the poor, the movement had become very sophisticated, offering a range of credit services and "competing directly with the established banking sector". They note that credit unions now offer automatic teller machine facilities, credit cards, mortgage loans, small business loans, chequing facilities, and bill paying services.

2. Conceptual Framework

The predominant empirical and regulatory approach to banking competition has been the Structure-Conduct-Performance (SCP) paradigm. This procedure presumes that measures of

bank market structure, including those relating to market concentration, are good indicators of the intensity of competition (Scherer and Ross 1990, pp. 4-7). In essence, a higher market concentration means larger prices for financial services and, consequently, bigger bank profits. The theoretical models specified in the study follows Rhoades (1987), who includes a Herfindahl-Hirshman index of market concentration, consisting of commercial banks and credit unions' share of total market deposits (MP_{bu}), commercial banks' share of total commercial bank and credit union deposits (MP_b) and credit unions' share of commercial bank and credit union deposits (MP_u). If credit unions are important competitors for commercial banks' business, then MP_{bu} should be an influential determinant of commercial banks' profit performance, and be negatively related to commercial banks' profitability, since its inclusion in the profit function is likely to erode the ability of banks to earn monopoly profits. However, MP_b should be positively associated with commercial banks' profitability because as concentration within the banking sector rises, the ability of banks to reap monopoly profits expands. Similarly, if commercial banks significantly affect credit unions' activity then MP_{bu} is likely to be an important determinant of credit unions' performance (profitability, efficiency and interest rate spread). It is expected that MP_{bu} should be negatively correlated with credit unions' profitability, since as credit unions gain market share their profitability should increase. On the other hand, MP_{bu} is likely to cause inefficiency and interest rate spreads to contract. MP_u is expected to be positively associated with credit union profitability, and negatively correlated with inefficiency and interest rate spreads. Ideally, different measures of market concentration should not lead to dissimilar findings, or the robustness of the results would have to be called into question. Thus, using loans rather than deposits as the unit of measure of market concentration in constructing MP_{bu}, MP_b and MP_u, should give similar conclusions.

To look formally at the interaction between commercial banks and credit unions their objective functions must be defined. For commercial banks, it is customary to assume that banks are profit maximisers and incorporate such variables as inefficiency (Ine), market power (MP_b) and the amount of loans (L) into the profit function specification (see Moore and Craigwell, 2000). This standard specification is adopted, but extended to include a variable that represents credit union competition (MP_{bu}) to determine whether commercial banks profit performance is better explained by measures of market structure that take into account the presence of credit unions. Mathematically, the model is as follows:

$$p_b = f(\underset{-}{Ine_b}, \underset{+}{L_b}, \underset{+}{MP_b}, \underset{-}{MP_{bu}}) \qquad (1)$$

where p_b represent commercial banks profitability, and the subscripts b and u represent banks and credit unions, respectively. A priori, an expansion in the market power and loan portfolio of banks are expected to positively influence commercial banks' profitability, while increased inefficiency and total market concentration should reduce the rate of return obtained by commercial banks.

Defining the objective function of a credit union is, however theoretically and empirically, more problematic. As noted by many authors (for example, Smith, Cargill and Mayer, 1981; Smith, 1984), the standard theoretical treatment of financial intermediaries as profit maximisers cannot be applied directly to credit unions since the members of a credit union provide both the demand for and the supply of loanable funds. That is, a credit union intermediates between its member-savers and its member-borrowers. In this situation, it is not likely that a credit union can maximise its dividend rate for savers and minimise its loan rate for borrowers at the same time.

Because there is no generally accepted theory of credit union behaviour, three objective functions – profit maximisation, cost minimisation and spread minimisation – were tested with

each specification including a variable that captured bank competition. As a result, the function for a profit maximising credit union (Hempel and Yawitz, 1977) can be formally written as follows:

$$p_u = f(\underset{-}{Ine_u}, \underset{+}{L_u}, \underset{+}{MP_u}, \underset{-}{MP_{bu}}) \qquad (2)$$

In this model, the union market power (MP_u) and loans (L_u) are expected to positively affect credit union profitability, while an increase in total market concentration and inefficiency are likely to decrease union profits.

Postulating cost minimisation, the union's objective function can be expressed in the following way:

$$C_u = f(\underset{+}{L_u}, \underset{-}{MP_u}, \underset{+}{MP_{bu}}) \qquad (3)$$

An expansion in the market power of credit unions is expected to lower the costs of credit unions (C_u) due to benefits from returns to scale. In contrast, as the loan portfolio of the credit union expands, its costs should rise as well, because more resources have to be used to service the now larger loan portfolio. The effect of increasing total market concentration on the credit union's costs is expected to be positive, since this forces the credit union to incur higher expenditure as it attempts to augment the services offered to maintain its share of the deposit (loan) market.

An interest rate spread model, which posits that credit unions try to minimise the difference between interest received and interest paid is also analysed, and is shown below:

$$Spread_u = f(\underset{+}{Ine}, \underset{+}{L_u}, \underset{-}{MP_u}, \underset{+}{MP_{bu}}) \qquad (4)$$

A priori, an expansion in the union's market power is expected to reduce interest rate spreads ($Spread_u$) while credit union inefficiency, loan portfolio and the total market concentration all should raise interest rate spreads.

3. Data Description

The main sources of the data used in this study are the Co-operatives Department of Barbados, which compiles quarterly balance sheet and income and expenditure statement information for all 42 credit unions, and the Central Bank of Barbados which collects similar data for all 7 commercial banks. Complete quarterly information on the credit unions and commercial banks operating in Barbados was available from 1994 to 2000 and this is the period that this paper utilises. Summary statistics of this data are given in Tables 2 and 3.

Profitability in both financial institutions is measured by net income after taxes expressed as a percentage of total assets. Inefficiency is total expenditure as a percentage of total assets, loans was also calculated as a percentage of total assets, and the interest rate spread is the difference between interest income and interest expenditure as a percent of total assets. The competition variables are measured as described above in Section 2.

4. Econometric Results

Generally one would expect that the relationship between commercial banks and credit unions is dynamic, that is, current levels of credit union competition, for example, are likely to impact on commercial bank profitability in the future. Hence a dynamic approach to econometric modelling is employed, using the Hendry General-to-Specific methodology. This process requires an over-specified model (of lag order four due to the frequency and span of the data), which is then reduced to a more parsimonious version by removing variables that do not significantly contribute to the explanation of the dependent variable. However, before this was undertaken, the data was tested for poolability using a Chow test (see Baltagi, 1995). The results indicate that the calculated F-statistic is greater than the critical F-value for all the models. Thus, the null hypothesis that the parameters are equal could not be rejected leading to the conclusion

that the data is poolable. All estimations used generalised least squares with cross section weights and were done in the software package EVIEWS 3.1. White's Heteroskedasticity-Consistent standard errors are reported and the residuals from all the models did not exhibit serious problems of serial correlation. In addition, the profit and interest rate spread models explained a significant proportion of the variation in these variables while the cost model had a much lower Adjusted R-squared, suggesting at first glance, that credit unions objective function may be more related to profit maximisation or spread minimisation than cost minimisation.

Table 4 gives the results for the commercial banks profit function where deposits is the concentration measure used. The non-market structure variables all have their *a priori* signs. The inefficiency variable was found to have a negative long run impact on commercial bank profitability. Therefore, a reduction in commercial bank inefficiency should increase commercial banks' rates of return. The coefficient on the loans variable indicates that an expansion in a commercial bank's loan portfolio raises commercial bank profitability in the long run. The negative long run effect of the MP_b variable is, on the other hand, counterintuitive, as it implies that commercial banks' profitability is significantly reduced by an expansion in the concentration of the banking sector. Similarly, MP_{bu} also has the wrong sign in that the regression suggests that the long run impact of an increase in MP_{bu} on commercial bank profitability is positive (0.002). The Wald test for the joint significance of the coefficients of MP_{bu} does not reject the null hypothesis that the coefficients are all equal to zero, implying that the long run effect of MP_{bu} is statistically insignificant. These findings imply that the Barbadian banking sector does not compete directly with the credit union movement and hence do not constitute much of a foil to commercial banks' market power.

The results of the three credit union equations (with deposits as the concentration variable) are presented in Table 5. As expected, a rise in inefficiency reduced union profitability,

but led to a widening of spreads, as credit unions were less able to minimise the cost of borrowing to their members. An increase in the amount of loans implied a long-run expansion in union profits, interest rate spreads and costs.

Examining the credit union profit function (Column 2), the long run coefficient of MP_u possess the wrong sign, suggesting that contrary to expectation, an increase in concentration among credit unions indicates a reduction in union profitability. A similar unexpected result was recorded for the long-run coefficient of MP_{bu}, which while marginal (0.003), possesses a positive rather than a negative sign. A Wald test for the joint significance of the coefficients of the MP_{bu} variable implies a rejection of the hypothesis that the coefficients are jointly zero, suggesting that the long-run coefficient is indeed significant. This finding indicates that banks are not in fact, important competitors to credit unions.

Empirical estimates of credit unions as cost minimisers (Equation 3) are presented in Column 3 of Table 5. For the control variable MP_u, the negative and significant (according to the Wald test of joint significance) long-run effect implies that larger credit unions tend to have higher expenditure to total asset ratios in accordance with a priori expectations. As anticipated, an increase in MP_{bu} also leads to a significant rise in credit union inefficiency in the long run. While the signs of the coefficients are in accord with expectations, the ability of the equation to explain the variation in the data is quite low as demonstrated by the low R^2 (0.024).

Column 4 of Table 5 gives the empirical estimates of Equation 4 – the credit union interest rate spread equation. In line with a priori expectations, the control variable MP_u is negative in the long-run, suggesting implying that as credit unions concentration rises, this tends to lead to a reduction in interest rate spreads. This gives support to the hypothesis that larger credit unions are more efficient and are better able to lower the cost of borrowing to members. Again, the results for MP_{bu} are very similar to the preceding models: a small positive (and jointly

significant) long-run effect (0.002). This could mean that a reduction in the relative market power of credit unions results in a small increase in credit unions' spreads. Of the three equations that attempt to explain credit union behaviour, the interest rate spread equation performs best, in the sense that the R^2 is relatively high (0.78), while the signs are in accord with expectations.

The three credit union equations were also estimated using the data on only the 12 largest unions to assess whether the impact of commercial banks' competition on credit unions depended on the size of the union (see Table 6). The main difference observed was that only one of the MP_{bu} variables was significant in the credit union interest rate spread equation. These results could be interpreted to mean that the interest rate spreads of large credit unions tend not to be significantly influenced by the decisions of commercial banks. This finding is in accordance with the previous inferences that credit unions seem to serve a particular segment of the financial market not already served by commercial banks.

Equations 1, 2, 3 and 4 were reestimated using the loans data to form Herfindahl-Hirshman indices of concentration. These results were largely identical to those reported for the deposits data and are not reported here, but are available from the authors.

5. Conclusions

The goal of this article was to empirically examine the relationship between commercial banks and credit unions. This is done using quarterly firm-level credit union and commercial bank data from the Caribbean island of Barbados over the period 1994-2000. The approach used attempted a first look at how competition from credit unions affected commercial banks objective function and similarly how competition from commercial banks influenced credit unions objective functions. As is normally assumed in the literature, commercial banks were

modelled as profit maximising entities. However, since previous theoretical studies on credit unions have used a variety of objective functions, this study examined three of these many specifications – profit maximisation, cost minimisation and spread minimisation.

The results of the study indicate that credit unions do not act as a significant foil to the market power of commercial banks. Examining the influence of commercial banks on the operations of credit unions, the study also found that increased commercial bank competition did not impact on credit unions' behaviour either. While tentative, these results would lead to the conclusion that over the 1993-2000 period of the study, the credit union and commercial banks effectively served non-overlapping and hence non-competing markets. In this regard, the findings are similar to Mushinski(1999), the only other study done in a developing country. However, one caveat which arises, is that the study did not cover the 1980s period when credit union growth was fastest due to the unavailability of data. Thus the findings should be considered a first step in examining the interaction between commercial banks and credit unions.

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Table 1

Summary of Credit Unions and Commercial Banks Loans and Deposits Data

	Total Loans	Commercial Banks Loans	Mortgage Finance Loans	Credit Unions' Loans	Unions Loans /Banks Loans	Unions Deposits	Total Deposits	Unions Deposits/ Total Deposits
1980	800.7	546.6	70.6	4.2	0.8	1.2	738.1	0.2
1985	1383.8	849.0	117.8	22.9	2.7	4.8	1090.1	0.4
1990	2281.9	1235.6	306.1	109.2	8.7	17.2	1670.3	1.0
1995	2433.9	1522.5	379.5	165.6	10.8	29.5	2121.4	1.3
2000	3491.3	2712.6	359.6	302.8	11.2	87.1	3446.5	2.5

Source: Central Bank of Barbados

Table 2

Summary Statistics on Credit Union Activity in Barbados

	Average for all Credit Unions		
	Entire Sample	1994	2000
Profitability Indicators			
Return on Assets (%)	2.6	4.1	3.1
Interest Spread (%)	3.6	5.4	4.9
Efficiency Indicator			
Total Expenditure as a Percent of Total Assets (%)	3.1	3.9	3.3
Loans as a Percent of Total Assets	78.5	71.1	73.2
Market Structure Indicators			
Average Market Share - Deposits (%)	6.5	10.0	5.7
Herfindahl-Hirshman Index of Market Concentration	24.1	24.9	24.2
Average Market Share-Loans (%)	24.2	28.6	19.7
Herfindahl-Hirshman Index of Market Concentration	25.5	24.9	27.2

Source: Supervisor of Credit Unions

Notes: Herfindahl-Hirshman Index is calculated using total deposits/loans and is defined as follows: $100 * \sum_{i=1}^{n} a_i^2$ where a_i is the market share of a given credit union.

Table 3

Summary Statistics on Commercial Bank Activity in Barbados

	Average for all Banks		
	Entire Sample	1994	2000
Profitability Indicators			
Return on Assets (%)	0.3	0.3	0.4
Interest Spread (%)	0.6	0.7	0.8
Efficiency Indicators			
Total Expenditure as a Percent of Total Assets (%)	1.9	1.9	2.2
Loans as a Percent of Total Assets	55.0	55.2	51.9
Market Structure Indicators			
Average Market Share - Deposits (%)	14.3	14.3	14.3
Herfindahl-Hirshman Index of Market Concentration	17.7	17.7	17.6
Average Market Share - Loans (%)	75.8	71.3	80.2
Herfindahl-Hirshman Index of Market Concentration	16.5	18.0	16.1

Source: Central Bank of Barbados

Notes: Herfindahl-Hirshman Index is calculated using total deposits/loans and is defined as follows: $100 * \sum_{i=1}^{n} a_i^2$ where a_i is the market share of a given credit union.

Table 4

Estimation Results:
The Impact of Credit Union Activity on Commercial Bank Profitability

	Dependent Variable
	π_b
Intercept	0.092
	(13.141)***
Ine	-0.387
	(-6.052)***
Ine_{-4}	-0.264
	(-4.696)***
L	-0.0020
	(-6.015)***
L_{-2}	0.004
	(10.352)***
L_{-4}	0.002
	(4.716)***
MP_b	-0.443
	(-9.554)***
MP_{bu-1}	-0.016
	(-9.594)***
MP_{bu-3}	0.042
	(14.179)***
MP_{bu-4}	-0.024
	(-9.533)***
Adjusted R-squared	0.876
Standard Error	0.003
Number of Observations	193

Note: Concentration variables based on deposits

Table 5

Estimation Results:
The Impact of Commercial Banks on Credit Unions
(Entire Sample)

	Dependent Variable		
	π_u	C_u	$Spread_u$
Intercept	0.019	0.002	-0.001
	(7.458)***	(1.058)	(-0.233)
Ine	-	-	0.709
			(15.578)***
Ine_{-1}	-0.212	-	-0.167
	(-13.611)***		(-4.576)***
Ine_{-2}	-0.182	-	-0.151
	(-11.369)***		(-4.530)***
Ine_{-3}	-0.224	-	-0.120
	(-12.113)***		(-2.948)***
Ine_{-4}	0.265	-	0.178
	(13.675)***		(5.525)***
L	0.004	0.005	-
	(2.572)**	(1.872)*	
L_{-1}	0.006	0.005	0.029
	(3.886)***	(2.222)**	(2.225)**
L_{-2}	-	-	-
L_{-3}	-	-	-
L_{-4}	0.003	0.003	-
	(3.160)***	(1.907)*	
MP_{bu}	0.023	-0.043	-
	(2.155)**	(-3.935)***	
MP_{bu-1}	0.027	0.092	0.033
	(2.384)**	(6.841)***	(3.372)***
MP_{bu-2}	-0.041	-	-0.026
	(-3.654)***		(-2.647)***
MP_{bu-3}	-0.025	-0.034	-0.022
	(-2.642)***	(-3.184)***	(-2.004)**
MP_{bu-4}	0.019	-	0.035
	(1.776)*		(3.696)***
MP_u	0.279	-0.633	-0.370
	(1.902)*	(-5.000)***	(-3.066)***
MP_{u-1}	-	-	0.277
			(2.088)**
MP_{u-2}	0.396	0.631	-
	(2.207)**	(4.395)***	
MP_{u-3}	0.411	0.971	-
	(1.853)*	(4.109)***	
MP_{u-4}	-1.216	-1.030	-
	(-6.197)***	(-4.729)***	
Adjusted R-squared	0.774	0.024	0.783
Standard Error	0.016	0.019	0.015
Number of Observations	683	871	703

Note: Concentration variables based on deposits

Table 6

Estimation Results:
The Impact of Commercial Banks on Credit Unions
(12 Largest Unions)

	Dependent Variable		
	π_u	C_u	$Spread_u$
Intercept	0.021	0.030	0.027
	(4.376)***	(6.258)	(6.067)***
Ine	-	-	0.737
			(10.564)***
Ine_{-1}	-0.270	-	-0.333
	(-11.065)***		(-17.197)***
Ine_{-2}	-0.254	-	-0.327
	(-8.785)***		(-15.267)***
Ine_{-3}	-0.311	-	-0.275
	(-8.856)***		(-10.202)
Ine_{-4}	0.304	-	0.114
	(8.852)***		(1.708)*
L	0.004	-0.002	-
	(2.241)**	(-7.073)***	
L_1	0.004	-0.002	0.007
	(5.047)***	(-5.577)***	(2.324)**
L_{-2}	-0.001	-0.002	-
	(-3.004)***	(-6.609)***	
L_{-3}	-	-0.002	-
		(-5.669)***	
L_{-4}	0.002	-0.003	0.004
	(3.375)***	(-7.401)***	(1.905)*
MP_{bu}	0.000	-	
	(2.661)***		
MP_{bu-1}	-	0.001	0.000
		(3.992)***	(3.507)***
MP_{bu-2}	-0.000	-0.000	-
	(-1.859)	(-2.220)**	
MP_{bu-3}	-	-0.001	-
		(-2.769)***	
MP_{bu-4}	0.000	-	-
	(2.361)**		
MP_u	0.607	-0.846	-0.456
	(2.926)***	(-2.746)***	(-3.864)***
MP_{u-1}	-	-	-
MP_{u-2}	-	1.498	-
		(5.574)***	
MP_{u-3}	-	2.006	-
		(3.718)***	
MP_{u-4}	-1.385	-2.714	-
	(-4.266)***	(-5.360)***	
Adjusted R-squared	0.676	0.371	0.885
Standard Error	0.010	0.016	0.014
Number of Observations	226	269	230

Note: Concentration variables based on deposits