



# Determinants of Investment in Government Securities by Banks in Uganda

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**Abstract:** This study analyzed the determinants of investments in securities by banks using the generalized method of moments regression technique. The results showed significant effects of continuous partial adjustments in the government securities held, capitalization, loan performance and bank size. To ensure continued demand for Government securities, regulatory measures aimed at safeguarding capital adequacy and promoting competition in the banking sector are recommended.

**Keywords:** Commercial Banks, Investment, Government Debt Securities

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## 1. Introduction

The policy shift to inflation targeting provided Government with an alternative source of funding for the budget from domestic sources in form of treasury bills and bonds. Subsequently, the stock of treasury bills and bonds that had been previously issued for monetary policy during the reserve money targeting regime was converted into a source of funding for the budget. However, during the reserve money targeting regime, funds invested in treasury bills and bonds were simply kept at the BOU and returned to the investors when they matured while Government paid the interest. Following the change in the use of treasury bills and bonds from monetary policy to fiscal purposes, the funds raised through issuance of securities are spent by Government and both the principle and interest is now payable by Government. The requirement for Government to pay back the principle when it matures imposes a risk to Government referred to as the rollover risk if some of the repayments are to be funded through issuing of new securities. The rollover risk is associated with the refinancing of debt. Rollover risk is commonly faced when debt is about to mature and needs to be rolled over into new debt. If interest rates rise adversely, the debt would have to be refinanced at a higher rate resulting in high interest charges in the future. In addition, some lenders

may simply opt not to participate. This rollover risk and the risks associated with the liquidation of securities before maturity are some of the risks to the domestic debt strategy for financing part of the budget using securities. A good understanding of the drivers of investment in securities is therefore important for identifying some measures that could be taken to address these risks. This paper therefore investigates the determinants of investments in treasury bills and bonds by banks.

Government securities are earning assets of banks and as such should be influenced by the bank's portfolio allocation strategy. Subsequently, allocation of funds for purchases of securities should be motivated by among others loan demand, capital considerations and loan performance. The testable hypotheses that were investigated in this study therefore included:

- An increase in loan demand results in a reduction in investments in securities
- Increases in bank capital lead to increases in investments in Government securities
- Low loan provisioning reduces investment in Government securities.

The rest of the paper presents a review of the literature on bank determinants of investments in securities in section 2 followed with a description of the data used and methodology adopted for the analysis in section 3. The results are then

presented in sections 4 and discussed in section 5 followed by a conclusion in section 6.

## 2. Literature Review

The literature on the determinants of investments in securities has divided the various factors into regulatory and non-regulatory ([1]), temporary and permanent ([2]) and macro and micro ([3]). However, the key themes are similar irrespective of the typology adopted. The common themes revolve around loan demand, capital requirements, loan performance, bank size and deposits.

### 2.1. Loan Demand

The loan demand or accommodation hypothesis stems from the notion that bank's earning assets should be limited to short term self-liquidating loans for production and distribution of goods and services ([4]). The demand for loans for production and distribution of goods and services is therefore identified as a main determinant of bank behavior regarding borrowing from the Central Bank, holding of excess reserves and distribution of earning assets between loans and alternative investments such as securities in the case of aggregate models. Models based on the accommodation hypothesis have incorporated economic activity and current (short term) and future interest rates (long term) as key determinants ([4]; [3]; and [2]).

[2] notes that bank security holdings tend to increase relative to loans during a recession and early recovery for two main reasons. The first reason is that banks find lending less attractive during recessions because of the reduced business and household demand for credit and decreasing interest rates that they can charge on loans. The second reason is that recessions increase the risk of default which reduces the amount of loans banks are willing to extend even without any change in the interest rates. The role of monetary policy during a recession was also highlighted by [2] as one of the causes of increases in security holdings. The explanation provided was that easier monetary policy increases the funds available for banks to invest. This is because monetary policy during recessions results in lower short-term interest rates to stimulate the economy. However, the decline in short-term interest rates may not immediately stimulate lending mainly because loan demand may be unresponsive to the cost of borrowing in the short-run.

[3] attributes weak loan demand during recessions, to weak final demand which affects bank lending. In addition, it was noted that businesses react to the heavy indebtedness inherited from the boom period by adopting a more conservative financial attitude. This results in deleveraging by businesses and restructuring of balance sheets towards equity and away from debt which further reduces the demand for loans and increases banks holdings in securities. [5] noted the role of fluctuations in real estate and other markets as likely causes of reduction in demand for loans which could influence portfolio reallocation to Government securities during recessions. Linked to this is the effect of deterioration in the available

value of collateral due to falling real estate prices which increases the borrower risks.

[1] provided additional evidence in support of loan demand effects on the growth in bank holdings of USA treasuries during the early 1990's recession. The results showed a significant negative effect of the share of commercial real estate loans on the growth rate of USA treasury securities. [2] provided evidence of the loan demand effect based on a Vector Auto Regression (VAR) from which impulse response and variance decomposition results revealed that negative shocks to GDP, the funds rate and lending accounted for some of the increase in security holdings. Further, in the context of a disaggregate model estimated using bank level data, [3] used asset growth as a proxy for extraordinary lending opportunities at the bank level which was expected to be negatively related to securities growth. However, the estimates obtained did not support the hypothesized relationship as the asset growth variable was insignificant.

### 2.2. Capital Requirements

The effect of capital requirements on portfolio allocation featured prominently in the literature on the influence of the Basle Accord prescription on risk-based capital standards on the credit crunch which occurred in the USA in the early 1990's. According to the Basle Accord prescription, banks were mandated to hold capital in proportion to their perceived credit risks. All assets and off-balance sheet activities were assigned risk weights between 0 and 100 percent according to their perceived credit risk and banks were required to hold capital of at least certain percentages against total risk-weighted assets and off-balance sheet items ([1]). It has been argued that increases in bank holdings of securities were driven by risk-based capital requirements which created incentives to substitute low-risk weighted assets such as Government securities for high risk weighted assets such as loans. [3] showed that both well capitalized banks and adequately capitalized banks had lower investments in Government securities compared to undercapitalized banks. It was noted that because more capital is needed for high-risk weighted assets and capital costs for banks are higher than costs of deposits, the capital requirements raise the cost of funding high risk weight assets. This reduces the relative return on such assets and constrains poorly capitalized banks to shift to low risk weighted assets. [2] also highlighted risk based capital standards as one of the permanent factors that explained the increase in security holdings of banks. The explanation offered was that because securities carried a weight between 0 and 20 percent, increases in securities had little or no effect on risk adjusted assets. Therefore, a bank could use deposits or borrowed funds to purchase securities without having to raise a large amount of capital to satisfy risk based requirements. On the other hand because loans had a one to one effect on risk adjusted assets, a bank could reduce its required capital without shrinking its total assets by shifting to securities from loans. The shift from loans to securities was also attributed by [2] to leverage requirements in the form of a minimum ratio of capital to total assets. He argued that the risk

based capital requirements increased the attractiveness of securities only for banks that exceeded the leverage requirements but not the risk based requirement. [1] also provided a similar reason as the likely cause of the credit crunch in the early 1990's in the USA. They referred to this explanation in their study as the leverage credit crunch hypothesis.

[6] found evidence in support of bank portfolio changes in part due to response to the introduction of risk-based capital requirements. Their results showed that banks with the largest increases in government securities holdings tended to be those with the lowest capital – asset ratios when the new capital requirements were introduced. The results were robust when controls for weakness in bank's loan portfolio were included. Additional evidence on the effect of capital considerations on constrained credit and increased investment in securities during the same period was provided by [7]. Their study showed that increases in target capital ratios during the 1990 to 1991 period coupled with sharp reductions in responsiveness of lending to increases in equity were consistent with the expectations of a negative influence on credit and a positive influence on securities of capital increases. However, the empirical results of [1] suggested that compared to other possible explanations for the reduction in loans and increase in securities in the USA during the 1990's, the risk based capital variables fared worst. The effects of risk based capital ratios on lending did not get stronger in the early 1990's as would have been expected and tier 1 and total risk based capital ratios generally acted to counteract each other in their effects on portfolio allocation.

### **2.3. Loan Performance**

Bank loan performance is likely to influence bank portfolio choice since banks with better performing loans will continue to be attracted to the loan market and will have a less incentive to shift towards securities ([3]). [1] related the observed shift in banks portfolio behavior in the early 1990's to regulator's increased scrutiny of bank loan portfolio in response to heightened concerns about bank risk. Due to the tightened examination of loan loss reserve policies and increased enforcement actions by the regulators, it was argued that investment into safer assets such as treasuries was encouraged.

Other similar studies such as [8] noted that the tightening of credit standards in the USA during the late 1980's was associated with increased non-performing loans which impaired the capital position of banks. The increase in non-performing loans was due to mainly a drop in real estate prices which affected loans extended to real estate. This forced banks to increase their loan loss reserves, resulting in lower capital and the need to downsize through selling or securitizing assets and tightening of credit standards. A similar argument was made by [9] that regulators used stricter rules in the evaluation of the quality of bank loans in the early 1990's which had been extended in the 1980's. This effectively resulted in an increase in the minimum capital assets ratio constraining banks' capital.

In support of the arguments, estimates provided by [3] showed that as expected loan loss provisioning positively influenced investment in treasury securities. [6] also found evidence of a significant positive effect of loan loss provisioning on investment in securities. In particular, the effect was most significant on the increase in treasury securities relative to the decrease in real estate loans compared to other types of loans such as consumer loans.

However, [10] and [6] also attributed some of the effect of loan loss on reductions in portfolio shifts to non-regulatory based explanations motivated by bank risk retrenchment. [1] also investigated the possibility of portfolio shifts in the early 1990's resulting from increasing loan loss that was not motivated by regulatory burden. The hypothesized relationship was that banks voluntarily reduced their risks by having safer capital in the 1990's due to loan losses associated with the real estate problems in the late 1980's to mainly reduce bankruptcy costs and to lower the costs of uninsured funding. The empirical evidence provided support for the effect of voluntary risk retrenchment. However, the quantitative effects as noted by [1] were small.

### **2.4. Bank Size**

[1] argued that bank size accounts for some additional supply side influences on portfolio behavior with smaller banks which often make small relationship loans being affected most during a recession. [11] also noted that where there are a few large banks, it may be possible for the large banks to exercise market power in the loan market which may reduce the number of loans issued. Other studies on the effect of bank size noted that large banks allocate a much lower proportion of their assets to small business loans than small banks ([2] and [12]). Moreover it was also argued that the ratio of small business loans to assets declines after large banks are involved in mergers and acquisitions ([13]). [3] also controlled for bank size to determine if there were systematic differences in the desired securities to asset ratio by size. The results indicated that larger banks lowered their portfolio shares of securities. This is consistent with the argument that regulatory effects tend to be more severe for small banks compared to large banks. Therefore substitution between loans and securities may be affected by bank size if there are substantial regulatory changes. However, [1] failed to find conclusive evidence on the effect of size in banks investment in securities.

### **2.5. Deposits**

Banks can respond to a shortfall in loans by reducing deposits to reduce their interest costs or by increasing treasury securities to offset the loss in income from the shortfall in loans. Through this relationship, a reduction in deposits may result in a decrease in treasury securities as has been argued by [2]. In addition, [6] argued that deposits influence portfolio shifts through their influence on the relative return on different investments. The risk based capital standards require an increase in bank capital for further loan extension while investment in securities can be funded through increases in

deposits. [6] argued that the return on investment in securities funded through deposits may exceed the return on loans funded through additional equity if yields on treasury securities are high. Subsequently increases in deposits may result in increases in treasury securities relative to loans when risk based capital standards are considered.

Overall, the literature review indicates that at the bank level, portfolio shifts may be influenced by capital, loan performance, loan demand, deposits and bank size among others. However, the evidence is not unanimous on the direction of the influence. This study contributes to the literature by investigating the micro level determinants of investment in treasury securities by banks in Uganda. The literature reviewed did not reveal a similar study conducted for Uganda. In addition, the analysis in this study controls for the influence of partial adjustment by banks on portfolio allocation and uses the generalized method of moments to model this effect. As highlighted by [14], it is important to include inter-temporal demand considerations in the analysis since the bank’s portfolio allocation choice is not a single period problem.

### 3. Data Description and Methodology

#### 3.1. Data Description

The analysis used monthly data on 12 banks in Uganda that were operational between June 2006 and December 2012 obtained from BOU. The banks included in the analysis were selected on the basis of having been in operation throughout the period of analysis. This resulted in the exclusion of the recently licensed banks and banks which closed or merged with others during the period of analysis. The sample of banks used included both large and small banks, foreign owned and

locally owned, old and fairly newer banks and primary dealers and non-primary dealer banks. The sample therefore adequately reflected the character of the entire banking system. The variable for investment in securities was measured as the sum of the stock of treasury bills and bonds at the end of each month expressed as a ratio of the stock of total assets. Variables for investment in treasury bills and treasury bonds were derived as the respective stocks at the end of each month expressed as a ratio of each bank’s total assets at the end of the month. The data shows that the average share of securities to total assets for each bank was 19 percent. However, this share fluctuated between 4 percent and 40 percent.

Reserves of banks were measured as the sum of bank deposits at BOU including both shilling and foreign currency deposits and all shilling and foreign currency denominated notes and coins held by banks expressed as a ratio of each bank’s total assets at the end of the month. Banks on average maintained reserves as share of assets equivalent to 10 percent. Loan performance was measured as the sum of general and specific provisions for bad debt at the end of each month expressed as a ratio of each bank’s total loans at the end of the month. The average value of the loan performance indicator was 2 percent which suggests that banks for the most part had very good loan performance. The size variable was measured as the share of each bank’s deposits to the total deposits of all banks at the end of each month. While the average size of a bank as measured by the share of deposits to total bank deposits was about 7 percent, the range between the smallest bank with a share of 0.5 percent and largest bank with a share of 31 percent shows high levels of concentration in the sector. Capital adequacy was measured as the ratio of each bank’s tier 1 capital to its total assets. Table 1 provides a summary of the key variables.

Table 1. Descriptive statistics for determinants of bank purchases of securities.

Variable	Observations	Mean	Std. Dev.	Min	Max
Securities/Total assets	948	0.19	0.0722	0.039	0.40
Treasury bills/Total assets	948	0.11	0.0601	0.003	0.34
Treasury bonds/Total assets	948	0.08	0.0593	0.000	0.24
Reserves/Total assets	948	0.10	0.0307	0.010	0.26
Capital/Total assets	948	0.11	0.0417	0.038	0.31
Loan provisioning /Total loans	948	0.02	0.0156	0.002	0.12
Size (Bank deposits/Total deposits of all banks)	948	0.08	0.0757	0.005	0.31

Source: Author’s computations

#### 3.2. Methodology

The theoretical review provided some strong arguments for modelling the determinants of banks purchases of securities using a dynamic model ([15] and [16]). The dynamic relationship between investment in securities during the previous period and investments in the current period can be specified as follows:

$$P_{it} = \alpha P_{i,t-1} + X'_{it} \beta + u_{it}, \quad i=1, \dots, N; t=1, \dots, T \quad (1)$$

where  $P_{it}$  the dependent variable is the amount of securities purchased by bank  $i$  in period  $t$ ,  $\alpha$  is the parameter to be estimated,  $X'_{it}$  is a  $1 \times K$  vector of exogenous covariates,  $\beta$

is a  $K \times 1$  vector of parameters to be estimated. It is assumed that  $u_{it}$  follows a one-way error component model

$$u_{it} = \mu_i + v_{it} \quad (2)$$

where  $\mu_i \sim IID(0, \delta_\mu^2)$  and  $v_{it} \sim IID(0, \delta_v^2)$  are independent of each other and among themselves.

Since

$$P_{it} = \alpha P_{i,t-1} + X'_{it} \beta + \mu_i + v_{it} \quad (3)$$

It follows that

$$P_{i,t-1} = \alpha P_{i,t-2} + X'_{i,t-1} \beta + \mu_i + v_{i,t-1} \quad (4)$$

Suggesting that  $P_{it-1}$  and unobserved heterogeneity  $\mu_i$  are correlated. This renders the OLS estimator biased and inconsistent even if  $v_{it}$  are not serially correlated [17] proposed differencing the model to get rid of the  $\mu_i$ . However, the method suggested leads to consistent but inefficient estimates of parameters because it does not make use of all of the available moment conditions in addition to not taking into account the difference structure on the residual disturbance. [18] suggested a Generalized Method of Moments (GMM) procedure that is more efficient than the [17] method. They argued that additional instruments could be obtained in a dynamic model if one utilized the orthogonality conditions that exist between lagged values of  $P_{it}$  and the disturbance term  $\mu_i$ . The other alternative referred to as the system GMM was proposed by [19] and [20]. This method uses moment conditions in which the lagged differences are used as instruments for the level equation in addition to the moment conditions of lagged levels as instruments for the differenced equation. This approach is consistent for large  $N$  and finite  $T$ , and is more efficient than the estimator proposed by [18].

The Levin-Lu-Chin (LLC) panel data unit root tests were conducted before running the GMM models. A comparison of the Arellano-Bond and System dynamic estimates was also made using the Wald Statistics and the Sargan test to identify the best model.

Prior to estimation, transformations were made to some variables. The transformations included seasonal adjustment using the Hodrick Prescott filter to eliminate the effect of seasonal factors on the analysis. Unit root tests were therefore conducted on the seasonally adjusted values. The LLC unit root test was selected for the unit root test. The selection of the LLC test was on the basis of the small number of panels and large number of time periods in the data together with the balanced nature of the panels ([21] and [22]).

## 4. Results

The LLC unit root test results rejected the null hypothesis of unit roots in the panels leading to the conclusion that the panels were stationary. Table 2 shows the results of the unit root test results.

Equation (4) was estimated using the two GMM approaches for comparison purposes. The first set of estimates is based on the Arellano-Bond dynamic panel data estimation method while the second model uses the system dynamic panel data estimation method. The dependent variable in the two models was the share of securities to assets while the exogenous variables comprised of loan performance, bank size, reserve adequacy, and capital status. The results are reported Table 3.

Table 2. LLC panel data unit root test results.

Variable	Lags	Adjusted t Statistics
Securities	0	-6.5613***
T-treasury bills	0	-5.3151***
T-bonds	0	-7.1866***
Reserves	0	-13.2098***
Capital	0	-10.2532***
Loan performance	0	-9.0524***
Size	0	-9.7100***

Source: Author's computations

Notes: The LLC tests the null hypothesis that panels contain unit roots against the alternative that panels are stationary.

The Wald statistic shows that the two models can be used to explain the dependent variable. GMM estimators produce consistent estimates only when the moment conditions used are valid. Although there is no method to test if the moment conditions from an exactly identified model are valid, one can test whether the over-identifying moment conditions are valid using the Sargan test of over-identifying conditions. The test reveals evidence against the null hypothesis that the over-identifying restrictions are valid in the case of the system dynamic panel data model. The null hypothesis is therefore rejected for the system dynamic panel data model. However, the results of the Sargan test do not support rejection of the null hypothesis for the Arellano-Bond dynamic panel data model. The variation in the conclusion could be attributed to the tendency for the Sargan test to over reject in the presence of heteroskedasticity in the data generating process ([18]). Nonetheless, the results presented are based on the Arellano-Bond dynamic panel data estimation.

### 4.1. Determinants of Investments in Treasury Bills and Bonds

The results indicate that the previous periods investment in securities significantly affect investment in securities during the current period. The effect is large as a one percent increase in the level of investment in securities one period leads to an increase of about one half of a percent in the level of investment in the next period. This finding may partly be attributed to the fear of incurring transaction costs associated with alternative investments particularly for maturing securities. For instance the turnaround cost associated with identifying alternative investments may in itself be a disincentive for opting for the alternative to securities that would simply require a roll-over. Moreover, with the alternative investment, the bank would probably forego the marketability attribute related to securities which also affects transaction costs.

Table 3. GMM estimates of determinants of bank's investments in Government securities.

Variable	Arellano-Bond dynamic Panel data estimation	System dynamic panel data estimation
Lag 1 (treasury securities/total assets)	(1) 0.57 [0.0259]***	(2) 0.55 [0.0221]***
Reserves	0.02 [0.0368]	-0.01 [0.0336]
Capital	0.33 [0.0474]***	0.31 [0.0434]***

	Arellano-Bond dynamic Panel data estimation	System dynamic panel data estimation
Loan performance	0.23 [0.1002]**	0.23 [0.0941]***
Size	-0.30 [0.1118]***	-0.33 [0.1050]
Constant	-0.00004 [0.0007]	-0.00004 [0.0007]
No. of observations	924	936
No. of groups	12	12
Wald Chi2	583	706
Sargan test (Chi2)	898.002	1042.381
Prob > Chi2	0.17	0.01

Source: Author's computations

Notes: Ordinary standard errors are reported in parenthesis; \* is significant at 10 percent; \*\* is significant at 5 percent; \*\*\* is significant at 1 percent; the null hypothesis for the Sargan test is stated as over-identifying restrictions are valid.

The results do not provide any evidence of a significant effect of reserves on the purchases of securities although the expectation would be that reserves negatively impact on the investment in securities. However, this finding can possibly be justified on the basis of the already relatively large level of reserves held by banks relative to other types of assets and yet they are not remunerable [23]. For instance average reserves comprise about 10 percent of total assets of banks. This compares unfavorably with other similar countries such as those in the Central African Economic and Monetary Community and in the West African Economic and Monetary Union. For this high level of reserves, it is unlikely to find an increase beyond the 10 percent level that is associated with a further reduction in other types of assets including treasury bills.

The effect of capital on investment in securities is significant and positive as expected. An increase in capital of one percent leads to an increase in investment in securities of about one third of a percent. Increases in capital provide more resources for investment by banks and securities being one of the investment options of banks can be increased using the additional capital. More importantly, recent capital increases

have been driven by prudential requirements in Uganda to ensure sufficient buffers against counterparty credit risk ([24]) as opposed to expansion of business. This would imply that such funds are held in highly liquid form.

Worsening loan performance measured by the increase in the provisioning relative total loans of one percent leads to an increase in investment in securities of 0.23 percent. The result signifies the conservativeness of banks with respect to protection of depositor's funds. Securities offer a less risky investment option as loan performance deteriorates. Moreover, the high yields on Government securities which exceed 10 percent per annum in Uganda offer a reasonable return on investment given the low inflation.

An increase in the size of banks of one percent leads to a decrease in investment in securities of about 30 percent. This result lends support to the [25] and [26] proposition that when a bank has some degree of monopoly control over its loan price, uncertainty lessens and it is faced with a different problem of determining the optimal loan size to maximize profits.

#### 4.2. Determinants of Investment in Treasury Bill Securities

Table 4. GMM estimates of determinants of bank's investments in treasury bills.

Variable	Arellano-Bond dynamic Panel data estimation	System dynamic panel data estimation
Lag 1 (dependent variable)	(1) 0.65 [0.0247]***	(2) 0.63 [0.0219]***
Reserves	0.03 [0.0278]	0.01 [0.0.0257]
Capital	0.20 [0.0358]***	0.19 [0.0337]***
Loan performance	0.22 [0.0748]**	0.20 [0.0732]***
Size	-0.08 [0.0845]	-0.06 [0.0815]
Constant	-0.00003 [0.0006]	-0.00002 [0.0006]
No. of observations	924	936
No. of groups	12	12
Wald Chi2	738.56	898.65
Sargan test (Chi2)	906.008	1042.399
Prob > Chi2	0.12	0.01

Source: Author's computations

Notes: Ordinary standard errors are reported in parenthesis; \* is significant at 10 percent; \*\* is significant at 5 percent; \*\*\* is significant at 1 percent; the null hypothesis for the Sargan test is stated as over identifying restrictions are valid.

In Table 4, Equation (4) was re-estimated with investment in treasury bills as a share of total assets as the dependent variable. The estimates for the determinants of investment in treasury bills are broadly similar to estimates found for total investment in securities. There is a significant positive effect of investment in treasury bills during the previous period on the current period's investment. The results show that an increase of 1 percent in the investments in treasury bills of a bank during the previous period results in an increase of about 0.65 percent in the current period. The size of the effect suggests that it is much stronger on investments in treasury bills compared to total investments in treasury bonds by banks. This is consistent with observations on banks preference for treasury bills over treasury bonds associated with matching of deposit liabilities that are mostly short term liabilities with short term assets.

As in the estimates for total securities, reserves are not a significant determinant of investments in treasury bills. What this means is that even if the BOU were to increase or reduce reserve requirements, there would be no major effect on banks purchases of treasury bills. However, capital increases have a significant positive influence on the purchases of treasury bills by banks. An increase in the capital of a bank of 1 percent results in an increase in the purchase of treasury bills of about 0.20 percent. This effect is smaller compared to that on the combined purchases of treasury bills and bonds. This suggests that increases in purchases of securities by banks arising from additional capital are biased towards longer dated securities. This could be motivated by capital preservation needs since yields on longer term securities are much higher.

Poor loan performance has a positive significant effect on purchases of Government treasury bills as expected. The results show that an increase in loan provisioning of 1 percent (due to poor loan performance) leads to an increase in purchases of treasury bills of 0.22 percent. The direction and size of the effect of loan performance on purchases of treasury bills is the same irrespective of whether the dependent variable is purchases of treasury bills or purchases of both treasury bills and bonds.

The only exception when the determinants of purchases of treasury bills and purchases of treasury bills and bonds are compared is on the effect of bank size. While the results shown in Table 3 indicate that size is an important determinant of investment in total securities, estimates shown in Table 4 indicate that investment in treasury securities is not affected by the size of the bank. This result although surprising, is not entirely unexplainable. What it implies is that the appetite for banks varies by size. Large banks are more likely to purchase both treasury bonds and treasury bills owing to their access to larger deposits. Small banks on the other hand have smaller deposits and as such are less likely to invest in treasury bonds which have a longer maturity period compared to treasury bills which have shorter maturity. This could partly be explained by the cost associated with having to liquidate treasury bonds or borrowing from the interbank market, which small banks would have to face if they had liquidity problems

given their small deposit base.

## 5. Discussion of Results

The results on the analysis of the determinants of investments in treasury bills and bonds showed that there was a lagged effect of investments in the previous period on the current period's investment. This result supports the fact that banks adjust gradually towards the desired level of investments in treasury securities. The result of a significant effect of previous period investments conforms to the findings by [15], [27], [28], [16], [3] and [29] that highlighted the partial adjustment behavior of banks with respect to investment in securities. [15] attributed the partial portfolio adjustments to transaction costs and uncertainty. They argued that transactions costs be they explicit or implicit may make it uneconomical to adjust a bank's portfolio in one period. In Uganda, uncertainty plays a key role as banks are often unable to accurately predict liquidity needs. Uncertainty is also associated with the problem of determining whether changes in liquidity needs are permanent in nature and thus require adjustments in the bank's portfolio allocation or temporary in which case adjustment may not be warranted. For instance, if a bank opted not to roll over its securities over concerns of a shortage of liquidity that turned out to be only temporary, then the costs of foregoing the roll over and the additional costs associated with acquiring another security later would make it expensive for the bank. Further, political stability and global economic environment also play an important role in explaining the investment in securities which may also be partly reflected by the significance of the effect of investments in the previous period on the current period's investments. For instance where there is political stability, it is likely that investors will continue investing due to the low country political risk. Similarly, when the global economic environment is stable, investors are likely to continue investing in government securities in emerging markets in search of higher yields. However, under unstable global environment conditions, investors tend to repatriate their funds to more mature and safe economies to minimize losses. Another related but important occurrence is that of investment by mostly institutional investors on the basis of geographical considerations. For instance in the case of Uganda, it is not uncommon to find investors in securities in Kenya also investing in Uganda. This kind of behavior is reflective of the effect of political risk and economic conditions that tend to be similar for countries in the same geographic location on investment in securities.

The estimates did not provide evidence in support of a significant effect of demand for reserves on investment in securities. The expectation was that an increase in reserves would result in a decrease in investments in securities. This is partly because changes can occur in reserves arising from unexpected movements in deposits and loans after the portfolio allocation has been done as explained by [16]. However, the result though surprising could possibly be

explained by the excessive level of reserves in the banking system in general.

An increase in capital resulted in an increase in investments in securities. This finding is expected given that capital increases tend to be allocated to different types of assets including securities. The finding on the effect of capital on investment in securities is also confirmed by the estimates that exclude treasury bonds. [3] found a similar result for banks in the USA and attributed the finding to adoption of risk based capital standards. [2] came to the same conclusion on the role capital given the introduction of risk-based capital standards in the USA. The same argument could hold for banks in Uganda which, following BOU's adoption of the risk-based supervision methodology in 2003 have to maintain a sizeable share of Government securities in their total assets to comply with the regulatory capital to risk-weighted assets criteria if they are to avoid capital increases. The preference for treasury bills and bonds is because of the low risk rating associated with Government securities which lowers the credit risk.

It was also found that bank loans did not have a significant effect on investment in securities. The finding is similar to that of [4] who also failed to find strong evidence of the loan accommodation hypothesis. However, while the effect of increases in loan extension was found not to be significant, the results showed that quality of the loans mattered for investments in securities. This result suggests that loan performance is a sufficient indicator of loan opportunities compared to loan size [3]. The implication of the result is that investment in securities increase as bank's loan assets deteriorate. This finding is also consistent with the risk-based supervision requirements as continued expansion of credit amid deteriorating loan performance would require higher loan loss provisioning and subsequently capital expansion. Further, based on the interest rate differential, good loan performance is an incentive for further credit extension since interest rates on loans exceed yields on government securities.

An increase in bank size results in a decrease in investment in securities. This result is consistent with the arguments that have been advanced on the effect of market power under the portfolio choice models ([25]; [30]; [31]; and [32]). It has been argued that banks with increasing market shares can exercise market power in pricing their products to earn large profits. In Uganda, this has been achieved through setting of very low deposit rates and high lending rates by large banks. This is also noted by [33] and [34] who attributed the large spreads between lending and deposit rates among Ugandan banks to oligopolistic behavior. This is reflective of the high concentration of credit among a few banks as has been noted by [35].

## 6. Conclusion

This paper analyzed the determinants of bank's investment in securities. The results showed that bank investments in securities were explained by partial adjustments in holdings of securities to targeted shares of total assets. The results also showed that capital increases resulted in increases in

investments in securities. The results further showed that loan performance as an indication of the lending opportunities available was influential on the level of investment in securities. In addition, increases in bank size were associated with decreases in investments in securities. This finding was however significant only when large banks were in the sample suggesting some form of imperfect competition for credit.

The main implication of the findings for Government's reliance on domestic borrowing is that investments in Government securities by the banking sector could be constrained by inadequate bank capital and increased concentration. Promoting capital adequacy and competition policies are some of the measures required to ensure sustained investment by banks in Government securities. This is particularly important since banks take up a fairly large share of the Government securities issued for funding of the budget.

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