Working Paper Series No. 030/2025

COMESA MONETARY INSTITUTE

Sovereign Exposure Risk and Macroprudential Policy in Uganda

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OCTOBER 2025

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Abstract

The study analyzed the sovereign-bank nexus in Uganda using an approach that decomposed aggregate exposure into short and long-term exposure. Using monthly data from 2011 to 2024, the study examined the role of securities pricing and macro prudential regulatory requirements, such as capital adequacy and liquidity regulations, in driving banks' increased holdings of government securities. The analysis shows that short term exposures are more sensitive to market volatility and interest rate fluctuations. Additionally, the study explored the impact of market heterogeneity, particularly the distinction between primary and non-primary dealers in the government securities market. The results showed that primary dealers exhibit higher sovereign exposure and are more elastic in the event of changes in short-term yields. The study also provides evidence of the crowding-out effect, where banks' preference for government securities potentially limits credit availability to the private sector. The study thus proposes that regulators set limits on sovereign debt held by banks, beyond which surcharges should be applied to encourage diversification of bank balance sheets and hence minimize sovereign exposure risk. The study also proposes regular stress testing to assess the resilience of banks to plausible scenarios of sovereign exposure. Finally, introduction of dynamic risk rating of securities as opposed to classifying sovereigns as risk free will enable regulators to control the direction of sovereign exposure for attainment of sound and resilient financial systems.

Keywords: Sovereign Exposure, Financial Stability, Crowd out
JEL Classification: E44, E58, G01, G21, H63

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For citations: Musumba, B. and Namwanje, M. S., (2025) "Sovereign Exposure Risk and Macroprudential Policy in Uganda", *CMI Working Paper No*. 030/2025, COMESA Monetary Institute.

I. Introduction

The holding of sovereign debt exposes the financial sector to credit, interest rate, market, and refinancing risks as well as losses due to unexpected increases in inflation, and fluctuations in the value of sovereign exposures. However, the financial sector has always perceived sovereign debt as risk free due to the ability of the government to refinance its debt by issuing new debt and levy taxes to meet its budget deficits. It is against this background that this study seeks to examine the sovereign risk arising from banks' holdings of government securities and to assess its implications for financial stability in Uganda. Specifically, the study has three objectives. The first objective is to quantify the determinants of banks' sovereign exposure by maturity structure. Using an administrative dataset of monthly bank balance sheets, we distinguish between short-term (less than one year) and long-term (one year or more) holdings. This analysis estimates the effects of securities pricing (yield curve shifts), prudential requirements (capital and liquidity ratios), and macroeconomic conditions (inflation and GDP) over the period between 2011 and 2024. The second objective is to explore market heterogeneity by comparing primary dealers and non-primary dealers, and to identify how dealership status influences both the level and elasticity of sovereign exposure in response to movements in short- and long-term yields. Finally, the third objective is to assess the potential crowding-out effect of sovereign holdings on private-sector credit and to propose macroprudential policy interventions, which would be leveraged to mitigate related financial stability risks.

Our results show that banks' investment decisions are strongly influenced by movements along the yield curve, liquidity requirements, and macroeconomic performance. Short-term sovereign exposure is highly sensitive to short-term yield fluctuations, while long-term holdings are shaped by both capital adequacy conditions and broader economic trends such as inflation and GDP growth. We show that an increase in short-term yields in the previous quarter induces banks to increase short-term exposure to government securities, while an increase in long-term yields in the previous quarter induces banks to reduce their exposure to short-term securities. The results further indicate that exposure is partly explained by heterogeneity across the banks. Primary dealers that enjoy privileged access to auctions exhibit greater responsiveness to yield dynamics, indicating their pivotal role in intermediating liquidity and risk across the market. The findings also reveal evidence of a crowding-out. Increases in sovereign holdings are associated with a measurable decline in private credit growth, suggesting that fiscal expansions financed through the domestic banking system can constrain credit intermediation to the real economy. These results show the need for reinforcing sovereign-risk management within Uganda's macroprudential framework, including the introduction of exposure limits with surcharges, routine sovereign-risk stress testing, and dynamic sovereign risk-weighting practices that better reflect underlying vulnerabilities.

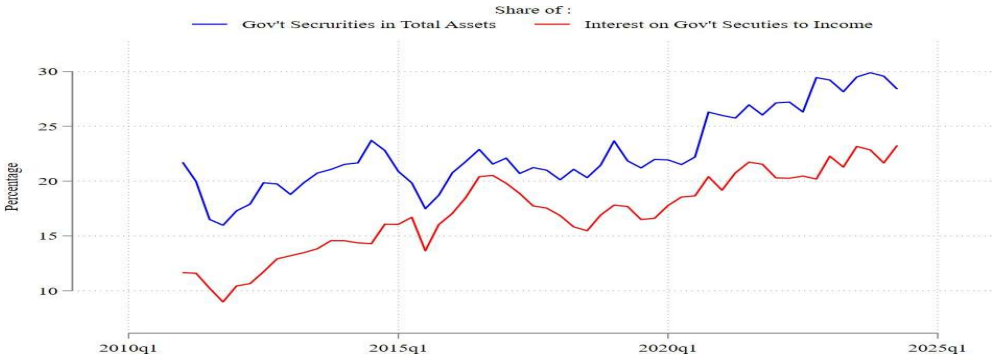
The rest of the paper is as follows. Section 2 provides details about the balance sheet exposure of commercial banks to sovereign holdings as well as evolution and maturity structure of sovereign exposure. Section 3 provides a review of literature while section 4 describes the data and methodology used in this study. Section 5 provides evidence on determinants of sovereign exposure and the role of market heterogeneity, whereas section 6 concludes.

II. Stylized Facts: Sovereign-Bank Nexus in Uganda

2.1 Evolution of Sovereign Exposure in Uganda

The share of government securities in total assets increased from about 16% to 30% while the share of interest on government securities in total income increased from about 10% to 20%, between 2011 to 2022. This increase reflects the reliance of the government on the domestic bonds market to finance fiscal deficits and attractiveness of the government securities to banks. Government securities are safer and liquid compared to loans, placements and fixed assets.

Figure 1: Exposure of Commercial Banks to Sovereign Risk



Note: The figure represents the contribution of treasury holdings to the asset side of commercial bank balance sheet and the income statement. Treasury holdings are reported at fair value for securities held to maturity, and reported at market value for securities held for trade. The marketable securities are valued as at the end quarter period.

2.2 Capital Requirements and Liquidity Regulations

The literature partly attributes the increasing holdings of sovereign debt by banks to the liquidity and capital regulations (Baule et al., 2021; Kirschenmann et al., 2017). These regulations, designed to ensure financial stability, have reinforced the concentration of bank balance sheets with sovereign debt. Previously, according to section 4(2)(d) of the Financial Institutions (Liquidity) regulations of 2005, liquid assets included not only cash and balances held at the Central Bank but also Uganda treasury bills and marketable government bonds. These regulations of 2005 were revoked and replaced by the financial institutions (Liquidity) regulations, 2023. The new regulations further provided for the inclusion of (i) funds held under a special deposit facility and the standing deposit facility at the Central Bank; (ii) Bank of Uganda Bills; (iii) inclusion of government securities held in available for sale portfolios or held in accordance with "hold to collect and sale" business models subject to a haircut. These regulations incentivize banks to hold significant amounts of sovereign debt to meet liquidity requirements as required under section 4(3) of the 2023 regulations which require a financial institution to maintain a sufficient stock of high-quality liquid assets for purposes of complying with the liquidity coverage ratio (Financial institution in Uganda must maintain the 100 percent liquidity coverage ratio for all currencies in which they hold 10 percent or more of their liabilities).

The Capital Requirement Regulations of 2005, 2010 and 2022 provide a basis for holding government securities. The regulations require financial institutions to hold and maintain adequate capital to protect depositors and creditors against the risk of loss which may arise from their business activities. The Financial Institutions (Revision of Minimum Capital Requirements) instrument of 2022 raised the minimum paid up capital and required that the capital be invested in liquid assets in Uganda as prescribed by Bank of Uganda. The Bank of

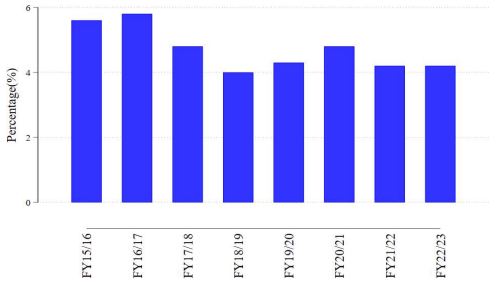
Uganda specifies that core capital should be invested in government securities, which have a risk weight of 0%; additionally, the financial institution shall at all times maintain a core capital of not less than 8% and a total capital of not less than 12% of the total risk adjusted assets plus risk adjusted off balance sheet items. Non-compliance to these ratios may attract penalties equivalent to a thousandth of the amount of the deficiency for every day on which the deficiency occurs coupled with submission of corrective plans provided to the Central bank. These regulations have penalties and benefits which encourage compliance and which provide incentives for holding of government securities.

Domestic Debt Dynamics

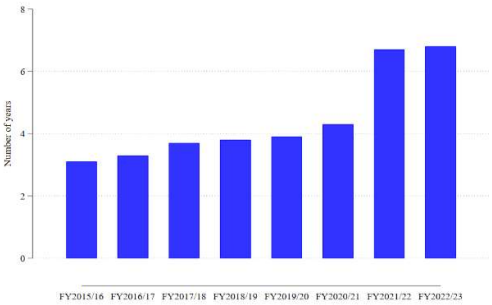
Despite the fact that Uganda benefited from debt relief initiatives in 1998 and the 2000s under the Highly Indebted Poor Countries (HIPC) framework, increase in government consumption, decline in the growth rate of tax revenue and difficulties in obtaining concessional loans have public debt levels. The ratio of public debt to GDP increased from about 31 percent in 2015 to 52 percent in 2024. Even though Uganda Revenue authority has enhanced tax revenue administration, fiscal deficit financed through the issue of government securities and loans has increased. Over the years, Uganda has taken measures to ensure sustainability of the domestic debt. Domestic debt maturing in one year as a percentage of total debt declined to 23.20% at the end of FY 2022/23 from 45.1% in FY 2015/16. This shows that Uganda has progressively tilted towards longer-dated securities, although this may have significant implications for the cost of debt. Furthermore, the average time to maturity has increased to 6.8 years from 3.10 over the same period (See Figure 2) These steps have ensured an improvement in refinancing and rollover risks.

Figure 2: Evolution of Domestic Debt in Uganda

(a) Debt maturing in 1 year (% of GDP)



(b) Average time to maturity (Years)



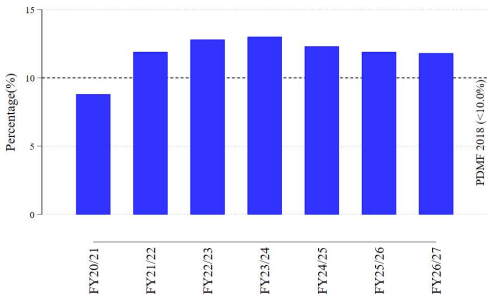
Note: The figure shows the evolution of key debt indicators in Uganda. Reported debt includes both domestic and External debt maturing in 1 year. The data is based on publicly available Debt Sustainability Reports from FY2015/16 to FY2022/24 conducted by Ministry of Finance, Planning and Economic Development.

However, the securities issued have been offered at relatively high coupon rate, thus attracting both corporate, retail and bank customers to invest in them at the expense of lending to the private sector. Whereas investment in government securities reduces lending to the private sector, trading in the securities deepen financial markets, provide resources used for stabilizing financial institutions and the securities constitute liquidity in the financial system. Developed and deep financial sector is resilient to shocks, while relaxations of fiscal constraints enable the government to support and resolve fragile banks and other non-bank financial institutions, which enhances financial stability. Nevertheless, for Uganda, the public debt to GDP ratio is above 50 %, which exceed the thresholds debt sustainability stipulated in t*he* 'Public Finance Management Act (PFMA 2015)'. In addition, two key thresholds in t*he* 'Public Debt Management Framework of 2018' were consistently breached, i.e. (i) Domestic interest payments to total government expenditure and (ii) Total domestic debt interest payments to total revenues (excluding grants). (see Figure 3). Although these thresholds were adjusted in 2023, domestic debt sustainability concerns persist given the experiences of developing countries such as Ghana and Kenya.

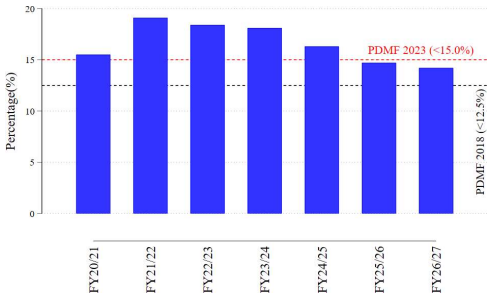
Higher domestic interest payments to total government expenditure indicate an increase in the cost of debt, which in turn reduces available resources towards growth enhancing projects, which not only reduces capital formation but may also deter growth and development. The elevated ratio of interest payments in relation to total government expenditure is risk on government ability to repay debt. As a result, lenders increase risk premium for loans and debt instruments issued, which further escalates the cost of funds. The increase in the cost of funds for the government tends to also affect the private sector, particularly financial institutions. This is due to the impact of public borrowing and spending decisions on economic performance and financial stability of households, firms and financial intermediaries. Consequently, the performance of fiscal policy, level of public debt and its sustainability influence credit rating for governments.

Figure 3: Performance Against PDMF 2018 Benchmarks

(a) Domestic Interest to Total Government Expenditure



(a) Domestic Interest to Domestic Revenue (Excl. grants)



Note: PDMF stands for the Public Debt Management Framework. The PDMF of 2018 was amended in 2023 leading to adjustment in key benchmarks. Reported debt in the figure is only domestic. The data is based on publicly available Debt Sustainability (DSA) Reports from FY2015/16 to FY2022/23 conducted by Ministry of Finance, Planning and Economic Development. The DSA of FY2022/23 provides an outlook to the indicators up to FY2026/27.

III. Literature Review

Numerous studies have analyzed the sovereign-bank nexus, often yielding different conclusions. Studies have shown that banks' holdings of sovereign debt are influenced by a variety of factors, including prudential regulation, fluctuations in yield curves, macroeconomic conditions, and the heterogeneity of the securities market. Boz et al. (2014), Altavilla et al. (2017), Baule et al., (2021) have examined the relationship between macro prudential regulation and the sovereign-bank nexus. They show that the privileged treatment of government securities in assessing risk and liquidity requirements tends to influence banks toward greater sovereign exposure. However, Lamas and Mencía (2018) contest this by showing that government securities are less risky relative to other assets and the value of government securities is less likely to change on maturity. As a result, holding of government securities has a higher chance of preserving the value of the assets as well as bearing higher returns.

Under the standardized approach of assigning risk weights to government exposure, the Basel II Framework provides a range of weights (0% to 150%) where credit rating is available from a ratings agency. For example, Banks exposed to sovereigns with a rating of BB+ to B are expected to assign 100% risk weight. Hence, it becomes imperative to consider the divergence between national regulations governing risk weights and global standards. And yet any attempt to apply Basel II risk weights to Uganda may significantly increase risk weighted assets and capital provisions to absorb potential losses. Stringent prudential requirements, such as tighter risk-weighted capital requirements, not only accentuate bank fragility due to the fact that endogenous equity holdings adjust at a slower pace relative to capital requirements, but also reduce private sector credit (Mankart et al., 2018).

Other studies focus on the role of market heterogeneity and bank-specific characteristics (Affinito et. al., 2022; Egesa et al., 2015). They contend that bank-specific characteristics such as bank balance sheet size, primary dealership and residence of the parent company (i.e. whether foreign or domestic) influence sovereign exposure. The findings suggest that primary dealer banks and foreign owned banks tend to hold government securities for shorter durations, reflecting their liquidity hedging strategies. However, we argue that the approach to estimating models with residence of a bank may make empirical inference difficult in the case of Uganda. This study notes that most of the commercial banks in Uganda are owned by foreign holding companies. This would create systematic sample bias. Moreover, incorporating bank size in the same model as the primary dealership would lead to multicollinearity given that large banks are normally the privileged traders in primary markets.

In certain circumstances, sovereign exposure has been viewed as a direct result of the profit-maximizing motive of banks. For example, banks may increase the uptake of low-priced debt of stressed sovereigns in anticipation that these countries will stabilize in the medium term. A common phenomenon identified in the literature is the carry trade strategy, in which banks observe price differentials between stressed and stable sovereigns. Several studies have found evidence of a robust response of domestic exposures to fluctuations in yields. Testing the carry trade hypothesis is more complex in our study in part because the data only observes banks licensed in a single country (Acharya and Steffen, 2015; Breckenfelder and Schwaab, 2018). However, our data is granular enough to observe bank-specific responses to changes in treasury

pricing. Moreover, the shallowness of secondary markets in Uganda's neighboring countries, or countries that would receive portfolio flows should Uganda be adversely stressed, may make the carry trade hypothesis much weaker. Moreover, models using country to country analysis have greatly diverged from this view (ESRB, 2015). Additionally, macroeconomic conditions have also been identified as key drivers of sovereign exposure. However, several studies diverge from this perspective in terms of direction. For example Funyina, (2023) argues that weak economic activity amplify exposure of banks to government securities and this would be in line with the carry trade hypothesis.

IV. Data and Methodology

This section provides the empirical model and the key variables used in analyzing the sovereign bank nexus in Uganda. The detailed description of these key datasets including the computation of sovereign exposure in the financial system, and the decomposition of securities holdings along the maturity profile of holdings are provided in Annex 1. The main source of the administrative datasets is the Bank of Uganda while the source of public data on macroeconomic variables is the Uganda Bureau of Statistics.

4.1 Empirical Model

4.1.1 Identification of Sovereign Exposure

When considering the sovereign exposure of a bank, it is important to take into account how the portfolio decomposition of securities would be affected by market risks. A bank with short term securities may be more exposed to interest risk rather than duration risk which is higher when banks have long term securities held to maturity. To control for this, we construct variables that measure exposure at different maturities. First, the study defines short term exposure as the aggregate treasury securities held for trading to maturity that are less than one year. This is denoted by $short\_exp_{it}$ which is the outstanding stock of short-term securities for each bank (i) quarter (t). Secondly, we define long term exposure as the aggregate treasury securities that are over one year whether for trading or held to maturity. This is denoted as $long\_exp_{it}$. This approach has the advantage of identifying the exposure on securities classified as bonds but the days to maturity have fallen to below one year.

The above variables are key in explaining why banks hold treasury securities. However, this does not explain why a bank would re-balance its portfolio of treasury securities in relation to other assets. To address this issue, we extend the analysis to measure the share of $short\_exp_{it}$ and $long\_exp_{it}$ in total net assets of bank *i* during quarter, *t*. The baseline specification is provided as below:

$$Exposure_{it} = \beta 1 + \beta 2 Pricing_{it} + \beta 3 Prudential_{it} + \beta 4 Macro\_Controls_{t} + \gamma_i + \epsilon_{it} \quad (1)$$

In this specification, $Exposure_{it}$ denotes the measure of short-term or long-term securities holdings for bank i at time t; $Pricing_{it}$ captures the short-term and long-term yields; $Prudential_{it}$ reflects compliance with prudential regulation; $Macro\_Controls_{t}$ includes macroeconomic control variables such as inflation and GDP; γ_i accounts for bank-specific fixed effects; and ϵ_{it} is the error term clustered at the bank level. The description of variables incorporated in the specification is provided in Table 1. We present the results from the baseline specification in Table 2. we iteratively extend the baseline by interacting key variables with market structure indicators (e.g., primary dealer status) and by changing the dependent variable

to capture both the level and proportional exposure to government securities. Each column in the results tables represents an adjusted version of the baseline that accounts for different outcome variables. In each iteration, the core set of covariates (pricing, prudential, and macro controls) is preserved, but the interpretation evolves to suit the context of the outcome variable.

Table 1: Variable Descriptions[1]

Variable	Description
short_exp_bn	Average bank-level holdings of short-term sovereign securities (maturity less than 1 year).
long_exp_bn	Average bank-level holdings of long-term sovereign securities (maturity of 1 year or more).
shr_short_exp	Share of short-term sovereign securities in total net assets.
shr_long_exp	Share of long-term sovereign securities in total net assets.
gvt_share	Overall share of government securities in total bank assets-
d_Yield_364Day	Quarterly change in the 364-day Treasury Bill yield (short-term rate).
d_Yield_10yr	Quarterly change in the 10-year Treasury Bond yield (long-term rate).
reg_t1_capital_to_rwa	Tier 1 capital as a percentage of risk-weighted assets.
short_term_gap	Difference between short-term liabilities and liquid assets (liquidity gap).
gdpg	Quarterly GDP growth rate.
inflh	Quarterly inflation rate.
PDSi	Dummy variable equal to 1 if the bank is a primary dealer, 0 otherwise.
Psc	Share of private sector credit in total assets of bank *i* at time *t*.
Securities	Share of government securities in total assets of bank *i*.

V. Empirical Results

5.1 Determinants of sovereign exposure

We first assess whether securities pricing, prudential regulation, and macroeconomic variables influence a commercial bank's decision to hold short-term government securities by using the fixed effects regression model outlined above. The results are presented in column one of Table 2. The results show that an increase in short term yields in the previous quarter induces banks to increase short term exposure to government securities by about 6.8% in the current quarter and it is statistically significant. However, an increase in long-term yields in the previous quarter induces banks to reduce their exposure to short-term securities by 15%. This is consistent with theory that increase in long term rates ideally triggers a sale of assets as banks are likely to incur unrealized losses. Note that an increase in rates is inversely related to the price as we showed in equation 3 in Annex 1. We also note that prudential regulation have limited explanation for why banks may be exposed to securities in the short term. The interpretation would be that assessment of interest rate risk plus macroeconomic fundamentals play a greater role than prudential requirements. Indeed, we observe that on the macro side,

[1] Details of some of the variables used in this study are provided in Annex 1.

inflation plays a significant role in the short term. Banks reduce their short-term exposure by about 6.1% when inflation rises by 1%. This is consistent with the fact that, as real short-term yields decline, banks tend to hedge against duration risk by deleveraging from non-inflation indexed securities.

In column 2, we provide an assessment of what drives long-term exposure. In contrast to column 1, we note that the magnitude of the effect of short-term rates is even higher, increasing to 7.1%, although this is unexpected. One explanation could be that banks, in an environment of rising short-term rates, might shift their portfolios towards longer-term securities to lock in higher yields for an extended period, particularly if they anticipate that short-term rates might peak soon. This strategy could help stabilize income over a longer horizon, even though it may expose banks to greater interest rate risk if long-term rates increase in the future.

Moreover, prudential regulations appear to play a more significant role in determining long-term exposure compared to short-term exposure. The need to meet regulatory requirements in the short-term for liquidity, may incentivize banks to hold a larger proportion of long-term government securities, which are often considered high-quality liquid assets (HQLA) under regulatory frameworks. Additionally, the influence of macroeconomic variables such as GDP growth and inflation rates becomes more pronounced in the long-term model. For example, higher growth in GDP is associated with a 2.6% increase in long-term exposure while increase in inflation reduces holdings of long-term bonds. This suggests that banks are more willing to hold longer-term securities when growth is robust and inflation is stable, due to the fact that sustained growth increases profitability as result of increased incomes and ability to meet debt obligations. Indeed, increase in inflation rates is associated with a reduction in long-term exposure by 4.5%, reflecting concerns about future economic downturns and the associated risks of holding long-duration assets in a weakening economy.

Table 2: Determinants of Sovereign Exposure

	(1) ln_short_exp	(2) ln_long_exp	(3) shr_short_exp	(4) shr_long_exp
Yield Curve				
d_Yield_364Day	0.068**	0.071*	0.14	0.22*
	(0.020)	(0.026)	(0.157)	(0.102)
d_Yield_10yr	-0.15***	-0.10	-0.89*	-0.15
	(0.035)	(0.058)	(0.386)	(0.229)
Prudential Regulation				
reg_t1_capital_to_rwa iv	0.00043	0.0011	0.16**	0.093
	(0.005)	(0.008)	(0.052)	(0.047)
short_term_gap iv	0.0047	0.030***	-0.033	0.17***
	(0.005)	(0.008)	(0.051)	(0.045)
Macro Variables				
gdpg	-0.0041	0.026*	-0.032	0.18***
	(0.005)	(0.010)	(0.057)	(0.038)
inflh	-0.061***	-0.045**	-0.35**	-0.051
	(0.012)	(0.015)	(0.114)	(0.079)
Constant	18.3***	17.1***	13.1***	3.18
	(0.163)	(0.248)	(1.575)	(1.571)
R-Squared	0.79	0.69	0.58	0.39
Observations	1129	892	1129	892
Bank FE	Yes	Yes	Yes	Yes
Auction Group	All	All	All	All

Standard errors in parentheses
$* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

We complement the above analysis, by extending the results presented in columns 1 and 2 of Table 2 to incorporate proportionality of banks' exposure to short and long-term government securities relative to their total net assets. The results in column 3 and 4 suggest that in comparison to other assets (on the bank balance sheet), an increase in short-term yields does not necessarily trigger a substantial reallocation towards short term securities. Instead, banks appear to re-balance their portfolios by increasing their holdings of long-term securities as a proportion of their total assets. As earlier shown, this behavior is likely driven by the anticipation that short-term rates, largely triggered by policy rate hikes, particularly in context of Uganda, are typically short-lived and reflective of temporary monetary policy actions. The results also suggest that the short-term funding gap plays a key role for banks holding securities in relation to other assets. However, we must apply several robustness checks to reaffirm these results and determine whether they can be explained by market heterogeneity.

5.2 The Role of Securities Market Heterogeneity

In this section we analyze how market heterogeneity influences sovereign debt exposure. The market for government securities consists of primary dealers and non-primary dealer banks. The results presented in Table 3 indicate that the yield curve plays a crucial role in explaining why primary dealers adjust their short-term exposure. Specifically, an increase in long-term yields, with the 10-year yield serving as the benchmark, triggers primary dealers to offload their short-term securities. However, other interest rates do not significantly impact long-term exposure or the proportion of these securities in total assets. Furthermore, primary dealers appear to be more sensitive to changes in inflation, which drives them to reduce their short-term exposure by approximately 49%. In contrast, there is no significant change in short-term exposure among non-primary dealers in response to inflation.

For non-primary dealers, the results in columns 2 and 4 suggest that prudential regulation and the macroeconomic environment are the main factors influencing their sovereign exposure. The need to meet regulatory Tier 1 capital requirements motivates non-primary dealers to increase their long-term securities exposure by 15%. When considering the size of the balance sheet, these regulations also trigger non-primary dealers to boost their short-term holdings by 16%, driven by the need to address the short-term funding gap. The improvement in GDP would trigger a 17% increase in long term exposure for the non-primary dealers but 20% for the primary dealers.

5.3 Sovereign Bank Nexus and Private Sector Credit Outcomes

What is imperative to note, is the asymmetric pass through of sovereign risk to other economic activities. There is evidence that high sovereign exposure crowds out private sector lending, (Önder et al. , 2024; Bocola, 2016). The implication of this evidence is that the banking sector substitutes private sector credit with public debt hence reducing the intermediation role of banks in the economy. The banking sector prefers government securities due to lower risks. However, they have lower returns compared to loans and advances. Hence, banks with an objective of maximizing return would extend more loans and advances relative to government securities. However, the decision to preserve capital and conversative approach to risk taking lead to increase in sovereign exposure, which leads a decline in intermediation of funds between deposits and borrowers in the private sector. This undermines the realization of social economic transformation in which the private sector plays active role.

To answer the question of how bank's holding of sovereign debt affects private sector credit, we provide a simple linear estimation in equation 2 of the trade-offs and plot the conditional estimates as shown in Annex 5.

$$Psc_{it} = \theta + \gamma Securities_{it} * \mathbf{I}[Auction\ \ Status]_i + \epsilon_{it} \tag{2}$$

where Psc_{it} refers to the share of outstanding private sector credit in total assets of bank i. Securities implies the share of outstanding stock of treasuries in total assets for a given bank i. Auction status refers to whether a bank has privilege status to trade as a primary dealer or a non-primary dealer in the auction system. The term α indicates the constant loan advances while θ denotes the coefficient on securities while accounting for dealership status. As data expands, this model would be extended to incorporate fixed effects such as bank-specific variables that influence lending.

Table 3: Determinants of Sovereign Exposure: Primary Delearship Privilege

	(1) ln_short_exp	(2) ln_long_exp	(3) shr_short_exp	(4) shr_long_exp
Yield Curve				
d_Yield_364Day	0.43	-0.095	0.016	0.27
	(0.217)	(0.151)	(0.160)	(0.141)
d_Yield_10yr	-1.95*	-0.14	0.16	-0.15
	(0.807)	(0.293)	(0.307)	(0.272)
Prudential Regulation				
reg_t1_capital_to_rwa iv	0.41	0.15**	0.51***	0.060
	(0.296)	(0.050)	(0.102)	(0.037)
short_term_gap iv	0.055	-0.076	0.19*	0.16*
	(0.053)	(0.069)	(0.065)	(0.058)
Macro Variables				
gdpg	-0.083	0.011	0.20*	0.17***
	(0.096)	(0.072)	(0.087)	(0.032)
inflh	-0.49*	-0.23	-0.095	0.067
	(0.188)	(0.117)	(0.090)	(0.129)
Constant	10.6	11.0***	-4.62	2.66
	(6.368)	(1.723)	(2.736)	(1.560)
R-Squared	0.45	0.62	0.42	0.40
Observations	440	689	356	536
Bank FE	Yes	Yes	Yes	Yes
Auction Group	PDs	Non-PDs	PDs	Non-PDs

Standard errors in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

The results further confirm that increase sovereign debt reduces lending to the private sector. The fact that banks prefer government securities to lending to the private sector raise financial stability concerns related to high exposure of financial institutions to sovereign holdings. Should a systemic event occur that induces funding constraints for banks, the balance sheet net worth of banks with significant exposure to securities may be affected (Morelli et al., 2022), which would further discourage private sector lending. Shocks to the financial system can emanate from domestic and global economies. For example, the COVID-19 Pandemic, the 2022 synchronized global monetary policy tightening among others. These shocks affected the value of the bonds and hence balance sheet of banks. Moreover, market heterogeneity plays a critical role in determining the elasticity of substitution between government securities and loans. Primary dealers are more exposed to sovereign holdings than non-primary dealers and tend to allocate less credit to the private sector as compared to the securities.

VI. Conclusions

This study analyzed the link between government securities and financial stability. The study estimated an econometric model using monthly data from 2011 to 2024 and examined the role of securities pricing and macro prudential regulatory requirements, such as capital adequacy and liquidity regulations, in driving banks' holdings of government securities. The results showed that first, regulatory requirements on building high quality liquid stocks and the lower risk ratings for securities as compared to loans encourage banks to substitute loans for more exposure to the sovereign. Second, primary dealers are more sensitive to interest rate changes and as such would be significantly affected in the case of failure by the sovereign to honor its obligations or when changes in interest rates occur. Third, profit maximization drive banks to invest in government securities due to their lower risk.

The study therefore suggests three recommendations. First, regulators to consider setting limits beyond which surcharges are applied to encourage diversification of bank balance sheets and hence minimize sovereign exposure risk. Second, the study proposes assessment of the resilience of banks to plausible scenarios of sovereign exposure through regular stress testing. Finally, introduction of dynamic risk rating of securities as opposed to classifying sovereigns as risk free can enable regulators to control the direction of sovereign exposure for attainment of sound and resilient financial systems.

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Annexes

Annex 1: Details of Data Description

Annex 1a: Monthly Balance Sheet Data

We begin our analysis by leveraging a novel data set derived from the monthly financial returns submitted to the Bank of Uganda, which have variables relevant to the assessment of sovereign exposure within the banking sector. These returns have bank level holdings of central government securities from 2011 to 2024, specifically treasury bills and treasury bonds, across various categories. The variables of interest include the fair value of these securities, further categorized by their intended purpose (trading or investment) and their holding period (greater than or less than one year).

The distinction between securities held for trading versus those held for investment purposes provides a unique dataset that enables disentanglement of short-term and long-term exposure to sovereign risk. Securities held for trading are more susceptible to price volatility and interest rate fluctuations, which can result in immediate gains or losses. In contrast, investment securities, particularly those held to maturity, represent a more stable and long-term exposure to sovereign debt. Additionally, dis-aggregating treasury bonds based on their holding period, enables the analysis of duration risk based on realized and unrealized losses.

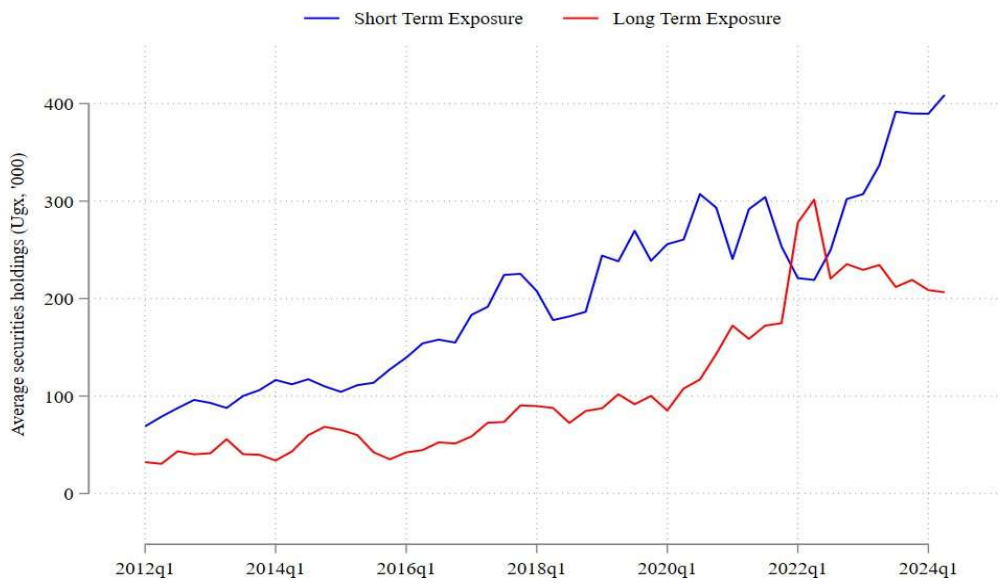
The implications for financial stability are significant. The shift towards short-term exposure may increase the susceptibility of banks to volatility in prices in the secondary market and interest rate changes in the primary market, which can lead to immediate gains or losses. For instance, synchronized global monetary policy tightening in 2022 to 2023, reduced the market value of longer-term securities substantially, leading to realized and unrealized losses for securities held for sale and held to maturity (Choi et al., 2023). The losses accentuated bank runs and failure of Silicon Valley Bank in the United States, which provided an impetus for analyzing duration risk emanating from sovereign exposure.

For example, Figure 4, shows that there is increasing reliance on short-term securities in the Ugandan financial sector which could similarly heighten the risk of contagion, especially if a sudden market correction or rate hike were to occur. The existence of liquidity constraints in Uganda's secondary markets may reduce trading in securities held for trading to enable banks improve liquidity or hold optimum liquidity levels. Therefore, we define short term exposure to be all securities with maturity of less than one year while securities above one year constitute long term exposure. Hence, the interaction between sovereign exposure and liquidity risk, particularly in a volatile macroeconomic environment, remains a critical area of concern for regulators and policymakers.

Annex 1b: Secondary Market Quote System

The second dataset utilized in this study is the secondary market auction quoting system. This is a daily dataset that captures secondary market trading activities from 2012 to 2024. The key variables included are short-term and long-term yields to maturity (YTM) and price quotes on treasury securities. The data is provided at the level of a primary dealer, who is responsible for reselling securities in the secondary market.

Annex 1c: Sovereign Exposure by Maturity Profile



Note: Short Term Exposure is the average holdings per bank, of central government securities with a maturity of less than one year. Long Term Exposure is the average holdings per bank, of central government securities with a maturity of more than one year. The figure shows a notable increase in short-term exposure relative to long-term exposure, particularly post-2021. This shift reflects a strategic preference among banks to manage liquidity and mitigate duration risk amid an uncertain economic environment

Yields are computed with a focus on controlling for the average days to maturity of any quoted security, ensuring consistent analysis and comparison across securities, given that the face value may diverge from the intrinsic value. Note that the YTM calculations for Treasury Bills is provided as:

$$YTM = \frac{100-P}{P} \times \frac{365}{Days\ to\ Maturity} \qquad (1)$$

where P is the primary market price quoted by the bidder, and the 'days to maturity' represent the time remaining until the security matures. For treasury bonds, the relationship between bond price and YTM is established using the following formula:

$$P = \sum_{t=1}^{n} \frac{C}{\left(1+\frac{YTM}{2}\right)^{t}} + \frac{M}{\left(1+\frac{YTM}{2}\right)^{n}} \qquad (2)$$

where P is the price of the bond, C is the semi-annual coupon payment, M is the maturity value, YTM is the yield to maturity, and n represents the total number of coupon payments over the bond's life. From the above equation, we can derive the quoted yield to maturity as shown in equation 3:

$$YTM = 2 \times \left[\left(\frac{C}{P - \frac{M}{\left(1+\frac{YTM}{2}\right)^{n}}} \right)^{\frac{1}{t}} - 1 \right] \qquad (3)$$

This approach ensures a robust analysis of the secondary market trading activities, providing insights into the pricing and yield behaviors of treasury securities over time. Using these prices and YTM quotes, provides an opportunity to disentangle the role of primary dealers and non-primary dealers in the auction system.

Annex 1d: Primary Dealership System

The main objective of reforms in the Uganda's financial market is to improve transparency, liquidity, and domestic participation in the government securities market. Central to these reforms is the establishment of a Primary Dealer (PD) system, which grants exclusive bidding rights for government securities to a select group of banks in an auction. These banks, typically large market leaders, are expected to enhance market depth by actively engaging in the secondary market.

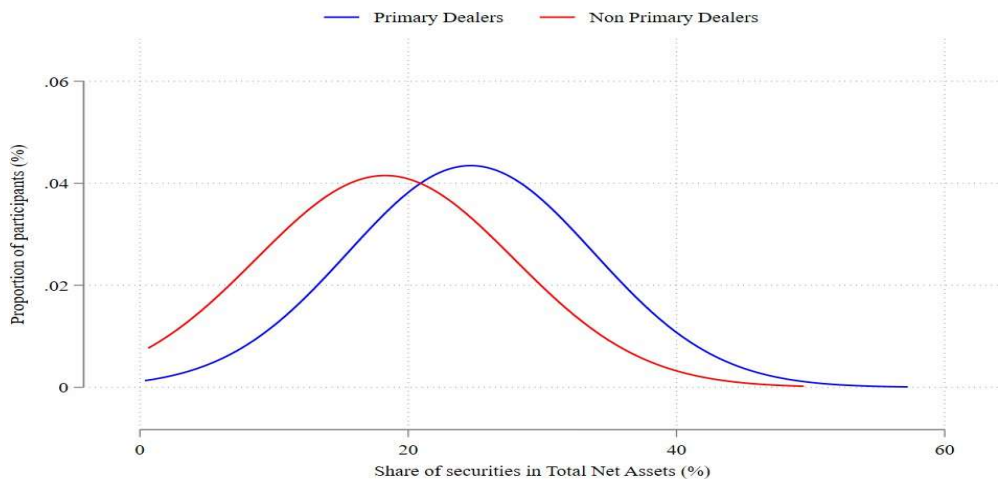
The system is also designed to streamline the auction process, with the objective of enhancing liquidity and ensuring efficient price discovery in the primary market. The selected Primary Dealers are required to meet specific criteria, including financial soundness, operational capacity, and a demonstrated ability to participate actively in both primary and secondary markets. These requirements are consistent with international best practices, such as those highlighted by Arnone and Iden (2003) and central banks. In 2020, competitive bidding was restricted to the gazette primary dealers.

The PD system by mandating banks to hold and trade significant stock of government debt increases exposure of banks to sovereign risk distress. The sovereign risk distress is amplified during fiscal distress especially with concentration of bank assets in government securities. Primary dealers also have a market clearing role, and in some circumstances (e.g where auction subscription may be low or in the event of private placements and tap sales) may hold the government securities on-book until they find an interested buyer from the secondary market. While this is essential in achieving a steady flow of liquidity for government, a dealer may lock in critical resources towards securities held for trading purposes, which reduces its high-quality liquid asset required to meet customer withdrawal needs as well as other liquidity requirements. In addition, holding government securities reduces resources available for lending to firms and households, which is the main objective of financial intermediation. Therefore, reforms in the government securities market, despite supporting liquidity, depth and participation of domestic investors, increase sovereign risk exposure

We capture the reforms in the government securities market using a dummy variable based on the status of being granted a privilege in the trading system of securities in the primary and secondary market. Let PDS_i be a dummy variable that represents whether bank i has attained Primary Dealership status (PD):

$$PDS_i = \begin{cases} 1 & if\ bank\ i\ is\ a\ Primary\ Dealer\ (PD) \\ 0 & if\ bank\ i\ is\ not\ a\ Primary\ Dealer\ (Non-PD) \end{cases}$$

Annex 1e: Distribution of Sovereign Holdings: Primary Verses Non-Primary Dealers



Note: Normal distribution plot of sovereign exposure by market participants, categorized into Primary Dealers (PDs) and Non-Primary Dealers (non-PDs). Primary Dealers exhibit a higher concentration of sovereign exposure, with a peak at a higher percentage compared to Non-Primary Dealers. This suggests that Primary Dealers, who are more involved in government securities markets, bear a greater proportion of sovereign risk on their balance sheets.

Annex 1f: Quarterly Financial Soundness Indicators Data.

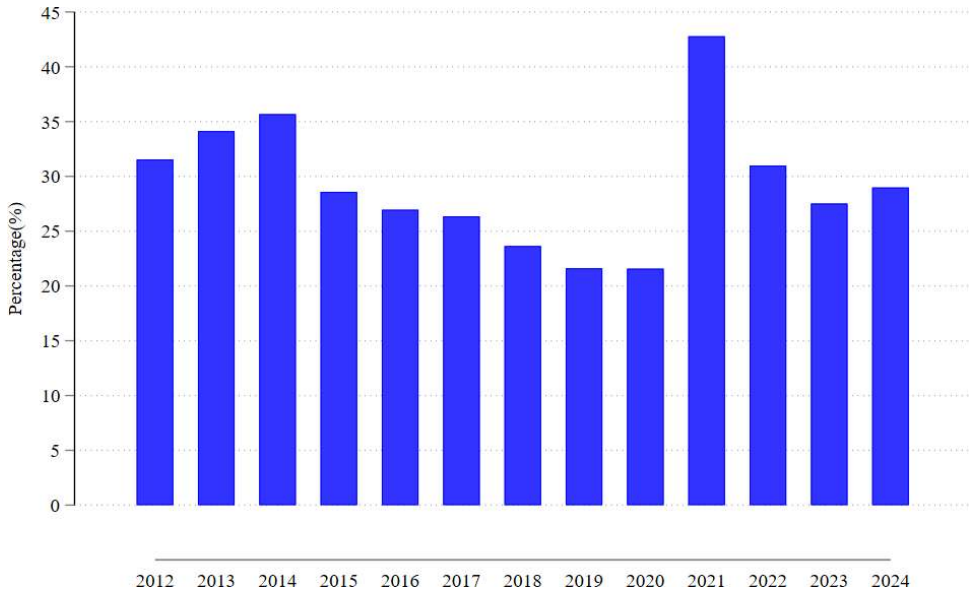
The study combines government securities data with quarterly financial Soundness indicators data, compiled according to the IMF's Financial Soundness Indicators (FSI) Compilation Guide. The main variables of interest as identified in the literature relate to a bank's capacity to absorb losses from sovereign bond holdings and the associated liquidity risk, (Altavilla et al., 2017). The proximate variables are therefore regulatory tier 1 capital to risk-weighted assets and short-term funding gap.

Regulatory Tier 1 Capital to Risk-Weighted Assets is measured as the ratio of a bank's core equity capital to its risk-weighted assets, providing a measure of the bank's financial strength and it determines a bank's buffer against potential losses from sovereign bonds, particularly in periods of sovereign stress. Altavilla et al., (2017) shows that banks with lower regulatory capital ratios tend to increase their holdings of distressed sovereign debt as part of a "carry trade" strategy, thereby exposing themselves to greater risk. A lower Tier 1 capital ratio suggests that a bank might be more vulnerable to sovereign debt repricing, which can lead to significant capital losses and force banks to deleverage, thereby amplifying the transmission of sovereign stress to the broader financial system.

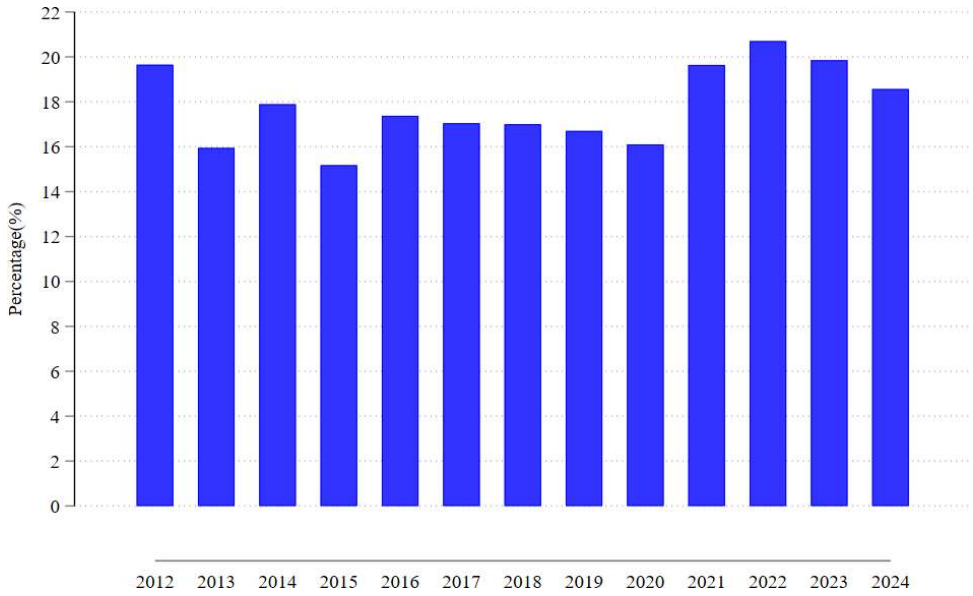
The 'short-term funding gap' is used to measure the difference between a bank's liquid assets and short-term liabilities. A negative short-term funding gap indicates that a bank does not have adequate liquid assets to meet its short-term obligations, even with government securities in its asset portfolio In periods of sovereign distress, banks with large sovereign exposures may face a sudden increase in funding costs or a liquidity shortage, especially if the value of their sovereign holdings declines. The short-term funding gap can thus serve as a key indicator of a bank's liquidity risk and its ability to withstand sovereign-induced market disruptions.

Annex 2: Prudential Regulation

Annex 2a: Regulatory Tier1 Capital to Total Risk Weighted Assets



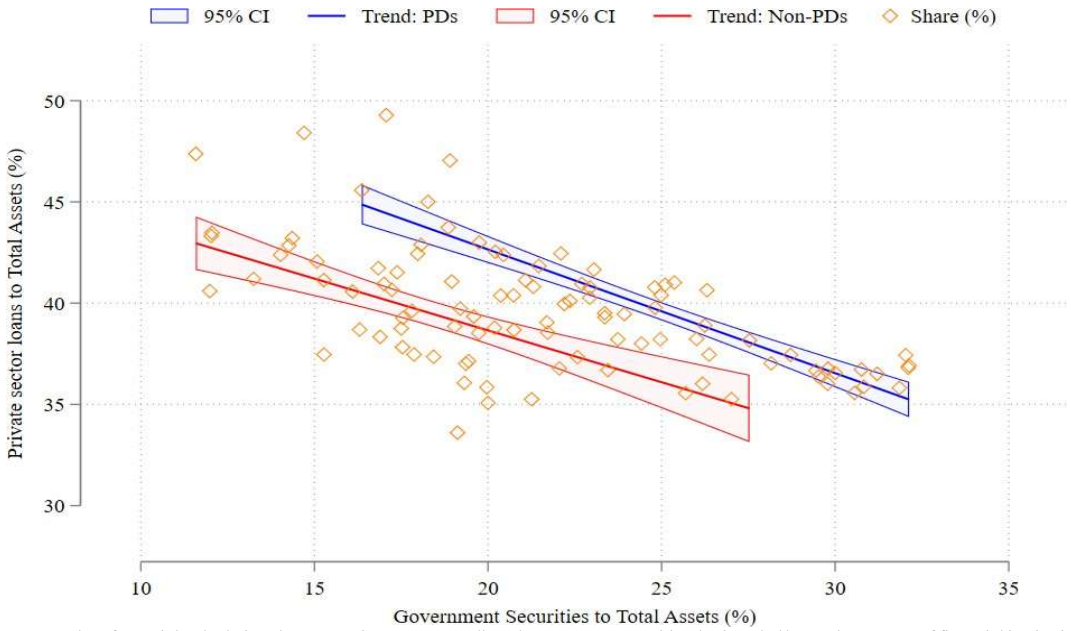
Annex 3: Short Term Funding Gap



Annex 4: Descriptive Statistics

	Mean	Standard Deviation	10th percentile	Median
Sovereign Exposure				
(mean) short_exp_bn	204.60	93.18	94.55	199.72
(mean) long_exp_bn	108.23	74.68	40.06	84.98
(mean) shr_short_exp	15.39	2.01	13.08	15.28
(mean) shr_long_exp	9.08	3.56	5.44	7.87
(mean) gvt_share	20.93	3.77	17.11	19.68
Yield Curve				
(mean) d_Yield_364Day	-0.10	1.73	-1.92	-0.15
(mean) d_Yield_10yr	-0.03	0.94	-1.27	-0.00
Prudential Regulation				
(mean) reg_t1_capital_to_rwa	29.24	7.35	21.83	26.84
(mean) short_term_gap	17.79	2.02	15.37	17.68
Macro Variables				
(mean) gdpg	4.65	3.40	0.14	5.25
(mean) inflh	5.05	4.18	2.05	3.56

Annex 5: Crowd Out Effects: Portfolio Switching Behaviour of Commercial Banks



Note: Scatter plot of unweighted relations between private sector credit and government securities, both scaled by total net assets of financial institutions. Each plotted symbol corresponds to the share of each asset in percentage terms, held in a given quarter. Private sector loans refer to outstanding stock of credit issued by all financial institutions and their share in total assets is on the y-axis. The government securities compound both securities held for trading purposes and those held to maturity. The x-axis displays the stock of end quarter balances of government securities divided by the total net assets held by all financial institutions. The plot illustrates the portfolio switching behavior between treasury holdings and loans, with an inverse relationship accounting for both PDs (primary dealers) and non-PDs (non-primary dealers).