American Research Journal of Humanities & Social Science (ARJHSS)
E-ISSN: 2378-702X
Volume-07, Issue-11, pp-25-30
www.arjhss.com

Research Paper Open Access

A Study into How Much the 'Risk Weighted Asset Density Predictor' Can Predict the Risk Weighted Asset Density of The Banking Sector in Zambia Using Published Financial Data.

Gabriel Mwami, Gwebente Mudenda
ZCAS University, Lusaka, Zambia
ZCAS University, Lusaka, Zambia

ABSTRACT: The study was aimed at applying the predictor formula or model developed when investigating the factors that impacted the Risk Weighted Asset (RWA) Density of the Banking Sector in Zambia. In the initial study, the factors affecting the Risk Weighted Density of the Banks in Zambia were examined, which were segmented into Liquidity Risk, Credit Risk, Other Assets and Sources of Funding. It was noted that Credit Risk and Other Assets led to significant growth in Risk Weighted Assets compared to other variables. Capital and Debt had a negative impact on Risk Weighted Asset Density while deposits had a positive impact. The current study applied actual data obtained from quarterly financial statements publications by Commercial Banks in Zambia based on the 31 December 2023 figures. This is secondary data published by Banks through media and on various websites. The application showed that the predictor formular was able to predict the Markert Risk Weighted Asset Density with 99.86% accuracy using the 31 December 2023 data. On a bank level application, the model was also able to predict with 90% accuracy levels of the 11 out of 16 banks in Zambia and up 70% accuracy levels of the 15 out of the 16 banks that published their data. The results both at Market level and at individual bank level showed that the balance sheet composition had a significant impact on the Risk Weighted Asset Density of banks in Zambia as per predictor model. This went to support the earlier findings and recommendations that policy makers should use capital requirements to influence resiliency and not influence lending. Policy makers can use policies around deposits to influence lending to the real sector. Banks also faced more risks when lending and buying Government Bonds and thus needed to optimise the balance sheet so as to balance between risk management and profitability.

Key words: Risk Weighted Asset Density, Liquidity Risk, Credit Risk, Other Assets

I. INTRODUCTION

In the initial study referenced 'the Factors affecting the Risk Weighted Asset Density of the Banking Sector in Zambia' covering a period from 2005 to 2023, it was noted that several factors affected the Risk Weighted Asset Density of the Banking Sector in Zambia. The study had examined the factors that impacted on the Risk Weight Density level of the banking sector in Zambia. The research looked at variable factors that covered Liquidity Assets, Sovereign Risk Exposures, Credit Risk, Other Assets, Regulatory Capital, Debt and Deposits. Liquidity assets included exposures to both domestic and foreign financial institutions as well as Treasury Bills. Sovereign Risk mainly covered Government Bonds. Other Credit Risk covered net loans and off-balance sheet items. Other variables were Other Assets, Regulatory Capital, Debt, and Deposits. The model explained up to 92.5 percent of the variation in the RWAs density with the remaining 7.5 percent being explained by variables that were not part of the study. The model revealed that the independent variables had a significant effect on RWAs density of the banking sector in Zambia with F factor of 277.7 and a Significant Factor of less than 0.0001.

Under liquid assets, the model revealed that exposures to financial institutions had a positive effect on the Risk Weighted Assets Density. Exposures to Foreign Financial Institutions (FIF) and exposures to Domestic Institutions (FIZ) had coefficients of 0.1632 and 0.4503 respectively. This meant that an increase in one unit of FIF would lead to 0.1632 increase in RWAs density while a unit increase in FIZ would lead to 0.45 increase in RWAs-Density. This meant that an increase in exposures to financial institutions would lead to an increase in risk weighted assets though at varying levels. Exposures to domestic financial institutions would have a higher impact of 0.45 compared to 0.16 from foreign financial institutions.

However, holding of Treasury Bills had a negative impact on the RWAs-Density with a coefficient of -0.3348, meaning one unit growth in Treasury Bills reduces the RWAs-density by 0.3348. Growing of Treasury Bills will lead to reduction in the Risk Weighted Assets. In an event that a financial institution wanted to reduce its risk weighted assets, investment in Treasury Bills would have a reducing impact of -0.3348 on the RWAs density. Exposures to sovereign risk in form of Government bonds had a positive impact on the RWAs density with a positive coefficient of 0.4197. This meant that an increase on exposures to Government Bonds by one unit will lead to 0.4197 increase in RWA density. That is increase in Government Bonds has almost the same impact on as with exposures to domestic financial institutions.

The intercept term showed that when all independent variables were held constant at zero, the Risk Weighted Assets Density Ratio will be -0.0524. Several variables had positive coefficients pointing to positive effect on the RWAs Density. The included Balances with Foreign Financial Institutions (+0.1632), Balances with Domestic Financial Institutions (+0.4503), Government Bonds (+0.4197), Net Loans (+0.8198), Off-balance sheet exposures (+0.7201), Other Assets (+0.8586), and Deposits (+0.1721). The variables with negative coefficients included Treasury Bills (-0.3348), Regulatory Capital (-0.1321), and Debt (-0.4284).

RWA=-0.0524+0.163FIF+0.45FIZ-0.335TBS+0.42GBDS+0.82LNS+0.72OBS+0.859OTS-0.132RGC-0.428DET+0.172DEP+0.0121

The predictor model developed was not tested with actual market data thus the current study was aimed at testing the predictability of the model against the Market data to find out its levels of applicability and accuracy. This study is aimed at showing the outcome the predictive equation when subjected to market data.

II. LITERATURE REVIEW

As noted in the earlier study titled 'The Factors affecting the Risk Weighted Asset Density of the Banking Sector in Zambia', the ability of a bank to contain more than enough capital to cover its Risk Weighted Assets above a given minimum limit is largely considered as a key measure of the resilience of the banking sector. Kishore (2018) noted that Risk Weighted Assets (RWAs) constituted the risk profile of bank's assets portfolio. The ratio of RWAs to total asset exposure provides a measure of riskiness of assets. The ratio has come to be known as RWA density and its variance from year to year indicates change in risk profile of asset portfolio of the bank. An increase in RWA density over a period shows that overall risk profile of bank assets has deteriorated. Avramova & Le Leslé (2012) defined the risk density as the levels of RWAs as a percentage of Total Assets. Higher density could mean higher risk of a bank although there was change in perception of this with higher levels pointing to prudent risk measurement approach. Typically, a high proportion of RWAs would tend to indicate a higher share of riskier assets, and regulators and market participants should prefer banks with a low RWA density.

Empirical Review

Oke & Ikpesu (2022) examined the effect of capital adequacy and asset quality on loans on the banking sector in Nigeria for a period 2010 to 2019. Both the capital adequacy and asset quality had a positive impact on the performance of banks. The maintenance of positive capital adequacy levels and ensuring that there was asset quality in the system aided performance across the sector. Based on the study outcome, the study pointed to the need for continuous improvement of the asset quality of the bank by management to ensure a decline in the non-performing loan. Abbas, Butt, Masood, & Kiran (2019) studies showed that the capital buffer and total risks were negatively correlated. The higher the buffer the lower the total risk. The findings showed that capital buffer had influence on the total risk and net interest margins differently in pre, during and post crisis. The results indicated that the interest margin was lower in pre-crisis and during crisis period than in the post-crisis period. The banks wanted to earn their target profits by making limited loans for which they charge higher interest margin.

Bonner (2016) looked at the preferential treatment of government bonds in financial regulation and whether the preferential treatment increased bank's demands for the bonds beyond their risk appetite. It was noted that the micro-prudential preferential treatment of bonds in capital and liquidity regulations led to an increase in demand for government bonds. It was also noted that there was a substitution effect with the government bonds holding higher preference to corporate and other bonds. There was also suggestive evidence that lending to the private sector was being impacted negatively by this preferential treatment. The main reason behind this substitution effect and impact on lending was the notion that government bonds were risk free and thus increasing the portfolio would be equivalent to holding risk free assets. However, the European sovereign debt crisis had exposed the risk of vicious circles between fragile governments and weak banks. Thus, where possible, going forward, this preference treatment should be revisited, and its removal would be a good start.

Beltratti & Paladino (2013) when reviewing why banks optimise risk weights noted that risk weights had an inducing impact on banks by compelling them to invest more in low risk weighted assets. If there are macroeconomic crises associated with the emergence of unforeseen risks in the assets the banks have over-invested into, then there is potentially negative relation between indicators of risk that are set by the regulators and the riskiness of banks. This negative relation was attributed to possible regulatory errors in determining the risks weights, not considering other factors that could influence the weights. The implication of this is that banks will most likely work with little capital when conditions are favourable but might need to raise additional capital when conditions impacting on the risk assets are unfavourable. Quirk (2022) when evaluating whether the BoZ Policy achieved its purpose of strengthening the financial sector with the setting a higher minimum capital limit concluded that broadly banks were able to meet the new rules by rising more capital. In addition, banks improved their capitalisation rates and increased their total assets by getting treasury assets rather than additional loans.

Literature Gaps

There has not been significant focus on the study around variables affecting Risk Weighted Assets as noted in the earlier study. Much of the focus has been on the impact that variables have on Capital Adequacy Ratio. The current study aims at bridging the gap in the study around Capital Adequacy Ratios and Risk Weighted Assets by adding a perspective of the factors influencing Risk weighted Assets, which has not been undertaken by several researchers. In this case, using the predictor equation to predict the Risk Weighted Assets Density of Banks in Zambia. This will add knowledge to the topic by answering the critical question.

Can the Risk Weighted Asset Density Predictor, Predict the Risk Weighted Asset Density of Individual Banks, and the Banking Sector as a whole?

To answer the research question above, the following objectives were designed.

RO1 – Use the collected market data to predict the Risk Weighted Asset Density of the Banking Sector in Zambia

RO2 – Recommend policy direction and management action arising from the interaction between Risk Weighted Assets and the variables impacting on it.

III. RESEARCH METHODOLOGY

The philosophical approach was based on Positivism. Park, Konge, & Artino, (2020) noted that Positivism is aligned with the hypothetical deductive model of science. The hypothetico-deductive method is a process that largely starts with theory from the literature to build testable hypotheses, which can be tested to prove the theory. In positivism studies, the role of the researcher is limited to data collection and interpretation in an objective way. In these types of studies research findings are usually observable and quantifiable. The study was based on secondary data obtained from the quarterly published data of Banks published in the media and on the websites of Banks. Banks are mandated to publish quarterly data and this information is in public domain. Collection of secondary data is an approach that uses data that was collected by someone else for similar purpose or for other purposes (George, 2023). The time horizon was published quarterly results showing the 31 December 2023 results. This was picked as it covered the complete year to date data. The data was used to feed into the predictor model to test the predictability ability of the model.

Sampling Frame and Sample size

The focus of the study was on the banking sector in the country. Owing to the availability of data, data was collected on all the 16 Banks that published the quarterly results. The Banks were given codes of A to P.

IV. DATA ANALYSIS AND FINDINGS

Applying the Predictive Model to The Banking Sector in Zambia

Using the December 2023 quarterly results, the model was able to predict the 99.86% accuracy of the industry Risk Weighted Asset Density. The actual Risk Weighted Asset Density for the industry was 0.481236 while the predictor results were at 0.481907, giving a result of 99.86% accuracy levels.

Full Description	Predictor	Variable/Total Assets	Result
Independent Variables	-0.0524	1	-0.0524
Balances with Financial Institutions Abroad/Total Assets	0.163	0.134873	0.021984
Balances with Domestic Financial Institutions/Total Assets	0.45	0.005486	0.002469
Treasury Bills/Total Assets	-0.335	0.110019	-0.03686

Government Bonds/Total Assets	0.42	0.135143	0.05676
Loans/Total Assets	0.82	0.280029	0.229624
Off-Balance Sheet/Total Assets	0.72	0.082812	0.059625
Other Assets/Total Assets	0.859	0.094292	0.080997
Regulatory Capital/Total Assets	-0.132	0.114933	-0.01517
Debt/Total Assets	-0.428	0.012497	-0.00535
Deposits/Total Assets	0.172	0.74433	0.128025
Total Assets	0.0122	1	0.0122
Risk Weighted Assets/Assets		Predictor	0.481907
		Actual	0.481236
		Variance	0.000672

Applying the Predictive Model to Each Bank

The predictor model was also applied on the data from each Bank to predict the Risk Weighted Density for each Bank. The model was able to predict with 99% accuracy levels on 13% of the Banks, 98% accuracy on 31% of the Banks, 95% accuracy on 50% of the Banks, 90% accuracy on 69% of the Banks, 85% accuracy on 81% of the Banks, 80% accuracy on 88% of the Banks and 70% accuracy of 94% of the Banks. There was only one bank that showed results significantly outside the predictor model observed when the model was used. The study did not look at the possible causes of deviation from the predictor model. This will be a study to be considered in the future.

Percent of Accuracy	Number of Banks in %	Number of Banks out of 16
99%	**13%**	**2**
98%	**31%**	**5**
95%	**50%**	**8**
90%	**69%**	**11**
85%	**81%**	**13**
80%	**88%**	**14**
70%	**94%**	**15**

	Bank Code			
Predictor Variables	A	B	C	D
Coefficient	(0.05)	(0.05)	(0.05)	(0.05)
Balances with Financial Institutions Abroad/Total Assets	0.01	0.02	0.02	0.01
Balances with Domestic Financial Institutions/Total Assets	0.00	-	0.00	-
Treasury Bills/Total Assets	(0.03)	(0.04)	(0.03)	(0.03)
Government Bonds/Total Assets	0.08	0.05	0.04	0.14
Loans/Total Assets	0.29	0.29	0.27	0.22
Off-Balance Sheet/Total Assets	0.01	0.09	0.05	0.09
Other Assets/Total Assets	0.10	0.05	0.09	0.08
Regulatory Capital/Total Assets	(0.01)	(0.02)	(0.02)	(0.02)
Debt/Total Assets	(0.02)	(0.00)	(0.01)	-
Deposits/Total Assets	0.13	0.13	0.13	0.13
Error	0.01	0.01	0.01	0.01
Predictor	51.65%	50.89%	50.11%	57.83%
Actual	51.96%	55.13%	53.08%	50.55%
Variance	-0.32%	-4.24%	-2.97%	7.28%

	Bank Code			
Predictor Variables	E	F	G	H
Coefficient	(0.05)	(0.05)	(0.05)	(0.05)
Balances with Financial Institutions Abroad/Total Assets	0.01	0.02	0.07	0.05
Balances with Domestic Financial Institutions/Total Assets	0.01	0.00	-	0.00
Treasury Bills/Total Assets	(0.05)	(0.09)	(0.03)	(0.02)
Government Bonds/Total Assets	0.07	0.03	0.02	0.09
Loans/Total Assets	0.27	0.23	0.13	0.10
Off-Balance Sheet/Total Assets	0.04	0.06	0.06	0.16
Other Assets/Total Assets	0.11	0.06	0.06	0.02
Regulatory Capital/Total Assets	(0.02)	(0.02)	(0.01)	(0.02)
Debt/Total Assets	-	-	(0.00)	-
Deposits/Total Assets	0.12	0.13	0.13	0.14
Error	0.01	0.01	0.01	0.01
Predictor	52.05%	38.76%	39.25%	48.13%
Actual	52.17%	39.94%	38.59%	47.17%
Variance	-0.12%	-1.18%	0.66%	0.96%

	Bank Code			
Predictor Variables	I	J	K	L
Coefficient	(0.05)	(0.05)	(0.05)	(0.05)
Balances with Financial Institutions Abroad/Total Assets	0.04	0.01	0.03	0.10
Balances with Domestic Financial Institutions/Total Assets	0.00	0.00	0.00	0.00
Treasury Bills/Total Assets	(0.06)	(0.00)	(0.09)	(0.04)
Government Bonds/Total Assets	0.05	0.02	0.05	-
Loans/Total Assets	0.15	0.16	0.06	0.04
Off-Balance Sheet/Total Assets	0.18	0.01	0.18	0.07
Other Assets/Total Assets	0.07	0.14	0.09	0.02
Regulatory Capital/Total Assets	(0.02)	(0.01)	(0.01)	(0.02)
Debt/Total Assets	-	-	-	-
Deposits/Total Assets	0.12	0.12	0.14	0.12
Error	0.01	0.01	0.01	0.01
Predictor	49.16%	41.18%	41.44%	25.51%
Actual	38.22%	46.27%	19.64%	27.50%
Variance	10.94%	-5.08%	21.80%	-1.99%

	Bank Code			
Predictor Variables	M	N	O	P
Coefficient	(0.05)	(0.05)	(0.05)	(0.05)
Balances with Financial Institutions Abroad/Total Assets	0.00	0.01	0.01	0.00
Balances with Domestic Financial Institutions/Total Assets	0.00	-	0.02	0.04
Treasury Bills/Total Assets	(0.10)	(0.03)	(0.07)	(0.01)
Government Bonds/Total Assets	0.07	0.07	0.03	0.00
Loans/Total Assets	0.17	0.34	0.25	0.42
Off-Balance Sheet/Total Assets	0.00	0.02	0.03	-
Other Assets/Total Assets	0.11	0.08	0.08	0.14
Regulatory Capital/Total Assets	(0.02)	(0.01)	(0.02)	(0.02)
Debt/Total Assets	-	-	-	-
Deposits/Total Assets	0.13	0.14	0.14	0.11
Total Assets	0.01	0.01	0.01	0.01
Error	33.77%	57.67%	43.45%	63.71%
Actual	39.15%	55.77%	42.36%	64.61%
Variance	-5.38%	1.89%	1.09%	-0.90%

V. CONCLUSION

The study was meant to build on the study of factors affecting the Risk Weighted Asset Density of Banks in Zambia, by applying the predictor model that was developed using the linear regression model. This was to assist in supporting the outcome of the initial research that concluded that increase in credit risk can significantly impact on the risk profile of an entity. Exposures to Sovereign Risk in form of Government Bonds also led to an increase in risk weighted assets while exposures to Treasury Bills led to a reduction in risk weighted assets. Exposures to financial institutions would lead to an increase in risk weighted assets. The banking sector grew its risk weighted assets from deposits and not from capital or debt. The relationship between Regulatory Capital and Risk Weighted Assets was negative. In addition, increase in debt led to reduction in risk weighted assets, leading to the conclusion that debt was also being used to create safer assets such as Treasury Bills.

The predictor model accurately predicted the behaviour of the Market, supporting the conclusions the earlier research. The 31 December 2023 quarterly publications showed a 99.86% accuracy on the Risk Weighted Density model for the Market. However, the results were dispersed when it came to applying the model to individual banks. The model was able to predict with 80% accuracy levels for about 88% of the Banks in the Industry. The equation was able to predict with 95% accuracy levels of 50% of the Banks in the Market. These high prediction levels support the findings of the research of the factors affecting the Risk Weighted Asset Density of the Banking Sector in Zambia.

Recommendations

The results both at Market level and at individual bank level showed that the balance sheet composition had a significant impact on the Risk Weighted Asset Density of banks in Zambia as per predictor model. This went to support the earlier findings and recommendations that policy makers should use capital requirements to influence resiliency and not influence lending. Policy makers can use policies around deposits to influence lending to the real sector. It is expected that policies affecting deposits can influence the levels of lending of banks to the real sector. A rise in Statutory Reserve Ratios can lead to reduction in lending while a reduction can increase the lending. Banks also faced more risks when lending and buying Government Bonds and thus needed to optimise the balance sheet to balance between risk management and profitability.

Limitations

The study did not investigate why some balance sheet composition of certain banks showed more dispersion from the predictor compared to others. It was meant to exam whether the findings from the first research could be applied with current market number to predict the outcome. Other studies are recommended which will allow for the identification of the reasons why some Banks would behave differently from the Market when it comes to predicting the Risk Weighted Asset Densit. At the same time, other factors such as Market Risk remained excluded from the predictor model.

REFERENCES

[1]. Abbas, F., Butt, S., Masood, O., & Kiran, J. (2019). The effect of bank capital buffer on bank risk and net interest margin: Evidence from the US. *Global Journal of Social Sciences Studies*, 72-87.

[2]. Avramova, S., & Le Leslé, V. (2012). Revisiting risk-weighted assets. *IMF Working Papers*, (090).

[3]. Beltratti, A., & Paladino, G. (2013, April 21). Why do banks optimize risk weights? The relevance of the cost of equity capital. The Relevance of the Cost of Equity Capital. *Munich Personal RePEc Archive*, p. MPRA Paper No. 46410.

[4]. Bonner, C. (2016). Preferential regulatory treatment and banks' demand for government bonds. *Journal of Money, credit and banking*, 1195-1221.

[5]. George, T. (2023, June 22). *What is Secondary Research? | Definition, Types, & Examples*. Retrieved from Scribbr: https://www.scribbr.com/methodology/secondary-research/

[6]. Kishore, K. (2018). Risk Weighted Assets Density as a Parameter of Risk Profile of Bank Assets: A Study of Indian Banks. *IUP Journal of Financial Risk Management*, 15(2).

[7]. Oke, B. O., & Ikpesu, F. (2022, May). Capital Adequacy, Asset Quality and Banking Sector Performance in Nigeria. *AUDOE, Vol. 18, No. 5/2022*, pp. 37-46.

[8]. Park, S. Y., Konge, L., & Artino, A. R. (2020). The Positivism Paradigm of Research. *Journal of the Association of American Medical Colleges*, 690-694.

[9]. Quirk, T. (2022, May 3). When Basel-inspired capital regulations are insufficient: Evidence from Zambia's use of absolute minimum bank capital requirements. *SSRN*, p. Available at SSRN 4095879.