BANK-SPECIFIC DETERMINANTS OF RISK MANAGEMENT EFFICIENCY: EVIDENCE FROM LISTED COMMERCIAL BANKS IN SRI LANKA

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Abstract

This study aims to identify the significant bank specific determinants of risk management efficiency of the listed commercial banks in Sri Lanka, by covering the financial statements of 11 banks during the period of 2008 to 2014. Panel regression analysis employed as the data analysis tool. Capital Adequacy Ratio (CAR) has been used as the dependent variable as the proxy for risk management efficiency and credit risk, liquidity risk, market risk, return on assets (ROA), banks' size, and operational efficiency selected as the determinants of bank efficiency. Results revealed that the credit risk, liquidity risk, ROA, operational efficiency and banks' size are the important factors of determining the degree of CAR of commercial banks in Sri Lanka. Further as shown by the results of the study, independent variables collectively have high effect on the dependent variable since the explanatory power of the model is approximately 67%.

Keywords: Capital adequacy Ratio**,** Risk Management**,** Bank-specific factors, Sri Lankan commercial banks

1   INTRODUCTION

The stability of the financial system represents its capability of withstanding external and domestic shocks. A stable financial system in a country not only fosters a healthy environment for depositors and investors but also assists financial institutions and markets to function smoothly. This stimulates investment from both local and foreign parties and ultimately promotes economic growth.

The banking system in Sri Lanka comprises with three main categories such as Central Bank of Sri Lanka as the apex financial institution, Licensed Commercial Banks (LCBs) and Licensed Specialized Banks (LSBs). At present there are 25 LCBs operate in Sri Lanka, out of those there are 13 domestic and 12 foreign banks (CBSL, 2015). The LCBs accounted for 48% of the total assets of the financial system as at end of 2014.

Banks act as financial intermediaries in an economy and provide liquidity to the entire economy. Therefore a robust banking system is crucial as it contributes towards maintaining confidence in the financial system and any failure may have the potential to impact on activities of all other financial and non-financial entities. Thus, the focus of this study is mainly on the risk management efficiency of the banking sector in Sri Lanka.

Background of the Study

Banks and other financial institutions are posed with many risks and these can be broadly categorized as market risks, credit risks, operational risks, legal risks, liquidity risks and reputational risks. Thus it is of paramount importance to manage these risks efficiently.

According to Al-Tamimi and Obeidat (2013) capital adequacy represents the banks' or other financial institutions' stability and solidarity. Capital adequacy ratio (CAR) generally represents the safety cushion which can absorb any unexpected loss that banks might face when operating in a highly uncertain environment. Thus regulatory authorities have introduced different measures of adequacy, to ensure the smooth flow of operations. The most prominent measure was the capital adequacy approved by Basel Committee in 1983, which was applied by more than 100 countries, furthermore the application of that standard during the recent years resulted in many weaknesses that led the committee to make some modifications on that standard and, ultimately, suggesting a new standard to measure adequacy under the name Basel II. (BIS) in September 2008, the further strengthening of the Basel II framework became apparent.

The banking sector had entered the financial crisis with too much leverage and inadequate liquidity buffers. Thus in July 2009, the Basel II capital framework was reinforced, notably with regard to the treatment of certain complex securitization positions, off-balance sheet vehicles and trading book exposures. These enhancements now referred as Basel III.
Financial system stability calls for a stringent regulatory framework and a robust payment and settlement system.

1.2 Research Problem

According to Hussein and Tamini (2007), Risk management is the foundation of the banking practices. Due to the nature of the business banks operate in a volatile environment facing a huge amount of risks associated with credit, market, operations, reputation, foreign exchange and liquidity. So adopting effective measures by banks to face such risks successfully is a vital thing.

Thereby, the study investigates "what factors determines the risk management efficiency of the banking sector in Sri Lanka", particularly LCBs. In the context of this study, the risk management efficiency, as indicated above, is measured through the CAR.

Determinants of the risk management efficiency can be twofold; mainly internal and external. Internal factors are the bank specific factors whereas the external determinants are macroeconomic factors, which can be the growth rate of Gross Domestic Product (GDP), changes in interest rates and inflation rates etc.

However, the focus of this study only rests upon the bank specific factors. This study examines how far the bank specific factors affect on risk management efficiency in Sri Lankan banking sector.

1.3 Research Objectives

Based on the above, the following research objectives can be ascertained:
- To examine the effect of bank specific factors on capital adequacy as a proxy for risk management efficiency in banks.
- To investigate the strength and the direction of the relationship between banks' specific factors and capital adequacy as a proxy for risk management efficiency in banks.

2. REVIEW OF LITERATURE

a. Risk Management in Banks

According to Bohachova (2008), risk taking and risk transformation belong to the core functions of banking. Pyle (2009) defines risk management as the process by which managers identify key risks, obtaining consistent, understandable, operational risk measures, choosing which risks to reduce and which to increase and by what means, and establishing procedures to monitor the resulting risk position.

It has been noted that Basel framework for risk management also has given more prominent role for the CAR as a key indicator of bank risk management. According to the definition given by the Reserve Bank of New Zealand (2007), capital adequacy is a measure of the financial strength of a bank expressed as a ratio of its capital to its risk weighted assets. This ratio indicates a bank's ability to maintain adequate capital in the form of equity and subordinated debts to meet any unexpected losses. CAR measures the amount of a bank's capital in relation to the amount of its risk weighted credit exposures. The risk weighting process takes into account, in a stylized way, the relative riskiness of various types of credit exposure that banks have, and incorporates the effect of off-balance sheet contracts on credit risk. The higher the CAR a bank has, the greater the level of unexpected losses it can absorbed before becoming insolvent.

The objective of capital adequacy analysis is to measure the financial solvency of an institution by determining whether the risk it has incurred are adequately offset with capital to absorb potential losses (Saltzman & Salinger, 1998). On the other hand Evans et al. (2000) consider the capital adequacy determines the robustness of financial institutions to shocks to their balance sheets and this ratio provides lagged indicators of many problems in financial institutions.

Bohachova (2008) has done a cross- country empirical assessment on macroeconomic factors by providing an overview of relationship between macroeconomic variables and individual bank's risk in an international perspective. He used the capital adequacy ratio as a proxy for the risk of banks. A linear mixed effects model for a large international panel of banks for the years 2001- 2005 has been estimated. He found that in OECD countries, banks hold higher capital ratios during economic booms whereas in non- OECD countries, capital ratios rise during economic recessions. Thereby he found the pro-cyclical behaviors of banks. Banks face more risks in favorable economic conditions and also subsequent recession will result to materialize the risks as a result of asset quality decline.

Atunbas et al (2009) have performed a research in order to analyze the relationship between capital, risk and efficiency of European banks between the period of 1992 and 2000. Unrelated regression approach has been used by allowing simultaneity between banks' risk, capital and efficiency while also controlling for important other bank and country- specific factors. Empirical evidence has found positive relationship between level of capital and risk of the banks. And also the study found that financial strength of the corporate sector has a positive impact on reducing the bank risk.

Several researchers have performed studies in order to investigate the impact of of bank specific factors on banks' risk management efficiency. Awojobi et al (2011), performed a study on Nigerian banking industry, focusing on factors affecting risk management efficiency in banks. For empirical investigation they employed panel regression analysis taking a stratum of time- series data and cross sectional variant of macro and bank specific factors for

period covering 2003 to 2009. Result of the study has shown risk management efficiency in Nigerian banks is affected by both bank specific factors and macroeconomic variables.

Hemachandra (2011), explains that there are few reasons for financial crises which occurred in different countries, in the recent history. Mainly he pointed out that weaknesses in supervisory activities, either due to insufficient legal framework or weaknesses in supervision, may not detect the problems of financial institutions early, thereby leading to financial crisis. He further pointed out those macroeconomic circumstances such as high interest rates, shift of exchange rate regimes, prolong deficits in the current accounts and unnecessary slowdowns or sharp increases in inflation are some of the macroeconomic reasons to trigger a financial crisis. Sri Lanka too has some painful experiences of failures in the financial sector. Starting in 1988-1990, according to CBSL, 13 registered finance companies failed where 11 of them were liquidated eventually.

Al-Tamimi and Obeidat (2013) conducted a study using 15 commercial banks listed in the Amman Stock Exchange, Jordan. The period in concern was from 2000-2008. These authors intended to find out the most important factors that determine the Capital Adequacy of the selected banks. Multiple Linear Regression Analysis and the Pearson Correlation Coefficient was used as the statistical tools to test the statistically significant relationship between the dependent variable (CAR) and independent variables which are a mix of macro level and bank specific factors, viz. interest rate risk, liquidity risk, credit risk, capital risk, revenues power, return on equity (ROE) and return on assets (ROA). The authors concluded that there exists a statistically significant relationship between capital adequacy and Liquidity Risks, Interest rate risks, ROE and ROA. Further they mentioned that the significant relationship between capital adequacy, liquidity risk and ROA is positively correlated whereas the relationship between capital adequacy, ROE and interest rate risk is negatively correlated.

The authors were unable to find similar research done in the local context. Hence this motivated the authors to conduct the current study on LCBs banks, operating in Sri Lanka, for the period from 2008 to 2014, to investigate the bank specific factors influencing the capital adequacy ratio as a proxy for risk management efficiency of individual banks. Further as macro level factors are beyond the immediate control of the individual banks, the authors are considering only bank specific variables which can influence the capital adequacy ratio, with the intention of improving risk management efficiency measures in banking sector in Sri Lanka.

2.2 Calculation of CAR

Schedule I guidelines of Central Bank of Sri Lanka, on "computation of capital adequacy ratio (revised framework-Basel II)", specifies the calculation of CAR as follows:

Capital Adequacy Ratio   = $\dfrac{\text{Capital Base (Tier I+ Tier II)}}{\text{Total Risk Weighted Assets}}$

Constituents of Capital Base
Capital base consist of eligible core capital (Tier I), eligible supplementary capital (Tier II), and eligible short term subordinated debt covering market risk (Tier III).

Table 1 - Capital Base of Banks

Tier I capital	Tier II capital	Tier III capital
Paid up ordinary shares	Revaluation reserves	Use for the sole purpose of meeting a proportion of the capital requirements for market risk.
Non- cumulative non-redeemable preference shares	General provisions	
Statutory reserve funds	Hybrid capital instruments	
Retained profit/ accumulates losses	Minority interest arising from preference shares	
General and other reserves	Approved subordinated term debt	
Unpublished current year profit or loss		

(Source: CBSL)

Total Risk Weighted Assets (RWA)

The calculation of total risk weighted assets consists of risk weighted operational risk, market risk and credit risk. According to the Basel accordance, identification of capital for market risk follows the standardized approach. In general market risk identifies based on three perspectives such as correlated part of the interest rate, correlated part of the securities and the related part of the foreign exchange profits.

Operational risk is defined as the risk which resulting from the losses of inadequate internal processes, systems or from external events. According to this definition operational risk include the legal risk excluding strategic risk. (CBSL, 2009)

According to the Basel II accord, the calculation of operational risk is based on the basic indicator approach using the average of positive gross income over three year periods and 15% of them were recognized as the capital which held for the operational risk.

Credit risk is one of the highly emphasized risk categories of the Basel accordance. Calculation of credit risk has continuously improved by the Basel accordance. Credit risk is most simply defined as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between credit risk and other risks. The effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long-term success of any banking organization.

As per the requirements by CBSL the minimum ratio for Tier I ratio is 5% and Tier II is 10%.
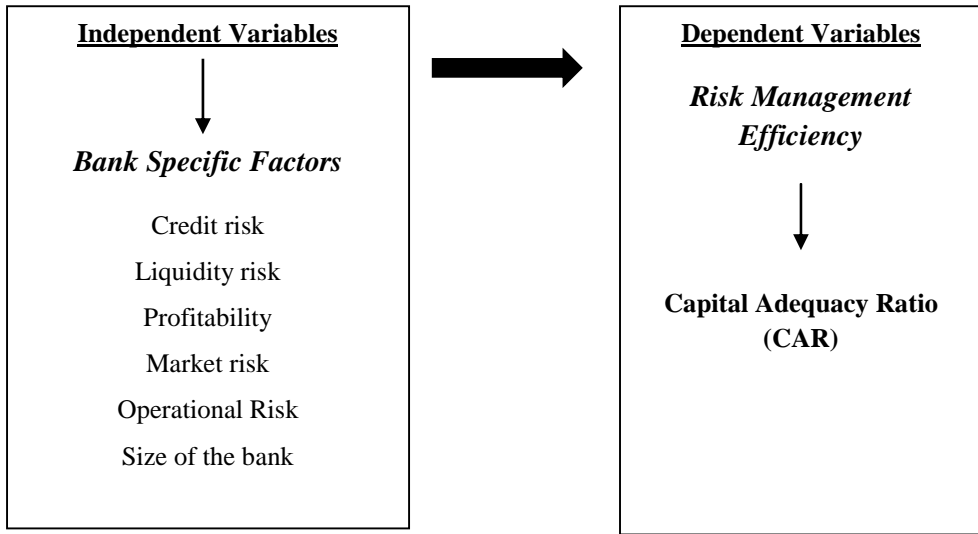
3. METHODOLOGY

3.1 Conceptual framework

Independent Variables	Dependent Variables
↓	*Risk Management Efficiency*
Bank Specific Factors	↓
Credit risk	**Capital Adequacy Ratio (CAR)**
Liquidity risk	
Profitability	
Market risk	
Operational Risk	
Size of the bank	

Figure 1 – Conceptual Framework

3.2 Research Hypotheses

This study tests the following null hypotheses:

H_{01}: No statistically significant impact of credit risk on banks risk management
H_{02}: No statistically significant impact of liquidity risk and banks risk management
H_{03}: No statistically significant impact of profitability and banks risk management
H_{04}: No statistically significant impact of bank size and banks risk management
H_{05}: No statistically significant impact of operational risk and banks risk management
H_{05}: No statistically significant impact of market risk and banks risk management

3.3 Research Design

This study intends to test the above mentioned hypotheses which are developed based on previous literature. Which indicates that the study is based on deductive approach in determining the impact and its direction between the bank specific factors and the capital adequacy of banks? Further the study adopts a quantitative approach. The methods used to analyze the data are discussed in section 4.3 Data Analysis.

3.1.1 Time Frame, Data and sample selection

The research in hand uses panel data for a time period of 7 years from 2008 to 2014. As at 30 June 2014, according to CBSL the banking sector comprised of 25 LCBs and 9 LSBs. To meet the uniformity of data it has confined into LCBs and due to non-availability of data for the time period in concern, authors had to opt out few banks. Thus, 11 LCBs have taken as the sample for this research paper.

3.1.2 Operationalization

In the context of this study, CAR denotes the risk management efficiency. Also out of the types of risks mentioned above, Sri Lankan banks adopt Basel II principles to mainly manage credit, market and operational risks.

Table 2 – Summery of variables, indicators and measurements

Construct	Variable	Indicator	Measurement
Bank Specific Factors	Credit risk (CR)	Independent Variables	Bank's exposure to the counterparty risk that can be obtained from the equation; (NPL ratio of banks) = **Loans / Total Assets**
	Liquidity risk (LQR)		Banks inability to meet their obligation and thereby forcing them to sell part of fixed assets at value less than their market value = **Liquid assets / Liquid liabilities**
	Return on assets (ROA)		Return on bank's total assets to reflect the profitability of banks = **Net income / Total assets**
	Size of the bank (BS)		This stands for the natural logarithm of the bank's total assets. = **Natural Logarithm of Total Assets of each bank**
	Operational efficiency (OE)		Operational efficiency as a measure of management quality. = **Operating income / Operating Expenses**
	Market risk (ISR)		Interest sensitivity ratio to reflect the market risk. = **Natural Logarithm of risk weighted assets for market risk**
Risk Management Efficiency	Capital Adequacy Ratio (CAR)	Dependent Variable	$\dfrac{\text{Capital Base (Tier I+ Tier II)}}{\text{Total Risk Weighted Assets}}$

3.2 Model Specification

As discussed in the above sections, risk management efficiency of commercial banks affected by several bank specific factors. The functional form of this relationship is specified as follows;

$CAR_{it} = f(CR_{it}, LQR_{it}, ISR_{it}, ROA_{it}, BS_{it}, OE_{it})$

The above model can be econometrically specified as follows;

$CAR_{it} = \alpha + \beta_1*CR_{it} + \beta_2*LQR_{it} + \beta_3*RSA_{it} + \beta_4*ROA_{it} + \beta_5*BS_{it} + \beta_6*OE_{it} + \pi_{it}$…**...** (1) Where,

'i' stands for individual banking institute, 't' stands for time period and 'π_{it}' is the disturbance term, α is the intercept and β is the parameters of estimating banks specific variables.

4. DATA ANALYSIS AND DISCUSSION

4.1 Regression Analysis

Panel data can be analyzed in two methods: fixed and random effects. The fixed effects model has constant slopes overtime but different intercepts, according to the cross-sectional unit and it is constant for each unit overtime. Although there are no significant temporal effects, there are significant differences between firms in this type of model. While the intercept in random effects model is random where the random outcome is a function of a mean value plus a random error (Manez, Rochina, & Sanchis, 2004).

Hausman's Test at five (5) percent confidence level is usually used to select either fixed or random effects for the analysis of panel regression .The random effect is used if the probability value (P) for chi-sq. is greater than 0.05, otherwise the fixed effect becomes the ideal model for the empirical analysis. As per the results of the Hausman's test statistics given in table 5 bellow, we would be concentrating our analysis on estimates provided by the fixed effect model. Hausman's Test result for the sample data represent in following table 5.

Table 3 - Hausman's Test

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		33.325213	6	0.0000
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CR	-0.163445	-0.079083	0.001745	0.0435
LR	0.181055	0.017638	0.001591	0.0000
ROA	0.510138	0.283752	0.011354	0.0336
RSA	0.132370	-0.469754	0.198087	0.1761
OE	0.173483	0.211245	0.001249	0.2853
BS	0.998401	0.864264	0.197421	0.7627

Table 6 represents the results of panel regression analysis of fixed effect model estimates. Based on the Hausman's test we ensured that right model is selected so that our analysis is based on the best estimate of the parameters.

The value of R square (R^2) indicates that 67.15% variability in CAR can be explained by CR, LR, ROA, RSA, BS and OE. The Durbin Watson is less than the rule of thumb 2 and that there is no serial correlation because of Durbin Watson value is 1.82. F-test value is 7.4131

and P value is less than 5%. These results indicates that the overall regression model was very well fit.

Table-4 – Estimates of Parameters for Panel Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.103729	12.31668	0.576757	0.5663
CR	-0.163445	0.064018	-2.553133	0.0133
LR	0.181055	0.050615	3.577077	0.0007
ROA	0.510138	0.202446	2.519875	0.0145
RSA	0.132370	0.490228	0.270017	0.7881
OE	0.173483	0.064159	2.703947	0.0090
BS	0.998401	0.478556	2.086279	0.0414
R-squared	0.671592			
Adjusted R-squared	0.580997			
F-statistic	7.413107			
Prob. F-statistic	0.000000			
Durbin-Watson stat	1.824657			

Results given in table 4 shows a negative impact of credit risk on capital adequacy position of Sri Lankan banks. The standardized t-statistic shows that parameter statistic is statistically significant at 0.01 level. This finding is also consistent with the several previous studies; such as Al-Tamimi and Obeidat (2013).

In case of banking institutions it is very much important to ensure that their current assets are well matched with the current liabilities. A bank with low liquidity is prone to having untimed operational misadventure whereby it cannot fulfill its short term obligation to customers Awojobi, Amel and Norouzi (2011). In the event where a bank face a liquidity problems the bank has to liquidate part of its assets or take from its capital. This indicates that law liquidity will affect capital ratio negatively and therefore have positive impact on capital adequacy ratio. Empirical findings of this study show a positive relationship between capital adequacy ratio and liquidity position of Sri Lankan banks. Liquidity risk parameter is statistically significant at 1% level.

ROA is the variable which reflects the profitability of banking sector. Saunders and Wilson (2001) concluded that the better performing banks with good return on assets and consistent management policies can be well capitalized for future operations. According to theory when returns are excessively high, managers decide to retain part of it as capital. Hence there is a positive relationship between profitability and capital position of a bank. In our study we found a significant positive relationship between Banks' CAR and ROA and it is significant at 5% level.

In this study log values of risk weighted assets were used as an indicator of market risk. The empirical results shows a positive relationship between market risk and capital position of banks. The *t* statistic of this parameter is statistically insignificant.

Concerning about the operational efficiency as a bank-specific indicator of risk management efficiency, empirical results shows a significant positive association. OE has been computed as operating income divided by operating expenses. If this ratio is increase, it indicate that management has better positioned for profit and impact of this for capital is positive.

Bank size as a bank specific determinants of risk management efficiency shows a significant positive impact on CAR. Which means banks which having larger assets base tends to have more capital and wise versa.

4.3.3 Robustness Test

In order to test the sufficiency of the estimated model we used the F- statistic and Durbin Watson statistic to test the autocorrelation and covariance analysis for multicollinearity. Table 6 shows the Durbin Watson results for autocorrelation is 1.82, which indicates that there is no autocorrelation in the model. F statistic used to measure the overall significance of the model. F statistic value of 7.41 and its probability value indicates that the overall model is significant at 1% level. The coefficient of determination used to determine the explanatory power of independent variables for the changes occurred in dependent variable. According to the statistical results R^2 value is 67.16% under the fixed effect model. This indicates that more than 60% of variation occurred in capital adequacy ratio is explained by changes of selected banks specific factors.

Table 05- Correlation Coefficient

	BS	CA	CR	LR	OE	ROA	RSA
BS	1.000000	0.441466	0.149736	-0.457390	0.136594	0.005929	0.036890
CA	0.441466	1.000000	-0.242702	-0.073428	0.392598	0.140848	-0.269053
CR	0.149736	-0.242702	1.000000	-0.377454	-0.193672	0.016487	0.315375
LR	-0.457390	-0.073428	-0.377454	1.000000	-0.213862	-0.140447	-0.332471
OE	0.136594	0.392598	-0.193672	-0.213862	1.000000	0.038847	0.015804
ROA	0.005929	0.140848	0.016487	-0.140447	0.038847	1.000000	-0.062497
RSA	0.036890	-0.269053	0.315375	-0.332471	0.015804	-0.062497	1.000000

In classical regression model there is an assumption that, when independent variables within the model are correlated, it weakened the efficiency of estimated parameters. Based on the correlation coefficient results represents in table 07, it is revealed that all correlation coefficient are below 80%, which indicates that there is no any multicollinearity among the regressor. So our model can be best estimate the regression line.

5. CONCLUSION AND RECOMMENDATION

The purpose of this study is to find the most important factors affecting risk management efficiency of commercial banks in Sri Lanka. The study examined the long run relationship between some of the financial ratios and capital adequacy ratio as the proxy for risk management efficiency. Panel regression methodology was employed to investigate the relationship between independent variables and dependent variable. Findings of the panel regression analysis show existence of positive relationship between liquidity risk, market risk, operational efficiency, bank size and ROA and CAR. The results also found a negative association between credit risk and CAR. Overall results were revealed that independent variables have relatively high influence on bank efficiency.

As per the finding of this study credit risk has negative impact on CAR of Sri Lankan banks. On average Sri Lankan banks have maintained adequate capital for exposures from credit

activities. Management quality, which has been measured as operational efficiency of the banks, indicates a positive impact on banks' risk management efficiency. There is a positive relationship between liquidity and CAR. This is because law liquidity of banks affect their capital ratio negatively, and therefore have positive impact with CAR. In this study ROA used to reflect the banks' profitability. Accordingly, banks which have high profits can be well capitalized for their future operations. As well as when banks have more returns managers tend to hold part of it as capital. So findings of the study also in line with the theoretical expectation. Further bank size has positive impact on CAR, which indicates that larger banks tends to have more capital and vice versa.

There is a higher importance of carried out further research on this area by incorporating some other variables as bank-specific determinants. Such as; leverage ratio, deposit ratio. This study only tested the impact of bank-specific factors on risk management efficiency of listed commercial banks in Sri Lanka, furthermore this study also can be extended by incorporating the macro-economic determinants of risk management efficiency. Such as; inflation, GDP growth rate etc.

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