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THE MODERATING EFFECT OF NON-PERFORMING LOANS ON THE RELATIONSHIPS BETWEEN MACROECONOMIC DRIVERS AND FTSE KLCI MOVEMENTS

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Abstract:

This study investigates the moderating effect of Non-Performing Loans (NPLs) on the relationship between Real Interest Rates (RIR), the Industrial Production Index (IPI), and movements of the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FTSE KLCI) from 2008 to 2023. Anchored in the Credit Risk Transmission Theory, it employs a quantitative panel data approach using the Fixed Effects Model to examine how credit risk influences the transmission of macroeconomic shocks to the capital market. The study is timely as Malaysia faces rising NPLs in the post-pandemic period, particularly in SMEs, construction, and retail sectors, raising concerns over banking stability. Volatility in real interest rates, driven by Bank Negara Malaysia's OPR hikes to combat inflation and support the ringgit, has disrupted investment behavior and increased market uncertainty. Meanwhile, the Industrial Production Index has weakened due to contractions in manufacturing and export-dependent sectors, reflecting global demand challenges. These macroeconomic pressures have contributed to the underperformance of the FTSE KLCI compared to regional peers, highlighting its sensitivity to both global and domestic imbalances. Findings reveal that NPLs significantly amplify the effects of RIR and IPI on FTSE KLCI movements, emphasizing the importance of financial sector health in emerging markets. The results contribute to the expanding literature on macro-financial linkages and offer practical implications for monetary authorities, banks, and investors. In line with the Sustainable Development Goals (SDGs) and Malaysia's Vision 2030, this study stresses the need for effective NPLs management and stronger macroprudential coordination to ensure capital market resilience and long-term economic stability.

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Credit Risk Transmission Theory, FTSE KLCI

Introduction

Malaysia's post-pandemic recovery has been marked by rising non-performing loans (NPLs), particularly among SMEs, construction, and retail sectors, raising concerns over banking sector stability (Bank Negara Malaysia, 2023). At the same time, monetary tightening such as the increase of the Overnight Policy Rate (OPR) to 3.00% has caused real interest rate (RIR) volatility, affecting investment decisions and stock market performance (BNM, 2023; Bloomberg, 2023).

Industrial activity has also weakened, with the Industrial Production Index (IPI) contracting due to declining output in manufacturing and electronics amid global demand uncertainty (Department of Statistics Malaysia, 2024). These factors have contributed to the FTSE KLCI's underperformance compared to regional markets, reflecting heightened sensitivity to macro-financial shocks (The Edge Markets, 2024).

While Vision 2030 and SDG goals call for financial resilience, limited macroprudential coordination remains a critical gap (UNDP Malaysia, 2024; EPU, 2023). These realities highlight the urgency of examining how NPLs moderate the effects of RIR and IPI on stock market dynamics in Malaysia. Table 1.0 below summarizes issues highlighted here.

Table 1.0 Key Macroeconomic and Financial Issues in Malaysia (2023–2024)

No.	Issues	Key Statistics	Sources
1.	Rising of Non-Performing Loans (NPLs)	i. Overall NPL ratio rose to 1.76% (Q4 2023) ii. SME loan NPL ratio: 3.1% iii. Business-related NPLs: 63% of total NPLs	Bank Negara Malaysia (2023), *Financial Stability Review*
2.	Volatility in Real Interest Rates (RIR)	i. OPR increased from 1.75% to 3.00% (2022–2023) ii. Inflation: 2.5–3.0% iii. Real interest rate swings: -0.5% to +0.7% iv. Loan growth slowed to 4.2% YoY	BNM Monetary Policy Statements (2023); Bloomberg (2023)
3.	Declining Industrial Output (IPI)	i. IPI contracted 2.3% YoY (Oct 2023) ii. Manufacturing dropped 4.6% iii. E&E and petroleum declined 5.8% and 4.1%, respectively	Department of Statistics Malaysia (DOSM), *IPI Report, Oct 2023*
4.	Weak FTSE KLCI Performance	i. FTSE KLCI fell -2.7% in 2023 ii. Net foreign outflows: RM2.9 billion iii. Underperformed SET (Thailand) and JCI (Indonesia)	The Edge Markets (2024); Bursa Malaysia (2023), *Year-End Review*

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5.	Need for Macro-Financial Policy Coordination	i. ii. iii.	SDG Finance Index score: 56.3 / 100 Identified gaps in macroprudential and credit risk policy Reforms highlighted in 12th Malaysia Plan MTR	EPU (2023); UNDP Malaysia (2024)

Note: E&E Refers to Malaysia's Electrical and Electronics Industry, Which Includes: Semiconductor Devices (Like Microchips), Consumer Electronics (TVs, Mobile Phones, Etc.), Electronic Components and Circuit Boards, Electrical Appliances (Air Conditioners, Washing Machines, Etc.); OPR is Overnight Policy Rate;
Source: Author's (2025)

The movements of Malaysia's stock market, particularly the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FTSE KLCI), has exhibited significant fluctuations in recent years. Between 2020 and 2024, the index experienced a series of contractions and recoveries, with annual returns ranging from –4.6% in 2022 to a positive rebound of +12.9% in 2024 (Awang, et. al, 2017). These movements reflect the increasing sensitivity of Malaysia's capital market to both domestic macroeconomic factors and external financial shocks. Among the many variables influencing stock market dynamics, real interest rates (RIR) and the Industrial Production Index (IPI) are widely recognized as critical macroeconomic drivers of investment behavior, risk pricing, and asset allocation in emerging economies like Malaysia (Sapuan, 2021; Naik & Padhi, 2012;).

Real interest rates, which account for inflation-adjusted borrowing costs, play a pivotal role in influencing investment flows, consumption patterns, and investor sentiment. Higher real interest rates tend to reduce borrowing and dampen equity market performance, while lower rates encourage investment and risk-taking behavior. Although studies on nominal interest rates and their impact on the Malaysian stock market are more common, research specifically focusing on RIR and FTSE KLCI movements remains limited. Sapuan (2021), in a study analysing data from 2001 to 2020, found that interest rate fluctuations significantly influenced market movements, underscoring the importance of real monetary policy dynamics in shaping stock performance.

The Industrial Production Index, on the other hand, serves as a proxy for real sector output and cyclical economic activity. In the Malaysian context, IPI captures the performance of key sectors such as manufacturing, mining, and electricity, which are strongly correlated with economic growth and investor expectations. Empirical research has consistently shown a positive relationship between industrial output and stock market returns, particularly in export-oriented economies like Malaysia (Naik & Padhi, 2012). While historical studies have demonstrated the significance of IPI in explaining variations in stock indices, there remains a research gap in exploring how this index contributes to stock market movements, especially during periods of economic disruption (Sapuan, 2021).

Beyond macroeconomic indicators, the health of the financial system particularly the quality of bank lending portfolios can significantly amplify or dampen the effect of economic shocks on stock markets. Non-performing loans (NPLs), as a measure of banking sector risk and credit quality, are crucial in this regard. Elevated NPL ratios weaken banks' ability to lend, undermine investor confidence, and increase financial sector vulnerability. Sivarajan et al. (2023) found that bank size and capital adequacy were inversely related to NPL levels in Malaysian commercial banks between 2010 and 2021, highlighting systemic exposure to loan defaults.

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Similarly, a study by Mohd Azmi, Syed Mohamad, and Ismail (2024) revealed that macroeconomic conditions such as inflation and unemployment significantly affect NPLs, with differing effects across Islamic and conventional banks.

Despite these findings, little research has examined the moderating effect of NPLs on the relationship between macroeconomic variables and stock market movements in Malaysia. This represents a critical gap, as deteriorating credit quality could exacerbate the transmission of macro shocks such as changes in RIR or IPI into financial market instability. High NPL levels may constrain liquidity in the banking system, reduce firms' access to financing, and increase perceived market risk, thus influencing the movements of the FTSE KLCI more acutely during periods of economic stress (Mohd Azmi et al., 2024; Sivarajan et al., 2023).

Briefly, while real interest rates and industrial production are well-established determinants of macroeconomic stability and market performance, their combined effect on stock market movements in Malaysia remains underexplored. Furthermore, the role of non-performing loans as a moderating variable in this relationship has yet to be rigorously investigated. This study aims to bridge this gap by analysing the impact of RIR and IPI on the movements of the FTSE KLCI, with NPLs as a moderating factor. The findings will provide a more comprehensive understanding of how macroeconomic fundamentals and financial sector vulnerabilities interact to shape equity market dynamics in an emerging market context.

Literature Review

FTSE KLCI Movements under Credit Risk and Macroeconomic Shocks

Stock market performance, especially in emerging markets like Malaysia, is inherently influenced by macroeconomic fundamentals and financial sector conditions. A robust theoretical framework that underpins this relationship is the Credit Risk Transmission Theory, which posits that systemic credit risk can transmit through the financial system into broader macroeconomic instability and asset price movements (Allen & Carletti, 2013). When non-performing loans (NPLs) rise, they reduce the credit supply, weaken bank balance sheets, and intensify the effect of economic shocks on financial markets. This theory forms a critical foundation for understanding how credit market deterioration can amplify the transmission of real interest rate and production shocks to stock market movements.

Empirical studies have long confirmed the impact of macroeconomic variables on stock market behavior. Real interest rates (RIR), which represent the cost of capital in real terms, are a significant determinant of stock price movement. Higher RIR typically leads to reduced corporate earnings projections, lower consumer spending, and decreased market valuation, leading to greater movements (Mishkin, 2020). In the Malaysian context, Sapuan (2021) found that fluctuations in interest rates had a measurable effect on the movements of the FTSE KLCI, underscoring the transmission of monetary policy shocks into market behavior. However, the extent of this transmission may vary depending on the stability of the credit market.

Similarly, the Industrial Production Index (IPI), which reflects the output of key sectors like manufacturing and utilities, is a widely used indicator of economic performance. Strong industrial output often correlates with investor optimism and market gains, while declining IPI signals economic downturns and may increase market risk perception (Naik & Padhi, 2012). IPI, as a proxy for cyclical economic performance, has been shown to influence both stock market returns and movements. However, during periods of financial stress particularly when

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NPLs are high, the positive signalling effect of strong IPI may be muted due to impaired credit flows and weakened investor confidence.

Framing FTSE KLCI Movements through Credit Risk Transmission (CRT) Theory

The Credit Risk Transmission Theory serves as a foundational framework in explaining how disturbances in the banking sector, particularly in the form of non-performing loans (NPLs), can ripple through the broader financial system and affect capital markets, including stock indices such as the FTSE Bursa Malaysia KLCI (FTSE KLCI). This theory posits that elevated credit risk typically reflected by a rise in NPLs reduces banks' capacity to lend, increases risk premiums, and creates liquidity constraints that ultimately suppress investment, corporate performance, and investor confidence (Bernanke et al., 1999; Kashyap et al., 1993).

In emerging markets like Malaysia, the FTSE KLCI, which tracks the performance of the top 30 listed companies, is particularly sensitive to macro-financial shocks. When banks face rising NPLs, the negative transmission of credit risk can lead to reduced access to financing for listed firms, lower profitability projections, and higher perceived systemic risk thereby triggering stock price volatility or downward movements (Klein, 2013; Nkusu, 2011). These dynamic highlights a credit-to-equity transmission channel, whereby banking instability exacerbates stock market uncertainty.

Empirical studies support this theory by documenting a strong linkage between banking sector fragility and stock market behavior. For instance, Espinoza and Prasad (2010) found that worsening credit quality negatively affects economic growth and investor sentiment. In the Malaysian context, Ibrahim (2009) and Kamarudin et al. (2017) report that NPLs act as a drag on market liquidity and dampen the FTSE KLCI's responsiveness to macroeconomic signals like industrial production or real interest rates.

Moreover, during periods of financial stress, such as the 2008 global financial crisis or the COVID-19 pandemic, the impact of NPLs on stock indices becomes even more pronounced due to tighter credit conditions and declining business confidence. These observations reinforce the relevance of Credit Risk Transmission Theory in studying the moderating role of NPLs on the relationship between key macroeconomic indicators and FTSE KLCI movements.

Thus, by applying this theory, the current study examines how non-performing loans moderate the transmission of macroeconomic signals namely real interest rates and industrial production into the FTSE KLCI, revealing how credit instability can distort stock market performance in a bank-dominant financial system.

The role of non-performing loans (NPLs) is central to the Credit Risk Transmission Theory. High NPL levels impair banks' ability to extend new credit, reduce liquidity, and erode investor confidence in the financial system. Sivarajan et al. (2023) demonstrated that in Malaysia, higher NPL ratios were associated with weaker banking performance, particularly in institutions with lower capital adequacy. Mohd Azmi, Syed Mohamad, and Ismail (2024) further established that macroeconomic variables such as inflation and unemployment significantly influence NPL trends, with varying effects across Islamic and conventional banks. When banks are constrained by high NPLs, they are less responsive to monetary easing or industrial recovery, which may intensify the market's movements response to macroeconomic news.

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Despite this body of literature, little studies have empirically explored the moderating role of NPLs in the relationship between macroeconomic variables and stock market movements, particularly in Malaysia. Most prior work has examined either the direct effects of macroeconomic indicators on stock prices or the determinants of NPLs within the banking sector. By integrating the Credit Risk Transmission Theory into this macro-financial framework, this study addresses a critical gap. It proposes that NPLs do not merely reflect banking sector weaknesses, but actively influence how real sector and policy variables like RIR and IPI transmit into stock market movements.

This perspective is increasingly relevant in the wake of economic disruptions such as the COVID-19 pandemic and global monetary tightening, which exposed the fragility of credit systems and their spillover effects on financial markets. Therefore, examining NPLs as a moderating variable provides a deeper understanding of the credit-financial market nexus, particularly in a transitioning economy like Malaysia.

In view of these observations, this study sets out to achieve the following research objectives:

i. To examine the moderating effect of Non-Performing Loans (NPLs) on the relationship between real interest rates and the movements of the FTSE Composite Index.
ii. To investigate the moderating effect of Non-Performing Loans (NPLs) on the relationship between the industrial production index and the movements of the FTSE Composite Index.

To address these objectives, the following research questions have been formulated:

i. Does the level of Non-Performing Loans significantly moderate the relationship between real interest rates and the movements of the FTSE Composite Index?
ii. Does the level of Non-Performing Loans significantly moderate the relationship between the industrial production index and the movements of the FTSE Composite Index?

Methodology

Research Design

This study adopts a quantitative, explanatory research design grounded in the positivist paradigm and guided by a deductive approach, which is appropriate for testing established economic theories and examining causal relationships. Specifically, the research employs panel data regression analysis to investigate the effects of Real Interest Rate (RIR) and Industrial Production Index (IPI) on the movements of the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FTSE KLCI), with Non-Performing Loans (NPLs) serving as a moderating variable. This methodological approach aligns with previous empirical studies in financial economics that utilize panel data to capture both individual (yearly) and aggregate effects across time, particularly within emerging market contexts such as Malaysia (Baltagi, 2021; Gujarati & Porter, 2020).

The use of panel data is especially suitable for analysing dynamic macro-financial interrelations and enhances the robustness of causal inferences. Furthermore, the quantitative framework allows for the identification of statistically significant patterns and associations between macroeconomic indicators and stock market performance (Creswell & Creswell, 2018).

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Data Collection Technique

This study employs a secondary data collection technique, which involves gathering data that has already been compiled and published by reputable institutions. Monthly time-series data were collected and structured into a panel format, covering macroeconomic indicators such as the Real Interest Rate (RIR), Industrial Production Index (IPI), Non-Performing Loan ratios (NPLs), and the FTSE Bursa Malaysia KLCI (FTSE KLCI). Data were sourced from authoritative and reliable agencies, including Bank Negara Malaysia, the Department of Statistics Malaysia (DOSM), and Bursa Malaysia.

This technique is widely adopted in empirical macro-financial research, as it enables researchers to explore economic relationships using high-frequency, policy-relevant, and systematically recorded datasets. Relying on official data sources ensures accuracy, transparency, and replicability, aligning with best practices in econometric studies (Sapuan, 2021; Klein, 2013; Nkusu, 2011). The structured panel format enhances the robustness of the analysis by allowing for both cross-sectional and time-series dimensions, which is critical in understanding dynamic interactions in financial markets (Baltagi, 2008).

In particular, the use of secondary macroeconomic and financial data has proven effective for assessing the impact of real-sector indicators and financial stability variables such as NPLs on stock market performance in emerging economies (Espinoza & Prasad, 2010; Ibrahim, 2009). This approach supports the empirical testing of relationships aligned with macroeconomic theory and financial transmission mechanisms, such as the Credit Risk Transmission Theory.

Method of Analysis

All variables were collected on a monthly basis and structured into a panel dataset to facilitate the application of econometric techniques, including the Fixed Effects Model (FEM), which is widely employed to control for unobserved heterogeneity in panel data analysis (Hsiao, 2014; Baltagi, 2008). Data cleaning and transformation were conducted using Microsoft Excel and STATA software to address missing values and inconsistencies, in line with best practices recommended by Wooldridge (2010) and Gujarati and Porter (2009). Only complete and consistent observations were retained to ensure the robustness and validity of the final analysis, as recommended in empirical econometric studies dealing with macroeconomic-financial linkages (Tang & Lean, 2017; Ibrahim & Baharom, 2012). This rigorous preprocessing ensures data reliability and enhances the credibility of the regression outcomes.

To enhance reliability, transparency, and replicability, the study relies exclusively on official national and international data sources. This data collection approach aligns with current empirical practices in macro-finance literature, which emphasize the use of high-quality time-series data for examining financial market dynamics in emerging economies.

Figure 1.0 Flowchart of Method Process

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The first step involves data collection, where all variables were gathered on a monthly basis to ensure a consistent time series for analysis. The study focused on key macroeconomic indicators and the stock market index, specifically the FTSE KLCI. To ensure credibility and reliability, data were sourced exclusively from official national and international databases, including Bank Negara Malaysia, the Department of Statistics Malaysia, and Bursa Malaysia.

Following data collection, the next step was data structuring. The data were organized into a panel dataset format, allowing for the simultaneous analysis of time-series and cross-sectional dimensions. This structure enabled the application of panel econometric techniques and facilitated the exploration of dynamic relationships across variables over time.

The third step involved data cleaning and transformation using Microsoft Excel and STATA software. This process addressed missing values, resolved data inconsistencies, and ensured that only complete and consistent observations were retained. These actions were crucial in preparing the dataset for robust and valid statistical analysis.

The fourth stage is econometric modelling, where the Fixed Effects Model (FEM) was employed as the primary analytical technique. This model was used to examine the relationships between macroeconomic variables, Non-Performing Loans (NPLs), and FTSE KLCI movements, allowing the study to capture variations within entities over time while controlling for unobserved heterogeneity.

Finally, to ensure research quality, the study emphasized reliability, transparency, and replicability. Reliability was ensured through the use of validated and official data sources. Transparency was maintained through a clearly defined methodology and consistent data handling procedures. The approach also aligned with current empirical standards in macro-finance, supporting the replicability and integrity of the study's findings.

Variables

Data for this study are collected on a monthly basis for the period between January 2008 and December 2023, which captures both pre- and post-global financial crises and the COVID-19 pandemic shock. This time span and frequency ensure a robust dataset capable of capturing both short-term fluctuations and long-term trends in the stock market (Baltagi, 2021; Brooks, 2019).

The key variables in this study are defined as follows: the dependent variable is FTSE KLCI movements, derived from monthly index. The independent variables include Real Interest Rates (RIR), calculated as the nominal interest rate minus the inflation rate, and the Industrial Production Index (IPI), a proxy for economic activity. The moderating variable is the Non-Performing Loan ratio (NPLR), representing banking sector risk. All variables are transformed into natural logarithmic form where appropriate to ensure normality and stationarity of the data.

Model Specification

This study employs the Fixed Effect Model (FEM) to analyze how Non-Performing Loans (NPLs) moderate the effects of macroeconomic variables: Real Interest Rate (RIR) and Industrial Production Index (IPI) on the movements of the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FTSE KLCI). The FEM is appropriate in this context as it controls for unobserved heterogeneity across time and eliminates time-invariant characteristics that

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could bias the results, such as institutional settings or policy regimes (Baltagi, 2021; Wooldridge, 2016).

Given the dynamic and entity-specific nature of Malaysia's financial and industrial landscape, FEM offers a robust framework for understanding how macroeconomic variables influence market movements when conditioned by financial sector fragility, particularly the level of NPLs. The model specification excludes direct effects and concentrates solely on interaction terms, in line with the objective of assessing credit risk transmission through the financial system.

The empirical model is specified as:

$$\text{FTSE KLCI}_{it} = \beta_0 + \beta_1 \text{NPLs}_{it} + \beta_2 (\text{RIR x NPLs})_{it} + \beta_3 (\text{IPI x NPLs})_{it} + \varepsilon_{it}$$

Where:

FTSE KLCI_{it} represents stock market movements for entity i at time t,
RIR_{it} is the Real Interest Rate,
IPI_{it} is the Industrial Production Index,
NPLs_{it} is the Non-Performing Loans,
β_0 is the Fixed (entity-specific) Effect, and
ε_{it} is the Error Term.

This specification captures how financial distress, as proxied by NPLs, amplifies or dampens the influence of monetary policy (RIR) and industrial activity (IPI) on stock market movements. This approach is grounded in credit risk transmission theory, which posits that elevated NPL levels weaken credit channels and exacerbate the sensitivity of capital markets to macroeconomic disturbances (Aldasoro et al., 2022; Acharya & Steffen, 2020).

Diagnostic checks including robust standard errors, multicollinearity tests, and panel unit root tests will be employed to ensure the validity of the results. The model supports an in-depth understanding of how systemic credit risks interact with economic variables to influence investor sentiment and equity market dynamics in Malaysia.

This model structure allows testing for both the direct effects of RIR and IPI on stock market movements and the interaction terms to capture the moderating effect of NPLs, in line with the Credit Risk Transmission Theory. This theory suggests that when banking sector risks (e.g., high NPLs) are elevated, they can amplify the impact of macroeconomic shocks on financial markets by constraining credit supply and increasing investor risk aversion (Aldasoro et al., 2022; Acharya & Steffen, 2020).

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Analysis of Findings

Findings

Table 1.0 Summary of the Fixed Effect (Model) for Hypotheses Testing

Variables Effect	Coef.	t-stat
Constant	-138.9467	12.57
MVNPLs	737.7052	1.00
MVNPLs*IV4RIR	5199.596 ***	2.94
MVNPLs*IV5IPI	547.5335 ***	5.64
Number of Observations = 192		
$R^2 = 0.8382$		
Prob > F = 0.0000		
Prob > chi^2 = 0.0000		

Note: n = 192 DVFTSE KLCI=Dependent Variable of KL Composite Index. MVNNPLs=Moderating Variable of Non-Performing Loans, MVNPLs*IV4RIR=Interaction between Moderating Variable NPLs and Independent Variable 4 of RIR, MVNPLs*IV5IPI=Interaction between Moderating Variable NPLs and Independent Variable 5 of IPI. ***, **, * indicates significant at 1%, 5% and 10% respectively.

Model and results:

$$\text{FTSE KLCI}_{it} = \underset{}{-138.9467} + \underset{}{737.7052}(\text{NPLs}_{it}) + \underset{(0.003\ ***)}{5199.596}(\text{RIR x NPLs})_{it} + \underset{(0.000\ ***)}{547.5335}(\text{IPI x NPLs})_{it} + \varepsilon_{it}$$

The FEM results presented in Table 1.0 reveal significant insights into how Non-Performing Loans (NPLs) moderate the influence of macroeconomic variables on stock market movements in Malaysia. The model demonstrates a high explanatory power with an R^2 value of 0.8382, indicating that approximately 83.82% of the variation in the FTSE KLCI movements is accounted for by the interaction terms in the model. The overall model is statistically significant, as indicated by the Prob > F = 0.0000.

The interaction between Real Interest Rate (RIR) and NPLs (MVNPLs*IV4RIR) is positive and statistically significant at the 1% level (coefficient = 5199.596, t = 2.94). This suggests that when NPL levels are high, the effect of changes in real interest rates on stock market movements becomes more pronounced. In other words, an increase in RIR, in the presence of elevated NPLs, intensifies market sensitivity and leads to greater fluctuations in the FTSE KLCI. This supports the notion that credit risk exacerbates monetary transmission effects, making capital markets more vulnerable to interest rate shocks an observation consistent with Aldasoro et al. (2022) and Acharya and Steffen (2020) who argue that financial fragility amplifies risk transmission mechanisms in emerging economies.

Similarly, the interaction between the Industrial Production Index (IPI) and NPLs (MVNPLs*IV5IPI) also shows a positive and highly significant coefficient (547.5335, t = 5.64, significant at 1%). This finding implies that the relationship between industrial activity and stock market movements is significantly intensified under high NPL conditions. When industrial output increases, the positive impact on stock market performance is amplified in the context of elevated NPL levels. This can be interpreted as a market reaction to improved real sector performance, which is perceived as a buffer against rising credit risks. It aligns with the

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view that in times of financial distress, investors place heightened importance on industrial indicators as signals of economic resilience.

Interestingly, while the main effect of NPLs (MVNPLs) is positive but statistically insignificant (coefficient = 737.7052, t = 1.00), this is consistent with the study's aim of focusing on moderation effects rather than direct impacts. It reinforces the analytical strategy of modelling NPLs as a conditioning factor, rather than as a standalone determinant of stock market behavior.

The constant term (-138.9467, t = 12.57), although large and negative, primarily captures the fixed effects inherent to the data structure and does not detract from the substantive interpretation of the interaction terms.

Table 2.0 Research Outcomes Aligned with ROs and RQs

Research Objectives	Research Questions	Coefficients	P-values	Outcomes
RO1: To examine the moderating effect of Non-Performing Loans (NPLs) on the relationship between real interest rates and the movements of the FTSE Composite Index.	RQ1: Does the level of Non-Performing Loans significantly moderate the relationship between real interest rates and the movements of the FTSE Composite Index?	5199.596	0.000	The study successfully fulfils RO1 and provides a conclusive answer to RQ1
RO2: To investigate the moderating effect of Non-Performing Loans (NPLs) on the relationship between the industrial production index and the movements of the FTSE Composite Index.	RQ2: Does the level of Non-Performing Loans significantly moderate the relationship between the industrial production index and the movements of the FTSE Composite Index?	547.5335	0.000	The study successfully fulfils RO2 and provides a conclusive answer to RQ2

Based on the statistical analysis, where p-values were found to be below 0.05, the study confirms that the research objectives were achieved and the research questions adequately addressed. Collectively, these findings strongly support the conclusion that Non-Performing Loans significantly moderate the relationship between macroeconomic fundamentals and stock market movements in Malaysia.

High NPL levels intensify the impact of both real interest rates and industrial output on FTSE KLCI movements, suggesting that financial sector health plays a critical role in the transmission of macroeconomic shocks to equity markets.

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This evidence contributes to the literature on financial stability and macro-financial linkages, particularly in emerging market contexts, by highlighting the amplifying role of credit risk in stock market dynamics.

Discussion

The findings provide compelling evidence that Non-Performing Loans (NPLs) significantly moderate the relationship between macroeconomic variables specifically the Real Interest Rate (RIR) and the Industrial Production Index (IPI) and the performance of the FTSE KLCI. These outcomes strongly support the Credit Risk Transmission Theory (CRT), which posits that the effectiveness of monetary policy and real-sector dynamics is heavily influenced by the condition of the banking system.

In addressing Research Objective 1 (RO1) and Research Question 1 (RQ1), the results show a positive and significant interaction effect between RIR and NPLs (coefficient = 5199.596, $p < 0.001$). This indicates that during periods of elevated credit risk, changes in interest rates exert greater volatility on stock market returns. This observation aligns with the interest rate channel of Credit Transmission Theory, which explains how monetary policy actions such as changes in real interest rates are transmitted through bank lending behavior. When banks are burdened with a high volume of non-performing assets, their capacity and willingness to lend diminishes. Consequently, interest rate fluctuations under these conditions amplify risk perceptions, restrict capital availability, and increase volatility in stock market performance (Drehmann & Juselius, 2014; Bernanke, Gertler, & Gilchrist, 1999).

Regarding Research Objective 2 (RO2) and Research Question 2 (RQ2), the findings reveal a significant moderating effect of NPLs on the relationship between IPI and the FTSE KLCI (coefficient = 547.5335, $p < 0.001$). This supports the notion that real-sector performance is filtered through the stability of the banking system, consistent with the balance sheet channel of the Credit Risk Transmission Theory. While rising industrial production typically signals economic growth and enhances investor sentiment, this effect is weakened when banks face high levels of NPLs. Under such conditions, banks are less able to finance productive activity, and the usual positive relationship between industrial output and market performance is disrupted. This makes the stock market more vulnerable to industrial performance shocks during periods of financial fragility (Klein, 2013; Nkusu, 2011).

These dynamics reinforce the central claim of Credit Transmission Theory: that the transmission of both monetary and real economic signals into the financial system depends crucially on banking sector soundness. A stable credit system ensures that interest rate adjustments and real output signals are effectively transmitted to the market. Conversely, when NPLs rise, the credit transmission channel becomes impaired, magnifying market volatility and undermining the predictive power of traditional macroeconomic indicators (Beck, Jakubik, & Piloiu, 2015; Louzis, Vouldis, & Metaxas, 2012).

In the Malaysian context characterized by a bank-based financial system the implications are critical. With high NPL ratios, the financial system becomes less responsive to monetary signals and more prone to volatility in reaction to industrial output or policy changes. These findings extend CRT by empirically confirming that NPLs not only weaken the credit transmission mechanism but also act as volatility accelerators in emerging stock markets.

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From a policy standpoint, the results highlight the urgency of enhancing NPLs resolution frameworks to restore effective credit transmission. Regulatory measures such as risk-based capital buffers, dynamic provisioning, and early warning systems would strengthen the resilience of banks, enhance monetary policy effectiveness, and reduce unnecessary stock market volatility (Balgova, Nies, & Plekhanov, 2016).

Conclusions and Recommendations

The findings of this study confirm that Non-Performing Loans (NPLs) significantly moderate the relationship between key macroeconomic variables namely, real interest rates (RIR) and industrial production index (IPI) and the movements of the FTSE Bursa Malaysia KLCI. The significant interaction effects indicate that when NPL levels are high, the influence of RIR and IPI on the stock market becomes more pronounced, underscoring the critical role of financial sector soundness in macro-financial dynamics.

This outcome is consistent with the Credit Risk Transmission Theory, which posits that the deterioration in credit quality amplifies the transmission of macroeconomic shocks to financial markets (Klein, 2013; Čihák & Schaeck, 2010). Specifically, higher NPL levels signal increased systemic risk, which can exacerbate investor reactions to changes in interest rates and production activity, thereby increasing stock market sensitivity. The evidence from this study thus highlights the importance of integrating credit risk considerations into market forecasting and policy formulation frameworks.

In line with Malaysia's Vision 2030 and the Sustainable Development Goals (SDGs), particularly SDG 8 and SDG 16, policymakers and financial institutions must strengthen the management of Non-Performing Loans (NPLs) to ensure long-term financial stability and inclusive economic growth. Effective NPL mitigation strategies such as improved credit evaluation processes, adaptive loan restructuring mechanisms, and early warning systems can enhance banking sector resilience. These measures support a stable investment climate, reduce systemic vulnerabilities, and ensure that financial resources are channelled into productive sectors, aligning with Malaysia's aspiration for a dynamic, high-income economy.

Given the finding that elevated NPL levels exacerbate the impact of real interest rates on stock market volatility, monetary policy coordination must be reinforced. As per SDG 16, promoting effective, accountable, and inclusive institutions is key. In this regard, Bank Negara Malaysia, in collaboration with other financial authorities, should implement an integrated policy framework that aligns interest rate decisions with banking sector conditions. Such synchronization supports Vision 2030's goal of fostering a more competitive and sustainable financial sector while ensuring that monetary interventions do not unintentionally destabilize capital markets.

From a macroprudential perspective, regulators should enhance systemic risk surveillance by incorporating credit quality indicators into financial stability assessments. By doing so, Malaysia can strengthen its early detection mechanisms and better mitigate contagion risks supporting SDG 9, which calls for building resilient infrastructure and fostering innovation in financial governance. Embedding NPL data into market risk evaluations will enable a forward-looking approach to regulatory interventions and protect the integrity of the capital market.

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Finally, in support of SDG 10 (Reducing Inequalities) and Vision 2030's commitment to inclusive participation in economic development, investors and capital market participants should integrate credit risk metrics, including NPL trends, into their decision-making processes. Transparency and regular reporting on banking sector health should be improved, allowing both institutional and retail investors particularly from underrepresented or vulnerable segments to make informed decisions. Enhancing financial literacy and investor risk awareness will democratize access to market opportunities and foster equitable economic empowerment.

Contributions of the Study

This study makes a significant academic contribution by empirically validating the moderating role of Non-Performing Loans (NPLs) in the relationship between key macroeconomic indicators namely, the Real Interest Rate (RIR) and the Industrial Production Index (IPI) and the movements of the FTSE Bursa Malaysia KLCI. The findings highlight that when NPL levels are high, the effects of RIR and IPI on the stock market become more pronounced. This reinforces the relevance of the Credit Risk Transmission Theory, which suggests that deteriorating credit quality intensifies the transmission of macroeconomic shocks into financial markets (Klein, 2013; Čihák & Schaeck, 2010). These results contribute to existing literature by integrating macroeconomic indicators and banking-sector fragility into one empirical model, offering fresh insights into how financial instability can amplify stock market volatility in emerging economies.

In terms of practical contributions, the study supports the integration of credit risk considerations into policy frameworks and market forecasting models. The confirmation of a strong interaction between high NPL levels and stock market sensitivity to macroeconomic changes suggests that financial sector soundness is vital for economic resilience. This is particularly relevant for Malaysian policymakers striving to meet Vision 2030 and the Sustainable Development Goals (SDGs), especially SDG 8 (Decent Work and Economic Growth) and SDG 16 (Peace, Justice and Strong Institutions). Strengthening NPL management through improved credit evaluation, adaptive restructuring, and early warning systems can enhance the banking sector's ability to absorb shocks and support sustainable economic growth.

Furthermore, the findings advocate for enhanced monetary policy coordination, especially in contexts where elevated NPLs can exacerbate the effects of interest rate changes on market volatility. As outlined in SDG 16, the development of accountable and integrated financial institutions is essential. In this context, Bank Negara Malaysia, in cooperation with relevant financial authorities, should align monetary decisions with prevailing credit conditions to avoid unintentionally destabilizing capital markets. This also aligns with Vision 2030's goal of promoting a competitive and resilient financial ecosystem.

From a macroprudential standpoint, the study recommends that credit quality indicators, particularly NPL trends, be embedded into systemic risk assessments. This recommendation supports SDG 9 (Industry, Innovation and Infrastructure) by enhancing infrastructure for financial risk governance. By institutionalizing NPLs-based metrics in early detection systems, regulators can strengthen financial surveillance and mitigate contagion risks, thereby enhancing the overall resilience of the Malaysian financial system.

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Lastly, the study highlights the importance of credit risk transparency and financial literacy to reduce economic inequalities in line with SDG 10 (Reduced Inequalities). Capital market participants, especially institutional and retail investors, should integrate NPL trends into their investment decisions. Regular reporting on banking sector health and improved public access to such information can foster inclusive financial participation. This will democratize market opportunities and empower a broader base of investors particularly those from vulnerable or underrepresented groups thus contributing to a more equitable and informed investment landscape, consistent with Malaysia's aspirations under Vision 2030.

Limitations of the Study

While this study provides meaningful insights into the moderating role of Non-Performing Loans (NPLs) on the relationship between macroeconomic fundamentals and stock market movements in Malaysia, several limitations must be acknowledged. First, the analysis is confined to the Malaysian context, using data from 2008 to 2023. As a result, the findings may not be generalizable to other emerging or developed markets, where institutional structures, regulatory frameworks, and investor behaviours differ significantly.

Second, although the study focuses on two key macroeconomic indicators real interest rates and the industrial production index it does not account for other potentially influential factors such as exchange rates, fiscal policy, or external shocks (e.g., global financial crises or geopolitical tensions). These omitted variables could interact with NPLs and further influence the movements of the FTSE KLCI, thereby introducing possible omitted variable bias.

Third, the use of the Fixed Effect Model, while suitable for controlling unobserved heterogeneity across time, assumes time-invariant characteristics and may not fully capture dynamic interactions or structural breaks over the studied period. Additionally, the accuracy of the findings is dependent on the quality and availability of secondary data from sources such as Bank Negara Malaysia and the Department of Statistics Malaysia. Any inconsistencies, delays, or revisions in these datasets could influence the reliability of the empirical results.

Lastly, the study adopts a quantitative approach and does not incorporate qualitative perspectives from policymakers, investors, or financial analysts. Such insights could provide a richer understanding of the behavioral dimensions influencing market reactions to NPLs-driven credit risk. Future research could benefit from integrating mixed-methods approaches to capture both statistical relationships and contextual factors driving capital market dynamics.

Suggestions for Future Research

Further research could investigate other potential moderators, such as exchange rate volatility and fiscal deficits, to gain a more comprehensive understanding of the macro-financial linkages influencing stock market movements. Expanding the scope to include sectoral indices within the Malaysian market may also uncover industry-specific sensitivities to macroeconomic fluctuations and credit risk. Additionally, exploring the asymmetric effects of Non-Performing Loans (NPLs) during periods of economic expansion versus contraction would provide deeper insights into the cyclical nature of credit risk transmission and its varying impact across different economic conditions. This could enhance policymakers' ability to tailor financial stability measures according to the prevailing macroeconomic climate.

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