The Impact of Financial Deepening and Macroeconomic Factors on Equity Risk Premiums in Malaysia

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ABSTRACT

Emerging markets often have a higher equity risk premium than developed economies. However, key causes remain unknown, making investment strategies uncertain. Thus, this study empirically analyses the impact of economic growth, exchange rate, inflation, financial deepening, and oil prices on Malaysia's equity risk premium over the 2009–2023 period. The equity risk premium model is predicted by applying the Bayer and Hanck combined cointegration tests, vector error correction Granger causality tests, and variance decomposition. The findings offer evidence that, in the long run, economic growth and financial deepening have a significant negative impact on Malaysia's equity risk premium, whereas exchange rate, inflation, and oil prices have a significant positive impact. Further analysis reveals that financial deepening and inflation have a short-run bidirectional causal effect on the equity risk premium, as well as a short-run one-way causal relationship between economic growth and equity risk premiums. The findings support the behavioral finance theory and fisher effect that economic growth and inflation shocks have a major impact on equity risk premium variation. Thus, policymakers should try to devise appropriate courses of action to successfully promote economic growth and regulate inflation, taking into account the multifaceted aspects of financial development and deepening.

Keywords: Equity risk premium, economic growth, financial deepening, inflation.

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1. INTRODUCTION

The source and magnitude of equity risk premiums are areas in financial economics that have attracted much attention among researchers since the landmark paper by Fama

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(1981). In recent decades, the size of risk that investors are willing to assume has shaped the growth of the equity markets. The market premium, or the amount that represents the increased return that investors expect to receive in exchange for foregoing their current consumption, is the reward for taking the risk. The real economy's state variables, or macroeconomic factors, determine an economy's perceived overall level of risk. Thus, all macroeconomic parameters that help predict the status of the economy should also help anticipate the equity premium. As a result, the general belief is that long-term changes in macroeconomic variables have a major impact on the ebb and flow of stock market return volatility. The inclusion of information derived from macroeconomic variables is of utmost importance when making predictions about the equity premium. However, with the exception of Buncic and Tischhauser (2017) and Ludvigson and Ng (2007), there is very little research that investigates the predictive gains of employing a broad collection of macroeconomic variables to estimate the equity risk premium.

Equity risk premiums play a pivotal role in various financial applications, influencing decisions for investors, portfolio managers, and equity analysts. Understanding the factors driving these premiums is crucial for informed investment strategies (Krismiaji, et al., 2024). Research on equity risk premiums in developing countries like Malaysia is limited, necessitating more studies tailored to these contexts. This paper contributes to emerging research by examining the impact of financial deepening and macroeconomic factors on equity risk premiums, a topic traditionally explored in advanced economies. Despite variations in economic development and institutional structures, previous studies consistently highlight the importance of factors such as economic growth (Moench and Stein, 2021), exchange rates (Vassalou, 2000), financial deepening (Allen and Santomero, 1997), inflation (Ramaprasad et al., 2011), and crude oil prices (Hamilton, 1983) across different economies and countries.

Over the previous decade, Malaysia's economy has grown significantly in terms of financial depth. The financial system was around 51 times the amount of GDP in 2013 (3.5 times GDP in 2000), with a growing contribution to GDP of 119% by 2023. The Central Bank of Malaysia continued to push financial market development activities through its Financial Markets Committee (FMC) and strong coordination with the industry. Malaysia focused efforts on improving accessibility and expanding market breadth and depth. Countries with great financial depth can increase investment opportunities, improve market efficiency, strengthen investor trust, promote capital formation, and facilitate risk diversification. However, it is unclear whether such a conclusion holds true in Malaysia. Furthermore, no empirical study has yet studied how financial deepening influences the equity risk premium, with the exception of Ogbulu et al.'s (2014) work in Nigeria. As a result, the purpose of this study is to address this significant gap by investigating the relationship between financial deepening, macroeconomic conditions, and Malaysia's equity risk premium from 2009 to 2023. The study uses a cointegration approach as an estimation tool to see if there is evidence of a long-run link between the macroeconomic variables, which include GDP, exchange rate, inflation, financial deepening, crude oil price, and equity risk premium.

The paper is structured as follows: Section 2 reviews previously established theories and frameworks to develop our hypothesis. Section 3 contains an explanation of the data and technique used. Section 4 offers the empirical findings, while Section 5 provides the conclusion.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

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2.1 Impact of economic growth on equity risk premium

Moench and Stein (2021) provide evidence for the strong link between the business cycle and the equity premium, which bolsters the Business Cycle Theory of Equity Risk Premium. This theory posits that the equity risk premium (ERP) ebbs and flows with the business cycle's phases. During an expansion phase, when the economy is growing, corporate profits rise, pushing up stock prices and reducing the ERP. Conversely, during the peak phase, investor caution increases, leading to a higher ERP to offset growing uncertainties. As the cycle transitions to the contraction phase, the ERP rises further as investors seek higher returns to mitigate escalating economic risks. In the trough phase, a resurgence of investor optimism typically leads to a decrease in the ERP (Kizys and Pierdzioch, 2010).

Duarte and Rosa (2015) further support this notion by illustrating that the ERP tends to peak during financial turmoil, recessions, and periods of low real GDP growth or high inflation, while it tends to bottom out after sustained periods of bullish stock markets and high real GDP growth. Moreover, as a leading indicator of future economic activity, a high ERP in the short term often precedes higher GDP growth, increased inflation, and lower unemployment rates. Researchers such as Stock and Watson (2003) and Damodaran (2022) have emphasised this relationship. On the other hand, Møller *et al.* (2024) support the consumption-based asset pricing model (CCAPM), which suggests that changes in GDP growth and economic activity can influence investors' consumption patterns, subsequently affecting their investment decisions and risk preferences, thereby impacting the equity risk premium. Thus, the first hypothesis is developed:

H_1: There is a significant and negative relationship between economic growth and equity risk premium.

2.2 Impact of exchange rates on equity risk premium

Three key international asset pricing models inspired the study's hypothesis: the Solnik (1974), revised by Sercu (1980), the Grauer et al. (1976) model, and the Adler and Dumas (1983) model. The International Asset Pricing Model posits that exchange rate movements can influence the risk premium demanded by investors in foreign assets. Changes in exchange rates can impact the expected returns and risks associated with foreign investments, thereby affecting the equity risk premium. For instance, if a country's currency depreciates relative to the investor's home currency, investors may require a higher risk premium to compensate for the increased exchange rate risk, leading to an increase in the ERP.

Vassalou (2000) investigates exchange rate risk premiums in a cross-section of equity returns across 10 developed countries using international asset pricing models. She illustrates how exchange rate risk factors play a crucial role in explaining variations in average returns within countries, underscoring the significance of safeguarding investors against exchange rate risk. Balduzzi (2020), on the other hand, argues that the real exchange rate in itself largely accounts for the long-term predictability of excess currency returns. Furthermore, Karolyi and Wu (2021) extend their analysis to include emerging markets in their validation of international asset pricing models. Their findings provide compelling evidence supporting the inclusion of currency risk in the pricing of international equity markets, particularly carry-trade risk. Therefore, our second hypothesis is formulated:

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H_2: There is a significant and positive relationship between the exchange rate and the equity risk premium.

2.3 Impact of inflation on equity risk premium

Numerous studies have examined the impact of inflation on equity risk premiums. Ramaprasad et al. (2011) and Karthik et al. (2011) highlight the significant influence of inflation on equity premiums. Investors seek a higher equity risk premium, known as the inflation risk premium, to counter future higher inflation levels and increased uncertainty. Benninga and Protopapadakis (1993) propose including the inflation risk premium as a third component in the Fisher equation. They argue that not only the level of inflation determines equity risk premiums, but also the uncertainty surrounding it, potentially reflecting some of the inflation uncertainty premium in the risk-free rate.

Brandt and Wang (2003), on the other hand, confirm the significance of inflation news in shaping risk aversion and risk premiums. According to their research, equity risk premiums tend to rise with higher-than-expected inflation and fall with lower-than-anticipated inflation. Human behaviour and irrationality can play crucial roles in determining equity risk premiums. Modigliani and Cohn (1979) contend that the depressed equity values in the late 1970s stemmed from investors' inconsistency in managing inflation in relation to their investments. Additionally, Damodaran (2022) asserts a positive correlation between implied equity risk premiums and inflation. In simpler terms, lower equity risk premiums lead to higher stock prices, whereas increased inflation tends to have negative implications for stocks. Thus, the third hypothesis is formulated:

H_3: There is a significant and positive relationship between inflation and equity risk premium.

2.4 Impact of financial deepening on equity risk premium

Based on Financial Intermediation Theory (Allen and Santomero, 1997), financial deepening has the potential to influence the equity risk premium by enhancing information access, reducing transaction costs, improving risk diversification opportunities, boosting market liquidity, providing superior risk management tools, and fortifying investor protection. These factors collectively contribute to the efficiency and resilience of the financial system, which may result in a decreased equity risk premium (ERP). Despite the theoretical underpinnings, empirical investigations into the impact of financial deepening on the equity risk premium remain limited. Notably, Ogbulu *et al.*'s 2014 study in Nigeria supports a negative relationship between financial deepening and the equity risk premium. Therefore, based on the existing literature and Ogbulu *et al.*'s findings, we propose the following hypothesis for further investigation:

H_4: There is a significant and negative relationship between financial deepening and equity risk premium.

2.5 Impact of crude oil prices on equity risk premium

Hamilton (1983) pioneered the oil price shock concept, which states that rising oil prices can increase production costs for businesses, resulting in reduced profit margins, lower corporate earnings, and potentially lower stock prices. This increased cost of production raises the overall risk level for investing in these companies, resulting in a

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higher equity risk premium. Consistent with this notion, Broadstock et al. (2014) reveal that in Tokyo, Korea, and Taiwan, oil prices positively influence firm-level stock market returns due to their impact on the market risk premium. They observed that the Chinese stock market demonstrates more resilience to oil price shocks compared to other markets.

Various studies have highlighted the significant role of crude oil prices in predicting equity risk premiums and their impact on financial markets. For example, Nonejad (2023) demonstrated an out-of-sample predictive relationship between the equity risk premium and crude oil prices, highlighting the critical role of oil prices in risk management, asset allocation decisions, and business cycle prediction. Governments and financial institutions closely monitor crude oil price movements. Candemir and Karahan (2022) incorporated crude oil prices as international determinants in their time-varying risk premia model in Turkey, suggesting that the crude oil price factor captures a substantial portion of the predictable variation in equity risk premiums across ten industrialised countries. Lubis and Halim (2022) have shown that the price of crude oil can effectively predict equity premiums and enhance the accuracy of predictions based on macroeconomic and financial variables. Cain et al. (2017) also revealed the predictive power of oil prices on equity premiums during market recessions. They found that the skewness distribution of oil prices predicts equity premiums during US recessions, observing a negative relationship between crude oil prices and market conditions. It is also supported by Dai, *et al*. (2021) that the three-order moments of crude oil prices during recessions can forecast equity premiums. Research indicates that crude oil prices influence macroeconomic and financial variables, impacting stock returns both in-sample and out-of-sample (Wang et al., 2019).

Furthermore, Symitsi et al. (2018) identified the vector heterogeneous autoregressive model as the best performer in predicting equity premiums, while the multivariate GARCH model performs poorly, especially during global crises. However, the majority of this literature focuses on developed countries, particularly the US. As a result, our study expands on previous research by examining the relationship between crude oil price and equity risk premium in Malaysia. This study hypothesises that:

H_5: There is a significant and positive relationship between crude oil prices and equity risk premium.

3 METHODOLOGY

3.1 Model Specification

The equity risk premium model of our study is as below:

$$ERP_t = \beta_0 + \beta_1 GDP_t + \beta_2 EXC_t + \beta_3 INF_t + \beta_4 FD_t + \beta_5 OIL_t + \mu_t \quad (1)$$

where subscripts *t* represents the year. ERP is equity risk premium, GDP is gross domestic product, EXC is the exchange rate, INF is the inflation rate, FD is the financial deepening, OIL is the crude oil price.

Following Weich and Goyal (2008), equity risk premium (ERP) is defined as the difference between the log monthly value-weighted aggregate stock return (including dividends) and the risk-free return. The risk-free return is the monthly 10-year Malaysian Government Securities (MGS) yield. Economic Growth (GDP) is the gross domestic product at constant 2005 prices. Exchange rate (EXC) is the Malaysian

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Ringgit (RM) per unit of United State Dollar (US$). Inflation (INF) is calculated using monthly year-on-year changes in Consumer Price Index. Financial deepening (FD) is proxy by the money supply to GDP (M2/GDP). Crude oil price (OIL) is the nominal Brent Blend price. All variables are expressed in natural logarithm. The data used in the analysis are monthly sourced from Bank Negara's Statistical Bulleting (various issues) and the International Monetary Fund's International Financial Statistics' website.

3.2Methods and Time Series Modeling

We use a Vector Error Correction (VEC) Granger causality approach to investigate the dynamic causal linkages between macroeconomics variables and equity risk premium. Multiple factors contributed to the decision to choose the Granger causality approach. First, the Granger causality test addresses the variables endogenously, and can ignore issues of identifying restriction. Second, using the Granger causality approach, it is possible to separate the variables' dynamic interaction and deduce the causative relationship. Third, the Granger causality test is an effective tool for examining the consequences of both short-term and long-term association between variables, providing policymakers with additional insights.

To appropriately define the VAR model, we follow standard time series analysis methodology. First, to examine the variables' stationarity properties or integration order, we use the unit root test with breakpoints to account for breakpoints in the series. A unit root test with breakpoints can improve its robustness and reduce the occurrence of spurious results. This is because conventional unit root tests, such as the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, might produce spurious findings by failing take into account series breakpoints (Agag and Eid, 2020). A variable is deemed integrated of order d, abbreviated as I(d), if it requires differencing d times to achieve stationarity. Non-stationary variables are those that have an integrated order of one or more. It is critical to categorise the variables as stationary or non-stationary, as most statistical techniques can only handle stationary series.

Furthermore, Cointegration, or the possible long-term co-movement of non-stationary variables with the same integration order, may also be present. In the second step, to explore the cointegration of variables in time series, several approaches are included (Engle and Granger (1987), Johansen (1988) and Carrion and Sanso (2006)). Previous researches have offered several techniques for investigating the cointegration of variables in time series. The option of conducting a cointegration test is problematic due to the lack of agreement among them. One cointegration test is occasionally rejected, whereas the other is unaffected. To address inconsistent findings, Bayer and Hanck (B-H) provide an approach that combines numerous cointegration techniques and provides a robust statistical framework for determining the presence of cointegration among variables. Two specific concerns drove the decision to use the B-H cointegration test. First, the B-H cointegration test combines the results of various cointegration tests while taking into account the issue of multiple testing. Second, the approach is robust to sample behaviour and utilises Bootstrap techniques to modify critical values. The B-H cointegration test technique is expressed algebraically as follows:

$$EG - JOH = -2[ln(P_{EG}) + ln(P_{JOH})] \tag{2}$$

$$EG - JOH - BO - BDM = -2[ln(P_{EG}) + ln(P_{JOH}) + ln(P_{BO}) + ln(P_{BDM})] \tag{3}$$

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where EG represents Engle and Granger, JOH represents Johansen, and BO represents Boswijk and Banerjee et al. The B-H cointegration is based on the assumption that the variables have the same level of integration. The B-H criteria are analogous to Fisher's Chi-Squared test. If Fisher's test statistic exceeds the critical value given by B-H cointegration statistics, it means that the hypothesis of non-convergence is rejected. The test provides valuable insights into the variables' potential long-term interdependence, particularly economic and financial indicators.
Concurrently, the results of the unit root and cointegration analyses provide critical rules for precisely characterising the VAR, ensuring the validity of findings derived about dynamic causal links between variables.

In the next step, we conduct the VECM as below:

$$\Delta Z_t = \alpha + B(L)\Delta Z_{t-1} + \lambda\mu_{t-1} + \varepsilon_t \tag{4}$$

where the variables under consideration denotes as Z, a vector of constant terms denotes as α, B(L) is a polynomial matrix in the lag operator L, and μ is the error correction term. The error correction term refers to the divergence of variables from the long-run equilibrium path given by the long-run cointegrating equation:

$$y_t = \beta x_t + \mu_t \tag{5}$$

where y denotes a normalised variable, x comprises the vector of remaining model variables (including the constant), and β represents the vector of long-run parameters in equation (4), λ denotes a vector of long-run speed adjustment coefficients. Every variable in VECM may be endogenous. Each variable's first difference reflects its sensitivity to changes in other variables as well as its own deviation from the long-term equilibrium trajectory. The method allows us to assess Granger-sense causality utilising the statistical significance of the error correction term as well as the lagged first-differenced terms for each explanatory variable.

In addition, we also use variance decompositions (VDC) to examine their dynamic interactions. VDC is the proportion of a variable's forecast error variance attributed to shocks in other variables. The VDC allows one to readily determine how significant each shock is to the system as a whole. As a result, we may assess the relative importance of macroeconomic variables in terms of ERP variations.

4 EMPIRICAL RESULTS

The empirical analysis follows the mainstream time series procedure to examine stationary properties, determine optimal lag lengths, establish potential cointegration between variables, use the Vector Error Correction (VEC) Granger causality test to examine long-run and short-run dynamics between variables, and the variance decomposition (VC) to assess the relative importance of macroeconomic variables in accounting for variations in ERP.

4.1 Descriptive Statistics

Table 1 reports the descriptive statistics of the data. These data provide an overview of the variables' central tendency, dispersion, skewness, kurtosis, and Jarque-Bera (J-B) statistics. It shows that Malaysia's lowest and highest equity risk premium occurred in 2022M6 and 2009M4, respectively. The variables do not exhibit the properties of a normal distribution, as indicated by the Jarque Bera statistics and negative skewness values.

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Table 1 Descriptive statistics

	ERP	GDP	EXC	INF	FD	OIL
Mean	2.7874	12.5219	1.0003	1.1355	1.7345	4.2910
Median	2.8069	12.5227	1.0907	1.1572	1.7474	4.3127
Maximum	3.3860	12.8942	1.3155	1.4516	1.9287	4.8354
Minimum	2.0469	11.8991	0.6706	-1.3076	1.5815	3.1241
Standard deviation	0.2062	0.2425	0.1908	0.2237	0.0667	0.3516
Skewness	-0.8616	-0.4381	-0.3105	-8.0305	-0.3116	-0.4840
Kurtosis	5.4326	2.4421	1.4972	85.9595	2.8548	2.8042
Jarque-Bera	62.2072	7.5020	18.5704	50246.94	2.8343	6.7506
Probability	0.0001	0.02349	0.0001	0.0001	0.2424	0.0342
Observations	169	169	169	169	169	169

4.2 Stationarity Tests

The main assumption in time series analysis is that the data is stationary. Conventional unit root tests such as the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are widely used in research. However, because these tests do not take into account breakpoints in data, they may produce spurious results (Solarin, 2024). To avoid spurious findings and increase the test's robustness, we conducted a unit root test with breakpoints. Table 2 reports the breakpoint unit root test. The test consisted of two specifications: the innovation outlier and the additive outlier. Table 2's innovation outlier and additive outlier specifications reveal that all variables achieved stationarity only after the first difference. Thus, we can proceed to test the cointegration.

Table 2 Breakpoint Unit Root Test: Dickey-Fuller min-t method

Panel A: Innovation Outlier					
Variable	Level		First Difference		Stationarity Decision
	ADF test statistics	Break Date	ADF test statistics	Break Date	
ERP	-3.8111	2015M04	-22.8845***	2009M06	I(1)
GDP	-2.7256	2020M06	-8.0071***	2010M08	I(1)
EXC	-3.1838	2014M08	-13.0518***	2011M09	I(1)
INF	-3.8206	2020M03	-17.6103***	2009M12	I(1)
FD	-4.0534	2011M11	-9.3891***	2020M03	I(1)
OIL	-3.7930	2014M06	-12.3100***	2020M03	I(1)
Panel B: Additive Outlier					
Variable	Level		First Difference		Stationarity Decision
	ADF test statistics	Break Date	ADF test statistics	Break Date	
ERP	-1.7128	2013M07	-22.8792***	2009M06	I(1)
GDP	-2.7794	2023M02	-15.0104***	2023M01	I(1)
EXC	-2.2834	2016M09	-13.1270***	2011M09	I(1)
INF	-3.6158	2016M08	-10.5965***	2018M05	I(1)
FD	-2.1978	2015M05	-10.0115***	2020M02	I(1)
OIL	-3.5523	2020M02	-14.3279***	2020M03	I(1)

***represent significance at 1% level.

4.3 Vector Autoregressive (VAR) Optimal Lag Selection

After verifying that the series has attained stationarity through differencing, the next step is to determine an optimal lag length. This study determined the lag length using the Akaike information criterion (AIC), Schwarz's Bayesian information criterion (SC),

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and Hannan and Quinn criteria (HQIC). Table 3 reports the results of the optimal lag selection procedure. Almost all criteria suggest that lag 4 is the optimal lag length. This is consistent with the assumption that the residual errors in each equation are independently and identically distributed (iid), also known as normal distribution.

Table 3 Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	432.0218	-	2.30×10^{-10}	-5.1639	-5.0510	-5.1181
1	1555.242	2151.137	4.36×10^{-16}	-18.3423	-17.5517	-18.0214
2	1850.156	543.3579	1.89×10^{-7}	-21.4807	-20.0124	-20.8847
3	1946.377	170.2813	9.16×10^{-18}	-22.2106	-20.0647*	-21.3395
4	2006.046	101.2567*	6.93×10^{-18}*	-22.4975*	-19.6739	-21.3513*

Note: *indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

4.4 Cointegration Test

This section provides the results of the variables' cointegration tests, where cointegration of two series occurs when their stochastic patterns are identical. Table 4 presents the findings of the B-H cointegration tests, confirming the existence of cointegration relationships between ERP and the variables GDP, EXC, INF, FD, and OIL. We can articulate a long-run relationship between ERP, GDP, EXC, INF, FD, and OIL in Malaysia, indicating their convergence to their long-term equilibrium. Consequently, the long-run interrelatedness of these variables will correct any deviations from the path of long-term equilibrium. Cointegration also eliminates the potential for noncausal relationships between variables, implying that each variable must have at least one-way causality with the others.

Before proceeding to the Granger causality test, it would be interesting to examine the long-term relationship between macroeconomic variables and ERP. The long-term cointegrating vectors from the cointegration method are shown in Table 5. The vectors were normalised using ERP. All of the predicted coefficients are significant, indicating that financial deepening has played a key role in Malaysia's equity risk premium. This result is not surprising, as one possible explanation is that financial deepening influences the equity risk premium by enhancing information access, reducing transaction costs, improving risk diversification opportunities, boosting market liquidity, providing superior risk management tools, and fortifying investor protection. These factors collectively contribute to the efficiency and resilience of the financial system, which may result in a decreased ERP in Malaysia, supporting the Financial Intermediation Theory (Allen and Santomero, 1997) and Ogbulu et al.'s 2014 findings in Nigeria.

The coefficient for economic growth is negative and significant at the 1% level, confirming the business cycle theory of the equity risk premium. This indicates that the ERP ebbs and flows with the phases of the business cycle. During an expansion phase, when the economy is growing, corporate profits rise, pushing up stock prices and reducing the ERP. Conversely, during the peak phase, investor caution increases, leading to a higher ERP to offset growing uncertainties. As the cycle transitions to the contraction phase, the ERP rises further as investors seek higher returns to mitigate escalating economic risks. During the trough phase, a resurgence of investor optimism typically leads to a decrease in Malaysia's ERP. Empirical studies that find evidence in

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line with the business cycle theory of equity risk premiums include Moench and Stein (2021) and Duarte and Rosa (2015).

Interesting evidence emerges from the Cointegration test for the Malaysian equity risk premium. The coefficient for the exchange rate is positive and significant at the 10% level. This result implies that a 1% increase in the exchange rate tends to increase the equity risk premium by 0.29% in Malaysia. Therefore, if Malaysia's currency depreciates relative to the investor's home currency, investors may require a higher risk premium to compensate for the increased exchange rate risk, leading to an increase in the Malaysian ERP. This finding supports the international asset pricing models (Solnik, 1974; Sercu, 1980; Grauer et al., 1976; and Adler and Dumas, 1983).

Additionally, the coefficient for inflation is positive and significant, revealing that inflation has a significant and substantial effect on the Malaysian equity risk premium. Higher inflation in the country corresponds to a higher equity risk premium. This suggests that investors seek a higher equity risk premium, known as the inflation risk premium, to counter higher inflation levels and increased uncertainty. This finding aligns with empirical evidence from studies by Ramaprasad et al. (2011) and Karthik et al. (2011).

Moreover, the oil price is significant and positively influences the Malaysian equity risk premium. This implies that rising oil prices can increase production costs for businesses in Malaysia, leading to reduced profit margins, lower corporate earnings, and potentially lower stock prices. Consequently, this increased cost of production raises the overall risk level for investing in Malaysia, resulting in a higher equity risk premium in the country. This result supports our hypothesis and is in line with empirical findings by Hamilton (1983) and Broadstock et al. (2014).

Therefore, managing risks in Malaysia requires monitoring financial market movements closely, strategically diversifying portfolios, and seeking professional assistance to navigate the complexities associated with fluctuations in oil prices and their impact on the equity risk premium in the Malaysian market. By staying informed, employing effective risk management strategies, and leveraging expert advice, investors can better position themselves to mitigate risks and make informed investment decisions in the dynamic Malaysian financial landscape.

Table 4 Bayer and Hanck combined Cointegration Test

Fitted Model	EG-JOH	EG-HOH-BO-BDM	Cointegration Remarks
ERP = f(GDP)	110.5241***	221.0482***	Yes
ERP = f(GDP, EXC)	73.6827***	184.2068***	Yes
ERP = f(GDP, EXC, INF)	28.8634***	139.3875***	Yes
ERP = f(GDP, EXC, INF, FD)	25.5154***	62.3568***	Yes
ERP = f(GDP, EXC, INF, FD, OIL)	25.9565***	136.4806***	Yes
1% critical values	15.7000	29.8000	
5% critical values	10.4190	19.8880	

Notes: EG represents Engle and Granger, JOH represents Johansen, and BO represents Boswijk and Banerjee *et al.* *** denote 1% significance levels.

Table 5 Long-run Cointegration Equation (Normalized on ERP)

GDP	EXC	INF	FD	OIL
-0.1444***	0.2869*	0.4070**	-1.2311***	0.1367*
(0.0524)	(0.1495)	(0.1745)	(0.2596)	(0.0729)

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Notes: Standard errors are in parentheses. *,**,***denote significant at 10%, 5% and 1% significance levels, respectively.

4.5 Vector Error Correction Granger Causality Test

In order to conduct Granger causality tests, which form the basis of this study's methodology, it is important that the variables are stationary and that there is evidence of cointegration among them. After setting up these conditions in the last section, we did Vector Error Correction Model (VECM) Granger causality tests. Table 6 displays the results. First, at the 1% significance level, there exists a long-term causal relationship running from GDP, EXC, INF, FD, and OIL to ERP. Second, economic growth demonstrates a short-run unidirectional effect on the equity risk premium, indicating that economic growth exerts a significant endogenous influence on the equity risk premium. In contrast, inflation and financial deepening exhibit a short-run bidirectional causal effect on equity risk premiums, suggesting a feedback relationship between these variables. However, there is no evidence of a short-run directional causality from the oil price to the equity risk premium. Third, in relation to the other variables, we observed a bidirectional causal effect between economic growth, oil prices, inflation, and financial deepening in Malaysia. Additionally, there is a unidirectional causal effect from the equity risk premium to the exchange rate, from financial deepening to the exchange rate, and from inflation to financial deepening. Forth, the error correction term (ECTt-1) coefficient of -0.6164 indicates that the adjustment speed is approximately 61.64% towards a stable position in the long run. The ECT, which is negative and statistically significant, validates the use of the VEC Granger causality approach.

We confirm cointegration by identifying significant coefficients for the error correction term. The four macroeconomic variables (GDP, EXC, INF, and OIL) and the measure of financial deepening (FD) are adjusted to account for any deviations from the long-term connection. To gain a better understanding of the adjustment for ERP, we can express the equation as follows:

$$\Delta ERP = f(\Delta Z) - 0.6164\mu_{t-1} \quad (6)$$

$$\mu_{t-1} = ERP_{t-1} - (-0.1444GDP_{t-1} + 0.2869EXC_{t-1} + 0.4070INF_{t-1} - 1.2311FD_{t-1} + 0.1367OIL_{t-1}) \quad (7)$$

where $f(\Delta Z)$ is the first-differenced term in the equation. Based on equation (3), ERP increases when $\mu_{t-1} < 0$ and decreases otherwise. In the long-run equilibrium ($\mu = 0$), rises in EXC, INF, and OIL or decreases in GDP and FD cause the error correction term (μ) to be less than zero. As a result, ERP adjusts upward to restore equilibrium. In short, these variables have a long-run causal relationship with ERP.

Table 7 reports the statistical results of the stability test using the Chow forecasting tests. The findings indicate that variables are stable across the time period under consideration.

Table 6 Vector Error Correction Granger Causality Test

Dependent Variable	Independent Variable (Chi-Square Statistic)						ECT_{t-1}
	ΔERP	ΔGDP	ΔEXC	ΔINF	ΔFD	ΔOIL	
ΔERP	-	12.8586***	3.9640	6.4153*	8.1309**	0.5999	-0.6164***
		[0.0050]	[0.2654]	[0.0931]	[0.0434]	[0.8965]	(-4.2130)
ΔGDP	2.8283	-	1.4824	15.0974***	43.8873***	7.0498*	-0.0065**
	[0.4189]		[0.6863]	[0.0017]	[0.0001]	[0.0703]	(-2.3904)
ΔEXC	7.5475*	3.2198	-	2.1650	6.5841*	0.4417	0.0100

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	[0.0564]	[0.3590]		[0.5390]	[0.0864]	[0.9315]	(0.4608)
ΔINF	7.2944*	36.6257***	2.7513	-	2.4779	4.7294	-0.5000***
	[0.0631]	[0.0001]	[[0.4316]		[0.4793]	[0.1927]	(-3.3728)
ΔFD	16.8182***	326.2208***	4.4344	14.4848***	-	5.8153	0.0265***
	[0.0008]	[0.0001]	[0.2182]	[0.0023]		[0.1210]	(5.6363)
ΔOIL	3.9408	15.3641***	1.1832	5.6306	2.1050	-	-0.0773
	[0.2679]	[0.0015]	[0.7570]	[0.1310]	[0.5509]		(-1.0992)

Notes: () is the t-statistic; [] is the probability value; ***,**,* represent 1%, 5% and 10% significance levels, respectively.

Table 7 Statistical output for stability test (Chow forecast test)

Forecast Period	F-Statistics	p-value of F-Statistics	Log-Likelihood Ratio	p-value of Log-Likelihood
2010M02-2019M02	0.4231	0.5168	0.4509	0.5019

4.6 Variance Decomposition Test

In order to examine the responses of ERP, GDP, EXC, INF, FD and OIL to different system shocks, we conduct a variance decomposition analysis that characterizes the dynamic behavior of the VECM (Yawdhacksa and Phonvisay, 2022) . This study uses the lagged ECM, or error correction term, as an exogenous variable. We use the first differences to display the growth rates for ERP, GDP, EXC, INF, FD, and OIL.

Table 8 presents the results obtained from the variance decomposition function. Based on the findings, we observe that ERP innovations account for 100% of the variation, while GDP, EXC, INF, FD, and OIL account for 0% of ERP changes. At a 60-month forecast horizon, GDP and INF have a significant explanatory effect on ERP fluctuations, whereas the effects of EXC, FD, and OIL remain unchanged. Specifically, GDP accounts for 35.72% of ERP fluctuations, EXC for 3.65%, INF for 15.56%, FD for 3.27%, and OIL for 2.3% at this forecast horizon. The increasing explanatory effect of GDP and INF on ERP changes suggests that ERP is more endogenous to GDP and INF in Malaysia compared to EXC, FD, and OIL. At a forecast horizon of 60 months, ERP itself only explains around 39.5% of ERP variations due to the differing explanatory effects of these variables on ERP variations.

Table 8 Forecast Variance Decomposition Function

Time horizon	Explained by innovation in					
(months)	ERP	GDP	EXC	INF	FD	OIL
<u>ERP</u>						
1	100.00	0.00	0.00	0.00	0.00	0.00
6	80.16	2.52	5.70	4.44	6.09	1.09
12	72.92	5.77	7.24	6.84	5.67	1.56
18	67.10	10.06	7.12	8.97	4.90	1.86
24	61.40	15.15	6.50	10.63	4.31	2.01
30	56.25	19.92	5.84	11.95	3.93	2.11
36	51.75	24.14	5.25	13.00	3.68	2.17
42	47.92	27.76	4.74	13.84	3.52	2.22
48	44.66	30.84	4.32	14.53	3.41	2.25
54	41.88	33.47	3.96	15.09	3.33	2.28
60	39.50	35.72	3.65	15.56	3.27	2.30

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Three statistical assumptions form the foundation of the methodological contribution. First, the study assessed the series' stationarity characteristics using the breakpoint unit root tests and the Chow test to examine the stability properties. Second, we utilised the Bayer and Hanck integrated cointegration approach to determine the likelihood of the variables' convergence. Additionally, the study employed the VEC Granger causality tests to distinguish the short- and long-term dynamics of the variables. The findings supported the existence of cointegration between the variables, revealing a one-way causal relationship where economic growth causes changes in equity risk premiums. Furthermore, there appears to be a two-way causal relationship between financial deepening and equity risk premiums, as well as between inflation and equity risk premiums.

5 CONCLUSION

This study examines the impact of financial deepening and macroeconomic factors on Malaysia's equity risk premium from 2009 to 2023. Although research on macroeconomic factors have gained popularity in recent years, particularly to promote economic growth, there has been no available empirical evidence to trace the link between financial deepening, macroeconomic factors and the equity risk premium in Malaysia. We employ the multivariate cointegration analysis, the Granger causality test, and the forecast error variance decomposition function in the analyses.

The empirical results demonstrate that financial deepening has a significant negative effect on the equity risk premium in Malaysia. This finding suggests that governments can improve the conduct of macroeconomic policies by improving the performance of the financial market, particularly financial deepening. A better financial system decreases uncertainty among investors, households, and firms, increases government credibility, and thus enhances the positive effects on the equity market. The Malaysian Financial Sector Blueprint (FSBP) 2022–26, for instance, focuses financial development priorities on bolstering intermediation functions for sustainable and inclusive growth, enhancing ecosystem enablers, and promoting longer-term reforms.

On the other hand, economic growth is statistically significant in reducing equity risk premiums in Malaysia, providing support to the case made by Moench and Stein (2021) and Kizys and Pierdzioch (2010). The empirical findings also suggest that among the macroeconomic determinants of equity risk premium, inflation is the most robust one in increasing the equity risk premium, supporting Ramaprasad et al. (2011) and Karthik et al. (2011). These findings suggest that improving economic development and maintaining a low inflation rate are vital to reducing equity risk premium in Malaysia. Meanwhile, the results suggest that oil price has a significant positive influence on the equity risk premium, thus supporting the Hamilton (1983)'s oil price shock theory and Broadstock et al. (2014). Additionally, our study finds that the exchange rate on equity risk premiums in Malaysia is positive. This infers that when Malaysian currency depreciates relative to the investor's home currency, the investor demands a higher risk premium to compensate for the increased exchange rate risk, thus, increasing the equity risk premium.

In terms of policy implications, these results may be useful to policymakers in formulating appropriate policies to mitigate the adverse effects caused by shallow finance. For instance, policymakers should continue to promote financial deepening in mature financial markets, such as FSBP, while ensuring sustainable economic growth.

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They should also actively pursue financial innovation and further explore how financial deepening contributes to efficient resource allocation. Furthermore, this study recommends that, in addition to various government development programmes, efforts should focus on enhancing economic development and ensuring low inflation, both of which are crucial in addressing high equity risk premiums. In particular, the international cooperation strategy should address global factors influencing inflation and economic growth, such as exchange rates and oil prices.

Moreover, this paper enriches the emerging research on the impact of financial deepening and macroeconomic factors on equity risk premium, which has thus far been confined to advanced economies, in the area of economic growth (Moench and Stein (2021)), exchange rate (Vassalou (2000)), financial deepening (Allen and Santomero, 1997), inflation (Ramaprasad et al. (2011)) and crude oil prices (Hamilton (1983)). In spite of differences in level of economic development and institutional based on an emerging economy, i.e., Malaysia, with prior research done on the advanced economies reaffirms the importance influence of financial deepening and macroeconomic factors across different countries and economies.

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