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THRESHOLD EFFECTS OF FOREIGN HOLDINGS ON ASEAN SOVEREIGN BOND YIELDS

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ABSTRACT

Research Originality – This study uniquely examines the non-linear effect of foreign ownership on sovereign bond yields in Indonesia, Malaysia, Thailand using a Panel Threshold Regression (PTR) model to identify specific inflection points, while differentiating from previous studies by accounting for market liquidity and foreign reserves.
Research Objectives – This study aims to empirically assess the impact of foreign participation on 10-year government bond yields, determine the threshold levels altering this relationship, and evaluate whether market liquidity and foreign reserves act as transmission channels or risk buffers.
Research Methods – Using quarterly panel data for Indonesia, Malaysia, and Thailand over the period 2009-2023, the empirical approach combines fixed-effect regression to capture baseline relationships with PTR to account for regime-dependent effects.
Empirical Results – Findings reveal a strong non-linear negative influence of foreign investments on interest rates, with a critical threshold established at 10.2%. Below this cut-off, interest rates are highly sensitive and prone to rise, indicating market vulnerability, whereas an increase above this value effectively lowers interest rates.
Implications – Contributing to the Term Structure of Interest Rate literature, this study demonstrates that emerging market bond dynamics are driven more by investor confidence than short-term instruments. Policymakers must maintain foreign participation within an optimal range to prevent sudden capital outflows and ensure market stability.

Keywords: Bond Yields; Foreign Participation; Government Bonds; Market Liquidity; Policy Interventions.

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INTRODUCTION

The bond market has long been recognized as a critical pillar supporting a nation's economic growth (Nneka et al., 2025; Pradhan et al., 2015; Wahidin et al., 2021). It provides an alternative source of financing for governments, which is particularly crucial for emerging economies that often face limitations in bank-based financing systems (Santosa, 2021). Over the past few decades, the bond market in Asia has expanded significantly, increasingly assuming a role comparable to that of commercial banks in national financial systems.

Accordingly, this study examines whether foreign holdings in local currency-denominated government bonds affect bond yields in emerging ASEAN economies. The focus is motivated by the growing importance of local currency (LCY) bond markets in East Asia, where countries such as Indonesia, Malaysia, the Philippines, and Thailand exhibit heterogeneous foreign ownership patterns shaped by both domestic and global macroeconomic conditions. As of mid-2024, ASEAN LCY bond markets reached USD 2.2 trillion,

representing 8.9% of East Asia's LCY market, with government bonds comprising the dominant share (Asian Development Bank, 2024).

The government bond markets in ASEAN are led by Thailand and the Philippines, with respective market shares of 54.3% and 41%. Indonesia has demonstrated robust annual growth of 17.4%, representing one of the highest rates in the region (Asian Development Bank, 2024). Since the early 2000s, the expansion of local currency government bond (LCGB) markets has attracted substantial foreign investment inflows (Ho, 2022). These developments are supported by improvements in domestic market liquidity and growing demand from both local and foreign institutions.

APPLICATIONS FOR PRACTICE

- Foreign investor ownership in government bonds can help to reduce government borrowing costs.
- Governments should maintain an optimal level of foreign participation to mitigate market risks.
- Liquidity and foreign currency reserves have a limited effect on long-term bond yields in ASEAN.
- Strengthening macroeconomic fundamentals is more critical than relying on short-term market interventions.
- Debt policies should strike a balance between openness to foreign capital and domestic financial stability.

The increase in foreign ownership in ASEAN-3 (Indonesia, Malaysia, Thailand) became more pronounced after the 2008–2009 Global Financial Crisis (GFC), as investors sought yield amid a low-interest environment. Conversely, a lack of foreign participation tends to increased reliance on foreign currency-denominated debt, exacerbating risks related to currency and maturity mismatches. Larger foreign participation is connected with increase liquidity and has been linked to reduce bond yields, as looked in the U.S. and various emerging markets. Foreign holdings in local currency (LCY) government bonds in ASEAN-4 (Indonesia, Malaysia, Thailand, Philippines) have increased significantly over the past two decades, with notable acceleration after the 2008–09 global financial crisis, especially in Indonesia, Malaysia, and Thailand. In contrast, China's foreign holdings remain below 10% of outstanding LCY government bonds (Shimada et al., 2021).

While foreign investors can extend markets and promote benchmark development, their existence may also include volatility. According to the ability-to-exit theory, foreign investors may quickly pull their money during periods of uncertainty, heading to sharp to rises in bond yields (Rommerskirchen, 2020). The effect of foreign involvement is seldom simple. Its stabilising effect in normal times tends to be non-monotonic, as noted by Ho (2022), as long as markets are stable, foreign investors help compress yield spreads but may exacerbate volatility when markets become unsettled. A similar dual effect was reported by Beirne et al. (2024) who also found that foreign investment can reduce yields but can also lead to sudden capital outflows.

A second important driver of bond prices is market liquidity. Liquidity tends to widen, making the liquidity risk premium for trading larger (Hartini & Hanggraeni, 2021). Despite this, outside of the deep and highly efficient secondary markets in Singapore, liquidity constraints have continued to be a major challenge across much of ASEAN (Kinateder et al., 2020). The significance of market depth came into play during the COVID-19 pandemic, where sufficient liquidity was critical in stabilizing bond markets.

Foreign exchange reserves also play a vital role as one of the major indicators of macroeconomic stability and the ability of the nation to honour its financial commitments. Based on the empirical results by Kariyawasam & Jayasinghe (2022) a robust foreign exchange reserve base may help improve the confidence level of investors and narrow down the yield spread. However, there is a need to understand the relationship between the influence of foreign reserves and foreign ownership on government bond yield. In particular, this relationship needs further research in the ASEAN setting. It is important to fill this gap since the ASEAN region is home to a large number of economies with different levels of liquidity among the ASEAN-3 nations. Hence, the application of a moderated mediation model coupled with panel threshold regression (PTR) has been proposed in this paper.

Even though there are previous studies like Shimada et al. (2021) and Beirne et al. (2024) that have explored foreign capital inflows thoroughly, the issue of non-linear threshold effects is still understudied. According to Ho (2022) the influence of foreign ownership might be non-monotonic in nature, but the identification of the "tipping points" in the ASEAN-3 economy empirically is still lacking. Furthermore, existing research done by (Hartini & Hanggraeni, 2021) and (Kariyawasam & Jayasinghe, 2022) mostly focus on examining liquidity and foreign exchange reserves individually.

Contribution of the paper is to make use of Panel Threshold Regression (PTR) approach in exploring possible inflection points where yield sensitivity varies after reaching specific thresholds in the foreign ownership of the stock market. In investigating how the change in yield sensitivity is dependent on certain

inflection points that are reached in the level of foreign participation, it adds another layer of complexity in the examination of regime-dependency in the emerging economies of Indonesia, Malaysia, and Thailand.

LITERATURE REVIEW

The evolution of the EMDebts dynamics has been affected significantly as a result of various international crises that occurred recently. The interest rates on sovereign bonds have been highly sensitive to monetary shocks and changes in the risk aversion attitude of international investors (Rogers et al., 2025). There are four theories that explain the formation of the yield curve (Bodie et al., 2022; Mishkin, 2019; Parameswaran, 2019; Petitt et al., 2015): the pure expectations theory**,** liquidity preference theory**,** market segmentation theory**,** and preferred habitat theory. Santosa (2021) elaborates on the pure expectations theory (which focuses on short-term fluctuations), The Pure Risk Premium Theory, and includes two versions in describing risk premium forms: liquidity premium and preferred habitat. The Liquidity Premium suggests that investors favour holding bonds with longer maturities, expecting them to yield higher returns (at a given risk level) to counterbalance higher bond volatility.

Preferred habitat theory stated that investors' liability situations influence their decisions to liquidate investments. Moreover, the Market Segmentation Theory offers a different explanation based on term premiums. It is said that individuals have strong term preferences and that bonds of different maturities are exchanged in separate and distinct markets. Additionally, the biased expectations theory is a unity of pure expectations theory and risk premium theory. This theory sums up that the yield curve reflects market expectations for future interest rates with varying levels of liquidity over time (Bodie et al., 2022; Fabozzi et al., 2021).

Asset Demand Theory gives a comprehensive framework for comprehending how individuals and institutions allocate their wealth among various assets. Mishkin (2019) said that before analyzing supply and demand in bond markets and money markets, it is important to know the factors determining the demand for an asset. An asset is a part of property that stores value, including cash, bonds, stocks, art, land, homes, agricultural equipment, and manufacturing machinery. Asset demand theory presents a comprehensive model for analyzing how investor preference, risk perception, and market inefficiency impact sovereign bond yields. In ASEAN countries and other emerging markets, sovereign bond yields generally include some risk premium, liquidity premium, and sensitivity premium to investor sentiment (Li, 2021).

Sovereign bonds are often regarded as "safe assets" due to their government guarantee. Therefore, in times of global risk aversion, this feature usually raises the demand for sovereign bonds, driving up their price while lowering their yield. New research finds that a diverse pool of foreign investors may lead to reduced volatility and tighter sovereign yield spreads Conterius et al. (2023); Ocampo et al. (2025). However, these stabilizing effects are typically more pronounced in advanced economies. Meanwhile, emerging economies like Indonesia, Malaysia, and Thailand tend to be highly vulnerable to abrupt capital outflows, which could result in rising yields. Meanwhile, emerging economies like Indonesia, Malaysia, and Thailand tend to be highly vulnerable to abrupt capital outflows, which could result in rising yields(Ho, 2022; Rogers et al., 2025). Although relatively higher yield spreads in developing Asia continue to attract foreign investors and reduce home bias (Tanaka et al., 2025), foreign participation also introduces additional vulnerabilities. In stable conditions, it can enhance market depth, yet during periods of external shock, it may intensify volatility in domestic bond markets.

Foreign participation in domestic government bond markets is defined as the section of domestic government securities held by non-residents. An escalated presence of foreign investors can also lead to higher volatility in local bond markets. Foreign investors provide the development of liquid measurement, leading to an increase in liquidity in secondary markets. Therefore, foreign participation in the domestic government bond market can serve a solid proxy for foreign involvement in the local currency domestic bond market.

Christensen et al. (2021) stated that higher foreign ownership of Mexican government bonds is significantly and positively associated with rising liquidity premiums in the Mexican bond market. Meanwhile, Liu (2020) discusses how declines in government bond yields are related to increases in the proportion of foreign investments. This indicates that the reduction in yields is associated with the rising number of foreign investments in the government bond market, where lower correlation can enhance diversification effects, thus reducing risk and increasing risk-adjusted returns. In less developed bond markets, foreign participation can increase yields by adding volatility, especially during periods of global financial stress. Based on this reasoning, the following hypothesis is proposed:

H_1: Foreign participation influences government bond yields.

Foreign investment in local bond markets will promote trading and increase market liquidity; thereby facilitating risk-sharing among domestic and foreign investors will be achieved. However, there is an element of vulnerability involved. Foreign investment in underdeveloped local currency bond markets might exacerbate the risks associated with capital flows and make market liquidity less stable in the long term (Marozva & Makoni, 2021; Beirne et al., 2024).

According to Park et al. (2019), the active participation of foreign holding facilitates market liquidity and depth and enhances market efficiency by incorporating information into bond prices via trading. Based on the above discussion, the research hypothesis is as follows:

H_2: Foreign participation affects market liquidity.

In less developed ASEAN bond markets, higher liquidity risk leads to higher yields as compensation for potential trading challenges. This is partly true for countries with poor financial and institutional development (Hartini & Hanggraeni, 2021). Tsang et al. (2021) show that volatile liquidity conditions, especially amid financial uncertainty, increase bond yields due to heightened risk aversion. Therefore, the research hypothesis is as follows:

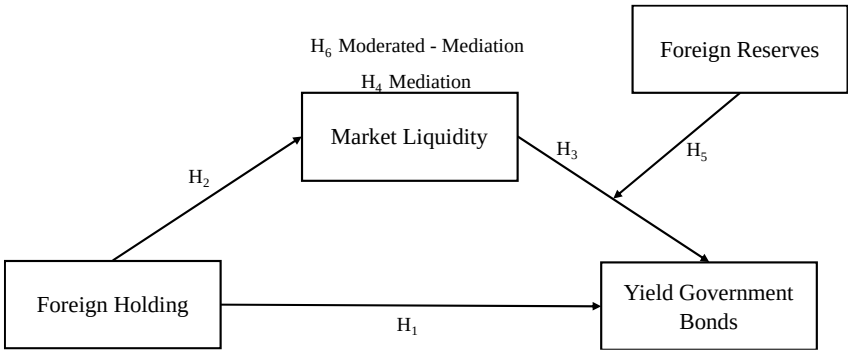
H_3: Market liquidity influences government bond yields.

Petitt (2019) said that liquidity premiums exist to compensate investors for the additional interest rate risk they have when lending for longer maturity, and these premiums grow with the maturity of the loan. In this context, fluctuations in government bond yield movements could be seen as being due to changes in liquidity in the market, where the yields take into account both the liquidity and the risks that have been priced by the investors. In the ASEAN countries, the relationship may not be consistent, as differences in the levels of liquidity due to different levels of development in their financial markets affect the sovereign bond yields differently (Uddin et al., 2023). Therefore, the research hypothesis is as follows:

H_4: Market liquidity mediates the relationship between foreign participation and government bond yields.

Kariyawasam & Jayasinghe (2022) stated that for countries strongly dependent on imports with high trade deficits, the foreign reserve ratio is an important liquidity indicator that measures the capability to purchase imported goods for consumption and investment. Kariyawasam & Jayasinghe (2022) also found a negative effect of foreign reserves; an increase in the reserve-to-import ratio reflects increased debt servicing capacity and thus reduces the sovereign bond spread in Sri Lanka. Meanwhile, Gumata & Ndou (2021) shows that the total of foreign currency reserves strengthens the weakening in bond yields, interest costs, and inflation more significantly under conditions of low debt growth compared to high debt growth conditions. This shows a positive government bond yield-lowering impact of foreign reserves, especially under low debt growth conditions.

Figure 1 Conceptual Framework of the Study



Source: Processed by the authors

Extreme accumulation of reserves might exhibit a traditionary fiscal policy, which may result in increasing bond yields by lowering domestic liquidity or increasing government dependence on debt financing (Kumamoto & Zhuo, 2020). When reserve accumulation accompanies inflationary pressures, bond yields may increase due to increased monetary policy tightening (Santosa, 2021). Thus, the research hypotheses are as follows:

H_5: Foreign Reserves moderate the relationship between market liquidity and bond yields.
H_6: Foreign Reserves moderate the indirect influence of foreign holdings on bond yields through market liquidity.

The conceptual framework presented in Figure 1 illustrates the dynamic relationship among the key variables, with particular emphasis on the direct effect of foreign holdings on bond yields.

METHODS

This study draws on secondary data obtained from Asian Bonds Online and CEIC, using quarterly observations spanning from Q1 2009 to Q4 2023. The sample focuses on Indonesia, Malaysia, and Thailand, selected based on data completeness and the relatively developed nature of their local currency bond markets (Asian Development Bank, 2024). Singapore is excluded due to its advanced market status, while the Philippines and Vietnam are omitted because of incomplete or inconsistent data for key variables such as foreign holdings and bond turnover ratios.

Sovereign borrowing costs are represented by quarterly yields on 10-year Government Bonds, sourced from CEIC and Asian Bonds Online. The empirical strategy combines panel data regression, moderated mediation analysis using the Sobel test, and Panel Threshold Regression (PTR). These methods are implemented using EViews and STATA, both of which are well suited for handling time-series cross-sectional financial data by Ahmed (2021) and Steiner (2016). This model allows for the consideration of either fixed effects or random effects, with model selection based on the Hausman test results. Independent variables are tested to identify their direct influence on the dependent variable, while the Sobel test is employed to examine the significance of the mediating effect of market liquidity in the relationship between foreign ownership and bond yields.

Basic Model: The following panel data regression model will be used as the basic model:

$$Yield_{it} = \beta_0 + \beta_1(Holdings_{it}) + \beta_2(Liquidity_{it}) + \epsilon_{it} \quad (1)$$

Moderation Model: To test the influence of moderation, interactions between the moderation variable and independent variables are added, generating the following model:

$$Yield_{it} = \beta_0 + \beta_1(Holdings_{it}) + \beta_2(Liquidity_{it}) + \beta_3(Reserves_{it}) + \beta_4(LiquidityxReserves_{it}) + \epsilon_{it} \quad (2)$$

Accordingly, this study adopts estimation techniques that are more appropriate for long-panel techniques. To examine the presence of a long-run equilibrium, the Pedroni Residual Cointegration Test is employed, complemented by a panel vector autoregression (VAR) framework. The estimators are still statistically reliable even though the residuals do not follow a normal distribution. For the homoskedasticity check, Glejser test is used. This was done by regressing the absolute residuals against the independent variables. The results showed p-values between 0.133 and 0.472. Since these numbers are higher than 0.05, there is no sign of heteroskedasticity. This means the assumption of constant error variance is met. Regarding multicollinearity, it is not a problem in this model. The VIF values are between 1.024 and 6.302, which is lower than the limit of 10. Also, the tolerance values are all above 0.1. All these points prove that the explanatory variables are independent enough, as shown in Table 1.

Table 1 VIF and Tolerance Values

Variable	Tolerance	VIF	Centered VIF
Holdings	0.9770	1.0240	1.0236
Liquidity	0.9600	1.0410	1.0413
Reserves	0.1590	6.3020	6.3017
LxR (Interaction)	0.1600	6.2610	6.2614

Source: Processed by the authors

RESULT AND DISCUSSION

Descriptive statistics in Table 2. This data covers quarterly periods for Indonesia, Malaysia, and Thailand from 2009 until 2023. In the table, we show the basic details such as the mean, standard deviation, and the range (min-max) for each variable. Through an examination of the 10-year government bond yields in these three countries, we get an early look at the trends and how volatile things are. This is important because it shows what affects sovereign borrowing costs across this region.

According to the descriptive statistics, Indonesia has the highest average for Foreign Holdings at 29.8%. Malaysia follows at 25.4%, and Thailand is the lowest at 13.3%. This high percentage in Indonesia shows that its bond market is quite attractive, even though the numbers change a lot over time. For market liquidity, Thailand has the best average turnover ratio at 0.606167. Meanwhile, Malaysia's liquidity seems more unpredictable. If we look at Foreign Reserves, Malaysia shows the most movement with an average change of 4.403490. This might mean their policy is more active when facing external pressure. On the other hand, the reserves in Indonesia and Thailand are much more stable.

The bond yields also show a big gap between these countries. Indonesia's 10-year government bond yield is the highest at 7.6%, which suggests a lasting risk premium. In contrast, Thailand stays low and

steady at an average of 2.8%. These different borrowing costs are linked to how many foreign investors are involved, as seen in Figure 2. Indonesia always has the biggest share of foreign investors in local bonds, but this has been dropping slowly since the 2015 peak. Malaysia stays quite stable in terms of foreign participation, while Thailand has a flatter trend because fewer foreigners enter their bond market.

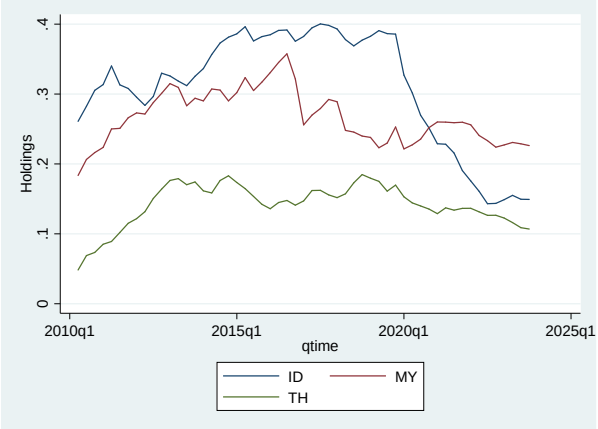
Figure 3 also highlights the volatility of these 10-year yields. Because Indonesia has a higher risk profile, its yields stay much higher than Malaysia or Thailand. All three nations saw yields decline before 2015, but things became more unstable after that. This volatility got worse during the COVID-19 pandemic and when global monetary policies started to tighten. During that time, bond yields reacted quickly as investor feelings and risk perceptions changed.

Table 2 Descriptive Statistics for Indonesia, Malaysia, and Thailand

Variable	Metrics	ID	MY	TH
FH (Foreign Holdings)	Mean	0.298255	0.254368	0.132683
	Std. Dev.	0.088343	0.054052	0.042153
	Min	0.143100	0.100100	0.024300
	Max	0.400300	0.357500	0.184800
ML (Market Liquidity)	Mean	0.604000	0.412000	0.606167
	Std. Dev.	0.140027	0.204805	0.186358
	Min	0.290000	0.150000	0.260000
	Max	1.130000	1.080000	1.010000
FR (Foreign Reserves)	Mean	0.556362	4.403490	0.414141
	Std. Dev.	3.507151	29.700530	4.592027
	Min	-3.208906	-33.642910	-23.641800
	Max	19.170890	224.850300	20.757540
Yield	Mean	0.076158	0.037850	0.028570
	Std. Dev.	0.013192	0.003879	0.008150
	Min	0.054755	0.026103	0.012867
	Max	0.126937	0.042687	0.012867

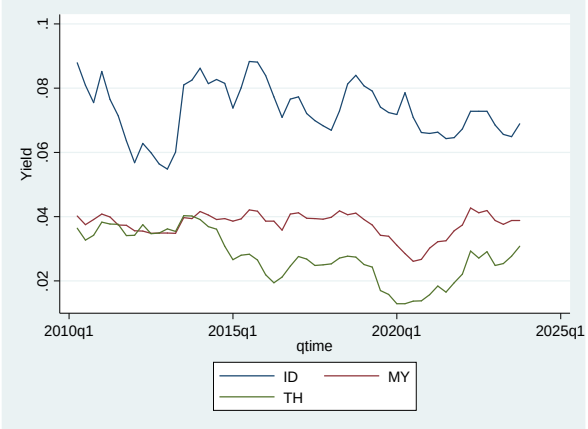
Source: Processed by the authors

Figure 2 Foreign Participation Levels in LCY Sovereign Debt Markets



Source: Processed by the authors

Figure 3 Movement of 10-Year Government Bond Yields in ASEAN-3 (2010Q1–2023Q4)



Source: Processed by the authors

All these observations show that the link between foreign investor activity and yield changes in ASEAN-3 varies across countries. Indonesia is a very interesting example. Even though foreign ownership is high, the yields also stay high. This suggests that there is a tricky balance between strong demand from investors and how they perceive risks. Because of this pattern, using a non-linear framework for the analysis is more appropriate. It seems the impact of foreign participation changes after it hits a certain level. In the end, these trends support the main idea of this research. The way government bond yields behave in ASEAN-3 depends on both local market conditions and how much foreign investors are involved.

Regarding long-term linkages, the Pedroni residual cointegration test indicates no stable equilibrium between foreign holdings, liquidity, reserves, and bond yields. With all probability values for the Panel v, rho, PP, and ADF statistics exceeding 0.05, the null hypothesis of no cointegration cannot be rejected. This absence of a long-term relationship suggests that the interactions are more dynamic and regime-dependent, further validating our focus on threshold effects.

Based on the cointegration test results shown in Table 3, no significant long-term relationship existed between foreign holdings, market liquidity, foreign reserves, and 10-year government bond yields in the

ASEAN-3 markets. This shows that these variables do not move altogether in a stable long-term equilibrium, suggesting that fluctuations in foreign ownership, liquidity, and reserves do not produce a consistent long-term pattern in influencing bond yields. Besides, bond yields in the region emerge to be more responsive to short-term factors compared to sustained macroeconomic fundamentals. These findings are in line with Rogers et al. (2025) and Ho (2022), debate that emerging market bond yields are largely influenced by global risk appetite and volatile capital flows, rather than structural economic conditions. The search-for-yield behaviour has become more pronounced since the 2008 global financial crisis, with foreign investors showing a preference for local-currency-denominated bonds over US dollar-denominated bonds in developing Asia (Tanaka et al., 2025).

Table 3 Pedroni Residual Cointegration Test Results

Statistic	Value	Prob.	Weighted Value	Weighted Prob.
Panel v-Statistic	-1.150347	0.8750	-1.121043	0.8689
Panel rho-Statistic	1.776636	0.9622	1.617456	0.9471
Panel PP-Statistic	1.870257	0.9693	1.330515	0.9083
Panel ADF-Statistic	1.890183	0.9706	1.016467	0.8453

Source: Processed by the authors

Table 4 Impulse Response Function (IRF) Results

Period	D(HOLDINGS)	D(LIQUIDITY)	D(RESERVES)	D(YIELD)
1	-0.000794	-0.001053	-1.43E-05	0.003482
2	-0.000498	-0.000117	-0.000181	0.000759
3	-0.000219	-9.17E-05	5.09E-05	1.54E-05
4	-9.02E-05	4.08E-06	-2.84E-05	-5.91E-06
5	-3.38E-05	-1.00E-05	1.43E-05	-3.15E-06
6	-1.24E-05	2.53E-06	-6.05E-06	-2.22E-06
7	-4.46E-06	1.47E-06	3.32E-06	-8.51E-07
8	-1.51E-06	6.06E-07	-1.42E-06	-3.83E-07
9	-5.53E-07	-2.70E-07	7.53E-07	-8.16E-08
10	-1.70E-07	1.29E-07	-3.37E-07	-8.16E-08

Source: Processed by the authors

As shown in Table 4, bond yields in ASEAN-3 drop sharply when there is a shock in foreign holdings. This effect is strongest at the start (-0.000794) and then fades away. We saw a similar but smaller negative reaction from market liquidity (-0.001053), while foreign reserves had almost no impact. These results suggest that short-term investor actions drive yield movements more than long-term factors. The fact that these responses are temporary is consistent with Conterius et al. (2023) and Ocampo et al. (2025), who noted that the stabilizing effect of foreign investors depends on market depth and often does not last. For policy, this means governments must be quick and flexible in managing capital flow volatility.

For the non-linear part, the Panel Threshold Regression (PTR) found a key threshold at 10.2% foreign ownership. When participation is below this level, yields are very sensitive to foreign flows (coefficient of 0.185). This might happen because of market fragility. But once it passes 10.2%, this sensitivity drops to 0.035. This change shows that as the market gets deeper, the impact on yields becomes smaller. This behaviour matches the "ability-to-exit" theory and the law of diminishing marginal effects. You can find the full testing results and their statistical basis in Tables 5-9.

Table 5 Impact of Foreign Holdings and Market Liquidity on Government Bond Yields (H1 & H3)

Model	Variable	Coeff.	Std. Error	t-Stat	Prob.	R2	Conclusion
Fixed Effect	Holdings	-0.02350	0.0106	-2.2015	0.0290	0.8395	Significantly negative
	Liquidity	-0.00050	0.0038	-0.1317	0.8953		Not significant

Source: Processed by the authors

Table 5 shows that the foreign holdings coefficient is -0.02355, indicating that each unit increase in foreign holdings decreases the government bond yield by 0.02355 points. The significance at $p < 0.05$ indicates that this relationship is statistically valid. For the liquidity variable, the small and insignificant coefficient (-0.000508, $p > 0.05$) suggests that increases in the bonds turnover ratio do not significantly affect the yield.

Table 6 Regression Results for the Impact of Foreign Holdings on Market Liquidity (H2)

Model	Coeff. (Holdings)	Std. Error	t-Stat	Prob.	R2	Conclusion
Random Effect	-0.235102	0.2056	-1.1434	0.2544	0.00733	Not significant

Source: Processed by the authors

The negative coefficient value in Table 6 indicates that an increase in foreign holdings is negatively related to market liquidity (H2). This implies that as foreign investors hold more government bond, the market liquidity for bonds (measured by the bonds turnover ratio) tends to decrease. However, given that the probability value is greater than 0.05 (not significant), this relationship cannot be statistically generalized.

Table 7 Indirect Effect (Mediation) of Foreign Holdings on Yield through Market Liquidity (H4)

Mediating Variable	Indirect Coefficient	z-Value (Sobel Test)	Conclusion
Market Liquidity	0.0001	0.896 < 1.973	No significant mediation

Source: Processed by the authors

Market liquidity does not mediate the impact of foreign holdings on government bond yield (H4 - Table 7). The indirect effect is very small (0.0001) and statistically insignificant, indicating that market liquidity does not mediate the impact of foreign holdings on government bond yield.

Table 8 Regression Results with Moderation by Foreign Reserves (H5)

Model	Variable	Coeff	Std. Error	t-Stat	Prob.	Conclusion
Fixed Effect	Holdings	-0.0239	0.0107	-2.2150	0.0281	Significantly negative
	Liquidity	-0.0005	0.0039	-0.1367	0.8914	Not significant
	Foreign Reserves	-6.26E-06	9.90E-05	-0.0632	0.9496	Not significant
	Liquidity*Foreign Reserves	-7.74E-05	0.0003	-0.2164	0.8289	Not significant
R2	0,84					

Source: Processed by the authors

Foreign holdings continue to have a significant negative effect on yield (H5 - Table 8). Neither foreign reserves nor their interaction with market liquidity shows significant effects. In tune with previous findings, the coefficient of -0.023915 shows that foreign holdings significantly reduce government bond yields. This describes that the existence of foreign investors raises the demand for bonds, thereby suppressing yields. The coefficients for foreign reserves and their interaction with market liquidity are very small and statistically not significant, indicating that interference throughout foreign reserves does not significantly affect bond yields. Interventions via foreign reserves may not be substantial or consistent enough to affect long-term risk expectations. Therefore, yields are more affected by economic fundamentals in the long run. The R-squared value of 0.84 shows that this model can explain 84% of the variation in government bond yields. The coefficient for foreign holdings remains significant (-0.023915), indicating that the direct influence of foreign ownership on yield does not depend on the interaction between market liquidity and foreign reserves.

Table 9 Indirect Effects through the Interaction of Market Liquidity with Foreign Reserves (H6)

Mediating Variable	Indirect Coefficient	z-Value (Sobel Test)	Conclusion
Interaction of Market Liquidity & Reserves	0.0001	0.8525 < 1.973	No significant mediation

Source: Processed by the authors

The interaction between market liquidity and foreign reserves (H6) yielded an insignificant coefficient, indicating that reserves do not moderate the impact of liquidity on bond yields. Based on these results in Table 9, market liquidity does not act as a reliable mediator between foreign ownership and bond yields, even with foreign reserves included. However, this lack of a linear mediation effect doesn't make the study less important. On the contrary, it confirms the need for a threshold-based approach was necessary. The bond markets in ASEAN-3 clearly follow asymmetric and regime-dependent patterns instead of simple linear ones. Based on the empirical findings outlined in the tables above, a summary of the research findings is presented in Table 10.

This study examines the relationships between foreign ownership, the mediating role of bond market liquidity, and the moderating role of changes in foreign reserves on the yields of 10-year government bonds in three ASEAN countries: Indonesia, Malaysia, and Thailand. The research confirms that foreign holdings have a significantly negative influence on government bond yields (H1). Liu (2023) explains that more foreign investors in China's bond market can lead to lower borrowing costs for the government. At the same time, Ocampo et al. (2025) found that a bigger share of these investors helps stabilize emerging markets by cutting down both yields and volatility. However, Liu (2023a) also gives a warning: too much foreign exposure might make the market more volatile in the end. Looking at the ASEAN-3 region, foreign

ownership levels are around 30% in Indonesia, 20% in Malaysia, and 10% in Thailand. These numbers seem to be in a range where the risks can still be managed. This situation matches the asymmetric effect found by Conterius et al. (2023), which shows that yields drop more when foreign ownership goes up compared to how much they rise when it goes down.

Table 10 Summary of Research Findings

Hypothesis	Result	Relationship with Theory/Literature	Findings
H1: Foreign Holdings → Yield	-0.0235 (0.029) *	Supports Term Structure and previous research	New empirical evidence of a negative relationship in ASEAN-3
H2: Foreign Holdings → Liquidity	-0.2351 (0.2544)	Contradicts Asset Demand Theory	No significant effect of foreign ownership on liquidity
H3: Liquidity → Yield	-0.0005 (0.8953)	Market liquidity does not directly affect yield	Not relevant for long-term bond markets in ASEAN-3
H4: Mediation Liquidity	0.0001 (Sobel z = 0.896)	Does not support mediation	Market liquidity does not mediate the relationship between Foreign Holdings and Yield
H5: Moderation Reserves	-7.74E-05 (0.8289)	Contrary to the view on stability provided by the foreign reserve	Foreign reserves intervention does not affect long-term bond yields in ASEAN-3
H6: Indirect Effects through the Interaction of Market Liquidity with Foreign Reserves	0.0001 (Sobel z = 0.8525)	Does not support moderation	New evidence that the interaction between Liquidity & Foreign Reserves is not relevant in the ASEAN-3 context

*Indicates statistical significance at $p < 0.05$.
Source: Processed by the authors

From a theory standpoint, like Asset Demand Theory or the Term Structure of Interest Rates, more foreign participation increases bond demand. This builds market confidence and helps lower the yields. Still, even though getting foreign capital is important, policymakers need to keep the macroeconomy stable. They should also grow the domestic financial markets to avoid future problems. Result found a negative relationship, but the coefficient was not statistically significant ($p > 0.05$) and H2 is not supported. Asset demand theory suggests that investors demand a liquidity premium for bonds with low liquidity, which may reduce trading frequency in the secondary market, thereby reducing market liquidity even when foreign ownership increases. ASEAN-3 markets are characterized by lower liquidity compared to developed countries. As observed by Rintu & Prasanna (2020), this may be due to the shortage of market depth, foreign investors' preference for long-term holdings, and high trading costs. This is in line with the findings of this study, which exhibit that foreign holding does not significantly increase the bond turnover ratio. Therefore, the bond turnover ratio may not sufficiently reflect liquidity complexities, such as trading costs, which are relevant for long-term bonds.

In theory, an asset is more attractive if it has higher liquidity, because it can be sold quickly without much loss. However, our empirical results show that market liquidity (using the Bonds Turnover Ratio) does not have a statistically significant effect on bond yields in ASEAN-3. This means H3 is not supported. In relatively shallow markets, liquidity seems to play a smaller role than the long-term preferences of investors. It looks like many investors use a "buy-and-hold" strategy. Because of this, how often a bond is traded becomes less important in deciding the yields. These results match the findings of Kinateder et al. (2020), showed that bond markets in ASEAN-3 (except Singapore) have lower liquidity and more yield curve deviations compared to advanced economies. In this situation, the secondary market is not deep enough to have a strong impact on yields. Instead, yields are shaped more by structural factors, such as the quality of institutions and market infrastructure, rather than trading for arbitrage. This indicates that in emerging markets, bond yields depend more on macroeconomic conditions than on the volume of transactions in the secondary market. Because of this, H4 is rejected.

Market liquidity does not work as a major channel to pass the effects of foreign holdings onto bond yields. Instead, things like investor confidence and macroeconomic risk are the main drivers. In the same way, changes in foreign reserves do not have a statistically significant impact on 10-year government bond yields, so H5 is also not supported. Even though reserves are important for keeping the exchange rate stable, small changes in their levels are not enough to change how investors see long-term risk. Also, we found no evidence that liquidity or reserves act as mediating or moderating variables between foreign ownership and yields (H5 and H6). This shows that reserves have a limited role in affecting long-term debt in emerging markets. It is possible that the influence of reserves is cancelled out by other factors, like inflation or interest rate policies, as noted by (Saraan et al., 2023). Based on the Term Structure of Interest Rates, long-term yields depend more on expectations for economic growth and fiscal health rather than short-term policy

moves. This explains why foreign ownership can lower yields quickly without creating a stable, long-term balance. These results match Conterius et al. (2023), who found that the effect of foreign participation is stronger in the short run. This highlights how bond markets in developing countries can be very time-sensitive and volatile.

The analysis suggests that 10-year government bond yields in ASEAN-3 are far more sensitive to long-term, and the fact that market liquidity is not significant suggests that "buy-and-hold" behavior is common among bondholders. For these investors, long-term goals are more important than trading frequently in the secondary market. Also, while foreign reserves help with short-term stability, they don't seem to affect long-term yield expectations much. This means that even though foreign participation helps lower borrowing costs, the roles of liquidity and reserves are quite limited.

To go beyond simple linear ideas and catch asymmetric market reactions, we used a Panel Threshold Regression (PTR). The results prove that foreign holdings have a strong negative effect on bond yields (H1). This matches the findings of Conterius et al. (2023) and Liu (2023b). On the other hand, market liquidity (H2, H3) and foreign reserves (H5, H6) do not work as significant mediators or moderators. This shows that yield movements in ASEAN-3 are tied more to macroeconomic outlooks than to secondary market conditions.

The PTR analysis also found a specific non-linear threshold at 10.2% foreign ownership. Below this 10.2% level, more foreign participation actually leads to higher yields (coefficient: 0.185, $p < 0.01$). This might happen because low foreign interest is seen as a sign of market weakness. However, once foreign ownership passes this 10.2% mark, the relationship changes. At this point, foreign ownership starts to lower the yields (coefficient: -0.035, $p < 0.01$). This shift proves that as the market grows and more investors join, foreign inflows start to stabilize things. This result fits with Asset Demand Theory and Preferred Habitat Theory. Full summary of these threshold estimates in Table 11. These findings explain why the same amount of foreign investment can cause different reactions in different countries.

Table 11 Summary Threshold Regression Results

Country	Threshold (%)	Holdings Group	Coeff.	t-Stat	p-Value	Significance
ASEAN-3 Panel	10.2%	≤ 10.2% (Low)	0.185	4.67	0.000*	Significant
		> 10.2% (High)	0.035	3.75	0.000*	Significant
ID	32.9%	≤ 32.9%	0.005	0.28	0.781	Not Significant
		> 32.9%	-0.182	1.94	0.052***	Significant
MY	25.0%	≤ 25%	0.021	0.40	0.691	Not Significant
		> 25%	0.053	2.21	0.027**	Significant
TH	13.1%	≤ 13.1%	-0.121	1.94	0.052***	Significant
		> 13.1%	0.293	4.41	0.000*	Significant

*) Indicates statistical significance at $p < 1\%$
**) Indicates statistical significance at $p < 5\%$
**) Indicates statistical significance at $p < 10\%$
Source: Processed by the authors

Indonesia has a fairly high threshold at 32.9%, which shows its long history of relying on foreign investors. When foreign ownership exceeds this point threshold, yields tend to decline (coefficient: -0.182, $p < 0.10$). However, below this level, there is no significant link. This pattern likely happens because Indonesia has a strong fiscal and macro framework, including good inflation targeting and debt management. These factors help the country handle shifts in foreign capital more effectively. In Malaysia, we found the threshold at 25%. Below this mark, foreign participation doesn't really affect the yields. But once it goes over 25%, the impact becomes positive and significant (coefficient: 0.053). This suggests that in Malaysia, high foreign exposure is seen as a risk, perhaps due to exchange rate concerns or fears of sudden capital outflows. This result matches the currency risk premium idea from Ho (2022), where more foreign involvement can widen spreads during tough times. Thus, the rise in yields seems to be a compensation for capital flow risks.

Thailand shows the most extreme asymmetry, with a very low threshold of 13.1%. Above this level, yields jump sharply (coefficient: 0.293), but below it, the effect is slightly negative (-0.121). This suggests Thailand is very sensitive to capital volatility, possibly because of its liberalized capital account. These findings support the “ability-to-exit” hypothesis (Chatterjee et al., 2023), which says that if investors can leave quickly, it can cause price instability. Thailand might need stricter macroprudential rules to handle it. Overall, these results prove that the link between foreign holdings and bond yields is not a straight line. It depends a lot on the situation. At low levels, yields might stay high because the market is too shallow. But after passing certain thresholds, the results differ: yields might drop because of high demand (like in

Indonesia) or rise because of risk premiums (like in Malaysia and Thailand). This suggests that policymakers should try to keep foreign participation in a balanced range to get the funding they need without becoming too vulnerable.

CONCLUSION

The empirical results show that the impact of foreign investments in the ASEAN-3 markets is significantly negative on the 10-year sovereign bond yield, and its threshold effect occurs at 10.2%. For levels below the threshold, the effect is relatively stronger compared to those the threshold. This finding contributes to the literature on term structures by proving that the advantages gained from capital flows depend on the state of the regime, thereby surpassing the conventional linear model assumptions. Additionally, neither market liquidity nor foreign reserves can influence the relation between the two variables, implying that yield changes are primarily determined by economic sentiments rather than temporary instruments. The results also provide additional insights regarding each country: Indonesia is relatively resilient in that the threshold is high (32.9%), Thailand is more vulnerable in that the threshold is low (13.1%), and Malaysia is riskier in that yields increase once foreign investment exceeds 25%.

There are several limitations of the current paper. Firstly, market liquidity is captured only with the help of the turnover ratio of bonds, which may not be sufficient as it does not measure transaction costs and market depth. Secondly, no behavioural factors have been incorporated into the model in order to determine why threshold effects differ among countries. Thirdly, severe crises have not been considered. The abovementioned limitations can be solved in the future through the application of regime-switching time-series models, which can allow one to assess the behaviour of yields in periods of severe stress. Furthermore, additional variables, including qualitative ones, like investor sentiment, should be used in order to achieve a fuller comprehension of threshold effects. In terms of policy implications, the results obtained show that keeping foreign participation within an optimal range is vital for achieving the optimal balance between low cost of borrowing and financial stability. At the same time, it should be kept in mind that developing institutional and market depth is also critical from this point of view.

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