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An Analysis of the Determinants of Corporate Bond Yield Spreads in Thailand

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ABSTRACT

The research aims to 1) study the different characteristics of corporate bonds traded in bond market. 2) investigate the ability to repay obligations of bond issue 3) study the change in economic conditions within the study period and 4) examine the impact of change in important factors on yield spreads. The research is quantitative research and empirical research. This thesis will analyze the correlation between sources of risk and yield spreads, preliminary data analysis with descriptive analysis. This thesis will employ Altman Z-score as a proxy of the default risk of issuer instead of one particular ration. The Altman Z- score is calculated as bond issuer, hypothesis testing using regression.

The results of the research revealed that investigating the long run relationships from rating portfolios, it is found that coupon rate has a positive effect of yield spreads. Increase in coupon rate leads to higher income tax payment. So, reduce in coupon rate will decrease the risk of bonds. The time to maturity is a positively determinant of yield spreads except quarterly AA portfolio. Increasing in Altman Z-score under ceiling three still shows the high default risk of bond issuers. The effect of stock prices volatility of issuer is the same direction of bond risk. The volatility of bond market is positively significant on yield spread except AA-rated bonds. The negative effects might happen because the returns from these bonds have an opposite direction with the bond market. Short-term interest rates and long-term interest rate, have the same effects on yield spreads similarly to long run, the bond market volatility effects on yield spreads only in short run, investigating long run relationship of time of maturity portfolios, default risk measured by Altman Z-score has positive effects parallel with rating portfolios. Moreover, there are consistent results of increase in short term interest rate. In addition, the effect of business sentiment index has negative relationship with yield spreads. Therefore, coupon rate is a negatively determinant of yield spreads for those bonds aged more than five years. In short run effects of time to maturity portfolios, coupon rate, default risk short-term market interest rate risk, and business sentiment index, have the sign as long run relationship, increasing in GDP growth leads to increase in bond risk, it might be implied that if GDP growth grows up, investor expect the economic downward in the future. Moreover, if the volatility of bond market is higher, the risk of bond will increase. The risk of term structure of interest has negative influencing on yield spreads which is different from the equilibrium's results as well. Future more, short run relationship of time to maturity portfolio presents the interesting issues. The lag of yield spreads is able to describe risk. If the yield spreads increase in the previous period, the current yield spread will increase.

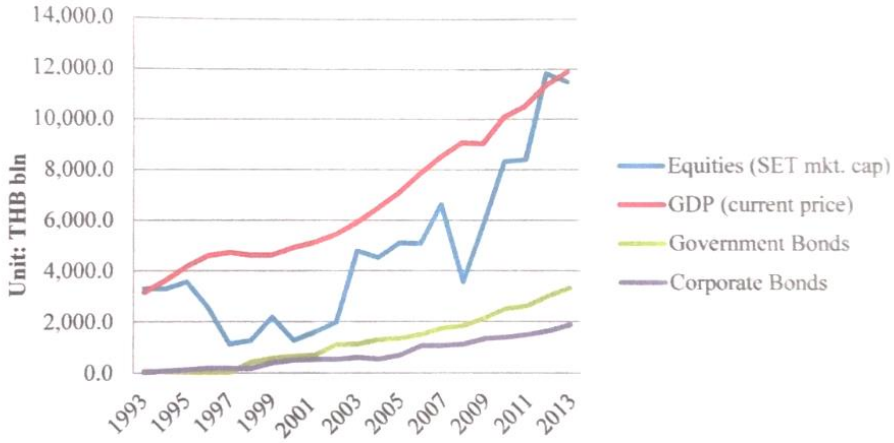
Introduction

This research investigated yield spreads on Thai bonds with a view to informing bond investment decisions Data consisting of 1.093 corporate bonds with 428 listed issuers gathered quarterly and monthly over the period October 2015 to December 2022 were analyzed using ARDI-VEC approach To study the determinants of yield spreads, the variables were divided into three groups: bond characteristics, issuer performance and macroeconomic factors. Higher spreads logically indicate higher risks Empirical results indicate significant factors are default risk measured by Altman Z-Score and short-term market interest rates

Although Thai investors have had access to debt securities since 1933, most securities have been issued by the government to fund basic infrastructure within the country and the government has also issued loan bonds over the years. More recently, in 1992, the government legislated to permit corporations to issue bonds. However, the trade volumes are low because almost all transactions are traded in Over the Counter (OTC) markets. The primary dealers in the bond market are currently limited to commercial banks and financial institutions. Moreover, scarcity of information caused a reluctance to invest by individuals and institutions. However, due to the economic crisis in 1997, the Thai government needed to ensure a quick and well-regulated recovery in economic activity. Therefore, the government decided to develop a serious bond market. For example, in 2003, the Thai government passed the Securitization Act in order to support securitization in Thailand and the Securities and Exchange Commission of Thailand also issued regulations which gave permission for financial institutions and commercial banks in Thailand to issue structured notes with their prices depending on changes in their underlying assets. Moreover, the Bank of Thailand in 2015 issued rules authorizing commercial banks to process the securitization which helped the banks to expand channels of money mobilization and increase liquidity (Gorton and Souleles, 2005). With these acts, the Thai government anticipates that economic development will be accelerated.

Despite the support from the Thai government, corporate bonds have not been widely issued in Thailand. The size of Thai Financial markets presented in Figure 1.1 demonstrates that the size of corporate bonds increases dramatically. However, its size is the smallest comparing with value of stock market and government bonds. In addition, in 2022, the size of corporate bonds is about 16.77% of GDP. These figures indicate that the Thai bond market still shows low liquidity. Thus, the government is willing to stimulate bond issuance by corporations in order to establish economic stability and to eliminate the liquidity risk in the bond market.

Size of Thai Financial Markets from 2013 to 2022



Source: http://www.thaibma.or.th

Investors will assess the risks so as to identify their required return. These risks are liquidity risk, time to maturity risk, default risk and so on. Therefore, corporate bonds should provide a yield which can compensate for those risks. Generally, the investors will consider the yield of bonds by comparing with a benchmark that is usually government bonds and calculating yield spreads. Understanding the significant factors that affect the spread of bond yields can help investors enhance their confidence in undertaking investment.

The yield spreads can represent the risks of the individual corporate bonds (Martellini, 2019). The investors will consider yield spreads before making investment decisions. At least, those yield spreads have to compensate for the possible risks of the bonds. Thus, many scholarly researchers have tried to develop yield spread models to identify the factors influencing the yield spreads and their movement. These studies are able to assist investors in selecting the appropriate bonds and also help the issuers to monitor their risks arising in the market.

Objective

Bonds are valued by discounting expected future cash flows with the appropriate discount rate. The investor is able to identify their required rate of return or market interest rates as discount rates so as to calculate the intrinsic values of a bond. However, the obtained values are a theoretical technique and they are inconsistent values. In practice, the investors have to make immediate decisions. Thus, investors need to select the right securities with acceptable risks within time constrain. Yield spreads can represent the risk of a particular bond. Risky bonds will have wide spreads and the riskless bonds otherwise. Using yield spreads as justification of risks, it is also to assess whether factor is able to be a proper indicator of bond risks. The main objectives in this research are as follows:

1. To study the different characteristics of corporate bonds traded in the bond markets
2. To investigate the ability to repay obligations of bond issuers
3. To study the change in economic conditions within the study period
4. To examine the impacts of change in important factors on yield spreads

Significance of the study

The empirical results of this study are expected contributions as follows:

- The empirical research on determinants of yield spreads is mostly conducted in development countries, especially in US. This study will contribute to the literature of Thailand as an emerging market context.
- This study will formulate econometric models which will investors to choose securities with confidence.
- Finding the significant factors on yield spreads will assist the investors to manage their portfolios. The proportion of each security will be adjusted quickly when the over risks have been changed. Consequently, the bond market will be more liquid.
- the empirical results from this study will inform the policy makers and concerned parties about the results of regulation related to the hood market. In addition, this research will assist policy makers to regulate the rules in order to improve the Thai bond market.

Research Methods

Data sources

To identify the determinants of yield spreads, the factors related to the risks of investment in corporate bonds are investigated. The risks can be classified into idiosyncratic and systematic risks. The sources of idiosyncratic risks are the difference in security features and the issuers. The changes in macroeconomic factors lead to changes in systematic risks. To investigate the relationship between the risk and return, data are collected from several sources as describes below:

Thai Bond Market Association (Thai BMA) was officially established in July 2015 to develop the Thai bond market. This organization has been gathering and providing information about fixed income securities for the investors. The Thai BMA contribute basic information of bond trading in Thailand by publishing the daily Mark-to-Market via www.ibond thaibma.or.th. The fixed income securities are classified into 7 categories, namely, government bonds, treasury bonds, state own enterprise bonds (guaranteed), state own enterprise bonds (non-guaranteed). corporate bonds, commercial paper, and foreign bonds. Each category consists of the bond features such as coupon rate, time to maturity, yield, price, modified duration. and convexity. Moreover, this database also provides registration detail such as issue size, type of coupon, company rating, and underwriter. The Thai BMA has developed the website: www.thaibma.or.th to provide bond information about Thai bond market to the investors.

- The Securities and Exchange Commission of Thailand provides the quarterly reports and annual reports of listed company via the www.sec.or.th. The reports consist of the financial statements; balance sheet, income statement, statement of retained earnings, and statement of cash flow including notes. Moreover, there are letters from the management attached with reports. Those letters describe the strategies and their activities during the period. The reports are beneficial for the investors to evaluate the company's performance.
- The Stock Exchange of Thailand caters information of capital market for the investors. The investors are able to monitor market movement via www.setor.th This website

provides information of all capital market in Thailand as well as the individual stock. The data employed in this thesis is the series of SET index.

- The National Economic and Social Development Board provides the economic and social information of Thailand such as National Income (NI). Gross Regional and Provincial Product (GPP), and Capital Stock. This thesis will gather Quarterly Gross Domestic Product (QGDP) to examine the economic movement during the study period. This data is available from www.nesdb.go.th

The Bank of Thailand has a responsibility to provide the quality data to public as a purpose of monitoring economic situation. The website of www.bot.or.th provides many statistics series. The economic indices are considered to be the indicator of changes in economic circumstance. This thesis will investigate the usefulness of applying the business sentiment index as a proxy of economic growth.

Bloomberg database provides the historical information and statistics. The institution investors and educational institutions always subscribe to the Bloomberg database so as to gather the data for their investment decision or their study. For individual investors, they are able to access the historical information via www.bloomberg.com. However, the required information is limited. For example, the website provides the historical stock prices of all listed companies in Thailand backdated to a maximum of five years. Moreover, this website also provides the news of capital markets which are beneficial for all investors. This thesis will collect the historical stock prices for calculating the market value of the equity and the beta of the issuers.

Sample selection

The original Mark-to-Market provides 7 categories of fixed income instruments. However, only the data on corporate and government bonds will be extracted from the original database because this study focuses on corporate bonds which have maturities longer than one year. Moreover, only the government bonds will be employed as a benchmark for calculating yield spreads because their maturities are more than one year as well.

The period of the study starts from the fourth quarter of 2015 through the fourth quarter of 2022 because the bond composite index starts from 1" September, 2015. This index will be employed as a proxy of the volatility of the market which will be discussed later in this chapter. Although there is daily data for bond characteristics, the frequency of collection is quarterly because this study will employ financial statements which are reported quarterly. Thus, only listed companies in stock market will remain for further study because they have the same rule of reporting their financial statements to the Securities and Exchange Commission of Thailand.

The data from Thai BMA at 30 June 2021 show the number of registered corporate debt securities. Those securities are classified into three debt instrument types; Bill of exchange, Promissory note, and Corporate bond. The numbers of each type are 769, 12, and 954, respectively. Only 954 corporate bonds will be observed. This number of corporate bonds represents those bonds which are registered with the Thai BMA, they will not guarantee selling it to the investors.

Considering the total 116 bond issuers, 72 issuers are listed in the stock market. Thus, 44 non-listed issuers will be eliminated from the dataset. Moreover, 72 issuers can be classified into 15 business sectors shown in table 5.2. The 11 issuers in banking and 3 issuers in finance and securities sectors are dropped from dataset because the structure of bank issuers is different from others. For example, the cash deposit item in balance sheet of the company is reserved assets for the liquidity of the company and for new investment. On the other hand, this item is the obligation of commercial banks and they need to reserve it to reimburse their customers upon their request. Another reason is that the issuer assessment by ratio is different. For example, the bank will use the leverage ratio under false III A global regulatory framework for more resilient banks and banking systems. In contrast, other companies use debt-to-equity ratio to evaluate the leverage of debt financing.

This thesis investigates the effect of bond issuer's performance. But the performance of issuers in energy and utilities sector may be intervened by the government. For example, the retail petrol price are controlled by oil fund. As a result, the sale prices do not follow demand and supply in the market. Although the sale revenue of energy and utilities issuers are different from other issuers, the bond issuers in this sector are included in the dataset. The stocks of energy and utilities are attractive to the Thai investors because of the issuer's reliability. Thus, their worthiness will affect the investors when they issue bonds.

Research Results

An empirically investigation is conducted to identify the determinants of yield spreads. The analysis is based on rating and time to maturity portfolios. Thai corporate bonds are constructed into quarterly and monthly portfolios. An Autoregressive Distributed Lag Modeling (ARDL) approach is applied to analyze the factors influencing yield spreads. The organization of this chapter presents as follows: Section 2 provides the summary of findings from statistical analysis. Section 3 discusses the contributions of this study. Section 4 describes the future implication according to this study's finding. Section 5 reveals the limitations of this study and future research directions.

Investigating the long run relationships from rating portfolios, it is found that coupon rate has a positive effect on yield spreads. Increase in coupon rate leads to a higher income tax payment. So, reduce in coupon rate will decrease the risk of bonds. However, there is an inconsistent result of time to maturity. The time to maturity is a positively determinant of yield spreads except quarterly AA portfolio. It can be implied that the well-known issuers launched long time to maturity AA-rated bonds for their fund raising which leads to reduce in risks of these bonds. The default risk of a issuer measured by Altman Z-score has a positive effect on yield spreads. The empirical result opposes with the literature which is higher the Altman Z-score, lower the risk. It happens because the average Altman Z-score of the issuers is less than three which still demonstrates the high default risk of the issuer. So, increase in Altman Z-score under ceiling three still shows the high default risk of bond issuers. The effect of stock prices' volatility of the issuer is the same direction of bond risk. The higher volatility of stock prices leads to the higher of asset volatility. As a consequence, the ability of debt repayment from their assets is more fluctuated. The volatility of bond market is positively significant on yield spread except AA-rated bonds. The negative effects might happen because the returns from

these bonds have an opposite direction with the bond market. As a result, aggregating these is able to reduce the risks of the portfolio. Increase in short-term market interest rates reduces the risk of bonds. Increase in market interest rates brings to reduce in bond value but their intrinsic values are lower than traded prices. Those bonds are undervalued which are desirable for value investors. Although increase in slope of yield curve indicates the economic booms, it is also implied increase in long-term interest rates as well. Therefore, change in long-term interest rates leads to increase in risk of bond investment. On the other hand, increase in short-term interest rates reduces investment risk.

The short run relationships of bond rating portfolios demonstrate that the factor of coupon rate, time to maturity, default risk, short-term interest rates and long-term interest rates, have the same effects on yield spreads similarly to long run except volatility of bond market. The bond market volatility effects on yield spreads only in the short run. The positive effect demonstrates that increase in bond market volatility leads to increase market risk of corporate bonds.

Investigating long run relationship of time to maturity portfolios, default risk measured by Altman Z-score has a positive effect parallel with rating portfolios. Moreover, there are a consistent result of increase in short-term interest rate. The negative effects between short-term interest rates and yield spreads are conformed by rating portfolios' results. In addition, the effect of business sentiment index has a negative relationship with yield spreads. Increase in sentiment index assumes that investors are confident of economic situations. So, the required rate of return to compensate the economic risk is reduced. Although coupon rate's effects are statistically significant, these effects are inconsistent. There are opposite relationship between coupon rate and yield spreads in monthly long-term portfolio. It can be implied that returns from coupon receiving are able to compensate the risk of long time to maturity bonds. Therefore, coupon rate is a negatively determinant of yield spreads for those bonds aged more than five years.

Discussion

The discussion of "An Analysis of the Determinants of Corporate Bond Yield Spreads in Thailand" revolves around the study's objectives, which encompass understanding various aspects related to corporate bonds and their yield spreads in the Thai bond market. The discussion surrounding the objective of studying the characteristics of corporate bonds is fundamental to understanding the dynamics of the bond market and its impact on yield spreads. Bond characteristics such as bond ratings, maturity dates, coupon rates, and issuer types play crucial roles in shaping investor perceptions of risk and return associated with corporate bonds.

The Characteristics of Corporate Bonds

Bond ratings serve as indicators of creditworthiness, with higher-rated bonds typically offering lower yields due to their lower perceived default risk (Hull, 2016). Conversely, lower-rated bonds, commonly referred to as high-yield or junk bonds, often command higher yields to compensate investors for the heightened risk of default. Thus, bond ratings directly influence bond yields, with spreads widening as credit quality deteriorates. Maturity dates also

influence bond yields, with longer-maturity bonds generally offering higher yields to compensate investors for the increased uncertainty and interest rate risk associated with longer holding periods (Fabozzi et al., 2012). Shorter-maturity bonds, on the other hand, typically exhibit lower yields due to their reduced exposure to interest rate fluctuations and credit risk.

Coupon rates, representing the annual interest payments as a percentage of the bond's face value, impact bond yields as well. Higher coupon rates result in lower yields, reflecting the higher income streams generated by these bonds relative to their market prices. Conversely, lower coupon rates lead to higher yields, as investors demand greater compensation to offset the reduced interest income. Issuer types also influence bond yields, with bonds issued by governments or highly-rated corporations typically commanding lower yields compared to bonds issued by lower-rated or non-investment-grade entities (Choudhry, 2011). The perceived creditworthiness of the issuer, along with market conditions and investor sentiment, drives yield differentials among bonds issued by various entities.

In summary, analyzing the characteristics of corporate bonds provides valuable insights into the risk-return profiles of different bonds and their implications for yield spreads. By understanding the relationships between bond characteristics and yield spreads, investors can make informed investment decisions, while policymakers and market participants can better assess market dynamics and formulate appropriate strategies.

Investigating the Ability to Repay Obligations

Investigating the ability to repay obligations is a crucial aspect of analyzing corporate bonds, as it directly impacts investors' perception of credit risk and yield spreads. Assessing the creditworthiness and financial health of bond issuers involves examining various factors that indicate their ability to meet their repayment obligations. Issuer credit ratings are one of the primary indicators used to assess the creditworthiness of bond issuers. Credit rating agencies assign ratings based on an issuer's financial strength and ability to repay its debts. Higher credit ratings indicate lower credit risk and are associated with lower yield spreads, while lower ratings imply higher credit risk and result in wider yield spreads (Fabozzi et al., 2012).

Leverage ratios, such as debt-to-equity ratios, provide insights into an issuer's financial leverage and debt repayment capacity. Higher leverage ratios indicate higher levels of debt relative to equity, which may increase the risk of default and lead to wider yield spreads (Altman, 2012). Profitability metrics, such as return on assets (ROA) and return on equity (ROE), reflect an issuer's ability to generate profits from its operations. Higher profitability ratios indicate healthier financial performance and a greater capacity to service debt obligations, which may translate to lower yield spreads (Choudhry, 2011). Cash flow adequacy is another critical factor in assessing an issuer's ability to meet its debt obligations. Positive and stable cash flows enable issuers to fulfill their interest and principal payments on time, reducing the risk of default and potentially narrowing yield spreads (Fabozzi et al., 2012).

By investigating these factors comprehensively, researchers can gain a better understanding of the credit risk embedded in corporate bonds and its implications for yield

spreads. A thorough analysis of issuer creditworthiness helps investors make informed investment decisions and allows policymakers to monitor systemic risks in the bond market effectively.

Studying Changes in Economic Conditions

Studying changes in economic conditions is essential for understanding the dynamics of bond markets and their impact on yield spreads. Economic conditions, including interest rate movements, inflation rates, GDP growth, and market volatility, are key determinants of investor sentiment and risk perceptions in bond markets.

Interest rate movements have a significant influence on bond yields, as changes in interest rates affect the present value of future cash flows associated with bonds. When interest rates rise, bond prices tend to fall, leading to higher yields to compensate investors for the increased risk of holding bonds in a rising rate environment (Fabozzi et al., 2016). Conversely, falling interest rates may lead to higher bond prices and lower yields. Inflation rates also affect bond markets by eroding the purchasing power of future bond payments. Investors demand higher yields on bonds to offset the expected loss in real value caused by inflation. Thus, higher inflation expectations are typically associated with wider yield spreads to compensate investors for inflation risk (Fabozzi et al., 2016).

GDP growth is another critical factor influencing bond yields and spreads. Strong economic growth may increase investor confidence and lead to higher bond yields as investors expect higher returns to compensate for the opportunity cost of investing in bonds rather than equities. Conversely, weak economic growth or recessionary conditions may lead to lower bond yields as investors seek safe-haven assets (Fabozzi et al., 2016). Market volatility, reflected in measures such as the VIX (Volatility Index), can also impact bond yields and spreads. Heightened volatility may increase risk aversion among investors, leading to higher demand for safe-haven assets such as government bonds and wider yield spreads on riskier corporate bonds (Fabozzi et al., 2016). The studying changes in economic conditions over the study period, researchers can gain insights into the macroeconomic factors driving yield spreads in bond markets. Understanding the relationship between economic indicators and bond yields helps investors anticipate market trends and make informed investment decisions.

Examining the Impacts of Important Factors on Yield Spreads

Examining the impacts of important factors on yield spreads is crucial for understanding the underlying determinants of corporate bond pricing and market dynamics. Several key factors, including changes in interest rates, credit risk, liquidity conditions, and market sentiment, can significantly influence yield spreads in bond markets. Changes in interest rates have a direct impact on bond yields and spreads. When interest rates rise, bond prices fall, leading to higher yields to attract investors. Conversely, when interest rates decline, bond prices increase, resulting in lower yields. This inverse relationship between interest rates and bond prices affects yield spreads, as changes in interest rates alter the relative attractiveness of bonds compared to other investment options (Fabozzi et al., 2016). Credit risk is another critical factor influencing yield spreads. Bonds issued by firms with lower credit ratings or higher default probabilities typically offer higher yields to compensate investors for the increased risk of default. Changes in credit risk perceptions, driven by factors such as changes

in financial health, leverage ratios, and profitability of bond issuers, can lead to adjustments in yield spreads (Fabozzi et al., 2016).

Liquidity conditions also play a significant role in determining yield spreads. Bonds that are less liquid, meaning they are more difficult to buy or sell without significantly impacting their prices, tend to offer higher yields to compensate investors for the illiquidity risk. Changes in liquidity conditions, influenced by factors such as market depth, trading volume, and transaction costs, can affect investor demand for bonds and consequently impact yield spreads (Fabozzi et al., 2016). Market sentiment, reflecting investors' perceptions of risk and return expectations, can also impact yield spreads. Heightened market uncertainty or negative sentiment may lead investors to demand higher yields on bonds as compensation for perceived risk. Conversely, positive sentiment or improving economic conditions may result in tighter yield spreads as investors become more risk-tolerant (Fabozzi et al., 2016). Thus, examining the impacts of these factors on yield spreads, researchers can gain insights into bond market dynamics and investor behavior. Understanding how changes in interest rates, credit risk, liquidity conditions, and market sentiment influence yield spreads helps investors assess risk-return trade-offs and make informed investment decisions in corporate bond markets.

Conclusion

In short run effects of time to maturity portfolios, coupon rate, default risk short-term market interest rate risk, and business sentiment index, have the sign as long run relationship. The relationships between default risk and short-term market interest rate risk are confirmed by bond rating portfolios.

Considering the short run dynamics of bond rating portfolios depending on lag operations without long run relationship, increase in GDP growth leads to increase in bond risk. It might be implied that if GDP growth grows up, investors expect the economic downward in the future. Moreover, if the volatility of bond market is higher, the risk of bond will increase. In addition, the positive effect of change in short-term market interest rates is different from the results in the equilibrium. But this result is supported by the previous study. The risk of term structure of interest has a negative influencing on yield spreads which is different from the equilibrium's results as well. Furthermore, short run relationship of time to maturity portfolio presents the interesting issues. The lag of yield spreads is able to describe its risk. If the yield spread increases in the previous period, the current yield spreads will increase.

Research Contributions

This study provides the contributions to the literature on Thai bond market. Firstly, this study combines the three different perspectives of risk together, bond characteristic, bond issuer, and macroeconomic factors. The empirical results are able to identify the sources of risks clearly. Secondly, the data which is applied for investment investigation in development countries, is sufficient to assist investors for selecting the appropriated bonds. Moreover, this is the first attempt of using business sentiment index provided by the Bank of Thailand to capture the risk of corporate bonds. It provides the information about the attractiveness of market and affords the timing of buy or sell securities. Thirdly, identifying the determinants of yield spreads enhances the investors' confident investment in corporate bonds. Monitoring

the change in important determinants is able to inform change of bonds' risks. Finally, it is consistent that default risks of the issuer are important factors influencing bond risks. This study does not analysis only one particular financial ratio in order to assess the default risk of the issuer, but also combine five financial ratios to calculate Altman Z-score. This score is able to identify the possibility to default of bond issuer.

Future Implication

Empirical results are divided into long run and short run. Using the long run determinants of yield spreads is able to assist investors to manage their portfolios. It is clear that default risk of the issuers and market interest rates are consistent factors determining yield spreads. Change in Altman Z-score, issuer's stock prices, one- month Treasury bills, 2-year, 10-year government yields lead to change in portfolio's risks. Moreover, this information is beneficial for selecting the different securities because individual investor has a difference in risk tolerance.

For short run determinants of yield spreads, they will be able to employ for arbitraging. Investors are able to undertake financial ratios, one-month Treasury bills. and business sentiment index to take a position. In the case of increase in yield spreads, the bond value will decrease. Investors should sell their bonds if bid prices are higher than bond values. The investors will receive unrealized gain. On the other hand, if the bid prices are lower than bond values, the investors should hold these bonds because they will receive unrealized loss. For investors who are searching for a good bond, they should offer prices which are less than intrinsic value of bonds in order to take a profit for buying those bonds. Eventually, when investors take many positions, the liquidity of bond market will be enhanced.

The government is acknowledged that short-term and long-term securities issued by the government affect the risks of corporate bonds. Increase in short-term interest rates will decrease the bond risk. However, increase in long-term interest rate will enlarge the risk of bond investment. Change in market interest rates many times affects the confidence of the investors.

Limitations and Future Study

The limitations of this study which should be considered for further study are explained as follows:

Firstly, the bond features provided by Thai BMA are available from 2015 which is the starting point of this study. The study period from 2015 to 2022 is relatively short, especially quarterly analysis. The bounds tests demonstrate that there are long run relationship in quarterly AA, quarterly BBB, and quarterly medium-term portfolio. However, the less than -1 of ECT, term presents that the it is unable to observe the pattern of convergence to the equilibrium after the shock in the system.

Extending longer period may be able to provide more information about the pattern of adjustment clearly. Moreover, plots of variables' movement demonstrate that economic crisis in 2008 and 2011 are interesting points. If the study is able to extend, comparative study before and after economic crisis may provide more information as well.

Secondly, this study employs financial ratios to assess the default risk of the issuers. Thus, many bonds are excluded from the analysis because data is collected quarterly basis.

Moreover, only listed bond issuers are observed. However, the data for particular bond features is able to collect every day from Mark-to-Market provided by Thai BMA. The daily analysis is able to increase the number of observations. None of corporate bonds traded in the market will be eliminate from the analysis.

Thirdly, the variety of corporate bond is limited because issuing complicated bonds leads to confusion of investors. Thus, each company launched the simple bonds which are beneficial to raise funds. As a consequence, there are no subordinated bonds in the data set. The subordination which is the important bond feature, is unable to investigate in the study. When the bond market is developed and the corporate bonds are recognized by the investors, the variety of the securities will be enhanced.

Finally, the limitation of Micro fit 5.0 program and critical bounds values, the maximum variables including intercept term is 10. Thus, one variable needs to be removed. The volatility of stock market which is a proxy of asset volatility in previous studies, is eliminated because it has a high correlation with other variables in each portfolio. Moreover, investment in stocks are accounted for the substitution of bond investment. Including volatility of stock and bond market may be able to identify the effects of capital markets on yield spreads comprehensively.

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