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Emerging Bond Markets in Asia: Credit Spread Dynamics

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Abstract

We present a comprehensive analysis of the credit spread determinants in five Asian bond markets over a sample period of 10 years, from January 2010 to December 2019. Consistent with the western literature, we find that the structural models are broadly valid even in emerging countries with developing bond markets. Empirical results unveiled that bond-specific liquidity is the most important driver that reduces the credit spread, followed by the slope of the term structure and industrial growth in the economy. In Emerging Asia, inflation is the key driver that aggravates credit spread for business firms, followed by financial market volatility. Cross-country data reveals that the Chinese corporate bond market is the largest in Asia. Indian markets offer higher yield rates, while credit spread is noted to be highest in China. The empirical findings of our study would provide important insights for the policy makers while developing the most sought-after liquid bond markets. Effective liquid bond markets would reduce the cost of capital for firms and price credit risks efficiently.

Keywords: Corporate bonds, Credit spread drivers, Emerging countries
JEL classification - B22, C13, E43, G12

1. INTRODUCTION

Asia now brags as being the world's fastest growing emerging economy and a major contributor to global growth. Financial integration coupled with domestic economic growth has increased capital inflows to Asian economies, which exert a notable influence on pricing of corporate bonds in emerging countries. Global linkages drive convergence of bond yields across the term structure as well as across countries.

Corporate bond markets in Asia exhibited quadruple growth in the last decade. The outstanding local currency bonds of the region in 2020 stood at USD 16.3 trillion,

with corporate bonds accounting for USD 6.4 trillion[1]. However, the consequent significant increase in the leverage positions of business firms brought the underlying credit risk to limelight and increased the debt vulnerability of emerging countries. Given the context, we investigated the drivers of credit spread among the Asian emerging countries.

Credit spread is the primary component in the pricing of corporate bonds and is paid to compensate the default risk. Increased credit spread reflects higher cost of capital which drains the net worth of business firms (Bondt 2004), and leads to the credit disposition of the financial sectors in a country (Gilchrist, Yankov, and Zakrajs 2009). Credit spread provides insights about the current market conditions and helps to predict the macro-economic environment of a country (Wang, Nie, and Wang 2019).

Corporate bonds are not only exposed to default risk, but also to numerous other market-wide risk factors. The extra premium demanded by the investors to compensate this risk is termed as credit spread, which is the difference between the yield rate of corporate bonds and government bonds of the same maturities. Prior research has concentrated either on firm-specific characteristics or macroeconomic variables as causes of changes in the credit spread.

Our study extends the existing research in the following ways: First, we have provided a comprehensive analysis of bond specific variables, bond market variables, market risk variables and macroeconomic variables jointly as predictors of credit spread. Second, rather than focusing on a single nation, we have examined credit spread determinants across all emerging Asian economies - China, India, Malaysia, South Korea, and Taiwan for a period of ten years. Finally, we have analyzed the changing nature of these drivers across different maturity spectrums on the term structure.

While Merton (1974) developed a theoretical framework for firm level default risk, Collin (2001) provided empirical evidence about determinants of credit spread. Subsequently, numerous empirical studies have noted that credit spread determinants are multidimensional, and several factors are responsible for the changes in credit spread. Macroeconomic and liquidity-related factors are found to be the key drivers of credit spread changes (Duffie, Saita, and Wang 2007); (Gilchrist and Zakrajsek 2007). Credit spreads shrink during periods of rapid economic expansion and hence industrial production growth (IIP) is found to be a significant determinant (Chun, Ha, and Kim 2014; David 2008). On the contrary, (Giesecke et al. 2011) stated that macroeconomic factors have no role in predicting the credit spread in US markets.

Majority of these studies have focused on developed economies and very few on emerging countries. In developed economies, the corporate bond markets are dynamic

[1] Asia Bond Monitor report by Asian Development Bank, 2020

and actively traded. However, emerging nations face challenges in terms of inadequate depth and breadth, apart from illiquidity. In this paper, using credit spread as an endogenous variable, we ran economic models to analyze the different drivers of credit spread across the maturity spectrum. The sample data comprised of five emerging countries in Asia over a period of 10 years, starting from January 2010 to December 2019.

The major contribution of this study is the validation of structural models in the context of emerging markets. We have identified a set of variables that are significant drivers of the credit spreads in emerging Asian countries. The empirical results revealed that, slope of the term structure; bond specific liquidity and inflation in the economy are the more important drivers of credit spread in Emerging Asia. However, we also noticed the differential impact of spread determinants within the maturity spectrum as well as across the countries.

Our empirical findings would provide important insights for policy makers in developing the most sought-after liquid bond markets. Effective and liquid bond markets would reduce the cost of capital for firms and also price credit risks efficiently. Proper estimation of credit spread helps firms to manage their cost of capital and choose the optimum level of leverage in their financial structure. Credit spread is the lead indicator of market liquidity and also indicates the direction of the economic environment. Regulators infer that a higher credit spread indicates lower market liquidity, and would thus take the required actions to bring stability in the market.

The remaining parts of study are organized as follows: Section 2 describes the key characteristics of the emerging Asian bond markets; Section 3 reports research design; Section 4 presents the results and discussion and Section 5 concludes.

2. CORPORATE BOND MARKET IN ASIA: KEY CHARACTERSTICS

The emerging markets are characterized by lower to middle per capita income, higher growth rate, instable socio-political environment, higher volatility, and underdeveloped capital markets. Bond markets in many Asian countries are small in size when compared to their equity markets but have outpaced the latter in terms of growth rates (Fig. 1). Corporate bond markets in many Asian nations are still in an early development stage and it is the government bonds that are driving their growth. Lack of diversity in fixed income products, fewer participants and rigid regulatory as well as institutional framework are the typical challenges on their growth path.

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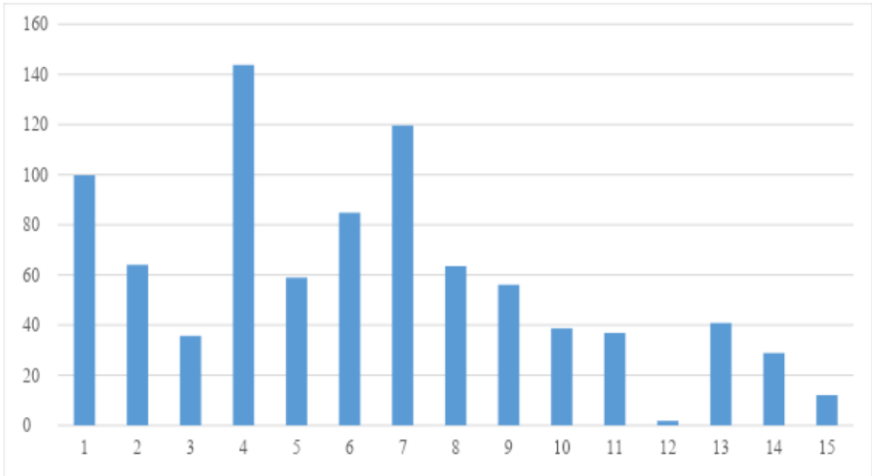
Figure 1
Growth of Local Currency Bond Market in Asia

The amount is in USD billion. Countries included are China, India, Malaysia, Korea and Taiwan.
Source: Asian Development Bank- https://asianbondsonline.adb.org/
Taipei Exchange - https://www.tpex.org.tw/web/bond/?l=en-us

Korea has a vibrant corporate bond market wherein the total size of the market is about 140% of the GDP, out of which the corporate bond market is more than 80% of the GDP (Fig. 2). Malaysia and China are larger in size compared to Taiwan and India, but in terms of absolute market size, China is the largest followed by South Korea.

Figure 2
Bond market as percentage of GDP



Notes: Fig. 2 compiles data that represents the size of the bond markets as percentage of their GDP as on December 2020.
Data Sources: Asian Development Bank- https://asianbondsonline.adb.org/
Taipei Exchange - https://www.tpex.org.tw/web/bond/?l=en-us
Security and Exchange Board of India (SEBI) https://www.sebi.gov.in/statistics/corporate-bonds.html

The corporate sector continues to depend significantly on bank lending. Firms prefer to issue bonds either in overseas markets or through private placements. The share of private placements is more than 90 percent of the total issues in India. Private placements are more popular due to the ease in issue process, lower issue cost and higher demand from institutional investors (Sengupta and Anand 2014).

Liquidity is fairly inadequate in the Asian bond markets (Goswami and Sharma 2011). Bid-ask spreads for newly issued corporate bonds are found to be typically wider than in the case for sovereign bonds, reflecting lower liquidity in Asia. (Park and Shin 2017). Despite the fast growth in primary issues, lower trading volume in secondary markets remains a limitation. In comparison to the developed countries the credit spreads are also high in Asian countries, which indicate the relatively high-risk profile of corporate bond markets in Asia.

In the backdrop of emerging Asia evolving as hub for global investments and opening up of bond markets for global trade, we examined the primary drivers of credit risk across bonds of various maturities. This empirical research is crucial since the regulators are in the process of easing rigid structures to enhance the pace of development in bond markets among these countries.

3. RESEARCH DESIGN

3.1 Data

We collected the bond-specific data, including coupon rate, issue date, trading data, redemption date, Volume traded, and Yield to Maturity of each bond for each country during the period January 2010 to December 2019, from the data stream. We excluded the year 2020 due to the abnormal market conditions caused by the Covid-19 pandemic. The countries included in the sample, China, India, Malaysia, South Korea, and Taiwan are countries that are referred to as "emerging" in Asia, according to the MSCI Emerging Market Index (Morgan Stanley Capital International).[1] Due to the tiny size of their corporate bond markets, Pakistan and the Philippines, both members of the MSCI index, were omitted. We included bonds only with standard features such as fixed coupon bonds and excluded the bonds with floating rates, mortgages, call and put options, annual adjusting rates, etc. All the bonds in the sample were rated AA+ by Moody international. This was done to bring uniformity in the analysis as lower-rated bonds are thinly traded in emerging countries. In addition, bonds having residual maturity of less than 12 months were excluded. The numbers of bonds in the sample, meeting the above criteria are presented in the Table 1. Data revealed that in the

[1] At the end of December 2020, China and Republic of Korea's corporate bond markets accounted for a combined 91.2 percent of emergent East Asia's corporate bond market. Malaysia and Singapore have the largest corporate bond markets among the ASEAN members (Asian Bond Monitor report by Asian Development Bank, 2020).

Chinese market a large number of corporate bonds are issued and traded; followed by Korea and India.

Table 1. Number of bonds collected country wise

Country	Number of bonds collected originally	Number of bonds filtered after the set criteria
China	8571	6152
India	1150	925
Malaysia	567	511
South Korea	6540	3538
Taiwan	810	645

We further collected the consumer price index (CPIG), industrial production index (IIPG), currency exchange rates, stock market index returns, Treasury bond yields from the Bloomberg and Census & Economic Information Center (CEIC) databases.

3.2 Variables and Econometric Model

The data set was divided into different maturity series to examine the short, medium, and long-term effects. The corporate bonds were classified on the basis of residual maturity into six maturity levels: one year, two years, five years, ten years, fifteen years, and twenty years. Each maturity series across the countries has been independently analyzed.

We employed a panel regression model to examine the data. In our econometric model, we use credit spread as an endogenous variable and a set of nine independent variables. These variables include bond-specific variables, bond market variables, market risk variables and macro-economic variables (Table 2).

Table 2. Details of the Independent Variables

Explanatory Variables	Calculation	Predicted relation
Bond specific variables		
MD	Modified Duration of the bond	+/-
TV	Total traded volume of each bond in terms of local currency	-
Bond Market variables		
Slope	The difference between 10 years government bond yield and its one-year counterpart	-
TBYV	Historical volatility of 10 year treasury bond	+
Market risk variables		
EXCVOL	Historical return volatility of exchange rates (in terms of US dollar)	+
STOCKRET	Log return of respective country's stock index	-
MARKETVOL	Historical volatility of stock index returns of respective country	+/-
Macro-economic variables		
CPIG	Inflation Proxy: The growth rate of the Consumer Price Index	+
IIPG	The growth rate of the Industrial Production Index	-

Note: Table 2 reports the summary of variables along with the hypothesized relationship with credit spread. MD is the modified duration; TV is traded volume in terms of local currency; TBYV is Treasury bond yield volatility; EXCVOL is historical volatility of exchange rates of respective country; STOCKRET is benchmark stock index return; MARKETVOL is stock market return volatility; CPIG is growth rate of consumer price index which is proxy for inflation; and IIPG is growth rate of industrial production index.

The model is represented as follows:

$$CS_{i,t} = \beta_0 + \beta_1 MD_{i,t} + \beta_2 TV_{i,t} + \beta_3 CPIG_{i,t} + \beta_4 EXCVOL_{i,t} + \beta_5 TBYV_{i,t} + \beta_6 IIPG_{i,t} + \beta_7 MARKETVOL_{i,t} + \beta_8 SLOPE_{i,t} + \beta_9 STOCKRET_{i,t} + \varepsilon_{i,t}$$

Where,

$CS_{i,t}$ = Credit Spread; $MD_{i,t}$ = modified Duration; $TV_{i,t}$ = traded volume in domestic currency terms; $CPIG_{i,t}$ = growth rate consumer price index representing inflation; $EXCVOL_{i,t}$ = exchange rate volatility; $TBYV_{i,t}$ = Treasury bond yield volatility; $IIPG_{i,t}$= growth of industrial production; $MARKETVOL_{i,t}$ = equity market return volatility; $SLOPE_{i,t}$ = Slope; $STOCKRet_{i,t}$= benchmark stock index return; and $\varepsilon_{i,t}$= Stochastic error term.

The cross-country comparison of exogenous variables is provided in Table 3. Industry growth rates were found to be highest in India followed by China. However, in India, the financial markets (equity, bond as well as currency) exhibited higher volatility and offered higher returns to the investors. In China, both market volatility and returns were moderate. China is the second country in the region that offers higher returns, both in equity as well as bond markets.

Table 3. Cross country comparison of exogenous Variables

Average value of monthly data series from 2010-2019 (data in % terms)					
	China	India	Korea	Malaysia	Taiwan
SLOPE	0.49	0.3	0.538	0.761	0.46
TBYV	0.2	2.42	0.261	0.177	2.26
EXCVOL	0.1	1.66	1.773	1.435	0.97
STOCKRET	0.73	1.43	0.106	0.186	0.57
MAREKETVOL	1.91	4.29	1.573	2.633	3.67
CPIG	0.78	0.5	0.133	2.048	1
IIPG	1.6	2.73	0.12	0.555	1.56

Note: Table 3 presents the descriptive statistics of variables, including, Slope (SLOPE), Treasury bond yield volatility (TBYV), Exchange Volatility (EXCVOL), benchmark stock index return (STOCKRET), stock market return volatility (MARKETVOL), growth rate consumer price index (CPIG), and the growth of industrial production (IIPG). The values are presented in percentage terms. The monthly data was collected over a sample period from January 2010 to December 2019.

4. RESULTS AND DISCUSSION

4.1 Credit spread drivers in emerging Asia

Table 4 presents the Credit spread determinants in emerging Asia. Fixed effect panel regression analysis (based on Hausman test) unveiled the drivers of credit spread across the maturity spectrum. Short-term bonds up to tenure of 5 years were widely issued and traded across the sample countries (Appendix A). In the long-term segment, the 10-year bonds were very popular. Very few bonds with a maturity of more than 10 years were traded on the markets.

With regard to the bond specific variables, traded volume was negatively associated with the credit spread as articulated by structural models. Higher traded volume signifies active trading and higher liquidity. Liquid bonds warrant lower risk premium and lower credit spread. We found mixed results for duration. The credit spread was positively associated with the duration for the short-term bonds (Güntay and Hackbarth 2010) and it was negatively associated with the bonds with long-term maturity (Anon 1990; Wang and Zhang 2009).

Bond market variable Treasury bond yield volatility exhibited a positive association with the credit spread, which is consistent with the earlier findings (Chen et al. 2010; Chun et al. 2014; David 2008). The Merton (1974) model explained that change in interest rate risk affects the default probability of firms. Higher interest rate risk strains the profitability of business firms and the capital adequacy of financial firms, which widens credit spread.

The slope of the term structure was negatively associated with the credit spread (Avramov et al. 2007). This indicates that steepening of the yield curve would hamper the expected present value of existing projects, which would reduce the firm value and widen the spread. Besides, a negative slope indicates a downturn in the economic growth and increase in the default probability of business firms that also widens the credit spreads.

Regarding the market risk factors, exchange rate volatility exhibited a positive association with credit spread, supporting the evidence provided by (Carr and Wu 2007), who argued that implied volatility in exchange rate options is correlated with higher credit spreads. Similarly, the stock market volatility was significant and positively associated with credit spreads across the maturity spectrum. Market volatility emulates the idiosyncratic volatility and both are assumed to be highly correlated with each other (Collin-Dufresne et al., 2001). This evidence also supports (John Y. Campbell and Glen B. Taksler 2003) argument that idiosyncratic volatility drives the bond spreads significantly. As per the contingent claims model, a debt holder is short on put option and the value of the put option reflects the credit spread. Higher volatility

in the market increases the value of the put option, which indicates higher credit spread in the market.

The relationships between the credit spread and stock returns was also negative and mostly significant, which is in line with reported literature. When equity markets offer higher returns, investors shift their investments from bond markets to equity markets. Lower demand reduces the bond prices, increases yield rates and widens the spread. However, the empirical results revealed that stock returns influence the credit spreads of short and medium-term bonds only. Apart from investor preferences, a bullish environment in financial markets affects the recovery rates, which in turn affect the payoffs to the bondholders. Since recovery rate is a function of the overall market climate (Altman and Kishore 1996), a bullish business environment brings down the spreads.

Among the macro-economic variables, inflation portrayed a positive relationship. Higher inflation causes higher depreciation of assets in the capital structure and increases the proportion of liabilities. Therefore, the default probability of firms increases, leading to higher credit spreads (Kim and Sorensen 2016). Industrial production growth was found to be negatively associated in those bond classes wherever it was statistically significant. These results supported the evidence provided by (Chen et al. 2010; Chun et al. 2014; David 2008) that higher production growth demonstrates the strong economic environment in the country; and raising business profits enables firms to repay debt on time leading to lower credit risk and spread.

Table 4. Credit spread determinants

	Year1	Year 2	Year 5	Year 10	Year 15	Year 20
VARIABLES						
MD	0.0629***	0.0380***	0.000363	-0.475***	-0.510***	-0.144***
	(0.00531)	(0.00210)	(0.00281)	(0.00824)	(0.0195)	(0.0346)
TV	-0.253***	-0.243***	-0.199***	-0.141***	-0.136***	-0.683***
	(0.00354)	(0.00163)	(0.00223)	(0.00392)	(0.00958)	(0.0552)
SLOPE	-0.221***	-0.270***	-0.0645***	-0.0681***	-0.211***	-0.477*
	(0.0130)	(0.00491)	(0.00590)	(0.00858)	(0.0421)	(0.258)
TBYV	0.0954	0.0484**	0.0212***	0.101**	0.202	0.147
	(0.112)	(0.0235)	(0.00604)	(0.0458)	(0.157)	(0.0981)
EXCVOL	0.0552***	0.0688***	0.0154***	0.00234***	0.00874***	0.0612***
	(0.00210)	(0.000611)	(0.00107)	(0.000801)	(0.00265)	(0.0192)
STOCKRET	-0.110***	-1.031***	-0.352***	0.153	-0.160	-1.162
	(0.00422)	(0.0404)	(0.0388)	(0.101)	(0.251)	(0.986)
MARKETVOL	0.0819***	0.00222***	0.167***	0.000541***	0.00197*	0.0119**
	(0.00833)	(0.000111)	(0.00462)	(0.000179)	(0.00108)	(0.00531)
CPIG	0.346***	0.275***	0.0583***	0.0902***	0.0915***	0.664***
	(0.0174)	(0.00679)	(0.00669)	(0.00697)	(0.0137)	(0.101)
IIPG	-0.0515***	-0.0784***	-0.0188***	-0.0211***	-0.0331***	-0.146***
	(0.00201)	(0.00101)	(0.000987)	(0.00182)	(0.00442)	(0.0240)
Observations	9,973	48,286	35,431	7,328	1,237	445
R-squared	0.903	0.920	0.841	0.649	0.629	0.595

Note: Table 4 presents the panel regression analysis for all the six time-maturity series of corporate bonds. The countries included were China, India, Malaysia, South Korea, and Taiwan. Credit spread is a dependent variable. Modified duration (MD), traded volume (TV), Slope, Treasury Yield Volatility (TBYV), Exchange Volatility (EXCVOL), benchmark stock index return (STOCKRET), Stock market volatility (MARKETVOL), growth rate of consumer price index (CPIG), and the growth rate of Industrial production index (IIPG) are independent variables. The time period is from 2010 to 2019. The standard error is reported in the parenthesis. The asterisk ***, **, * represents the significance at level 1%, 5% and 10% respectively.

To summarize the results, bond specific liquidity, slope of the yield curve and industrial growth in the economy are negatively associated, while inflation and financial market volatility are positively associated with credit spread.

4.2 Cross Country Analysis

Since the financial and macro-economic conditions are different for different countries, the significance of the spread determinants may vary across the countries. We conducted a separate analysis for each country to understand the cross-country differences. The findings (Table 5) suggest that though the direction of the variables remains broadly consistent, the significance of spread determinants vary across countries and maturity spectrums.

Credit spread drivers in China were exactly similar to the Panel data results. In India, though the direction of relationship was consistent across all the variables, inflation, stock return and volatility were statistically significant only for short term bonds. Duration was positively associated with credit spreads of all bond classes.

In South Korea, though the Treasury bond yield volatility, inflation and market volatility were found to be important, they were not consistently significant across maturity periods. In Malaysia, the credit spread was majorly driven by the duration, traded volume, Treasury bond yield volatility and Slope. Surprisingly, the relationship was weaker for other variables such as inflation, IIPG, and market volatility despite their expected direction of relationship. Like in China and Korea, the duration followed a negative sign for the bonds having longer maturities.

The relationship of Treasury bond yield volatility, inflation, and stock return with credit spread was not statistically significant in Taiwan. Overall, the direction of relationship was similar across the countries, though the significance varied across the countries and maturity periods.

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Table 5. Findings of cross country analysis

Panel A: China						
Variables	**Year1**	**Year 2**	**Year 5**	**Year 10**	**Year 15**	**Year 20**
MD	0.114***	0.104***	0.327***	-0.156***	-1.500***	-0.302***
	(0.0181)	(0.00439)	(0.0689)	(0.0118)	(0.0684)	(0.0439)
TV	-0.294***	-0.266***	-0.218***	-0.163***	-0.118***	-0.0866**
	(0.0282)	(0.00711)	(0.0174)	(0.0122)	(0.0116)	(0.0383)
SLOPE	0.215	-0.305***	-0.212***	-0.0491*	-0.0483	-0.156***
	(0.282)	(0.0339)	(0.0782)	(0.0256)	(0.0343)	(0.0530)
TBYV	0.0684	0.104***	0.383***	0.172*	0.702***	0.981***
	(0.217)	(0.0294)	(0.106)	(0.0936)	(0.147)	(0.174)
EXCVOL	0.977***	0.157***	0.716***	0.0948***	0.0785***	-0.107***
	(0.0561)	(0.0489)	(0.0329)	(0.0158)	(0.0210)	(0.0249)
STOCKRET	-0.215***	-0.409***	-0.879***	-0.140	-0.252*	-0.117
	(0.0580)	(0.101)	(0.0688)	(0.207)	(0.148)	(0.123)
MARKETVOL	3.150***	0.363***	0.352***	0.0744*	0.320	1.430**
	(1.081)	(0.0438)	(0.0786)	(0.0411)	(0.495)	(0.626)
CPIG	0.584***	0.0431	0.315***	0.0125	0.0178	0.0717**
	(0.0592)	(0.0274)	(0.0832)	(0.00878)	(0.0126)	(0.0281)
IIPG	-0.0697	-0.0220	-0.0511***	-0.0175**	-0.0344***	-0.005
	(0.0465)	(0.0737)	(0.0302)	(0.0303)	(0.0406)	(0.010)
Observations	14,543	34,345	27,362	2,877	617	236
R-squared	0.424	0.440	0.310	0.711	0.763	0.866
Panel B: India						
MD	2.777***	8.008***	1.306***	0.597***	0.0622	1.685***
	(0.534)	(0.310)	(0.161)	(0.129)	(0.179)	(0.0515)
TV	-0.223***	-0.0667***	-0.0701***	-0.0363**	0.0143	-0.0270
	(0.0315)	(0.00631)	(0.0155)	(0.0170)	(0.0229)	(0.0179)
SLOPE	-0.268	-0.0072***	-0.0010*	-0.043***	-0.037***	-0.0069
	(0.409)	(0.00138)	(0.000530)	(0.00841)	(0.00650)	(0.00487)
TBYV	0.377*	0.176	4.322*	2.626	0.818**	-0.804**
	(0.192)	(0.292)	(2.546)	(3.778)	(0.351)	(0.304)
EXCVOL	0.112*	0.664***	0.342***	0.178**	0.690**	0.863**
	(0.0610)	(0.0401)	(0.0538)	(0.0844)	(0.260)	(0.321)
STOCKRET	-0.480	-0.173*	-0.871***	-0.128	-0.439	0.693
	(0.386)	(0.0952)	(0.319)	(0.438)	(1.313)	(0.833)
MARKETVOL	0.495***	0.110*	0.653***	0.155	0.0295	2.439***
	(0.0887)	(0.0615)	(0.207)	(0.154)	(0.438)	(0.704)
CPIG	1.502**	0.420***	0.0118	0.581	0.883	0.056
	(0.601)	(0.114)	(0.0411)	(0.630)	(1.489)	(0.103)
IIPG	-0.0365*	-0.0349**	-0.108***	-0.0136*	-0.0336	-0.0616***
	(0.0191)	(0.0138)	(0.0252)	(0.00699)	(0.0349)	(0.0140)
Observations	1,350	2,177	1,057	288	36	26
R-squared	0.548	0.509	0.360	0.537	0.421	0.999
Panel C: Korea						
MD	4.593***	0.0347	-1.448***	0.0329	-0.835***	-0.524***
	(0.544)	(0.156)	(0.249)	(0.0561)	(0.0974)	(0.176)
TV	-0.222***	-0.169***	-0.120***	-0.208***	-0.0544**	-3.505***
	(0.00858)	(0.0168)	(0.0157)	(0.0127)	(0.0260)	(0.801)
SLOPE	-0.497***	-0.0444**	-0.131***	-0.143***	-0.359***	-0.299***
	(0.126)	(0.0190)	(0.0226)	(0.0237)	(0.0426)	(0.0468)
TBYV	0.186*	0.154*	0.198***	0.0584	0.0708	-0.0652
	(0.106)	(0.0877)	(0.0434)	(0.0567)	(0.0867)	(0.0969)
EXCVOL	0.194**	0.0383**	0.150***	0.240***	0.0846*	0.0361
	(0.0787)	(0.0164)	(0.0330)	(0.0312)	(0.0438)	(0.0527)
STOCKRET	-2.915***	-2.137***	-0.0974***	-0.749	-0.369	-0.751
	(0.958)	(0.132)	(0.0149)	(0.581)	(0.263)	(0.834)
MARKETVOL	0.401***	0.385***	0.313***	0.00693	1.432	0.599***
	(0.143)	(0.0572)	(0.0481)	(0.0208)	(1.058)	(0.151)
CPIG	0.0883	0.127***	0.0409**	3.030	0.655	0.0218
	(0.105)	(0.0125)	(0.0173)	(2.113)	(0.421)	(0.0125)

IIPG	0.495	-0.0294**	-1.535***	-0.936**	-1.783***	-1.233
	(0.673)	(0.0138)	(0.332)	(0.416)	(0.515)	(0.911)
Observations	4,848	10,186	4,848	3,480	400	162
R-squared	0.361	0.269	0.108	0.203	0.368	0.626
Panel D: Malaysia						
MD	1.163***	0.339**	-0.653***	-1.635***	-3.313***	0.191
	(0.279)	(0.171)	(0.0570)	(0.264)	(0.259)	(0.137)
TV	-0.780***	-4.134**	-0.773***	-1.12e-05	0.0445	-0.318
	(0.0938)	(1.174)	(0.0938)	(6.69e-05)	(0.117)	(0.624)
SLOPE	-0.119	-0.0519	-0.603***	-0.455***	-0.691**	-0.794
	(0.781)	(0.809)	(0.164)	(0.0757)	(0.285)	(0.856)
TBYV	1.203	4.193*	-0.735	1.162***	1.918	2.004
	(1.801)	(2.360)	(0.450)	(0.282)	(1.175)	(1.600)
EXCVOL	8.000	1.269*	0.384***	0.308***	-0.394	-0.401
	(5.156)	(0.702)	(0.108)	(0.0588)	(0.301)	(0.521)
STOCKRET	-0.0700	1.527	1.083	-1.759***	-0.396	-5.582*
	(8.904)	(4.159)	(1.028)	(0.662)	(2.227)	(3.192)
MARKETVOL	3.030	-0.671	0.0413	-4.681	0.426	0.595**
	(2.497)	(0.621)	(0.658)	(3.039)	(0.274)	(0.224)
CPIG	0.634	-0.0343	0.103	0.0372*	0.0525	-0.338**
	(0.455)	(0.144)	(0.192)	(0.0195)	(0.0623)	(0.127)
IIPG	-2.040	0.210	-0.00300	-0.0282	-0.211	-0.504
	(5.633)	(1.877)	(0.543)	(0.318)	(0.910)	(1.493)
Observations	166	458	458	163	60	75
R-squared	0.765	0.582	0.657	0.633	0.976	0.854
Panel E: Taiwan						
MD	0.0675***	0.294***	0.245***	0.548***	0.0122	0.314
	(0.00309)	(0.0142)	(0.0132)	(0.0573)	(1.011)	(6.434)
TV	-0.00443	-0.0132***	-0.0236***	-0.0118	-0.129***	-6.473**
	(0.00434)	(0.00388)	(0.00292)	(0.00899)	(0.0362)	(2.317)
SLOPE	-0.758***	-0.438***	-0.408***	-0.519***	-1.020***	-0.305
	(0.181)	(0.0985)	(0.0299)	(0.0309)	(0.123)	(0.346)
TBYV	-1.577	0.147	0.386***	0.552***	0.0141	0.332
	(1.373)	(0.614)	(0.0565)	(0.122)	(0.325)	(0.386)
EXCVOL	-0.0381	0.158***	0.0324***	0.00668	0.0143	0.0585
	(0.0444)	(0.0177)	(0.00998)	(0.0195)	(0.0769)	(0.164)
STOCKRET	-0.180	-0.551***	-0.382***	-0.180	-0.595	-0.434
	(0.216)	(0.137)	(0.0998)	(0.194)	(0.415)	(0.571)
MARKETVOL	-1.469	-1.171	0.0801***	0.0693***	0.146*	0.0933
	(1.209)	(0.939)	(0.00909)	(0.0200)	(0.0796)	(0.542)
CPIG	-0.0172	0.0396*	0.00539	0.0270***	0.0232	0.0102
	(0.0467)	(0.0215)	(0.00440)	(0.00894)	(0.0164)	(0.0996)
IIPG	-0.000216	-0.000134	-0.00683***	-0.0106*	-0.0119***	-0.00652
	(0.00266)	(0.00384)	(0.000653)	(0.00586)	(0.00336)	(0.00592)
Observations	404	643	1,882	378	84	18
R-squared	0.650	0.511	0.352	0.639	0.865	0.933

Note: Table 5 presents the result of the econometric analysis of the determinants of the credit spreads for all the six time-maturity series of corporate bonds. The Table includes five countries - China, India, Malaysia, South Korea, and Taiwan in five panels. The data comprised the credit spread as a dependent variable, while the modified duration (MD), traded volume (TV), Slope, Treasury Yield Volatility (TBYV), Exchange Volatility (EXCVOL), benchmark stock index return (STOCKRET), Stock market volatility (MARKETVOL), growth rate of consumer price index (CPIG), and the growth rate of Industrial production index (IIPG) were independent variables. The time period is from 2010 to 2019. The standard error is reported in the parenthesis. The asterisk ***, **,* represents the significance at level 1%, 5% and 10% respectively.

5. CONCLUDING REMARKS

The paper presents a comprehensive analysis of the credit spread determinants in five Asian corporate bond markets over a sample period of 10 years from January 2010 to December 2019. Consistent with the evidence in western literature, we found that the structural models are broadly valid even in emerging countries with developing corporate bond markets. Empirical results revealed that bond-specific liquidity is the most important driver that reduces the credit spread, followed by slope of the term structure and industrial growth in the economy. Inflation is the key driver that aggravates credit spread for business firms followed by financial market volatility in emerging Asia. However, cross country analysis revealed that China hosts the largest corporate bond market in Asia. Indian markets offer higher yield rates, while credit spread was noted to be highest in China. Our findings provide the required empirical evidence about credit spread drivers and support the ongoing bond market development initiatives of policymakers and regulators in emerging Asia. Business firms would be able to reduce the cost of capital with well-developed corporate bond markets.

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