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Determinants of Launch Spreads on EM USD-Denominated Corporate Bonds

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Determinants of Launch Spreads on EM USD-Denominated Corporate Bonds*

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Abstract

This paper examines the development of launch (primary) spreads (the difference between a bond's yield to maturity at issuance and U.S. Treasury yields of corresponding maturity) on USD-denominated corporate bonds issued by emerging market (hereafter "EM") companies since the mid-1990s and decomposes their determinants to assess the primary market environment surrounding EM companies. Our empirical results indicate that while the launch spreads on EM corporate bonds properly reflect firm-specific factors as structural credit models suggest, they are also affected by those market-wide factors that describe the primary market environment at issuance (hereafter "time effects"). During the 2004 to 2008 and 2010 to 2015 periods, the time effects clearly lowered the launch spreads to a level well below the long-term average prior to the global financial crisis of 2008, which indicates that the primary market environment for EM USD-denominated corporate bonds was favorable by historical standards during these periods. In addition, we find that the more accommodative the Fed's monetary policy is, and the more stable U.S. financial markets are, the lower the launch spreads on EM USD-denominated corporate bonds are. This finding is in line with the view that the accommodative and stable financial conditions in the U.S. contributed to improving USD funding conditions for EM companies since 2010.

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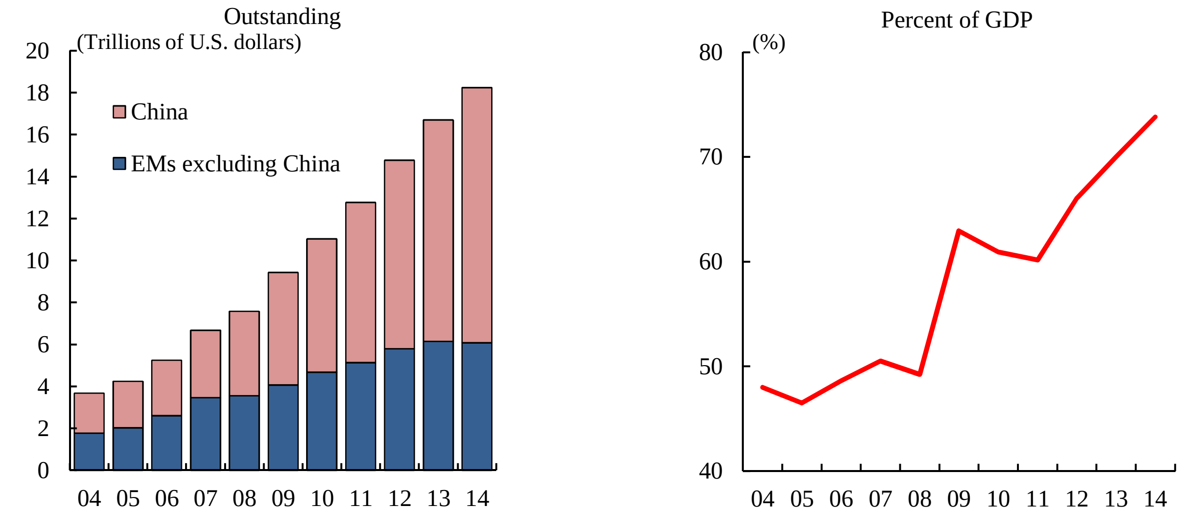
I. Introduction

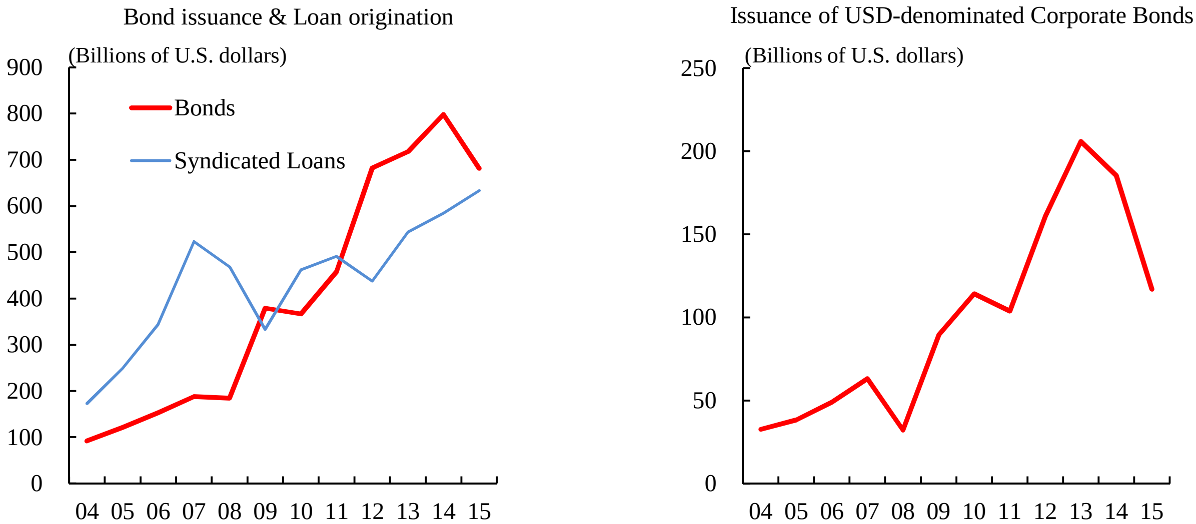
In major emerging market countries, corporate debt (USD equivalent) in non-financial sectors more than quadrupled from 2004 to 2014 and the debt-to-nominal GDP ratio increased sharply from 48% to 74% (Figure 1). Also, in the entire corporate debt universe, corporate bond issuance increased after the global financial crisis of 2008, exceeding the origination of syndicated loans (Figure 2). In particular, the issuance of USD-denominated corporate bonds increased significantly and its share as a percentage of the overall issuance of corporate bonds reached 24% in all EMs and 39% in the EMs excluding China.

(Figure 1) Corporate debt in EM non-financial private sector
(outstanding and debt-to-GDP ratio)



(Source) IMF

(Figure 2) EM corporate bond issuance



(Source) Dealogic

As the backdrop of the increase in EM corporate debt, especially foreign currency (mostly USD) denominated debt, many existing studies point out the favorable funding conditions for EM companies supported by the globally accommodative and stable financial environment[1]. Given this view, we examine the development of launch (primary) spreads (the difference between a bond's yield to maturity at issuance and U.S. Treasury yields of corresponding maturity) on USD-denominated corporate bonds issued by EM companies since the mid-1990s, identifying their determinants and assessing the primary market environment for EM companies. Our main intentions are summarized as follows.

(1) To examine how launch spreads on EM corporate bonds are determined and whether they properly reflect firm-specific factors as standard structural credit models suggest.

(2) To examine whether we can quantitatively confirm the view that funding conditions for EM companies have improved significantly since the global financial crisis of 2008.

(3) To examine how the Fed's monetary policy and financial market conditions in the U.S. have affected the primary market environment for EM USD-denominated corporate bonds.

The rest of this paper is organized as follows. In Section 2, we briefly describe an analytical framework and features of this study in comparison with related literature. In Section 3, we explain the dataset and the model. In Section 4, we interpret the empirical results. In Section 5, we describe how the time effects capture the primary market condition that affects launch spreads, and identify their determinants. Section 6 concludes.

II. Analytical Framework and Related Literature

1. Analytical Framework

In order to examine the primary market environment of corporate bonds, it is necessary to control firm-specific factors of launch spreads[2]. In this paper, we utilize the structural credit

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[1] For example, Chui, Fender and Sushko (2014) note "Corporates in many EMEs have taken advantage of unusually easy global financial conditions to ramp up their overseas borrowing and leverage. This could expose them to increased interest rate and currency risks unless these positions are adequately hedged." and Chow (2015) notes "In recent years, firms in emerging market countries have increased borrowing, particularly in foreign currency, owing to easy access to global capital markets, prolonged low interest rates and good investment opportunities."

[2] In this paper, we use launch spreads on each issue, rather than their average, because changes in the simple average of launch spreads on corporate bonds do not necessarily reflect the primary market

models pioneered by Merton (1974) and decompose launch spreads on each EM USD-denominated corporate bond into two determinants: the one affected by firm-specific factors, and the one affected by market-wide factors that reflect the primary market environment at issuance.

Under the framework of structural credit models, bond prices are determined on the assumption that a firm's value follows a certain stochastic process and a default occurs when the value falls below a certain threshold such as the nominal value of debt. In this framework, launch spreads are determined by firm-specific factors such as the firm's value and its volatility as well as the risk-free rate. In other words, basic structural credit models do not explicitly assume that macro factors, other than the risk-free rate, affect launch spreads.

In this paper, we use an expanded structural credit model incorporating market-wide time dummies, based on related studies such as Nakashima and Saito (2009). Specifically, we implement regression analyses on launch spreads on EM corporate bonds with three types of variable. The first type of variable represents factors based on basic structural credit models. The second explains characteristics of each issuer and issue. The last is a market-wide time dummy. While time dummies capture the market-wide impacts of financial and economic conditions at issuance on launch spreads via investors' behavior, etc., other variables capture risks specific to each issuer and issue.

As for USD-denominated corporate bonds of EM companies, it is reasonable to assume that the primary market environment is affected by the Fed's monetary policy and financial market conditions in the U.S. For example, launch spreads should tighten when investors' risk appetite for EM corporate bonds increases under an accommodative monetary policy by the Fed. In addition, through investors' behavior, launch spreads could tighten when investors' financing conditions improve or U.S. financial markets become less volatile. Therefore, changes in the environment surrounding investors are expected to have market-wide impacts on the launch spreads of USD-denominated corporate bonds.

In this paper, we define the market-wide impacts as the "time effects", a benchmark to

environment at issuance appropriately. For example, when investors' risk appetite is low, it becomes difficult for companies with high credit risks (typically lower-rated companies) to issue bonds, and those companies' share of the primary market will decrease as a result. On the other hand, the share of those companies with high credit risks will increase when investors' risk appetite is high. This means that averages of launch spreads are affected by changes in the average credit quality of issuers reflecting the prevailing primary market environment.

assess the primary market environment of EM USD-denominated corporate bonds. Then, we examine the impacts of the Fed's monetary policy and the U.S. financial market conditions on estimated time effects.

2. Related Literature

There are many empirical studies applying structural credit models on secondary market spreads in developed economies and assessing how well these models explain changes in credit spreads. For example, Longstaff and Schwartz (1995), Duffee (1998), Collin, Goldstein and Martin (2001), and Huang and Huang (2003) apply structural credit models on secondary market spreads on U.S. corporate bonds and their empirical results are consistent with the theoretical framework. Shirasu and Yonezawa (2007), Ohyama and Sugimoto (2007), and Nakashima and Saito (2009) reach similar conclusions by applying structural credit models on secondary market spreads on Japanese corporate bonds. Many of these studies additionally emphasize that those changes in corporate bond spreads in the secondary market cannot be fully explained by original structural credit models and the explanatory power of the models improves by adding macro variables such as investors' risk appetite, market liquidity, and monetary policy stance.

On the other hand, there are not many empirical studies applying structural credit models on EM credit spreads. Eichengreen and Mody (2000) implement a kind of structural credit model on the launch spreads of EM bonds (including those issued by sovereign entities) issued from 1991 to 1997 using variables such as the U.S. Treasury yield and the debt-to-GNP ratio, but the results are not necessarily consistent with the implications of structural credit models. The IMF (2015) examines the effects of country-level factors (such as debt ratios of each country) and global factors (such as secondary market spreads on U.S. HY bonds) on EM corporate bond spreads in the secondary market from 2001 to 2014[3], pointing out that the explanatory power of country-level factors has declined since the global financial crisis of 2008. Clark and Kassimatis (2015) analyze the secondary market spreads on USD-denominated sovereign bonds issued from 1995 to 2010 using variables such as the debt-to-GDP ratio, the foreign exchange reserves-to-GDP ratio, and the real GDP growth rate, concluding that the results are generally in line with structural credit models.

Examples of related studies incorporating market-wide time dummies into structural

[3] The IMF uses secondary market spreads on U.S. HY bonds as a proxy variable for investors' risk appetite.

credit models include Nakashima and Saito (2009) and Ohyama and Hongo (2010). The former analyzes secondary market spreads on Japanese corporate bonds based on structural credit models incorporating time dummies and points out that changes of time dummy coefficients are likely to reflect the impacts of liquidity conditions in the corporate bond market and the BOJ's monetary policy. The latter regresses launch spreads on Japanese corporate bonds on explanatory variables consisting of structural credit models and time dummies, concluding that the stance of the BOJ's monetary policy and the stability of financial markets are likely to have significant market-wide effects on the launch spreads.

3. Features of Our Paper

Compared to the related literature, our paper has the following three features.

First, we focus on EM USD-denominated corporate bonds. There are not many related studies applying structural credit models on EM corporate bond markets.

Second, we analyze launch spreads on corporate bonds rather than secondary market spreads. Secondary market spreads are easier to assess because their market values are continuously observable. However, yields in secondary markets, which are used to calculate conventional credit spreads, are often indicative and not based on actual trading. On the other hand, launch spreads on corporate bonds are based on actual trading in the primary markets and thus reflect market conditions more precisely. In addition, given our intention to assess the funding conditions of EM companies, it would be straightforward to analyze launch spreads instead of secondary market spreads.

Third, our paper quantitatively extracts market-wide factors that affect launch spreads, defining them as a benchmark index to assess the primary market environment of EM USD-denominated corporate bonds. This index enables us to assess how the Fed's monetary policy and the stability of U.S. financial markets affect the market environment.

III. Methodology and Data

Our primary dependent variables are the launch spreads of USD-denominated straight corporate bonds issued by EM companies in non-financial sectors from July 1995 to December 2015[4]. The data are obtained from Dealogic and Bloomberg. The number of samples is 1,541.

[4] EM countries in this paper refer to all countries other than developed countries as defined by the BIS.

The specification of our model is as follows:

$$spread_i = c + \beta_1 \ln debt_i + \beta_2 \ln \sigma_i + \beta_3 r_i + \beta_4 \ln maturity_i + \beta_5 rank_i + \beta_6 cyclical_i + \beta_7 freq_i + \beta_8 \ln volume_i + \beta_9 area_i + \sum_{\tau=1996H1}^{2015H2} \gamma_\tau time_i + \varepsilon_i \qquad (1)$$

where i, ln, and ε_i denote each corporate bond issue, logarithm, and the residuals, respectively.

The variables in the model are as follows:

$spread_i$ is the launch spread on corporate bond i.

$debt_i$ is the debt-to-EBIT ratio of bond i issuer, calculated by dividing the issuer's total debt by its earnings (EBIT, Earnings Before Interests and Taxes) at issuance[5]. The larger $debt_i$ is, the higher the default probability becomes. Hence, the expected sign of the coefficient is positive.

σ_i is the issuer's stock price volatility[6]. The higher σ_i is, the higher the volatility of the issuer's asset value becomes, and thus the higher the default probability becomes. Therefore, the expected sign is positive.

r_i is the risk-free rate, the U.S. Treasury yield with a maturity corresponding to that of

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[5] A debt-to-EBIT ratio at issuance is calculated by linear interpolation using annual and quarterly financial data. Based on standard structural credit models, it would be preferable to use debt-to-equity ratios instead of debt-to-EBIT ratios. In this paper, however, we use debt-to-EBIT ratios because of such data constraints as that there are a number of bond issuers, especially state-owned companies, not listed on stock markets. Although debt-to-EBIT ratios and stock price volatilities (mentioned later) could be correlated, the actual correlation coefficient is −0.03, indicating that the possible multicollinearity would be negligible. Furthermore, as a robustness check, we conducted the estimation using lagged debt-to-EBIT ratios as an alternative explanatory variable, and confirmed the results are not materially different.

[6] We use each issuer's 30-business-day historical volatility at issuance as long as data are available. Otherwise, for example in the case of non-listing, we use historical volatilities of the major equity indices in issuers' principal business locations alternatively. Considering a potential bias caused by using historical volatilities of equity indices, we conducted the estimation using a sub-sample consisting only of issuers' stock price volatilities and confirmed that the results are not materially different. The reason for using historical volatilities, rather than implied volatilities, is due to data constraints.

corporate bond i at issuance[7]. Risk-free rates indicate expected growth rates of asset values under the risk-neutral process. Thus, the higher r_i is, the lower the default probability becomes under the risk-neutral measure, and therefore the expected sign of the coefficient is negative.

$maturity_i$ is the remaining maturity of $debt_i$. In general, the longer the maturity is, the higher the default probability before maturity is, and therefore the expected sign of the coefficient is positive.

$rank_i$ is a set of dummy variables related to the issuer's rating at issuance[8]. The lower the rating is, the wider the spreads required by investors, and therefore the expected sign of the coefficient is positive. It is also expected that the lower the rating is, the larger the coefficient becomes.

$cyclical_i$ is a dummy variable related to the industrial sector to which bond i issuer belongs[9], taking 1 when the corresponding sector is categorized as cyclical, otherwise 0. The default probability of issuers in cyclical sectors until maturities is expected to be higher than that in defensive sectors (used as a benchmark), and therefore the expected sign of the coefficient is positive.

$freq_i$ is a dummy variable related to frequent issuers of corporate bonds[10]. It is assumed that frequent issuers are well known among investors and the liquidity of their corporate bonds is higher, and thus the spreads required by investors should be narrower. Therefore, the expected sign of the coefficient is negative.

$volume_i$ is the issuance volume of $debt_i$ denominated in USD. The larger the issuance volume is, the higher its market liquidity will be, and therefore the expected sign of the coefficient is negative.

$area_i$ is a set of dummy variables related to issuers' principal business locations (countries and regions)[11]. This is added in order to control the potential difference between risk premiums which investors require depending on issuers' principal business locations.

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[7] Calculated based on yield curves of U.S. Treasuries (generic) from Bloomberg.

[8] Dummy variables are established for the three categories (BBB, BB, and B or below). "A or above", which is used as a benchmark, is not sub-divided in order to ensure a sufficient number of samples.

[9] The definitions of "cyclical" and "defensive" are based on the MSCI's category.

[10] An issuer launching bonds more than three times in the sample period (July 1995 to December 2015) is defined as a frequent issuer.

[11] Dummy variables are constructed for China, Europe, the Middle East, Latin America, and other regions. Asia (ex China) is used as a benchmark.

Lastly, $time_i$ is a time dummy variable related to the issuance timing of $debt_i$[12] (semi-annual basis except for H2 1995, which is the starting point of the data). This is added to capture market-wide factors on a semi-annual basis after firm-specific factors are controlled. We add the constant to the coefficients of time dummies, and adjust the long-term average of the series prior to the global financial crisis of 2008 to be zero. Then, we define the value of the adjusted series at period τ as a "time effect" as of period τ. A negative (or positive) time effect indicates that the primary market environment at the corresponding period is more (or less) favorable than the period prior to the global financial crisis.

IV. Estimation Results

Table 1 summarizes the estimation results of Equation (1) by the OLS excluding those of time dummies. First, the estimated coefficients of the debt-to-EBIT ratio and the stock price volatility, and the risk-free rate are all statistically significant and the sign conditions are as implied. This result implies that the structural credit models are valid for launch spreads on EM USD-denominated corporate bonds.

[12] Although we assume the dataset is cross-sectional, it could be considered as panel data. In that case, time dummies are interpreted as time fixed effects. It is confirmed that the random effects model is rejected by the Wu-Hausman test.

(Table 1) Estimation results of equation (1) (excluding time dummies)

	All	Rating groups	
		IG	HY
Total Debt-to-EBIT	0.11***	0.09***	0.01
	(3.49)	(3.44)	(0.07)
Stock Price Volatility	0.36***	0.23***	0.50***
	(6.35)	(4.61)	(3.44)
Risk-free rate	-0.64***	-0.40***	-1.01***
	(-7.81)	(-5.40)	(-6.20)
Maturity	0.67***	0.55***	0.39*
	(6.96)	(6.09)	(1.85)
BBB dummy	0.95***	0.84***	-
	(15.83)	(15.28)	
BB dummy	2.45***	-	-
	(24.74)		
Below B dummy	4.26***	-	1.58***
	(22.36)		(8.89)
Cyclical-sector dummy	0.19***	0.18***	0.11
	(2.78)	(3.02)	(0.60)
Frequent-issuer dummy	-0.22***	-0.16**	-0.25
	(-3.07)	(-2.37)	(-1.54)
Issuance volume	-0.19***	0.04	-0.46***
	(-2.78)	(0.45)	(-3.34)
China dummy	0.40***	0.08	1.77***
	(3.74)	(1.29)	(3.66)
Europe dummy	0.64***	0.95***	-0.24
	(5.67)	(7.35)	(-0.97)
Middle East dummy	0.25**	0.25***	0.12
	(2.51)	(2.94)	(0.25)
Latin America dummy	0.28***	0.25***	0.01
	(3.47)	(3.58)	(0.05)
Other regions dummy	0.57***	0.58***	0.52
	(3.44)	(3.41)	(1.16)
Constant	6.02***	0.34	17.43***
	(4.20)	(0.21)	(6.53)
Adjusted R-squares	0.68	0.60	0.58
Number of samples	1541	1116	425

(Note 1) Numbers in parentheses are t-values. The asterisks ***, **, * indicate significance at the 1, 5, 10% level, respectively.

(Note 2) Heteroscedasticity robust t-values based on White (1980).

The coefficients of other variables are all statistically significant and the signs are consistent with the assumption. Specifically, launch spreads are wider when maturities are longer and ratings are lower. In addition, launch spreads of issuers in cyclical sectors are wider than those of issuers in defensive sectors. Furthermore, a frequent issuer with larger issuance volume enjoys lower launch spreads, implying that an improvement of market liquidity contributes to a decline of launch spreads.

The coefficients of dummy variables related to issuers' principal business locations (countries and regions) are statistically significant and positive in all locations, suggesting that launch spreads required for Asian companies (excluding China) are narrower than those required for companies in other countries and regions. The reason for the launch spreads of Asian companies (excluding China) being relatively narrow might be attributed to investors' perception that those countries and regions are politically more stable or that the transparency of Asian companies is expected to be higher.

Examining the estimation results for investment grade (IG) bonds and high yield (HY) bonds separately, the results for IG bonds are very close to the results for all samples. On the other hand, as for HY bonds, there are several coefficients such as the debt-to-EBIT ratio that are not statistically significant. However, the coefficients of the stock price volatility, the risk-free rate, and the issuance volume are all statistically significant and the sign conditions are met, and their absolute values are higher than those of IG bonds. In other words, the elasticities regarding the asset value volatility and the expected growth rate of each issuer, and the issuance volume for HY bonds are larger than those for IG bonds.

V. Development and Determinants of Time Effects

1. Comparison of Time Effects and Average Launch Spreads

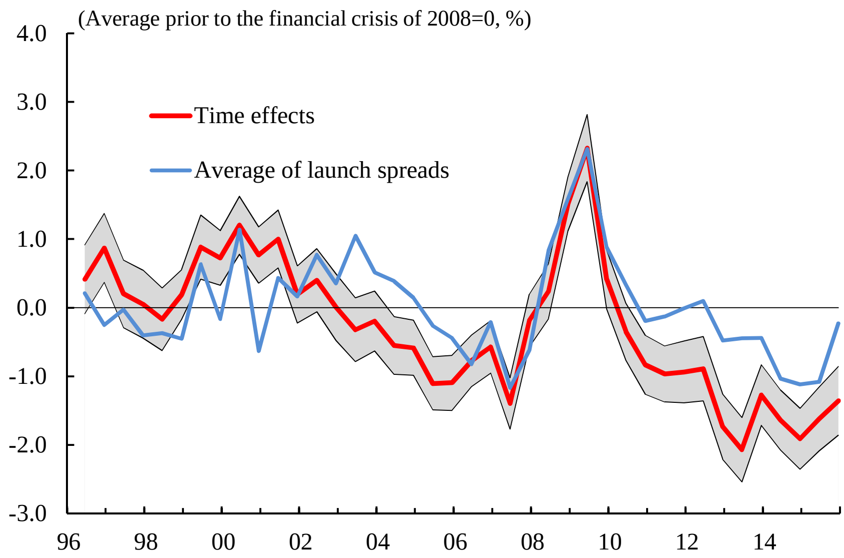
This section discusses the development of time effects. As explained in Section 3, time effects are based on the estimation results of equation (1). We add the constant to the coefficients of time dummies, and adjust the long-term average of the series prior to the global financial crisis of 2008 to be zero, defining the value of the adjusted series at time τ as a time effect as of time τ.

First, comparing the time effects with the simple average of launch spreads,[13] their

[13] In order to compare with time effects, we also adjust the simple average of launch spreads. In other words, we adjust the long-term average of the series prior to the financial crisis of 2008 to be zero.

developments are relatively similar (Figure 3)[14]. This finding implies that market-wide factors significantly affect each launch spread. Launch spreads are considered to be determined by each issuer's and issue-specific factors given the market-wide factors at issuance.

(Figure 3) Time effects and the simple average of launch spreads (All Samples)



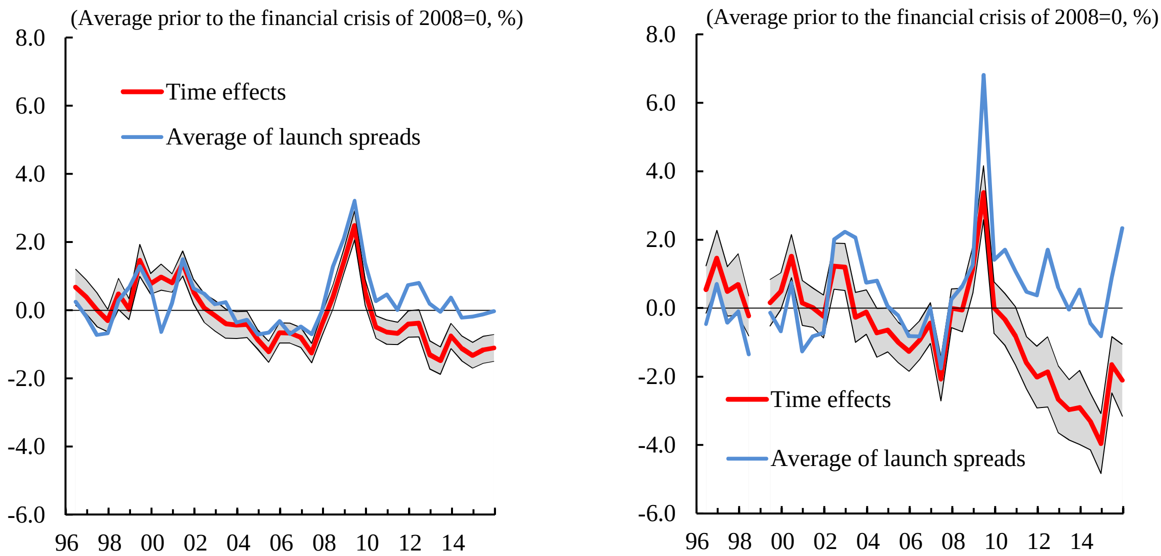
(Note 1) Shaded areas indicate ±1σ using standard errors of γ.

(Note 2) The latest data are as of H2 2015.

Second, during the 2004 to 2008 and 2010 to 2015 periods, the time effects clearly lower the launch spreads to a level well below the long-term average prior to the financial crisis of 2008 (Figure 3). Comparing the sub-sample results between IG and HY, the time effects of HY compress launch spreads more significantly than those of IG from 2010 to 2015 (Figure 4). This finding implies that, during that period after the global financial crisis of 2008, the primary market environment for EM USD-denominated corporate bonds was favorable especially that for the HY bonds from 2010 to 2015, in comparison with the historical average.

[14] The correlation coefficient between time effects and the simple average of launch spreads (from 1996 to 2015) is +0.73.

(Figure 4) Time effects and the simple average of launch spreads
(Left: IG bonds, Right: HY bonds)



(Note 1) Shaded areas indicate ±1σ using standard errors of γ.

(Note 2) The latest data are as of H2 2015.

2. Financial and Economic Environment for Investors and the Time Effects

As mentioned above, our time effects represent market-wide factors after controlling issuers' and issue-specific factors, capturing the financial and economic environment surrounding investors at issuance of EM corporate bonds.

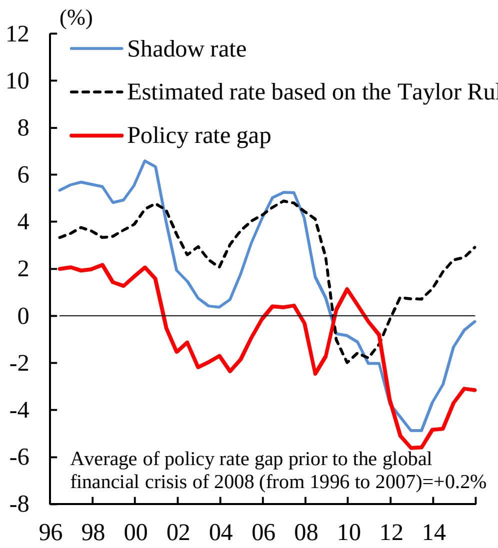
For example, under accommodative monetary conditions, the demand for high yield assets increases and credit spreads fall, driven by investors' "search for yield" behavior, which is called "the risk-taking channel". Lower volatility both in financial markets and in the real economy not only contributes to a smaller risk premium required by investors, but also improves investors' financing conditions. In that case, launch spreads on corporate bonds are expected to contract.

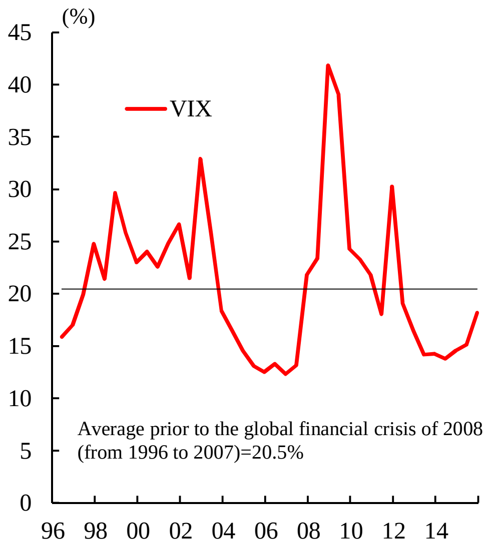
3. Factors Affecting Time Effects

Given the view discussed above, we examine how the Fed's monetary policy and the stability of the U.S. financial markets affect our time effects extracted from EM USD-denominated corporate bonds. The proxy variable of the Fed's monetary policy is the

U.S. policy rate gap (the shadow rate minus the estimated rate based on the Taylor rule)[15], while that of the stability of U.S. financial markets is the VIX (Figure 5).

(Figure 5) Policy rate gap and VIX





(Note) The latest data are as of H2 2015.

(Source) Bloomberg

The specification is as follows:

$$timeeffect_\tau = c + \beta_1 prgap_\tau + \beta_2 \ln vix_\tau + \varepsilon_\tau \qquad (2)$$

where $timeeffect_\tau$, c, $prgap_\tau$, vix_τ, τ, ln, and ε_τ denote the time effects, constant, policy rate gap, VIX, time at semi-annual basis, logarithm, and residuals, respectively. The estimation method is the OLS.

The results of equation (2) show that the coefficients of the policy rate gap and the VIX are positive and statistically significant for all sample categories: All, IG and HY (Table 2). This indicates that the more accommodative the Fed's policy is and the more stable U.S. financial markets are, the lower the launch spreads on EM USD-denominated corporate

[15] The U.S. policy rate gap is calculated by deducting the estimated rate based on the Taylor rule from the shadow rate estimated by the Reserve Bank of New Zealand (data source is Bloomberg). A positive (negative) sign of the policy rate gap indicates that the stance of monetary policy is tightened (accommodative). Under the unconventional monetary easing policy, the policy rate gap can be considered as the measurement of the monetary policy stance in terms of the policy rate.

bonds are.

In addition, the coefficients of the policy rate gap and the VIX for HY bonds are larger than those for IG bonds. This result is consistent with the view that investors' "search for yield" behavior had larger impacts in the HY bond market under accommodative and stable financial conditions.

(Table 2) Estimation results of equation (2)

	All	Rating groups	
		IG	HY
Policy rate gap	0.21***	0.15***	0.36***
	(6.00)	(4.52)	(6.00)
VIX	1.92***	1.84***	2.53***
	(5.12)	(4.99)	(4.72)
Constant	-0.06	0.00	-0.14
	(-0.52)	(-0.04)	(-0.76)
Adjusted R-squares	0.73	0.64	0.68
Durbin-Watson Statistics	1.19	1.45	1.57
Number of samples	40	40	39

(Note 1) Numbers in parentheses are t-values. The asterisks *** indicate statistical significance at the 1% level.

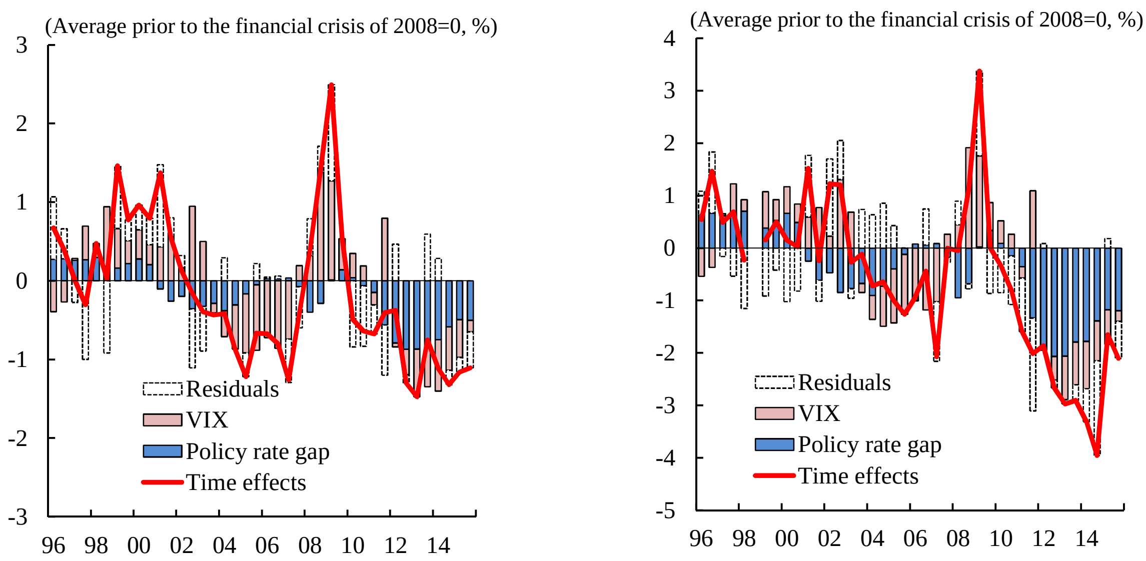
(Note 2) Serial correlation and heteroscedasticity robust t-values based on Newey-West (1987).

Based on the estimation results, we decompose time effects into those contributions of time effects and the VIX[16] (Figure 6). During the 2004 to 2008 period, the VIX contributes to lower the launch spreads of both HY and IG. This is consistent with the view that the stable financial market conditions prior to the global financial crisis of 2008, which is referred to as the "Great Moderation", contributed to the tightening of credit spreads. On the

[16] In this section, we analyze the impacts of the Fed's monetary policy and the stability of the financial and economic environment on the launch spreads on EM USD-denominated corporate bonds: first by extracting cross-issue time effects, and then decomposing the contributions of them. Another method of analysis is to incorporate the policy rate gap and the VIX into extended structural models and estimate the impact simultaneously. With this alternative method, both the policy rate gap and the VIX are positive and statistically significant, and time dummies during the 2004 to 2008 and 2010 to 2015 periods rarely fall below the average prior to the financial crisis in a significant way (the estimation results are summarized in the Appendix). This means that the main conclusion in this paper is robust regardless of the analytical methodology employed.

other hand, during the 2010 to 2015 period, the Fed's aggressive monetary easing contributed to lower the spreads especially in HY bonds markets. This finding is in line with the view that the accommodative funding conditions for EM companies were supported by aggressive monetary easing by the Fed and other central banks in developed countries.

(Figure 6) Decomposition of time effects
(Left: IG bonds, Right: HY bonds)



(Note 1) The latest data are as of H2 2015.

(Note 2) Constant term adjusted. Log of the VIX and the policy rate gap are standardized with the average prior to the financial crisis being zero.

VI. Conclusion

We examined the development of launch spreads on EM USD-denominated corporate bonds with an expanded structural credit model incorporating market-wide time dummies. Based on our empirical results, while the launch spreads on EM corporate bonds properly reflect firm-specific factors as standard structural credit models suggest, they are also affected by market-wide factors that reflect the primary market environment at issuance. In other words, the launch spreads are considered to be determined by each issuer's and issue-specific factors given the market-wide factors at issuance.

Moreover, during the 2004 to 2008 and 2010 to 2015 periods, our estimated time effects clearly lower the launch spreads to a level well below the long-term average prior to the global financial crisis of 2008, which indicates that the primary market environment for EM USD-denominated corporate bonds was favorable during these periods. Comparing the sub-sample results of IG and HY bonds, the time effects lower the launch spreads of HY bonds more significantly than those of IG bonds during the 2010 to 2015 period. This finding implies that, during the period after the global financial crisis of 2008, the primary market environment for EM USD-denominated corporate bonds was favorable especially in the HY market.

Lastly, we examine how the Fed's monetary policy and the stability of financial markets in the U.S. affect the time effects. The results indicate that the more accommodative the Fed's policy is and the more stable U.S. financial markets are, the lower the launch spreads on EM USD-denominated corporate bonds are. In addition, the contribution of the VIX and that of the policy rate gap to compressing launch spreads were relatively larger during the 2004 to 2008 period and the 2010 to 2015 period, respectively. This result is consistent with the view that investors' "search for yield" behavior contributes to improving the market condition of the EM corporate bonds under the accommodative and stable financial conditions during the 2010 to 2015 period.

Given the discussion above, it is important to carefully monitor how launch spreads on EM USD-denominated corporate bonds would be affected in the case that the Fed advances the normalization of monetary policy or financial markets become more volatile. In fact, in 2015, it was observed that while the U.S. policy rate gap became less negative and the VIX went up, the extent of time effects to lower the launch spreads became somewhat smaller.

With regard to the analyses in this paper, it is necessary to keep in mind that the estimated results depend on the model specification, and we do not assume structural changes in the model. In addition, the analysis of the impact of the Fed's monetary policy and the stability of financial markets on time effects and launch spreads is based on statistical relationships and thus the mechanism is not identified. We leave these issues for future research.

Appendix: Estimation results of the alternative method

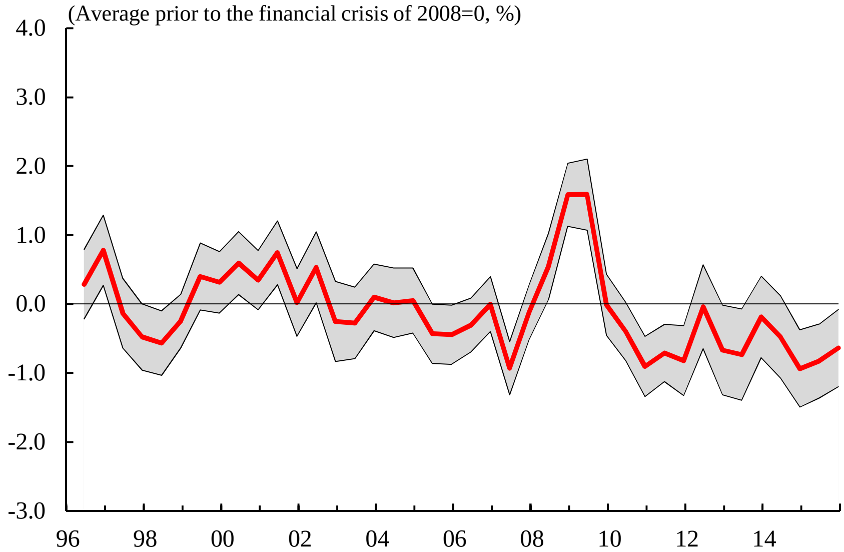
(Appendix Table 1) Estimation results of the model with policy rate gap and VIX

	All
Policy rate gap	0.13*
	(1.87)
VIX	1.24***
	(5.45)
Total Debt-to-EBIT	0.11***
	(3.58)
Stock Price Volatility	0.32***
	(5.68)
Risk-free rate	-0.61***
	(-7.04)
Maturity	0.63***
	(6.36)
BBB dummy	0.97***
	(16.18)
BB dummy	2.48***
	(25.17)
Below B dummy	4.27***
	(22.59)
Cyclical-sector dummy	0.18***
	(2.71)
Frequent-issuer dummy	-0.21***
	(-2.95)
Issuance volume	-0.23***
	(-3.21)
China dummy	0.44***
	(4.16)
Europe dummy	0.64***
	(5.76)
Middle East dummy	0.25**
	(2.48)
Latin America dummy	0.27***
	(3.44)
Other regions dummy	0.55***
	(3.38)
Constant	3.18**
	(2.07)
Adjusted R-squares	0.69
Number of samples	1541

(Note 1) Numbers in parentheses are t-values. The asterisks ***, **, * indicate significance at the 1, 5, 10% level, respectively.

(Note 2) Heteroscedasticity robust t-values based on White (1980).

(Appendix Figure 1) Time effects with policy rate gap and VIX



(Note 1) Shaded areas indicate ±1σ using standard errors of γ.

(Note 2) The latest data are as of H2 2015.

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