

Monetary Policy and Risk-taking: Evidence from Thai Corporate Bond Markets

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Motivation

- The risk-taking channel of monetary policy has gained much attention since the GFC.
 - Low rates encourage financial intermediaries to take on greater leverage and risks
- Some theories:
 - Impact on valuations, income and cash flows (Borio and Zhu, 2012)
 - Impact on lending profitability and capital (Adrian and Shin, 2010)
 - Search for yield (Rajan, 2006)
- A number of empirical evidence for banks (Maddaloni and Peydro, 2011; Jimenez et al., 2014; Ioannidou et al., 2015; Dell’Ariccia et al., 2017)
- BUT, evidence beyond the banking sector is rather scarce.
 - Focus on search-for-yield of institutional investors
 - Focus on the case of AEs

Related Literature

[1] Bank risk-taking Channel of Monetary Policy

- Bank Level: Altunbas et al. (2014)
- Loan Level: Jimenez et al. (2014); Ioannidou et al. (2015); Paligorova and Santos (2017); Dell'Ariccia et al. (2017); Bonfim and Soares (2018); Ratanavararak and Ananchotikul (2018)
- Country Level: Maddaloni and Peydro (2011)

[2] Search for yield

- Money Funds: Di Maggio and Kacperczyk (2017); Chodorow-Reich (2014)
- Equity Funds: Hau and Lai (2016);
- Pension Funds: Kim and Olivan (2015); Andonov et al. (2017)
- Individuals: Lian et al. (2019); Daniel et al. (2021)
- Treasury Markets: Hanson and Stein (2015)

[3] Search for yield in Bond Markets

- Becker and Ivashina (2015); Czech and Roberts-Sklar (2017); Choi and Kronlund (2018)

This Paper

Examine the risk-taking channel of monetary policy in the context of Thai corporate bond market

→ The first to explore evidence of the risk-taking channel outside banks for EMs.

Research Questions

[1] Do low interest rates contribute to higher ex-ante risks of newly-issued bonds?

→ The first to uncover this relationship

[2] How do low rates impact the pricing of risks?

→ Among the first to uncover this relationship

[3] Are any corporate bond investors prone to the search-for-yield behavior?

→ Expand the set of bond investors beyond institutional investors

Data

ThaiBMA

2001Q1 to 2020Q2

Information on newly-issued non-financial corporate bonds: issue/issuer characteristics

Focus on bonds with fixed coupon

A total of 2526 bonds from 247 companies during 20 years

Classify credit ratings into 4 groups:

- A Group
- BBB Group
- Non-investment Grade
- Unrated

Debt Securities Holding Database

2013Q1 to 2020Q2

Focus on bond holdings at the issuance month

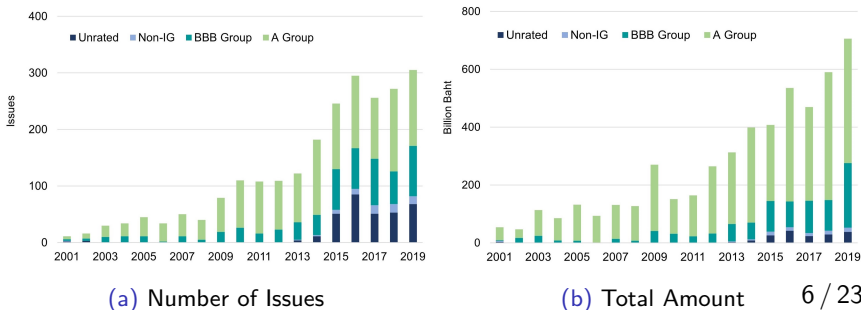
Classify bondholders into 8 groups from 24 original bondholder types:

- Pension and provident funds
- Mutual funds (except MMF)
- Insurances
- Commercial banks & SFI
- Cooperatives and MMF
- Corporates
- Individuals
- Government agencies and others

Stylized Facts

- Bond markets have become a more popular source of financing for Thai businesses over times.
- Risky bonds, especially unrated ones, have also been issued in greater number.

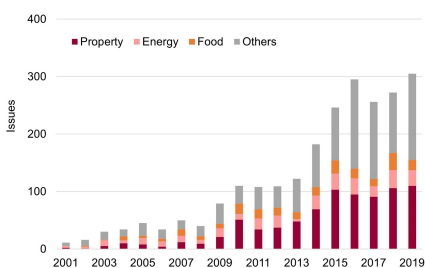
Figure 1: Corporate Bond Issuance by Risk Ratings



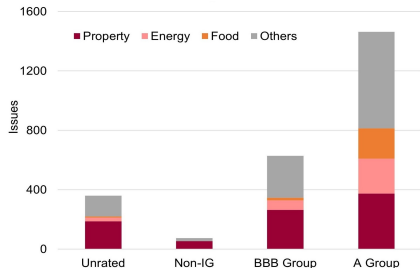
Stylized Facts (Cont.)

Bonds from the property sector outnumber those of other sectors, accounting for almost one-third of total issues and more than half of risky bonds.

Figure 2: Corporate Bond Issuance By Issuer Sectors



(a) Over Time

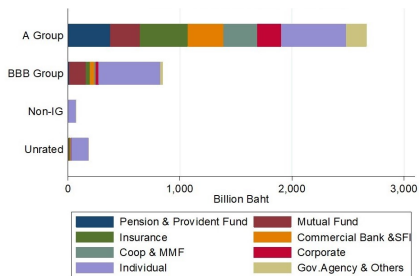


(b) By Risk Ratings

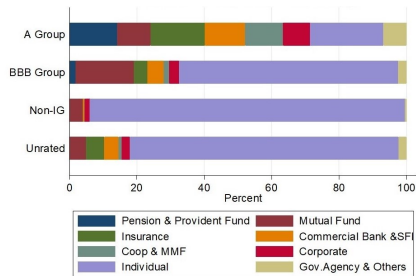
Stylized Facts (Cont.)

Individuals hold most of the risky bonds, indicating both their risk preference and limited institutional and regulatory constraints.

Figure 3: Bond Holding across 8 Investor Groups



(a) Holding Amount By Ratings



(b) Holding Share by Ratings

Impact of Low Rates on Risky Bond Issuance: Method

Impact on Credit Risks

Multinomial Logistic Framework:

$$\ln\left(\frac{p(\text{rating}_{i,t} = s)}{p(\text{rating}_{i,t} = A)}\right) = c + \beta r_t + \theta \text{bond}_{i,t} + \mu \text{macro}_t + \epsilon_{i,t}, \quad (1)$$

where $s \in \{BBB, non - IG, unrated\}$

Impact on Maturity Risks

OLS Regression of Bond Maturity ($\text{mat}_{i,k,t}$):

$$\text{mat}_{i,k,t} = c + \beta r_t + \theta \text{bond}_{i,k,t} + \mu \text{macro}_t + u_k + \epsilon_{i,k,t}, \quad (2)$$

- r_t = monetary policy measure
- **Issue characteristics** ($\text{bond}_{i,k,t}$): issue size, dummy for callable bonds, dummy for secured bonds, maturity, ratings
- **Macro conditions** (macro_t): GDP growth, stock market volatility, bank loan spread, 2Y-5Y spread

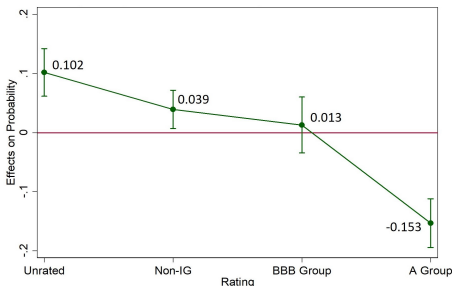
Identification Strategy

- The endogeneity between monetary policy and business cycles
→ include GDP growth
- Disentangling investor risk-taking (bond demand) from changes in the pool of borrowers (bond supply)
→ include issue characteristics
- Ex-ante risk measures
→ use credit ratings, but issuer ratings may slowly adjust

Impact on Probability of Risky Bond Issuance

- The issuance probability of unrated and non-investment-grade bonds are significantly higher when rates are low.
- This comes at the expense of A-group bonds

Figure 4: Marginal Effects of Low Rates on Prob. of Bond Issuance by Ratings

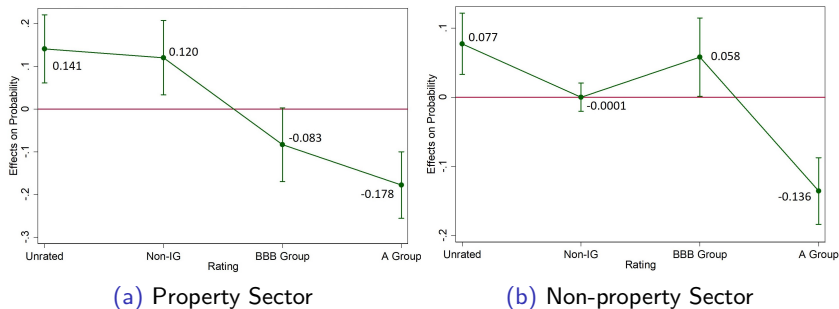


Note: Marginal effects derived from estimates of a multinomial logistic regression. Bands represent 95% confidence intervals.

Any Heterogeneity across Sectors?

The relationship is more pronounced for bonds from the property sector.

Figure 5: Marginal Effects of Low Rates on Prob. of Bond Issuance by Ratings (cont.)



Impact on Bond Maturity

Low interest rates lead to the issuance of bonds with longer maturity. In particular, it is mainly risky bonds that have lengthened maturity.

Table 1: Impact of Monetary Policy on Bond Maturity

Variable	Full Sample		A-group	BBB-group	NonIG	Unrated
Monetary Policy						
Low rate	0.0902*** (0.0309)		0.0758* (0.0416)	0.0325 (0.0404)	0.600*** (0.0596)	0.438*** (0.0859)
Policy rate		-0.0898*** (0.0228)				
Bond Characteristics						
BBB group	-0.183** (0.0819)	-0.173** (0.0817)				
Non-investment grade	-0.290*** (0.106)	-0.280*** (0.106)				
Unrated	-0.419*** (0.106)	-0.408*** (0.106)				
Issue size	0.0412** (0.0172)	0.0394** (0.0173)	0.0258 (0.0253)	0.0602** (0.0264)	0.103 (0.0765)	0.0470 (0.0429)
Callable	0.251*** (0.0697)	0.243*** (0.0683)	0.441*** (0.0999)	0.257** (0.117)	0.152 (0.110)	-0.125* (0.0681)
Secured	-0.0881 (0.0915)	-0.0727 (0.0929)	-0.307** (0.138)	0.263 (0.208)	-0.288** (0.126)	0.146 (0.0963)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,526	2,526	1,463	629	74	360
R ²	0.053	0.060	0.067	0.073	0.304	0.117

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Do low rates result in the compression of risk premium, esp. for risky bonds?

Regression specification:

$$\begin{aligned} \text{spread}_{i,k,t} = & c + \sum_s \alpha^s \text{rating}_{i,k,t}^s + \beta r_t + \sum_s \rho^s (\text{rating}_{i,k,t}^s * r_t) \\ & + \theta \text{bond}_{i,k,t} + \delta \text{issuer}_{k,t-1} + \mu \text{macro}_t + \epsilon_{i,k,t}, \end{aligned} \quad (3)$$

- Estimated by OLS
- Include interaction terms between ratings and GDP growth
- Include issuer characteristics ($\text{bond}_{k,t-1}$) for robustness checks: firm size, profitability, leverage

Pricing of Risk Results

We fail to find that riskier firms enjoy a coupon discount compared to safer firms when they issue bonds during periods of low interest rates.

Table 2: Pricing of Risk Estimation

Variable	1	2	3	4
Credit rating				
BBB group	1.269*** (0.0385)	1.179*** (0.0733)	1.118*** (0.0728)	1.094*** (0.0745)
Non-investment grade	2.960*** (0.107)	1.510* (0.880)	1.419* (0.838)	1.377* (0.832)
Unrated	2.660*** (0.0883)	2.214*** (0.297)	2.022*** (0.308)	1.960*** (0.321)
Monetary policy & interaction term				
Low rate	0.229*** (0.0409)	0.108*** (0.0351)	0.0375 (0.0340)	-0.0979 (0.100)
BBB X Low rate		0.259*** (0.0716)	0.288*** (0.0729)	0.328*** (0.0773)
NonIG X Low rate		1.785** (0.880)	1.839** (0.841)	1.900** (0.838)
Unrated X Low rate		0.861*** (0.292)	1.258*** (0.300)	1.345*** (0.323)
Maturity X Low rate				0.0869 (0.0620)
Bond characteristics				
Maturity	0.106*** (0.0358)	0.118*** (0.0358)	0.128*** (0.0290)	0.0657 (0.0533)
Other Bond Charac.	Yes	Yes	Yes	Yes
Issuer characteristics	No	No	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes
Observations	2,526	2,526	2,046	2,046
R ²	0.742	0.753	0.790	0.790

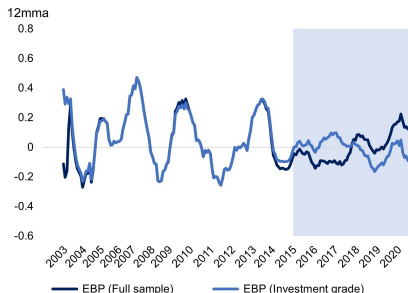
Excess Bond Premium - Gilchrist and Zakrajsek (2012)

EBP as a measure of investors' risk-bearing capacity over times

$$\text{spread}_{i,k,t} = c + \beta r_t + \theta \text{bond}_{i,k,t} + \delta \text{issuer}_{k,t-1} + \mu \text{macro}_t + \epsilon_{i,k,t}$$

$$\rightarrow \text{EBP}_t = \sum_{i,k} \epsilon_{i,k,t}$$

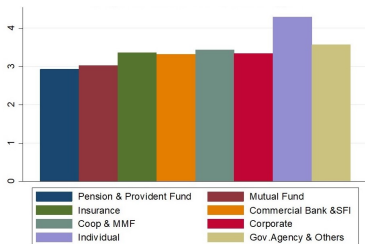
Figure 6: Excess Bond Premium



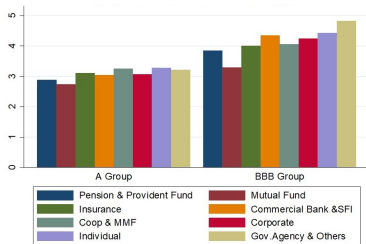
Weighted-average Yield across Bond Investors

- Individuals obtain the highest yields, over 4 percent per annum.
- They remain the yield-chasing agent even within safe group of bonds.

Figure 7: Weighted-average Yields (%) by Bondholder Groups



(a) Full Sample

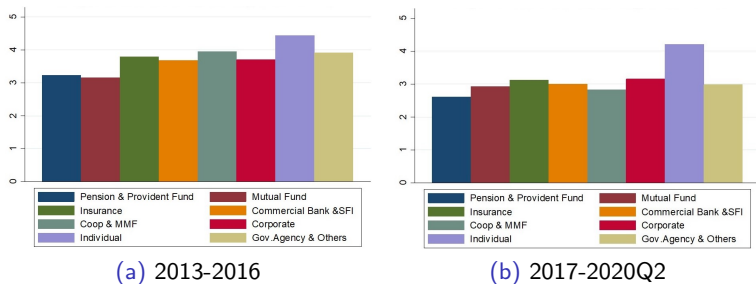


(b) Investment-grade Bonds

Weighted-average Yield across Bond Investors (Cont.)

Individuals stand out with their ability to maintain similar yields across the two time periods.

Figure 8: Weighted-average Yields (%) over Time



Are Any Bond Investor Groups Prone to Search-for-Yield Behavior?

Regression Specification:

$$holding_{i,t}^j = f(\text{spread}_{i,t}, \text{bonds}_{i,t}, \text{macro}_t), \quad (4)$$

where $holding_{i,t}^j$ represents the share of each bondholder j 's holding amount of bond i to its total non-financial corporate bond portfolios during the issuance month t

Estimation Method

Zero-inflated Beta Regression (Cook et al, 2008)

- Logistic Regression for whether $holding_{i,t}^j = 0$
- Beta Regression for $0 < holding_{i,t}^j < 1$

Result: Full Sample

Conditional on bond risk ratings, only two groups of bondholders appear to bias toward higher-yield bonds: **individuals and other depository financial institutions (saving cooperatives and MMF)**.

Table 3: Searching for Yield Estimation: Full Sample

Variable	Pension Fund	Mutual Fund	Insurance	Bank & SFI	Coop & MMF	Corporate	Individual	Others
Spread	-0.0729*** (0.0133)	-0.0520*** (0.0125)	-0.0240*** (0.00862)	-0.0666*** (0.0207)	0.0613*** (0.0184)	0.00297 (0.00750)	0.0268*** (0.00525)	-0.0268** (0.0134)
A group	0.00158*** (0.000492)	-0.000368 (0.000412)	-0.000553** (0.000265)	0.000733 (0.000762)	0.000544 (0.000755)	0.00100*** (0.000291)	-0.00170*** (0.000241)	0.000392 (0.000513)
BBB group	0.000645 (0.000480)	0.000300 (0.000337)	-0.000476* (0.000261)	-0.000104 (0.000589)	0.000745 (0.000608)	7.59e-05 (0.000199)	7.82e-05 (0.000153)	-0.000503 (0.000377)
Maturity	-0.00128*** (0.000151)	-0.00141*** (0.000175)	0.00127*** (9.47e-05)	0.000126 (0.000236)	0.00216*** (0.000181)	-0.000135 (9.23e-05)	0.000250*** (8.02e-05)	0.000127 (0.000163)
Issue size	0.000826*** (7.28e-05)	0.000939*** (8.14e-05)	0.000409*** (4.95e-05)	0.000818*** (0.000109)	0.000813*** (8.87e-05)	0.000922*** (5.53e-05)	0.000901*** (5.12e-05)	0.000933*** (9.13e-05)
GDP growth	0.0106*** (0.00291)	0.0106*** (0.00308)	0.00421*** (0.00158)	0.0186*** (0.00452)	0.0155*** (0.00301)	0.0117*** (0.00179)	0.00562*** (0.00151)	0.0120*** (0.00294)
SET volatility	0.0120*** (0.00202)	0.00763*** (0.00219)	0.00378*** (0.00130)	0.0100*** (0.00315)	0.00614*** (0.00226)	0.00820*** (0.00127)	0.00227** (0.00105)	0.0116*** (0.00231)
Observations	1,858	1,858	1,858	1,858	1,858	1,858	1,858	1,858

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Result: Samples of Investment Grade Bonds

Previous results still hold for the sample of investment-grade bonds, which are less prone to law and regulatory constraints.

Table 4: Searching for Yield Estimation: Only Investment-Grade Bonds

Variable	Pension Fund	Mutual Fund	Insurance	Bank & SFI	Coop & MMF	Corporate	Individual	Others
Spread	-0.156*** (0.0248)	-0.112*** (0.0228)	-0.0462*** (0.0141)	-0.126*** (0.0360)	0.122*** (0.0273)	0.00253 (0.0127)	0.0754*** (0.00957)	-0.0604*** (0.0203)
BBB group	-0.000306 (0.000388)	0.00139*** (0.000337)	0.000360 (0.000248)	-0.000201 (0.000627)	-0.000529 (0.000515)	-0.00106*** (0.000251)	0.00101*** (0.000207)	-0.000556 (0.000392)
Maturity	-0.00134*** (0.000187)	-0.00145*** (0.000199)	0.00159*** (0.000133)	0.000457 (0.000297)	0.00231*** (0.000213)	-0.000133 (0.000126)	3.81e-05 (0.000106)	0.000273 (0.000205)
Issue Size	0.00104*** (8.87e-05)	0.00109*** (9.04e-05)	0.000486*** (5.96e-05)	0.000947*** (0.000133)	0.000971*** (0.000104)	0.00117*** (7.47e-05)	0.00102*** (7.09e-05)	0.00118*** (0.000115)
GDP growth	0.00925*** (0.00358)	0.00940*** (0.00352)	0.00436** (0.00189)	0.0206*** (0.00548)	0.0202*** (0.00361)	0.0155*** (0.00239)	0.00880*** (0.00194)	0.0144*** (0.00362)
SET volatility	0.0144*** (0.00241)	0.00928*** (0.00243)	0.00477*** (0.00156)	0.0120*** (0.00377)	0.00688*** (0.00263)	0.0109*** (0.00173)	0.00323** (0.00139)	0.0155*** (0.00290)
Observations	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Robustness Checks: alternative measures of bond holding & yields.

Takeaways and Policy Implications

- Low interest rates are associated with greater issuance of bonds with worse risk ratings.
- However, we do not find evidence of compression of risk premium or underpricing of risks during these low-rate periods.
 - Evidence of the risk-taking less clear-cut. Risky bond outstanding also low to begin with.
 - Awareness may be placed on bonds from certain sectors.

Takeaways (cont.)

- Individuals, rather than banks and institutional investors, are the prime holder of high-risk bonds.
- Conditional on bond risk ratings, individuals, and saving cooperatives and MMF reach for yields in their investment.
 - Search for yield evidence among individuals requires improved market conduct. But, not much a concern due to investors being high net worth(?)
 - In terms of financial-stability implications, need monitoring of investment from cooperatives.