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DETERMINANTS OF CORPORATE BOND YIELD IN CHINA

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Abstract: The violation of the long standing sovereign ceiling rule triggers our interests in investigating the determinants of corporate bond yield in the Chinese market. Eight independent variables are selected according to literature review, representing sovereign bond risk, bond characteristics and firm financial ratios. Monthly and quarterly data are employed to run the regression models to explore the effectiveness of sovereign ceiling rule in Chinese market. We find the sovereign ceiling rule is still applicable in China, while there is a positive relationship between liquidity and corporate bond yield, which is inconsistent with widely accepted bond theory and our expectation. Additionally, the coefficients of remaining time to maturity and net income margin are both negative. However, the rest of the independent variables are insignificant.

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1. Introduction

Bond is one of traditional investments in addition to equity investments and money market investments. The return of a risky bond is measured by the sum of yield on a default-free bond and credit spread. Yield on Treasury securities is treated as risk-free rate, and the yield spread above this risk-free rate is paid to compensate the default risk and other risks. Many studies have examined how the corporate bond yields affected by the variables such as systematic risk or beta, liquidity risk, default risk and supply/demand of stocks. We analyse the sovereign risk, bond characteristics and firm financial ratios in an attempt to sort out the major factors determining the corporate bond yield in China.

1.1 The Sovereign Ceiling Rule

"Sovereign ceiling rule" is a long-standing policy among the rating agencies, which means that the corporate bonds cannot be more creditworthy than that country's sovereign bonds. The rating agencies meticulously applied this rule and never granted a corporate bond rating higher than the rating of a sovereign bond of a respective country before 1997. However, in 22ndApril 1997, Standard & Poor's upgraded 15 Argentine bonds (Table Appendix 1) and assigned ratings higher than that of Argentine's sovereign bonds (Durbin and Ng, 2005), which were rated as BB. In the same year, corporate bonds in two more countries, Panama and Uruguay, also received higher ratings than their sovereign bonds. Therefore, the violation of the sovereign ceiling rule first appeared in three highly dollarized economies (Borensztein, 2007).

These events instigated researchers to identify how the "sovereign ceiling rule" has been applied in corporate bond yield. Nevertheless, giving corporate bonds a higher rating than the sovereign bonds is gradually being accepted nowadays. According to Standard & Poor's (2011) application of sovereign in determining corporate bonds ratings,

> *"Sovereign credit risk is generally a key consideration in our assessment of non-sovereign ratings… While sovereign ratings are not 'ceilings', in our view, Standard & Poor's does consider the impact of sovereign risk as part of the rating process for non-sovereign entities. When we issue a rating for an entity that is higher than the rating of its respective sovereign government, Standard & Poor's expresses its view that the entity's willingness and ability to service its debt is superior to that of the sovereign. Moreover, we are offering the opinion that, ultimately, if the sovereign does default, there is an appreciable likelihood that the entity or its debt will not default."*

In terms of the yield, the sovereign ceiling rule acts as sovereign floor, indicating that the corporate bond yield cannot be lower than the sovereign bond yield in order to compensate for the higher credit risks. However, gradual relaxation in the application of this rule raises a question that whether sovereign risk is still one of the important factors determining the corporate bond yields and how significant is it compared with the other determinants.

1.2 The Analysis of the Chinese Market

China is a market worth studying in regard to credit rating changes. Firstly, there have been three occasions of sovereign default in Chinese history after 1900. The first default was due to civil wars started from 1921 and the second default occurred after communist party takeover in 1949. The latest one was in 1988, rising from bank crisis. Secondly, modern corporate bonds in China were

issued from 1983 and in 30 years of trading, corporate bonds have entered into a stable development phase. Additionally, as compared to other emerging countries' sovereign bonds, Chinese sovereign bonds obtain a relatively higher rating (Table 1.1), indicating a more reliable macroeconomic environment.

Table 1.1: Selected Emerging Countries Sovereign bond Ratings Evolution

	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
China	BBB	BBB	A-	A	A	A+	A+	AA-	AA-	AA-	AA-
Russia	N/A	B-	BBB	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB	BBB
India	BB+	BB	BB+	BB+	BBB-	BBB-	BBB-	BBB-	BBB-u	BBB-u	BBB-u
Brazil	B+	B+	BB-	BB	BB+	BBB-	BBB-	BBB-	BBB	BBB	BBB

Source: Bloomberg, as of 31st January 2013

Thirdly, amongst 8956 active corporate bonds available in Bloomberg which were issued in China, 324 corporate bonds have the same rating with sovereign bonds and only 1 corporate bond rated by S&P is in violation with the sovereign ceiling rule (Table 1.2). This corporate bond is Aaic Motor Corp, specialized in manufacturing automobiles and related parts and accessories. Therefore, it seems that the Chinese bond market generally applies the sovereign ceiling rule.

Table 1.2: Number of Corporate Bond Rated Higher Than Sovereign Bond

Rating Agency	Sovereign Bond Rating	Corporate Bond Rating	Number of bonds
Moody's	Aa3	Aa3	194
		Aa2, Aa1 or Aaa	0
S&P	AA-	AA-	40
		AA, AA+ or AAA	1
Fitch	A+	A+	90
		AA-, AA, AA+ or AAA	0

Source: Bloomberg, as of 5th July 2013

In this study we confirm that the ceiling rule applies to Chinese bond market, but to our own surprise higher liquidity is not reflected in lower yields. We believe that this result is caused by the lack of liquidity and smoothed prices in monthly or quarterly datasets.

In the following section we refer to relevant literature. In Chapter 3 data and methodological approaches have been elaborated, while analysis is included in Chapter 4. We finalise this paper with concluding remarks.

2 Literature Review

2.1 Sovereign Ratings

The crucial question has always been whether the sovereign ratings influence the corporate bond yield? Was it merely a bias before 1997? Borensztein, Cowan and Valenzuela (2007, P.4) demonstrate three ways in which sovereign ratings may affect the performance of private sectors. Firstly, the country default has negative effect on the overall economy, which further weakens the financial performance of private sectors. Secondly, the default of sovereign bonds may trigger financial and monetary policies influencing the solvency of the private sectors. The third way is other measures relating to capital controls and administration, which could effectively prevent private borrowers from serving their external obligations.

A considerable amount of research investigates the impact of sovereign bond rating change on the corporate bond yield. According to Brooks et al. (2004), these findings can be divided into two streams: a) no impact and b) significant impact. For instance, Weigel and Gemmill (2006) conduct a research to find out how the creditworthiness of corporate bonds in emerging markets can be influenced by country, region and global factors. Surprisingly, the country-specific factors only constitute 8% of the 80% explained variables. The creditworthiness of corporate bonds in emerging markets is highly related to the regional factors, which account for 45% of the explained variables. Furthermore, Ederington and Goh (1998), Goh and Ederington (1993) and Griffinand Sanvicente (1982) imply that sovereign bond ratings have no influence on corporate bond yields. However, Altman (2005) finds that most fluctuations in corporate bond yield could be explained by the fluctuations of sovereign bond yields. Meanwhile, Ferri and Liu (2002) explored how rating agencies distinguish sovereign risks and default risks for a particular corporate bond. They conclude that the influence from sovereign rating is more significant in developing countries than in developed countries. In addition, they also believe that firm level characteristics are irrelevant in developing countries. Brooks et al. (2004), Glascock et al. (1987), Hsueh and Liu (1992) and Impson et al. (1992) also claim that sovereign bond downgrades will have a negative influence on corporate bond yields.

2.2 Sovereign Ceiling Rule and Other Determinants

Studies on how the sovereign ceiling rule influences the corporate bonds yields are still rather limited. Durbin and Ng (2005) are one of the pioneers in this area. They measure investors' perception of a country risk on corporate bond yields in emerging countries. Selected corporate bonds are denominated in hard currency to get rid of the currency risk. Thus, the risk premium compensates

mainly for default risks and liquidity risks. Each corporate bond is matched with a sovereign bond in the same country. To investigate investors' perception on sovereign ceiling rule, the authors select a subset of corporate bonds and sovereign bonds data with closely matched maturities. About a third of the pairs (11 pairs) have a corporate bond yield lower than or equal to the corresponding sovereign bond yield, which is a strong indication against the sovereign ceiling rule. However, as mentioned above, the risk premium also includes liquidity risks, so the lower corporate bond spread may be a result of higher liquidity. Further research in comparing trading frequency indicates the violation of sovereign ceiling as a result of corporate bonds' higher liquidity. In their paper, they also discussed four possible reasons why sovereign ceiling rule is violated: government foreign currency control, hard-currency revenue, foreign affiliation and government ties. In addition, they show that the sovereign ceiling rule is more sensitive in some particular countries than in other countries.

Grandes and Peter (2004) find out the importance of sovereign ceiling rule and other firm specific characteristics in determining corporate bond yield in South Africa. Their sample bonds are domestic currency-dominated, instead of being influenced by foreign hard currency. Meanwhile, other firm specific determinants are controlled for to assess the influence of country risk on corporate default premium. Following the structural approach put forward by Black and Scholes (1973) and Merton (1974), they include six determinants in their research: (i) sovereign risk, (ii) leverage, (iii) firm value volatility, (iv) risk free rate volatility, (v) remaining time to maturity, and (vi) liquidity. Lastly, they find sovereign risk premium, leverage, firm value volatility and time to maturity as being highly significant. The coefficient of sovereign default risk is 0.82, i.e. smaller than 1. This means that when the sovereign bond defaults, corporate bond may not default, which is inconsistent with the sovereign ceiling rule. In addition, an increase in interest rate volatility will result in wider corporate bond yield. However, impact from liquidity is not significant. It's worth mentioning that no risk free rate is applicable here, since the corporate bonds are denominated in South African dollars. As a consequence, they select AAA-rated supranational organizations' bonds yields as risk free rate.

Borensztein et al (2007) conclude in a similar manner that sovereign ratings have a significant influence on corporate bond ratings. They collect data worldwide and increase the number of the independent variables to include firm level[1] , industry level[2] and country level[3] characteristics. Most of the variables

[1] Firm level variables include EBIT/assets, EBIT/interest expense, retained earnings/assets, equity/assets and size.

[2] Data is divided into 9 industries; they are social and personal service, agriculture, construction, retail, trade and restaurant, manufacturing, mining, transport and communication, financing and utilities industries.

[3] Country level variables include inflation, current account/GDP, growth GDP, GDP per capita, industrial, volatility

have the expected signs, but data from developed economies has greater explanatory power.

In the continuation of this study we mention studies that used appropriate variables. Eichengreen and Mody (1998) explore the determinants of spreads for both sovereign and corporate bonds in 1998 and find that yields are more sensitive to market sentiments than fundamental shifts. Similarly, Dufresne et al (2001) indicate that local supply/demand shocks are main drivers of credit spread fluctuations, while credit risk and liquidity are not. However, Campbell and Taksler (2003) claim that both equity volatilities and credit ratings can explain fluctuations in the corporate bond yield. With respect to the influence from liquidity, Chen et al. (2007) state that after controlling for firm-specific, bond-specific characteristics and macroeconomics factors, bonds with higher liquidity earn lower yields and a decrease in liquidity would result in a significant decrease in bond yields. This finding is supported by Ericsson and Renault (2006), who believe that as the default probability increases, the impact of liquidity on corporate bond yields also augments. In addition, according to Dufresne et al. (2001), corporate bond spread changes are independent of bond liquidity and driven by stock supply and demand.

In relation to the Chinese market, most analyses focus on the determinants of sovereign bond yields. Feng (2002) investigates the major factors influencing sovereign bond pricing and bond yields, including the macroeconomic environment, bond supply and demand, and changes in other relevant markets such as stock markets and money markets. However, he did not use any empirical evidence to support his conclusion. Wang and Li (2005) use weekly bond transaction data from January 2002 to April 2004 to analyze the influence of macro-economy, stock market and bond characteristics on sovereign bond yield curve. The authors claim that macroeconomic factors impact the total return in bond markets; stock index and banking deposit have a negative influence on bond yields.

Some researchers focus on the determinants of corporate bond spreads. Liu and Wang (2005) believe sovereign bond yield is an important factor and it has significant cointegration. Additionally, Chen (2008) conducts a comprehensive analysis of the determinants with respect to two perspectives, default risk and liquidity risk. The author concludes that corporate bond remaining time to maturity and firm level financial ratios are main microeconomic contributors to default risk premium; business cycle, risk free rate and term structure are the main macroeconomic contributors to default risk premium. Furthermore, corporate bond liquidity and its characteristics would influence the liquidity risk premium.

Methodology and Data Description

The sovereign ceiling rule can be developed by using the conditional probability theorem and additive property of the probability measure. If event C stands for the corporate bond default event, then we will have:

$$\begin{aligned} P(C) &= P(C \cap S) + P(C \cap S^C) \\ &= P(S) \cdot P(C|S) + P(S^C) \cdot P(C|S^C) \\ &= P(S) \cdot P(C|S) + [1 - P(S)] \cdot P(C|S^C) \end{aligned} \quad (3.1)$$

S is sovereign bond default event, while Sc is complementary event that the sovereign bond does not default.

when $P(S) = 0$, $P(C) = P(C|S^C)$, (3.2)

and when $P(S) = 1$, $P(C) = P(C|S)$. (3.3)

It is straightforward that the sovereign ceiling rule only exists when sovereign bond default is an impossible event. Most investors believe sovereign bond is a relatively risk-free investment and thus the sovereign ceiling rule was popular before 1997. When sovereign bond is impossible to default, the corporate bond default probability is unaffected by the sovereign bond rating or default probability. However, if sovereign bond default becomes a certain event, we must take the sovereign bond default probability into consideration when calculating the corporate bond default probability. Furthermore, to derive the item $P(C \mid S^C)$ of equation (3.2), we can get $P(S) - P(C) = 0 - P(C) \leq 0$, and thus $P(S) \leq P(C)$. In other words, when sovereign bond is impossible to default, the corporate bond default probability is always higher than that of sovereign bond. However, when $P(S) = 1$, we can get $P(S) \geq P(C)$ in the same way. Therefore, the sovereign ceiling rule is violated in this case. Before 1997, most investors ignored the underlying assumption of the sovereign ceiling rule and believed that sovereign bond is impossible to default. However, over time more people have realized that the sovereign bond default is a possible event, particularly after the European debt crisis.

We will examine the significance of the sovereign bond yield factor and further evaluate whether its coefficient is higher than 1. The coefficient being higher than 1 depicts that the sovereign bond ceiling rule exists in Chinese bond market and vice versa. Except for the sovereign bond yield factor, there are many other firm characteristic factors affecting the corporate bond yields.

Chen et al. (2007) use bid-ask spread, zero returns liquidity measure and a liquidity estimator as proxies for corporate bond liquidity. In addition to the average bid-ask spread, Longstaff (2005) use other six variables as proxies of liquidity: general availability of the bond issue, bond age, time to maturity, and

dummy variables issued by financial firms, AAA-rated firms and AA-rated firms. In this paper, we will use turnover rate as the proxy of liquidity, which is the trading value (trading volume times par value) divided by the total outstanding value. An increase in liquidity would result in a lower corporate bond yield. Therefore, we expect a negative correlation. We are also interested in the relationship between corporate bond yield and the volatility of risk-free rate, since the risk-free rate volatility has an effect on the corporate credit condition. The ambiguous relationship between these variables has been confirmed by Grandes and Peter in 2004[4] .

There are many other firm characteristic factors that could affect the corporate bond yield. According to the DuPont analysis, return on equity equals to net income margin times asset turnover time leverage.

$$ROE = \frac{NI}{R}\frac{R}{A}\left(\frac{1}{1-L}\right) \tag{3.4}$$

So we have

$$L = 1 - \frac{NI}{R}\frac{R}{A}\frac{1}{ROE} \tag{3.5}$$

The correlations between return on equity and asset turnover and corporate bond yield are uncertain, since the net income can be either negative or positive.

Finally, we assume the following:

$$y = f(SY_{+}, \sigma^{2}_{+}, L_{+}, MA_{?}, LQ_{-}, ROE_{?}, RV_{?}, AT_{?}, NIM_{-}),$$

where y is corporate bond yield and SY is sovereign bond yield. σ^2is firm value volatility and L is leverage. Remaining time to maturity and liquidity are represented by MA and LQ. ROE and RV represent return on equity and risk-free rate volatility, while AT and NIM stand for asset turnover and net income margin. Expected coefficient estimates' signs have been enclosed on the right-hand side of each acronym.

3.1 Data Description

The Chinese bond market started in 1983, but it is still not as liquid as the stock market and around 83% of the publicly traded corporate bonds listed on Shanghai Stock Exchange and Shenzhen Stock Exchange are issued after 1st January 2010 [5]. Variables we have employed in this essay are firm financial

[4] Generally, increases in risk free rate volatility tend to increase the corporate credit spread, especially if leverage is high, However, this result is not universally true (Grandes and Peter, 2004).

[5] All the data starts from 1st January 2010, but the effective start date is 4th January 2010 due to the country holidays.

ratios and they are quarterly data. Bonds issued before 1st January 2012 are selected and the time interval ranges from 1st January 2010 to 29th February 2012. There are 53 bonds issued during this period. However, some of these bonds are highly illiquid and they are not priced for more than one month and thus these bonds are excluded. Therefore "liquid bond" in this paper is defined as at least priced once within a month. In addition, three bonds do not have a paired listed stock issued by the same company, so they are excluded. As a result, 19 bonds are used to conduct the empirical analysis.

All the data except financial ratios starts from daily data and then it is averaged monthly or quarterly. The data is obtained mainly from two databases, Bloomberg and RESSET [6] . More details regarding variables are explained in the following chapter.

(1) Corporate bond yields (BY). Corporate bond yield or yield to maturity (YTM) is calculated according to daily closing full (dirty) price, par value, coupon rate, coupon payment frequency and maturity and it is annually compounded. The monthly and quarterly corporate bond yields are the simple average of daily yields.

(2) Remaining time to maturity (MA). The remaining time to maturity is calculated as a percentage of maturity. For instance, a bond issued on 24th September 2007 has a maturity of 10 years (3653 days). Its remaining time to maturity on 4th January 2010 is 2820 remaining days divided by 3653 days.

(3) Firm value volatility (SV). Firm value volatility or stock price volatility is the variance of the stock price issued by the same firm for a particular bond.

(4) Sovereign yield (SY). Theoretically, we should match one sovereign bond issued on the same date with the same maturity to each corporate bond. In the meantime, this sovereign bond should be "liquid bond" according to our definition. However, due to the limited sovereign bonds issued by Chinese government, we cannot find matched sovereign bonds for all the 19 corporate bonds. For the purpose of consistency, we decide to use one sovereign bond with a maturity of 15 years named 05 Sovereign Bond (12) for the following two reasons. Firstly, although the maturities of the selected corporate bonds range from 5 years to 10 years, sovereign bonds with maturities ranging from this interval are either overdue before 29th February 2013 or "illiquid". Thus, we can only choose from sovereign bonds that mature after 15 years or even after this period. Secondly, this sovereign bond is highly "liquid" according to our standard. However, this selection may lead to biases and affect the regression result. The calculation of this sovereign bond yield is the same as the calculation of corporate bond YTM.

[6] RESSET is a financial research database and it is widely accepted data sharing platform in Chinese market. It is widely recognized database by academic institutions. RESSET website: http://www.resset.cn/en/.

(5) Liquidity (LQ). We decide to use trading volume as a proxy for liquidity. However, we find the absolute values of data being less than 1, while the daily trading volume can be in hundreds or thousands. This might cause the coefficient of this variable to be inconsistent with other coefficients. Therefore, turnover rate is employed as a proxy for liquidity.

(6) Leverage (L). The leverage calculated here is based on market prices. More specifically, it is the total value of the bonds divided by the firm value, which equals stock price multiplied by outstanding amount.

(7) Risk free rate volatility (RV). It is the variance of risk free rate. Shanghai Interbank Offered Rate (Shibor) is used as a proxy for risk-free rate. According to Chinese literature, this is the most frequently used risk-free rate. Shibor is quoted by various banks and thus the average of all the quoted prices is used.

(8) Return on equity (ROE), net income margin (NIM) and asset turnover (AT). They represent firm-level characteristics and are proxies for return on investment funds, profitability and activity. The quarterly data are collected from financial reports.

4 Analysis

The two panel regressions have been analysed:

$$BY = \alpha + \gamma_1 MA_{it} + \gamma_2 SV_{it} + \gamma_3 SY_{it} + \gamma_4 LQ_{it} + \gamma_5 L_{it} + \gamma_6 RV_{it} + \varepsilon_{it} \quad (4.1)$$

$$BY = \alpha + \gamma_1 MA_{it} + \gamma_2 SV_{it} + \gamma_3 SY_{it} + \gamma_4 LQ_{it} + \gamma_5 ROE_{it} + \gamma_6 RV_{it} + \gamma_7 NIM_{it} + \gamma_8 AT_{it} + \varepsilon_{it} \quad (4.2)$$

The results for equation 4.1 are reported in Table 4.1.

Initially, we run the pooled OLS and the fixed effect (FE) estimations. As the results show, risk-free interest rate volatility (RV), remaining time to maturity (MA) and liquidity (LQ) have a significant effect on the corporate bond yield in both pooled OLS and fixed-effect estimations. The coefficient of remaining time to maturity (MA) is always negative, which means that maturity is negatively correlated with the corporate bond yields. In addition, the coefficient estimates for liquidity (LQ) are always positive and statistically significant. Comparing the pooled OLS and fixed effect estimations, the F-statistic amounts to 43.84, i.e. it is higher than the threshold value. We compare the fixed effect estimation and the random effect (RE) estimation by using the Hausman test, the P value is 0.44, which implies that we fail to reject the null hypothesis of Hausman test. The random effect dominates the data. Following

the exclusion of insignificant variables, we compare several random effect estimations. As can be seen in the table, the sovereign bond yield (SY) is positively correlated and its value being 1.2, is higher than 1. This indicates that the sovereign ceiling rule does exist in the Chinese bond market. The sovereign bond yield is lower than corporate bond yield and therefore the former one is less risky. In addition, the sovereign bond yield (SY) is the most important factor in this model, since it has the biggest coefficient. The liquidity factor is significant, while it plays little role in determining the corporate bond yield.

Table 4.1: Regression 4.1 Results

Variables	Pooled OLS	FE	RE (1)	RE (2)	RE (3)
MA	-.0221358	-.0228033	-.021053	-.0217678	-.022005
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
SV	.0000348	.0000448	.0000336		
	(0.789)	(0.789)	(0.797)		
SY	.0012787	1.216947	1.103101	1.213669	1.201353
	(0.183)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
LQ	.0001362	.0001362	.0001649	.0001785	.0001799
	(0.006***)	(0.006***)	(0.001***)	(0.000***)	(0.000***)
L	-.004474	-.006474	-.0021137	.0018198	
	(0.283)	(0.243)	(0.583)	(0.626)	
RV	16.73896	6.593011	6.92795	7.404504	7.555793
	(0.000***)	(0.000***)	(0.000***)	(0.082*)	(0.076*)
Cons	.0602729	.0692419	.0680309	.0242595	.0251274
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Obv	721	721	721	722	722
R-squared	0.6406	0.2872			
F value		43.84			

Note: *** p<0.01, ** p<0.05, * p<0.1Sources: Calculated by author

The second panel regression model comprises more firm-level financial factors. Substituting the net income margin (NIM), asset turnover (AT) and return on equity (ROE) into the leverage (L) in the first model, the regression result of the second model is shown in Table 4.2 below. In the Hausman test, the chi square value is 27.55 and the P value is 0. Therefore, we reject the null hypothesis of Hausman test and the fixed effect is more appropriate in this analysis. Similarly, we delete the insignificant variables in FE (1) estimation, including stock price volatility (SV), return on equity (ROE), risk free rate volatility (RV) and asset turnover (AT). In FE (2) and FE (3), time to maturity

(MA) is still negatively correlated, while liquidity (LQ) is positively correlated. The coefficient of sovereign bond yield (SY) is still around 1.2 and thus the sovereign ceiling rule in Chinese bond market is again confirmed over here. The other two new added firm-level factors are insignificant and it is only the net income margin (NIM) which is significantly (at 10% level) and negatively correlated with the corporate bond yield. The underlying reason is straightforward: the lower the net income margin, the poorer financial performance of the firm and thus it is riskier to invest in the firm's bond. In order to compensate for the risk premium, the bond yield increases. This is why net income margin and corporate bond yield are negatively correlated.

Table 4.2: Regression 4.2 Results

Variables	Pooled OLS	FE (1)	RE	FE (2)	FE (3)
MA	-.0229688 (0.000***)	-.0229688 (0.000***)	-.0212083 (0.000***)	-.0213233 (0.000***)	-.0213378 (0.000***)
SV	.0002461 (0.500)	.0002461 (0.500)	.0002433 (0.504)		
SY	1.167781 (0.000***)	1.167781 (0.000***)	1.161872 (0.000***)	1.263254 (0.000***)	1.256431 (0.000***)
LQ	.0002265 (0.039**)	.0002265 (0.039**)	.0003456 (0.001***)	.0003384 (0.001***)	.0003465 (0.001***)
ROE	.0113652 (0.186)	.0113652 (0.186)	.0102851 (0.232)	.0076068 (0.342)	
RV	11.93638 (0.416)	11.93638 (0.416)	11.14141 (0.456)		
AT	.0007977 (0.737)	.0007977 (0.737)	-.0002008 (0.928)		
NIM	-.0109922 (0.083*)	-.0109922 (0.083*)	-.0117134 (0.058*)	-.0118926 (0.046**)	-.0097305 (0.076*)
Cons	.0209068 (0.070*)	.0270315 (0.018**)	.0260454 (0.026**)	.0230247 (0.036**)	.0233853 (0.033**)
Obv	228	228	228	228	228
R-squared	0.7187	0.3999		0.4327	0.4935
F value		14.66		19.49	23.47

Note: *** p<0.01, ** p<0.05, * p<0.1Sources: Calculated by author

In relation to the result that the correlation of liquidity is different with respect to most previous studies, a possible explanation is inactive trading in the

Chinese bond market and a smaller sample size. Some sampled bonds are traded actively, while others are traded discontinuously. For instance, 122000 (Changdian 07) was traded almost every day in July 2008, but for122008 (HuanengG1 08) there were hardly any trades during the same month. In other words, 122008 (HuanengG1 08) avoided most fluctuations and enjoyed less volatility in yields at that time. The theoretical negative relationship between liquidity and bond yield cannot be reflected precisely using monthly and seasonal data, since the inactively traded bonds data are assumed to have equal weight as the actively traded bonds data. The less actively traded bonds are expected to have lower monthly or seasonal yields after avoiding most fluctuations. Therefore, we are likely to get a slightly positive correlation between liquidity and the bond yield in an inactive market.

In both models, the coefficient estimates for the remaining time to maturity (MA) and liquidity (LQ) are negative and positive, respectively. These observations are opposed to our expectations. In order to avoid the impact of outliers the data sets have been winsorised at 95% and 99%, but we find similar results. It is possible to get a slightly positive correlation between liquidity and the bond yield in an inactive market using monthly and seasonal data. In addition, the coefficient of sovereign bond yield (SY) is larger than 1, supporting the sovereign ceiling rule in China. When firm's net income margin decreases, the yield of its bond is expected to increase in the Chinese bond market. However, the effects from other variables are insignificant.

5. Conclusion

This paper produces two main results. Firstly, the sovereign bond yield (SY) is positively correlated with the corporate bond yield (BY) in China. As the results show, the coefficient of sovereign bond yield (SY) is around 1.2, i.e. higher than 1. Therefore, the sovereign ceiling rule is not violated in the Chinese bond market and the sovereign bond yield is less risky than corporate bond yield in China. In addition, the sovereign bond yield (SY) is the most important factor, compared with the other variables in the model.

Secondly, the remaining time to maturity (MA) has a negative effect on the corporate bond yield (BY), indicating lower than 1 leverage ratios in most companies. It is interesting that the corporate bond's liquidity (LQ) is positively correlated in China. This result is different from findings in most previous studies. A slightly positive correlation between liquidity and the bond yield is possible in an inactive market using monthly and seasonal data. In relation to the firm-level factors, only net income margin is negatively significant. When the net income margin decreases, the yield of its bond is expected to increase. However, it plays a little economic role in determining the corporate bond yield (BY).

These results can be explained by the fact that China has experienced a rapid economic development and further modified its political system since the last sovereign bond default in 1989. Thus investors have become more confident in the Chinese sovereign bond in recent years. Secondly, the Chinese corporate bond market is highly underdeveloped as compared to other developed markets. It has only recently relaxed the social planning system in fixed-income securities industry. As a consequence, the market is inactive and relatively inefficient.

Further analyses could be conducted to explore the reasons behind the violation of sovereign ceiling rule and to investigate the factors that make the sovereign ceiling rule ineffective in some countries. In addition, it is also meaningful to explore the determinants of the sensitivity of sovereign ceiling rule in different countries

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DETERMINANTE PRINOSA NA KORPORATIVNE OBAVEZNICE U KINI

Apstrakt: Narušavanje ustaljenog obrasca da se privatni sektor ne može zaduživati po povoljnijim uslovima od države izazvalo je naše interesovanje u istraživanju determinanti prinosa na korporativne obveznice na kineskom tržištu. Osam nezavisnih varijabli je odabrano prema postojećoj literaturi, prikazujući rizik državnih obveznica, karakteristike samih obaveznica i finansijske pokazatelje emitenata. U regresionim modelima smo koristili mesečne i kvartalne podatke kako bismo istražili da li na tržištu obveznica u Kini važi pravilo da prinos na državne obveznice određuje prag prinosa na obveznice privatnog sektora. Utvrdili smo postojanje ovog obrasca (pravila), kao i pozitivan odnos između likvidnosti i prinosa na korporativne obveznice, što je u suprotnosti sa široko prihvaćenom teorijom kojom objašnjavamo prinos na tržištu obveznica, kao i u suprotnosti sa našim očekivanjima. Pored toga, koeficijenti za vreme preostalo do dospeća i neto profitnu maržu su negativni. Međutim, kod ostalih nezavisno promenljivih nije utvrđena statistička značajnost.

Ključne reči: tržište obveznica, Kina, prinos na državne obveznice