Yield spread between green versus non-green bonds

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Since the launch of 'Climate Awareness Bond' by Europe Investment Bank in 2007, the green bond has been regarded as one of the noticeable driver to attract private funding on tackling climate change. Moreover, the demand for green bond is expected to increase over time under the global consensus. We hypothesize that the yield spread for green bonds may be lower than that of a non-green bond similar in risk structure since the green bond enjoys lower environmental risk. All tests control for issue characteristics, market conditions, organizational characteristics of bonds and etc. based on the cost of debt regression model.

Green Bond

Green bond is usually defined as a bond whose use of proceed is to support green projects. However, green bond is a newest concept which is overlap with bonds which funds projects for climate change mitigation and adaptation, and the distinction between the terms ‘green bond’ and ‘climate bond’ is not clear. Therefore, the estimated market size of green bond is not consistent among forecasters. Climate bond Initiatives estimated the market size of green bond as 35.82 billion dollar while that of ‘climate-themed bond universe’, more comprehensive concept of climate-friendly bonds, is 502.6 billion dollar[1]. Bloomberg New Energy Finance estimated the amount of year to date issuance of green bond in 2014 as 32.6 billion dollar[2], and the estimation covers not only the bonds whose use of proceed is specified as ‘green’, but also several project bonds and municipal bonds.

Statistics of Green Bond

Since the first green bond was issued by Europe Investment Bank(EIB) in 2007, more than two hundred of green bonds whose use of proceeds is ‘green’ have been issued. In particular, half of green bond were issued by supranational entities such as EIB and World Bank. Among 206 of green bonds—which are issued from 2007 to August 2014, International Bank for Reconstruction & Development (IBRD) issued 59 green bonds. Moreover, 46% of green bonds have been issued in Euro, followed by US dollars and Swedish krona. Swedish krona is supposed to outstands because SEB (Skandinaviska Enskilda Banken AB) is one of the most influential underwriters of green bond.

Green Bond Issuance by Industry groups

Industry group	Number of issuance
Consumer Products	1
Diversified Banks	3
Financial Services	1
Government Agencies	14
Government Development Banks	16
Government Local	6
Government Regional	6
Industrial Other	5
Power Generation	2
Real Estate	3
Renewable Energy	9
Semiconductors	1
Supranationals	1
Utilities	135
Consumer Products	3
	206

Source: Bloomberg Professional Service (August 2014, including matured bonds)

Descriptive Statistics of Green Bond

	Mean	Median	Standard Deviation	Min	Max	Observed
Maturity	6.264	5.005	3.741	1.496	32.359	176
Age	1.905	1.485	1.587	0.012	5.778	175
Coupon	2.981	2.253	2.528	0.000	10.180	176
Yield to maturity	3.648	2.104	3.556	0.075	13.488	163
Duration	3.367	2.727	2.919	0.014	20.269	163
Price	98.720	100.473	9.891	35.600	120.443	147

Source: Bloomberg Professional Service (August 2014)

According to the descriptive statistics of green bonds, mean value of yield to maturity is 3.6%. Mean value of maturity is about 6 years, and mean value of coupon is about 3%. Mean age of green bonds is only 2 year, which means that most of green bonds were issued recently, one or two years ago.

Hypothesis

We are confronted with urgent and unavoidable problems: climate change and energy security, and relevant projects requires long-term, and huge amount of financial support from private fund. In this respect, green bond is regarded as one of the effective instrument to invest on green projects, and green bond market is anticipated to grow in long-term perspective. its market. Therefore, we assumed that green bond enjoys lower environmental risk. Moreover, the higher yield spread—a difference between risk-free rate of return and promised yield, the bigger an investment risk. In this respect, we hypothesize that the yield spread for green bonds may be lower than that of a non-green bond similar in risk structure.

Hypothesis: *A yield spread for green bond is significantly lower than that of non-green bond.*

Regression Model

Base on the cost of debt regression model, we controls for issue characteristics, market conditions, organizational characteristics of bonds and et cetera. Especially, we will control organization characteristics by grouping issuers, because green bond issuers are diverse, ranging from supranational entities to corporates. Additionally, we controls whether bond is green bond or not with a dummy variable ‘green’. Dependent variables are credit spread, yield to maturity, and interest cost.

$$\boldsymbol{Cost\ of\ debt} = \boldsymbol{b1}(\boldsymbol{green\ dummy}) + \{\boldsymbol{issue\ characteristics}\} + \{\boldsymbol{market\ conditions}\} + \{\boldsymbol{organizational\ characteristics}\}$$

References

[1] Climate Bond Initiative, “Bonds and Climate Change – The State of the Market in 2014”, 2014, p. 4
[2] Q4 2014 Green Bonds Market Outlook, 2014, p.4