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A Comparative Study on the Performance of Green and Traditional Bonds

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ABSTRACT:*Shift in global consensus to meet sustainable priorities led to the emergence of green bonds. Green bonds offer a creative solution to deal with increasing lack of capital for green projects while generating returns on investment with positive environmental impact. They are pivotal to the sustainable finance market and have recorded unprecedented growth over the past decade. The global issuance reached $ 257.7 billion in volume in 2019, growing by 51% over 2018. However, in spite of its impressive growth in recent years, the market only accounts for 3% of the global bonds market. Although, the market is characterized by a diverse investor base, high demand and huge potential for growth, a dilemma often faced by the investors is whether green bonds offer higher returns on investment than traditional bonds? This paper aims to evaluate the performance of green bonds in comparison to traditional bonds in order to assess their viability from an investment perspective. It paper also makes suggestions to facilitate growth and development of this market.*
KEY WORD*: Bond returns, Conventional Bonds, Green Bonds, Sustainable Finance*

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I. INTRODUCTION AND LITERATURE REVIEW

Financial market has churned out different assets in order to bridge the finance gap for environmental ventures. Lack of capital availability in sustainable sector has stunted its growth and made the process of transition towards low carbon economy extremely difficult. Green bonds were developed specifically to mediate between those in need of green finance and those willing to provide it. Inception of the market in 2007 was met with high demand but growth remained largely restricted. However, 2010 onwards, the market showed a steep rise in issuances. It nearly doubled between 2015 and 2016 and has continued to show a steady rise since then. These instruments are speculated to have developed pricing differentials owing to their green characteristics. This study thus, aims to develop an understanding of green bonds and compare their returns with respect to their conventional counterparts.

Green bonds outperformed conventional bonds in an empirical investigation conducted by(William& Ley, 2017)on a green-conventional bond sample between 2011-2017 using an extended Fama-French model. Investors don't compromise financial gains for environmental benefit, while there is no significant pricing differential observed between conventional and green US municipal bonds. A pair of green and conventional bond is likely to be treated as exact substitutes of one another in case of identical and constant risk-payoff characteristics made known to the investor.(Larcker& Watts, 2019)

Yield-curve comparisons between US municipal green and non-green bonds provides evidence of green bond premium in the primary and secondary green bonds market.(Partridge and Medda, 2018) Green bonds experience an average negative yield premium of -2 base points than standard bonds. The figures indicate lower yield for green bonds analysed using two-step regression procedure on bonds issued from 2013-2017.(Zerbib , 2016)

1.2 Research Objectives

1. To develop an understanding of green bonds.
2. compare the performance of green bonds with conventional bonds.
3. suggest measures for improving the performance of green bonds market.

1.3 Research Methodology and Data Analysis

The research is descriptive in nature. Data is gathered from secondary sources, graphs and insights presented are compiled from noteworthy sites and publications. Policy recommendations are based on the insights gathered.

1.3.1 *To develop an understanding of green bonds.*

Green bonds are a subset of bonds. They are simply debt securities, modified to cater specifically to the financial needs of green projects. This means that their funds can only be allocated to projects which generate environmental benefit. Green bonds differ from sustainable bonds and social bonds as sustainable bonds raise

funds for projects of both, social and environmental benefit while funds from social bonds only accrue to socially beneficial projects. Green bonds are a significant tool for market participants to increase their corporate social responsibility (CSR) and environment, social and government (ESG) activities while scaling up investments in the environmental sector. They are generally issued as they act as an alternate funding source for borrowers and an investment opportunity for investors.

1.3.1.2 Types of Green Bonds

- **Green use of proceeds bonds** – These green bonds are secured by assets comparable to those of standard bonds.
- **Green use of proceeds revenue bonds** – Use of proceeds revenue bonds are secured by income generating projects.
- **Green project bonds** –These are secured by the project's assets and balance sheet.
- **Green securitized bonds** – Securitized bonds are backed using a larger asset pool.

1.3.1.3What are Green Projects?

Regulation in the green bonds market is governed by a set of guidelines called the green bond principles. They list in detail the projects that can be funded by green bonds and are thus, called green projects. These are :

1) **Pollution control** - This refers to projects like greenhouse gas control, wastewater management, soil remediation, etc.
2) **Energy efficiency** - This includes projects such as : energy efficient buildings and structures, smart grids, energy storage technologies, etc.
3) **Renewable energy** - Solar, wind and other forms of renewable energy development projects constitute this category.
4) **Clean transportation** - Development of clean energy infrastructure, electric and hybrid vehicles, etc.
5) **Sustainable land use and natural resources management projects** - Projects focused on development of climate smart farms and infrastructure, sustainable agriculture, aquaculture and fishery, restoration or afforestation projects.
6) **Climate change adaptation projects** - Early warning systems, climate observation and other such projects come under this category.
7) **Biodiversity conservation projects** - Protection of marine, watershed or coastal environments, terrestrial and aquatic biodiversity conservation projects.
8) **Sustainable water management projects** - Sustainable drainage systems, flood mitigation efficiencies, infrastructure for clean or drinking water, etc.
9) **Green Buildings** - These are energy efficient buildings that meet required standards, qualify as green buildings.
10) **Production processes and technologies** - This includes products having environmental certification or eco-label, sustainable packaging and techniques of distribution, etc.

1.3.1.4 Issuing Green Bonds

The process of issuing green bonds involves the following steps :

- **Structure and risk mitigation -** Structuring green bonds requires election of the type of bond to be issued. The purpose of selection is to ensure risk minimisation. Risk removal can be furthered with the help of techniques such as : insurance, hedging, etc.
- **Credit enhancement** - Bonds carry a credit rating, given by credit rating agencies to certify the borrower's credibility. Higher the credit rating, lower the cost of capital raised from the instrument. Thus, credit ratings are used by issuers to reduce issuing costs. Some agencies which provide credit ratings are : International Finance Corporation (IFC), Asian Development Bank (ADB), United States Agency for International Development (USAID), etc.
- **Certification** - Before issuance, bonds need to be certified green. Issuing agencies and bond structures are evaluated by international agencies like FITCH. If they meet standards, principles and guidelines laid down by agencies like Climate Bonds Initiative (CBI) or International Capital Market Association (ICMA), the bonds are certified green.
- **Issuance and listing** - Finally, the bonds can be issued by banks, government agencies, multilateral institutions or the private sector. The bonds may further be listed or unlisted. Bond issuers are assisted in listing and roadshows by institutions such as merchant banks.

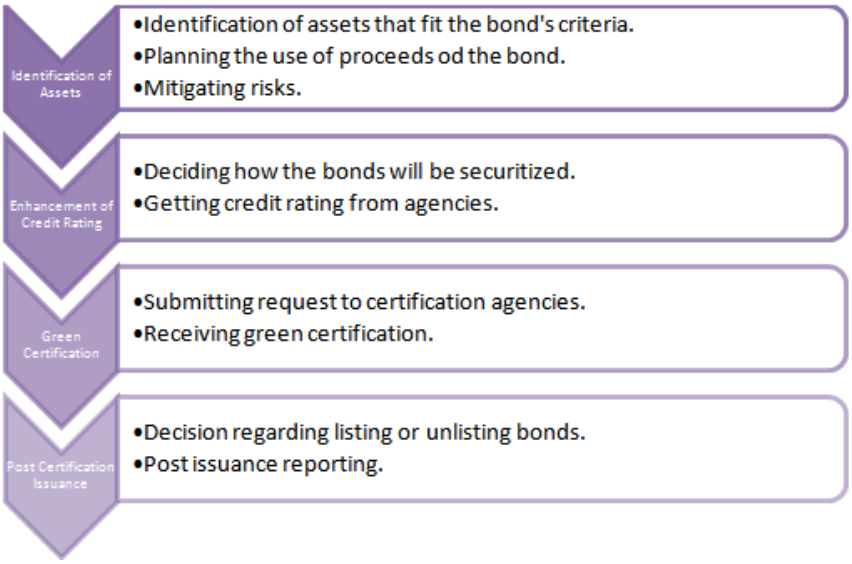

Fig: 1. Process Flow for Green Bond Issuance

1.3.1.5Difference in Characteristics of Green and Traditional Bonds

Subscription

Green bonds are oversubscribed compared to standard bonds. The trend is consistent across all green bond markets. Climate Bond Initiative's market report (H1, 2019) recorded an average oversubscription of 4.1 times for USD green bonds and 3.9 times for Euro bonds. This is consistent with all literature available on this subject. This occurs primarily because of the huge demand-supply outmatch for green bonds, the volume of green bond issuances fail to match high demand, leading to increased issuance or oversubscription.

Liquidity

Market research indicates that green bonds are less liquid assets than standard bonds. Several factors impact liquidity. In green bonds market, this is particularly because of the small size, indicating scarcity of funds for buyers. Market growth and issuance activity also determine liquidity, although the factors have shown positive signs of growth, it is not sufficient to significantly increase liquidity.

Risk

Comparison of credit risk of green bonds and conventional bonds reveals identical characteristics, implying that green and conventional bonds from the same issuer face similar credit risks. However, green bonds are exposed to additional risks due to climate-change phenomenon and natural calamities, called environmental risks. This also involves the risk of greenwashing, which means that the funds may be used for activities that are not as green as the investor would desire.

Returns

Comparative return analysis reveals mixed results for yields of green bonds in comparison to standard bonds. The returns have been observed to vary across bonds of different currency denominations and across different time periods, making it difficult to assess the comparative monetary advantage of green bond investing. Insights from some of the most extensive studies (Larcker& Watts, 2019; Hyun, Park and Tian, 2019) on the subject reveal green bond yields to be comparable to standard bonds in view of an insignificant yield differential observed.

1.4 Analysis and Interpretation

Market Growth

The market grew rapidly post 2014 in terms of investor base and size. The key driver of growth was inclusion of the International Capital Market Association's Green Bond Principles in market framework in 2014. This led to an apparent surge in market activity and evolution of issuer profile asthe earlier issuances came from advanced nations and multilateral institutions only. By 2016, issuers from emerging market economies like India and China started actively participating in the market. Bonds were no longer Dollar or Euro dominated as other currencies denominations emerged.

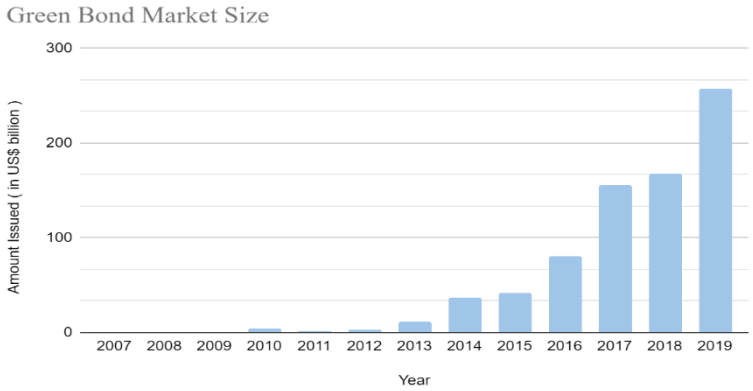

Fig 2. Green Bond Market Size

The market size is smaller than the conventional bond market, this implies limitedinvestment opportunities in this market.

Credit Rating

Inferences from the graph above show similar credit risk pattern for both categories of bonds. While conventional bonds are systematically distributed across all investment grades, green bonds prior to 2017 mostly found to be at the lower end of the credit rating spectrum. It is only post 2017 that green bond issuances acquired a credit rating on par with conventional bonds. This indicates similar bond default risks, thus, no conclusion of a poor performance from risk-based perspective in case of green bonds can be derived.

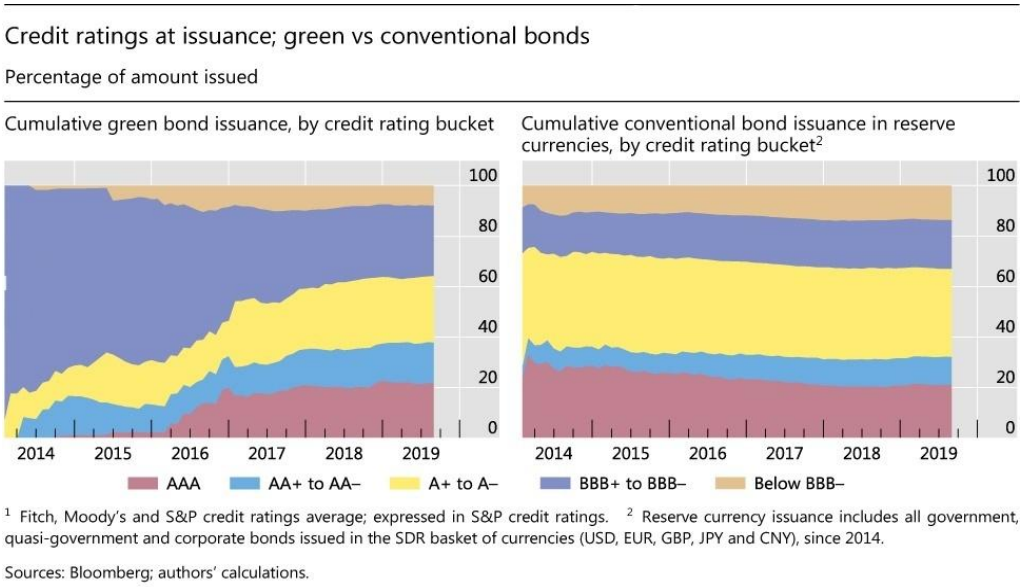

Fig 3. Credit Rating of Green Bonds and Conventional Bonds(Source : BIS Report)

Another assessment to compare credit quality of green bonds and conventional bonds across different sectors confirms similar results. As seen in the graph below, green bonds and conventional bonds have broadly similar credit ratings, with an exception of government issued bonds in the US dollar market. Majority of green bonds issued in this sector fall in BBB+ to BBB- category (low credit rating).

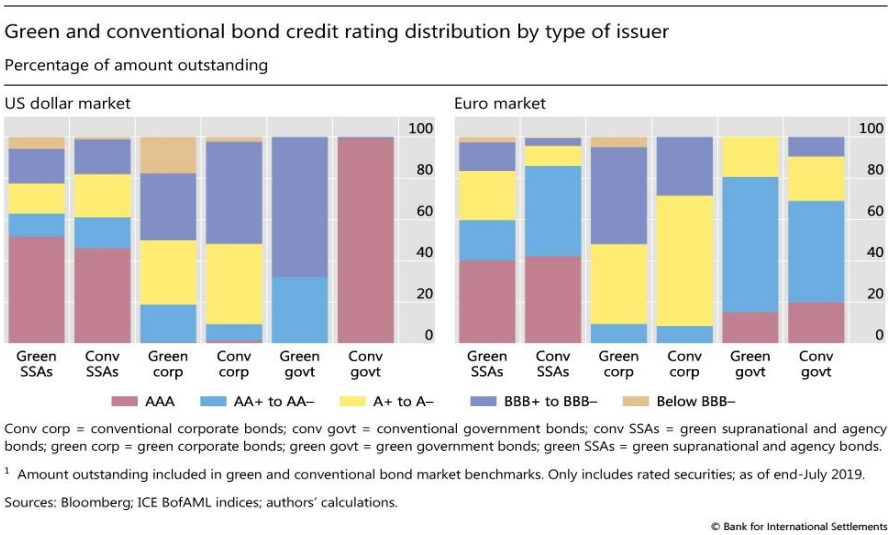

Fig 4. Credit Rating by Issuer Type (Source : BIS Report)

Liquidity

Another important parameter to look at while choosing between green bonds and standard bonds is liquidity of asset. It indicated the ease of doing transactions without impacting the price of the security. An indicator of liquidity is bid-ask spreads. Lower spreads indicate greater liquidity. A comparison between median bid-ask spreads for green and traditional bonds across the USD and Euro markets shows lower liquidity for green bonds which trade at wider spreads compared to their conventional counterparts. This is in accordance with existing literature pertaining to liquidity of green bonds (CBI, 2019) and is due to the lower market size and issuance volume at present.

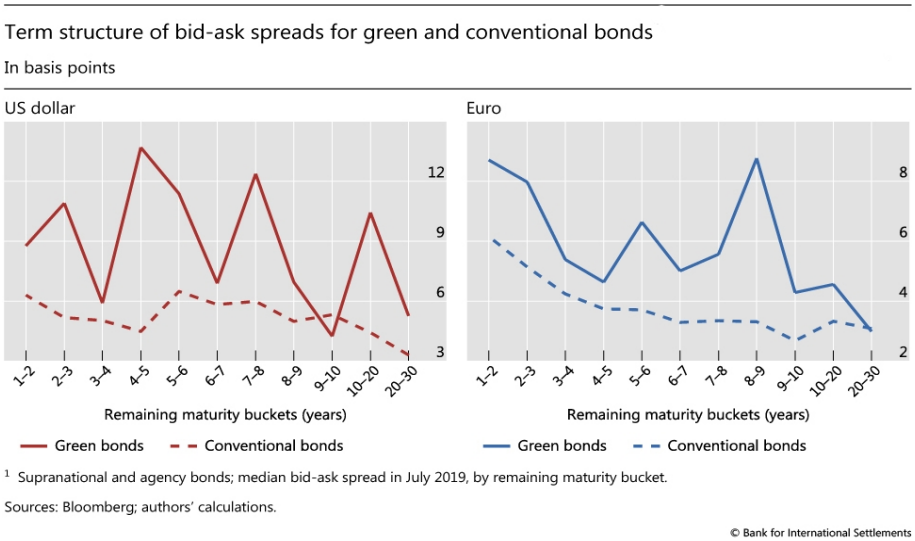

Fig 5. Bid-Ask Spreads of Green and Conventional Bonds (Source : BIS Report)

Returns

Returns of bonds are compared using yield spreads. Fundamentally, they indicate the interest rate differential between two bonds and are thus, used to compare comparative returns of such securities. Green bond yields are found to compare reasonably well with their conventional counterparts. A slightly higher premium, 4 base points is observed for green bonds in the US Dollar market. An investor in the Euro green bonds market would find himself getting a negative premium of 12 base points based on this study. The difference in this premium fluctuates over time, partly because of varying composition of issuer profile. Another point to note is that the yield differential narrows over time, indicating the returns from green bonds to be absolutely similar to standard bonds with time. In both markets, it is clear that the yield differential completely dissolves by 2019.

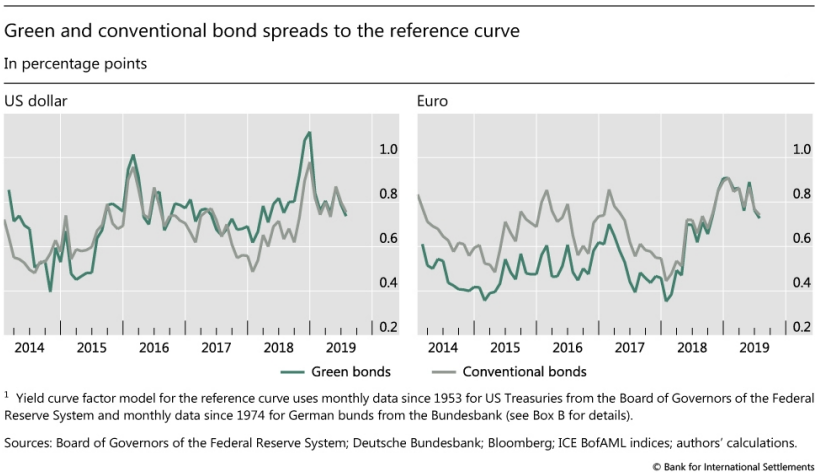

Fig 6.(Yield Spreads of Green and Conventional Bonds (Source : BIS Report)

Absolute comparison of green and standard bond yields reaffirms these observations. Comparison of asset class summary of the green and conventional bonds shows them to have offered similar yields. In the US Dollar market, the average monthly yield from 2014 to mid-2019 was 0.26% and 0.24% for green and standard bonds respectively while it was 0.36% and 0.39% in the Euro market respectively.

Asset class summary statistics

In per cent

	US dollar assets			Euro assets		
	Government bonds	Green bonds	Conventional bonds	Government bonds	Green bonds	Conventional bonds
Average return	0.19	0.26	0.24	0.34	0.36	0.39
Volatility	0.88	0.76	0.67	1.3	1.18	1.17
VaR return (97.5%)	–1.39	–0.97	–0.82	–2.17	–2.23	–2.18
Expected shortfall (97.5%)	–1.82	–1.55	–1.44	–2.37	–2.68	–2.69
Probability of negative return	52.31	35.38	36.92	38.46	30.77	29.23
Duration (years)	5	5	5	9	9	9

[1] Historical statistics using monthly returns from January 2014 to July 2019.

Sources: Board of Governors of the Federal Reserve System; Deutsche Bundesbank; Bloomberg; ICE BofAML indices; authors' calculations.

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Fig 7. Asset Class Summary of Green and Conventional Bonds(Source : BIS Report)

1.4 Findings of the Study

Results imply a strong market performance for green bonds. The market has grown rapidly for a nascent asset. The high investor demand and huge oversubscriptions in the primary market indicate positive investor response. In comparison to the global bond market though, the green bond market is smaller in size. The relatively small size of the market and the lack of fully developed secondary market contract market and asset liquidity. Comparison of bid-ask spreads reveals different liquidity characteristics.Wider spreads for indicate that green bonds are less liquid than conventional bonds. Credit security does not seem to be a concern for the investors with green bonds faring well with respect to conventional bond in terms of credit rating. From return perspective, the evidence of a comparable financial performance of green and conventional bonds can be obtained as indicated by the narrowing yield spreads in both US Dollar and Euro markets. The results are reinforced by asset summary figures which too exhibit similar return performance in case of green and standard bonds in absolute terms.

1.5 Policy Recommendations

The lack of record on financial return and technological risks of green bonds leads to them being perceived as risky by investors. The risk of investing in green bonds is only determined based on issuing entity rather than the underlying assets. Reducing these risks is essential for improving market performance. Some of the ways in which government can de-risk green bonds are :

- **Guarantees** – Credit enhancement or guarantees can be provided by governments, green banks or green investment institutions like Climate Bonds Initiative, European Investment Bank, etc.

- **Insurance** – Providing green insurance reduces risk involved for investors. A government, multilateral entity or private monoline can provide insurance against green investments. Government can facilitate this by setting up national or regional institutions.
- **Lowering default risks** – The government should set up legislative structures to mitigate default risks. One such way is to allow projects to be repaid through taxes like property tax. The system is in place in the US, and is successfully used to back green securities and should be adopted elsewhere too.
- **Loss provisions** – First loss provisions are another way to partially insulate green securities to market risks. Institutions like green banks or government entities can make such provisions facilitating greater market activity.

II. CONCLUSION

Green bond market is undeniably advancing at a great pace. Since the inception of the market during the Global Financial Crisis, there have been apprehensions regarding green investments. A comparison of green and normal bonds in previous literature and this study leads us to conclude that as the market has diversified, much of the green bond characteristics have aligned themselves with those of traditional bonds. With both assets exhibiting nearly similar financial behaviour across different parameters, it can be concluded that the financial performance of green bonds is comparable to that of standard bonds, except liquidity. The market size and growth is largely restricted due to ignorance of market players towards green assets and investing know-how. Lack of standardization of market procedures increases the risk of greenwashing making green bonds potentially less attractive to investors. Till date, the market has thrived largely without government support. However, to sustain growth in the future, both public and private involvement is essential. The government can best lend support through tax-incentives, risk-mitigation procedures and increased public sector participation, which will instil investor confidence in the market and promote growth in the future.

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