Do Shareholders Benefit from Green Bonds?

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December 2017
Ongoing Debate

- Disagreements on working together tackling climate issues
  - "The Paris Climate Accord will undermine our economy and put us at a permanent disadvantage." — Donald Trump

- Australians are voting on quitting the Paris accord.

- Europe and China are stepping up coordination by shifting to a low-carbon economy and reducing dependency on fossil fuels.

- Hong Kong is in a position to be the primary centre for green finance in the region.

- A large gap between our efforts and targets according to analysis
  - Combining climate policies could increase GDP by 2.8%. (G20, 2017)
  - Required investment USD 6.9 trillion per year. (OECD, 2016)
  - Green bonds can attract private investment and enable the world to achieve growth in financial sector and green development.
Green Bond Rapid Growth

Outstanding amount by year (USD Billion)

- First Green Bond issued by EIB
- Most of bonds issued by development banks and supranationals
- Start to grow after IFC
- First Corporate GB by EDF, BCA, Vasakronan
- Luxembourgh Green Exchange
- Poland first sovereign green bond
- Toyota first green ABS

Year


- Do Shareholders Benefit from Green Bonds?
MTR Green Bond Case

HSBC, Bank of America Merrill Lynch and Goldman Sachs (Asia) L.L.C

Choose underwriter

Design green bond Project selection

Kwun Tong Line Extension South Island Line (East)

Registration Application

Bond Prospectus

Deloitte Assurance

Ongoing report

MTR Treasury Department and Corporate Responsibility Department

Review funding option Internal control

Issue green bond

Issue: November 2016; Maturity: 10 years
Size: USD 600 million; Coupon: 2.50%; Issue Spread: +80bp vs Treasury 1.5%
matured 08/15/26

Second opinion by Sustainalytics Credit rating: Aa2(Moody), AA+ (S&P)

Information Disclosure Credit Rating

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Findings and Contributions

- We are the first to compile most comprehensive green bond dataset and study shareholders’ benefits of issuance.
- Stock market reacts **positively** when firms announce issuance.
  - Results are robust to alternative sample.
- Issuers’ **stock liquidity improves** after issuing green bonds.
  - Panel regression and fixed effects.
  - Matching sample.
- Firms carry on green projects themselves benefit from improved liquidity rather than banks, which make green loans to corporates.
- Implication: Shareholders will benefit from issuing green bonds.
Data Construction

We choose Climate Bond Initiative (CBI) as our baseline data source:
- Established and recognized green bond standards and classification.
- Authority in green bond practice.
- Provide approvement for third party verifier.
- S&P green bond index eligibility criteria.

We augment CBI with Bloomberg labelled green bonds.
- We identify bonds using ISIN with issue date and issue amount information. When there is a disagreement, we use web search.
- We validate our sample using conservative data and results are same.
- Announcement date and bond characteristics comes from Bloomberg.
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<th>Muni Bank</th>
<th>Comm Bank</th>
<th>Corp Bank</th>
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<td>2015</td>
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<td>46</td>
<td>21</td>
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<tr>
<td>2016</td>
<td>80</td>
<td>59</td>
<td>62</td>
<td>103</td>
<td>9</td>
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<td>2017</td>
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<td>41</td>
<td>45</td>
<td>100</td>
<td>14</td>
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<td>Total</td>
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<td>185</td>
<td>169</td>
<td>427</td>
<td>30</td>
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### Bond Characteristics

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<td><strong>Amount (USD Million)</strong></td>
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<td>261</td>
<td>407</td>
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<td><strong>Coupon (Percent)</strong></td>
<td>1275</td>
<td>3.13</td>
<td>2.61</td>
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<td><strong>Maturity (Year)</strong></td>
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<td>7.52</td>
<td>6.97</td>
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<th>Country</th>
<th># Bonds</th>
<th>Shares</th>
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<td>US</td>
<td>368</td>
<td>28%</td>
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<tr>
<td>China</td>
<td>141</td>
<td>11%</td>
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<tr>
<td>France</td>
<td>103</td>
<td>8%</td>
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<table>
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<th>Currency</th>
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<td>EUR</td>
<td>180</td>
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<td>CNY</td>
<td>133</td>
<td>10%</td>
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</table>

Note: Coupon zero means float coupon, e.g. Gothenburg Jun 3, 2020;

Note: Maturity 100 year bond is issued by District of Columbia Water.
Market Reaction

Stock Market Reaction around Annoucement Date

Return

Event window

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

-0.005 0 0.005 0.01 0.015 0.02

Raw Return  Cumulative raw return  Excess return  CAPM AR  CAPM CAR

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## Market Reaction

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<th>Window</th>
<th>Obs</th>
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<th>t-stat</th>
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<th>Max</th>
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<td>[-10,5]</td>
<td>107</td>
<td>1.04%</td>
<td>1.85</td>
<td>5.49%</td>
<td>-13.07%</td>
<td>17.34%</td>
<td>0.109</td>
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<td>[-10,10]</td>
<td>107</td>
<td>1.72%</td>
<td>2.32</td>
<td>7.25%</td>
<td>-17.42%</td>
<td>25.59%</td>
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<td>[-5,10]</td>
<td>107</td>
<td>1.17%</td>
<td>1.85</td>
<td>6.16%</td>
<td>-14.81%</td>
<td>21.05%</td>
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<td>[-5,5]</td>
<td>107</td>
<td>0.49%</td>
<td>1.16</td>
<td>4.17%</td>
<td>-9.72%</td>
<td>8.64%</td>
<td>0.1524</td>
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</table>
We following Holden, Jacobsen and Subrahmanyam (2014) literature review about liquidity measures and Lesmond (2005 JFE) about international stock markets and add controls according to that.

\[
\text{Amihud illiquidity} = \frac{1}{\text{days}} \times \sum_{i=1}^{\text{days}} \frac{|R_t|}{\text{Price}_t \times \text{Volume}_t}
\]

\[
\text{Quoted spread} = \frac{|\text{Ask} - \text{Bid}|}{\frac{\text{Bid} + \text{Ask}}{2}}
\]
### Liquidity Change after Issuance

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<td>log(Amihud)</td>
<td>log(Amihud)</td>
<td>log(Amihud)</td>
<td>log(Amihud)</td>
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<td>Post_Issue</td>
<td>-0.180*** (0.06)</td>
<td>-0.117** (0.05)</td>
<td>-0.120** (0.05)</td>
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<tr>
<td>Price</td>
<td>-0.0134** (0.01)</td>
<td>-0.0127** (0.01)</td>
<td>-0.01 (0.00)</td>
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<tr>
<td>Volatility</td>
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<td>0.0490*** (0.02)</td>
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<td></td>
</tr>
<tr>
<td>Size</td>
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<td>-0.781*** (0.13)</td>
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<td>YES</td>
<td>YES</td>
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## Robustness

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<td>Quoted Spread</td>
<td>Quoted Spread</td>
<td>Quoted Spread</td>
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<td>(0.02)</td>
<td>(0.02)</td>
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### Diff-in-diff Analysis for Matched Sample

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<td>All sample [-6m,6m]</td>
<td>[-3m,3m] All sample</td>
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<td>Post</td>
<td>-0.0598*** (-4.143)</td>
<td>-0.0813*** (-4.854)</td>
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<td>Treat</td>
<td>0.0867 (0.199)</td>
<td>0.0959 (0.206)</td>
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<tr>
<td>Treat*Post</td>
<td>-0.0872*** (-5.388)</td>
<td>-0.0916*** (-4.307)</td>
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<td>Number of firms</td>
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<td>Year FE</td>
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## Banks versus Firms Carrying out Green Projects

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<th>Log(Amihud) (1)</th>
<th>Quoted Spread (2)</th>
<th>Log(Amihud) (3)</th>
<th>Quoted Spread (4)</th>
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<td><strong>Liquidity</strong></td>
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<td>Bank</td>
<td>-0.09</td>
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<tr>
<td>Corporates</td>
<td>-0.143***</td>
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<td>-0.165**</td>
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<tr>
<td><strong>Post_Issue</strong></td>
<td>-0.09</td>
<td></td>
<td>0.115</td>
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<tr>
<td>Bank</td>
<td>-0.143***</td>
<td></td>
<td>-0.165**</td>
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<td><strong>Price</strong></td>
<td>-0.0236*</td>
<td>-0.01</td>
<td>-0.0157</td>
<td>-0.00305</td>
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<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>-0.531***</td>
<td>-0.641***</td>
<td>-0.04</td>
<td>-0.142***</td>
</tr>
<tr>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.03)</td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td><strong>Volatility</strong></td>
<td>0.219***</td>
<td>0.0837***</td>
<td>0.149***</td>
<td>0.0292*</td>
</tr>
<tr>
<td>(0.06)</td>
<td>(0.02)</td>
<td>(0.06)</td>
<td>(0.02)</td>
<td></td>
</tr>
<tr>
<td><strong>MV</strong></td>
<td>-0.761**</td>
<td>-0.15</td>
<td>-0.10</td>
<td>-0.136**</td>
</tr>
<tr>
<td>(0.28)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.06)</td>
<td></td>
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<tr>
<td><strong>Constant</strong></td>
<td>-13.93***</td>
<td>-20.58***</td>
<td>-6.024***</td>
<td>-6.979***</td>
</tr>
<tr>
<td>(3.05)</td>
<td>(2.41)</td>
<td>(1.30)</td>
<td>(0.62)</td>
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<td><strong>Observations</strong></td>
<td>783</td>
<td>1733</td>
<td>768</td>
<td>1720</td>
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<tr>
<td><strong>R-squared</strong></td>
<td>0.45</td>
<td>0.48</td>
<td>0.05</td>
<td>0.09</td>
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<td><strong>Number of firms</strong></td>
<td>36</td>
<td>80</td>
<td>36</td>
<td>80</td>
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<td><strong>Firm FE</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Dragon Yongjun Tang, Yupu Zhang (HKU) Do Shareholders Benefit from Green Bonds? December 2017
Summary

- This study is the first to construct most comprehensive international green bond dataset and study stock market reaction.
- The short term market reaction is significant positive.
- There are also other externalities to issue green bonds.
  - Stock market liquidity improves after issuance.
  - Improvement only benefits those firms carrying out green projects.
- Shareholders benefit from issuing green bonds!