Do Shareholders Benefit from Green Bonds?

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September 2018, San Francisco
Apple issues $1 billion green bond after Trump’s Paris climate exit
Green Bond Rapid Growth
Green Bond Rapid Growth

Outstanding amount by year (USD Billion)

- First Green Bond issued by EIB
- First Corporate GB by EBR, BOA, Vasakronan
- Poland first sovereign green bond
- Most of bonds issued by development banks and supranationals
- Luxembourg Green Exchange
- Toyota first green ABS

CBI Projected

Year

Can firms do well by doing good?

- Corporate social responsibility (CSR) will benefit firm from:
  - lower cost of capital: Goss and Roberts (2011 JBF); Chava (2014 MS)

- Corporate social responsibility (CSR) will damage firm from:
  - agency problems: Benabou and Tirole (2010 Economica); Kruger (2016 JFE)
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Why study green bonds?

- positive environmental externality
- third party verification

Can firms obtain additional benefits from green bond financing activity, which incentivize firms at a better position to conduct environmental friendly projects and improve social welfare in the broader context.
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MTR Green Bond Case

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Findings and Contributions

- Stock market reacts **positively** when firms announce issuance.
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The positive reaction is due to increased investor attention. Little evidence for pricing benefits (Zerbib (2018 WP)) enlarged institutional ownership after issuing green bonds. Issuers' stock liquidity improves after issuing green bonds.

We are among the first to study international green bond announcement effect and shareholders benefits from it based on a comprehensive green bond dataset.

Implication: Shareholders benefit from issuing green bonds.
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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.

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## Green Bond Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Development Bank</th>
<th>Municipal</th>
<th>Commercial Bank</th>
<th>Corporation</th>
<th>State</th>
<th>ABS</th>
<th>Sovereign</th>
<th>All</th>
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<tbody>
<tr>
<td>2007</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>2008</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2009</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>4</td>
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<tr>
<td>2010</td>
<td>57</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>62</td>
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<tr>
<td>2011</td>
<td>33</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>36</td>
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<tr>
<td>2012</td>
<td>23</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>28</td>
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<tr>
<td>2013</td>
<td>29</td>
<td>4</td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>50</td>
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<tr>
<td>2014</td>
<td>65</td>
<td>24</td>
<td>28</td>
<td>43</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>170</td>
</tr>
<tr>
<td>2015</td>
<td>105</td>
<td>46</td>
<td>21</td>
<td>178</td>
<td>2</td>
<td>13</td>
<td>0</td>
<td>365</td>
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<tr>
<td>2016</td>
<td>80</td>
<td>59</td>
<td>62</td>
<td>103</td>
<td>9</td>
<td>41</td>
<td>1</td>
<td>355</td>
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<tr>
<td>2017</td>
<td>91</td>
<td>82</td>
<td>85</td>
<td>129</td>
<td>25</td>
<td>23</td>
<td>3</td>
<td>438</td>
</tr>
<tr>
<td>Total</td>
<td>489</td>
<td>226</td>
<td>209</td>
<td>456</td>
<td>41</td>
<td>85</td>
<td>4</td>
<td>1510</td>
</tr>
</tbody>
</table>

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## Bond Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Std.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Green Bonds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coupon (Percent)</td>
<td>3.3</td>
<td>2.8</td>
<td>2.4</td>
<td>1510</td>
</tr>
<tr>
<td>Maturity (Year)</td>
<td>7.62</td>
<td>5</td>
<td>6.45</td>
<td>1510</td>
</tr>
<tr>
<td>Amount (million)</td>
<td>286</td>
<td>75</td>
<td>575</td>
<td>1510</td>
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<tr>
<td><strong>Public Issuers Green Bonds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coupon (Percent)</td>
<td>3.2</td>
<td>2.9</td>
<td>2.2</td>
<td>241</td>
</tr>
<tr>
<td>Maturity (Year)</td>
<td>6.56</td>
<td>5</td>
<td>4.21</td>
<td>241</td>
</tr>
<tr>
<td>Amount (million)</td>
<td>369</td>
<td>153</td>
<td>552</td>
<td>241</td>
</tr>
</tbody>
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## Market Reaction: First Time vs. Subsequent

<table>
<thead>
<tr>
<th>Event Window</th>
<th>First time issue</th>
<th>Subsequent issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>CAPM_CAR (%)</td>
<td>1.39**</td>
<td>1.04**</td>
</tr>
<tr>
<td></td>
<td>(2.36)</td>
<td>(2.12)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0171**</td>
<td>0.0303**</td>
</tr>
<tr>
<td>FF3_CAR (%)</td>
<td>1.41**</td>
<td>1.06**</td>
</tr>
<tr>
<td></td>
<td>(2.42)</td>
<td>(2.24)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0247**</td>
<td>0.0225**</td>
</tr>
<tr>
<td>FF5_CAR (%)</td>
<td>1.29**</td>
<td>1.01**</td>
</tr>
<tr>
<td></td>
<td>(2.19)</td>
<td>(2.07)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0513*</td>
<td>0.0492**</td>
</tr>
<tr>
<td>Observations</td>
<td>132</td>
<td>132</td>
</tr>
</tbody>
</table>
## Market Reaction: Financials vs. Corporations

<table>
<thead>
<tr>
<th>Event Window</th>
<th>Corporate (1) [-10,10]</th>
<th>Corporate (2) [-5,10]</th>
<th>Financial (3) [-10,10]</th>
<th>Financial (4) [-5,10]</th>
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<tr>
<td>CAPM_CAR (%)</td>
<td>1.88**</td>
<td>1.51**</td>
<td>0.44</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(2.40)</td>
<td>(2.22)</td>
<td>(0.55)</td>
<td>(0.26)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0132**</td>
<td>0.0264**</td>
<td>0.5962</td>
<td>0.5962</td>
</tr>
<tr>
<td>FF3_CAR (%)</td>
<td>1.96**</td>
<td>1.59**</td>
<td>0.36</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(2.54)</td>
<td>(2.42)</td>
<td>(0.45)</td>
<td>(0.15)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0160**</td>
<td>0.0152**</td>
<td>0.6820</td>
<td>0.6114</td>
</tr>
<tr>
<td>FF5_CAR (%)</td>
<td>1.86**</td>
<td>1.53**</td>
<td>0.22</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(2.36)</td>
<td>(2.25)</td>
<td>(0.27)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>P(Sign-test)</td>
<td>0.0302*</td>
<td>0.0342*</td>
<td>0.8741</td>
<td>0.8058</td>
</tr>
<tr>
<td>Observations</td>
<td>86</td>
<td>86</td>
<td>46</td>
<td>46</td>
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Explanations for positive abnormal return

- Financing Cost
  - Green bond issuance attracts investors with the green mandate and socially responsible funds.
  - Investor demand will push up the bond price and lower the cost of capital for the firm.
  - Investor attention
    - Green bond issuance attracts investors' attention and improves visibility and enlarges the investor base.
  - Firm fundamental
    - Green bond issuance discloses valuable investment opportunities and illustrates firms' dedication to sustainable development, facilitating firms' survival in the long run.
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<td></td>
<td></td>
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</tr>
<tr>
<td>Green</td>
<td>-0.0695*</td>
<td>-0.1333**</td>
<td>-0.1318**</td>
<td>-0.0985*</td>
<td>-0.05</td>
</tr>
<tr>
<td></td>
<td>(-2.21)</td>
<td>(-2.86)</td>
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## Investor Attention Channel: Institutional Ownership

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| Observations             | 5,824         | 2,878  | 5,824 | 2,878
We find that shareholders benefit from issuing green bond, but we are also aware of the market is still fast growing and far from steady stage.
Relevance and Takeaway

- We find that shareholders benefit from issuing green bond, but we are also aware of the market is still fast growing and far from steady stage.
  - China and EU issue joint white paper paves the way for enhancing the consistency of green finance definitions and standards.
  - Many governments are stepping in and facilitating the green bond market.
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- China and EU issue joint white paper paves the way for enhancing the consistency of green finance definitions and standards.
- Many governments are stepping in and facilitating the green bond market
  - Green Bond Grant Scheme launched by the Singapore in June 2017 will reimburse "Eligible Expenses" including arranger fees, auditor’s fees, credit rating fees, legal fees and listing fees.
  - Three-year Green Bond Grant Scheme from Hong Kong, which will provide up to HKD 800,000 (USD 102,000) in subsidies for green bond issuers.
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Possible market development:
- More green securitization (Fannie Mae issued USD24.9bn of Green MBS at the end of 2017)
- Surge in nonfinancial corporate green bond issuance
- Subsidy and tax benefits
We construct a comprehensive international green bond dataset and study stock market reaction.

The short-term market reaction is significant positive.

There are little direct benefits (cost of debt) to issue green bonds.

But there are other externalities to issue green bonds.

- Institutional ownership increases
- Stock market liquidity improves after issuance.

Shareholders benefit from issuing green bonds!