CARBON DISCLOSURE AND CLIMATE RISK IN SOVEREIGN BONDS

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Today’s Moderator

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About South Pole Group

We measure and reduce environmental and social impact for 1’000+ clients.

We enable our customers to create value from sustainability-related activities.

Our staff of 150 employees in 17 offices worldwide are passionate to fight climate change.
Your Presenter:

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Sovereign Risk: ERISC
Working Group Members

- BlackRock (US)
- MN (The Netherlands)
- Alliance Bernstein (US)
- DEGROFF Petercam (Belgium)
- Vontobel (Switzerland)
- Aegon Asset Management (Netherlands)
- BT Pension Scheme (UK)
- Nippon Life Global Investors (Japan)
- Swisscanto Invest (Switzerland)
Three key dimensions

1. Transition Risk
2. Policy Response
3. Physical Climate Change
What the report covers:

1. Intensity or Debt Outstanding? A Recommended Approach
2. Mixed Asset Class Portfolios
3. Transition Risk
4. Policy Response
5. Variations (Net Carbon Footprint, Government Emissions, Land Use Emissions, Cumulative or Historical Emissions)
6. Physical Climate Change
7. Sovereign Green Bonds
8. Appendices: Data sources and Example portfolio analysis
Methodological Approaches:
Carbon Disclosure - Methodological choices

1. Ownership Approach:
   How much of the country’s emissions am I financing with my investment?

2. Carbon Intensity Approach:
   How carbon intense or efficient are the entities we are investing in?
Methodological Approaches:

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<tr>
<th>APPROACH</th>
<th>SCOPE</th>
<th>MEASURING CARBON INTENSITY</th>
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<td>GOVERNMENT EMISSIONS</td>
<td>CONSUMPTION APPROACH</td>
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<td>APPROACH</td>
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<td>INTENSITY</td>
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<td>APPROACH</td>
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Global Footprint Network
Advancing the Science of Sustainability
Carbon Disclosure – Production or Consumption?

1. Production Approach:
What is the total amount of emissions of the national economy within the nation’s territory?

2. Consumption Approach:
What is the total (or per capita) amount of emissions associated with the consumption of the inhabitants of the country?
Production carbon intensity

Figure 8 – Carbon Intensity of 16 Selected Countries on a Production Basis, 2012

The Global Intensity Benchmark (0.18 kg CO₂/USD) is derived from a global carbon budget compatible with a 2-degree warming limit. Source: Global Footprint Network, National Footprint Accounts.
Production or Consumption?

Figure 2: CO₂ Emissions from Consumption and Production, 2012 (t CO₂/$M GDP)

Source: Global Footprint Network, National Footprint Accounts
Consumption or Production?

Figure 3: Emissions from Consumption (t CO₂ Per Capita) and Production (t CO₂/$M GDP)

Source: Global Footprint Network, National Footprint Accounts
Exposure to Trade:

Figure 5: The Carbon Embedded in Trade for Select Countries (KgCO₂/SBil GDP)

- China
- India
- United States
- Germany
- Brazil
- Japan
- Italy
- France
- United Kingdom

Source: Global Footprint Network, National Footprint Accounts
Multi-asset class portfolios

Multi-Asset Portfolio Intensity =
\[ \sum_{i}^{n} \left( \frac{\text{Carbon Emissions of Issuer}_i}{\text{Revenue or GDP}_i} \right) \times \left( \frac{\text{Exposure to Issuer}_i}{\text{Portfolio Value}} \right) \]

And more specifically:

Sovereign Bond Intensity =
\[ \sum_{i}^{n} \left( \frac{\text{Country Carbon Emissions}_i}{\text{GDP}_i} \right) \times \left( \frac{\text{Country Exposure}_i}{\text{Total Sovereign Bond Exposure}} \right) \]

Corporate Bond Intensity =
\[ \sum_{i}^{n} \left( \frac{\text{Company Emissions}_i}{\text{Revenue}_i} \right) \times \left( \frac{\text{Corporate Bond Exposure}_i}{\text{Total Corporate Bond Exposure}} \right) \]

Equity Intensity =
\[ \sum_{i}^{n} \left( \frac{\text{Company Emissions}_i}{\text{Revenue}_i} \right) \times \left( \frac{\text{Company Exposure}_i}{\text{Total Equity Exposure}} \right) \]
Example: BlackRock Global Allocation Fund

Figure 6: Weighted Average Carbon Intensity Across Asset Classes (tCO₂/€ Million)

- Equity: 230
- Corporate Bond: 115
- Sovereign Bond: 379
- Total: 253
Example: BlackRock Global Allocation Fund
Production carbon intensity

Figure 8 – Carbon Intensity of 16 Selected Countries on a Production Basis, 2012

The Global Intensity Benchmark (0.18 kg CO₂/USD) is derived from a global carbon budget compatible with a 2-degree warming limit. Source: Global Footprint Network, National Footprint Accounts
Transition Risk - Intensive Sector Burden (ISB)

Figure 9: Intensive Sector Burden (ISB)

Source: Global Footprint Network, MRIO Database
Moody’s Transition Risk ‘Heat Map’

Exhibit 11

13 Sectors with Very High or High Exposure to Carbon Regulations

- Unregulated Utilities/Power Companies (Very High)
- Coal Mining
- Coal Terminals
- Oil & Gas - IOCs
- Regulated Electric and Gas Utilities with Generation
- Automobile Manufacturers
- Oil & Gas - Independent E&P
- US Public Power/Cooperative Utilities with Generation
- Steel
- Building Materials
- Oil & Gas - R&M
- Airlines
- Power Generation Projects

Rated Debt, USD Billion

Note: Qualitative scoring assessment of the credit exposure of a given sector to carbon regulations. The scoring was part of a heat map developed by relevant Moody’s analytical teams and Moody’s credit strategy and standards groups. The review took place on a globally coordinated basis from September to November 2015.

Source: Moody’s Investors Service
Transition Risk Research Approach
Policy Response

Figure 12: World CO₂ Intensity Reduction Benchmark

- Projected GDP (3% growth)
- Global Carbon Reduction Scenario
- Carbon Intensity Scenario

Year:
- 2010
- 2015
- 2020
- 2025
- 2030
- 2035
- 2040
- 2045
- 2050

CO₂ Emissions (10^8 tonnes):
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400

GDP (Trillion $): 0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35

Policy Response

Figure 13: Decarbonization Projections for Spain, Germany, Brazil, and the World based on Intended Nationally Determined Contributions (INDCs)
Hypothetical Sovereign Rating Impact

(1-in-250-years disaster, in notches downgrade)
Developing countries most at risk from climate change

- Additional damage (% of values): Developing- and emerging economies (0.8) vs. Advanced economies (0.13)
- Additional GDP per cap loss (%): Developing- and emerging economies (1.1) vs. Advanced economies (0.16)
- Additional sov. rating downgrades (notches): Developing- and emerging economies (0.2) vs. Advanced economies (0.04)

S&P Global Ratings
Scoring climate risk

- **Climate change vulnerability** includes exposure to climate change, sensitivity, adaptive potential and adaptive capacity.
- India, China and Indonesia are the most vulnerable G20 countries in terms of climate change risks.
- Temperature and water indicators have worsened since 2013 but adaptive capacity has improved
- The financial risks are material; damage costs from extreme events over 2005-14 totaled USD309bn in the G20
ERISC Phase II

• How are countries affected by a food commodity price shock?

• Stress Test:
  • Rapid doubling of food commodity prices, as in 2007-08.
  • Impact on GDP, Current Account, and Inflation.
  • Results for 110 countries
Applying Insights to Investment Decisions

Recommendations:
- Measure and report carbon intensity
- Benchmark
- Involve portfolio managers and CIOs
- Participate in further research
- Call for new products to be developed

Manage risk:
- Screening
- Tilting
- Low carbon indices

Opportunities:
- Green bonds, including sovereign green bonds
Questions and Answers

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