On ESG Investing:
Heterogeneous Preferences,
Information, and Asset Prices

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Information in Prices

- A basic premise in financial economics: market prices are very informative about assets fundamentals

- This line of thinking goes back to **Hayek (1945)**
  - Prices aggregate information from many investors, providing information that would be hard to generate otherwise

- Price informativeness is widely important, e.g., for firms’ decision making or for their cost of capital

- Traditional framework builds on investors, who are all interested in the cash flows that firms generate, considering a risk-return tradeoff
The ESG Revolution

- Investors increasingly show interest in other aspects of firms’ operations, namely **ESG – Environmental, Social, and Governance**

<table>
<thead>
<tr>
<th>Region</th>
<th>2016 Amount</th>
<th>Share</th>
<th>2018 Amount</th>
<th>Share</th>
<th>2020 Amount</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>$12.0</td>
<td>52.6%</td>
<td>$14.1</td>
<td>48.8%</td>
<td>$12.0</td>
<td>41.6%</td>
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<tr>
<td>U.S.A.</td>
<td>$8.7</td>
<td>21.6%</td>
<td>$12.0</td>
<td>25.7%</td>
<td>$17.1</td>
<td>33.2%</td>
</tr>
<tr>
<td>Canada</td>
<td>$1.1</td>
<td>37.8%</td>
<td>$1.7</td>
<td>50.6%</td>
<td>$2.4</td>
<td>61.8%</td>
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<tr>
<td>Japan</td>
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<td>3.4%</td>
<td>$2.2</td>
<td>18.3%</td>
<td>$2.9</td>
<td>24.3%</td>
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<tr>
<td>Australasia</td>
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<td>50.6%</td>
<td>$0.7</td>
<td>63.2%</td>
<td>$0.9</td>
<td>37.9%</td>
</tr>
</tbody>
</table>

Amounts are in USD trillions. SRI definition change over time. Source: 2020 Global Sustainable Investment Review
Implications for Financial Markets and Asset Prices

- This is a revolution for the way asset markets work, since we now have investors, who are potentially interested in different things – cash flows vs. ESG

- Important questions for **price formation** and **information content**:
  
  o What information will markets reflect?

  o Since information in prices is important for firms’ cost of capital, what would be the implications for firms?

  o Since there is a lot of uncertainty about ESG activities, can we rely on the market to provide information on that?
Model Setup

- Stock uncertain “payoff” contains a monetary component $z$, and a non-monetary component $\delta$, capturing ESG performance
  - Both are normally distributed with mean 0 and precision $\tau$

- Two types of investors:
  - **Traditional**: proportion $\alpha$, care only about monetary factor
  - **Green**: proportion $1-\alpha$, put positive weights on both factors

  - Consider investors who genuinely care about doing the right thing for the environment, or fund managers whose reputation depends on picking green stocks
Information Structure

- Both types of investors receive **noisy signals** about both factors
  - Signals are normally distributed around factor realization with precision $\tau_s$
  - While green investors care about ESG factor more, they do not necessarily have an informational advantage
- They trade the stock based on their signals, and they also update based on the endogenously determined price of the stock
- In addition, there is noise demand $n$
  - Normally distributed with mean 0 and precision $\tau_n$
Investors’ Actions and Price Formation

• Investors trade to maximize expected payoff per unit of risk
  o But they perceive different payoffs and risks; for example, green fund managers fear investing in wrong green stocks

• Prices are set to clear the market, such that demand will equal supply
  o Information is brought to prices via investors’ trading
  o In equilibrium the price will be a function of the monetary factor $z$, the non-monetary factor $\delta$, and the noise $n$
  o A higher weight on $z$ ($\delta$), means that prices are more informative about monetary factor (non-monetary factor)
Equilibrium Results: Different Market Regimes

- Equilibrium analysis demonstrates that market can fall into two different regimes – traditional regime vs. green regime – each dominated by one type of traders and information
  - Investors trade with information about factor they care about and against information about factor they care less about
  - They trade more aggressively when prices are more informative about what they care about which implies that they face less risk
  - Self-reinforcing feedback loop can lead to different regimes as the next diagram illustrates
Illustration: Feedback Loop Leading to “Green Regime”
When does Equilibrium Multiplicity Arise?

- According to model, equilibrium multiplicity is more likely when:
  - There is less exogenous noise in price, i.e., higher $\tau_n$
  - Investor base is more balanced, i.e., $\alpha$ is closer to a half
  - Investors’ preferences are more heterogeneous, i.e., green investors put more weight on $\delta$
  - There is lower correlation between monetary and non-monetary factors
    - Result comes out of extension allowing two factors to be non-independent
Implications of Increasing Presence of ESG Investors

- ESG investing became more prevalent, and this trend will continue

- What changes should we expect in the pricing of stocks?
  - Prices gradually becoming more informative about ESG and less about traditional factors
  - Once a threshold is crossed, there might be a regime shift with a discrete jump upwards (downwards) in price information about ESG (traditional factors)
  - Due to informational effects, cost of capital is elevated as investor base becomes closer to balanced
Illustration: Price Informativeness

Relative price informativeness, $P_1/t / P_1/g$

Unique equilibrium, $\tau_n < \tau_n^*$

Multiplicity is possible, $\tau_n > \tau_n^*$
Illustration: Cost of Capital

Cost of capital, CoC

Unique equilibrium, $\tau_n < \tau_n^*$

Multiplicity is possible, $\tau_n > \tau_n^*$
Implications of Improving ESG Disclosure

- Another important trend is the greater requirements for publicly disclosed high-quality information on firms’ ESG performance.

- So far in the model, we assumed that the quality of information about ESG and traditional factors was the same.

- In an extension, we say that quality of information on ESG is a fraction $\lambda$ of that on traditional factors; we ask what the implications of increasing $\lambda$ on market outcomes are.

- While direct effect benefits both types of investors, green investors benefit more; hence, informativeness about monetary factor might deteriotate and cost of capital might increase.
Illustration: Effect of ESG Disclosure on Cost of Capital
Conclusion

- Greater emphasis on ESG investing changes the paradigm for thinking about trading and information in financial markets.

- **Multiple equilibria emerge**, where prices are either dominated by traditional factors or by ESG factors.

- Firms might experience an **increase in cost of capital** as investor base is not clearly dominated by either type of investors.

- Market does not easily reflect information about traditional and ESG factors; **tradeoff between the two types of information**.