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**

Region	2016		2018		2020	
	Amount	Share	Amount	Share	Amount	Share
Europe	$12.0	52.6%	$14.1	48.8%	$12.0	41.6%
U.S.A.	$8.7	21.6%	$12.0	25.7%	$17.1	33.2%
Canada	$1.1	37.8%	$1.7	50.6%	$2.4	61.8%
Japan	$0.5	3.4%	$2.2	18.3%	$2.9	24.3%
Australasia	$0.5	50.6%	$0.7	63.2%	$0.9	37.9%

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**:
    - What information will markets reflect?
    - Since information in prices is important for firms' cost of capital, what would be the implications for firms?
    - 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 δ, capturing ESG performance
    - Both are normally distributed with mean 0 and precision τ
- Two types of investors:
    - **Traditional**: proportion α, 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 $\boldsymbol{\tau_s}$
    - 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 $\boldsymbol{n}$
    - Normally distributed with mean 0 and precision $\boldsymbol{\tau_n}$

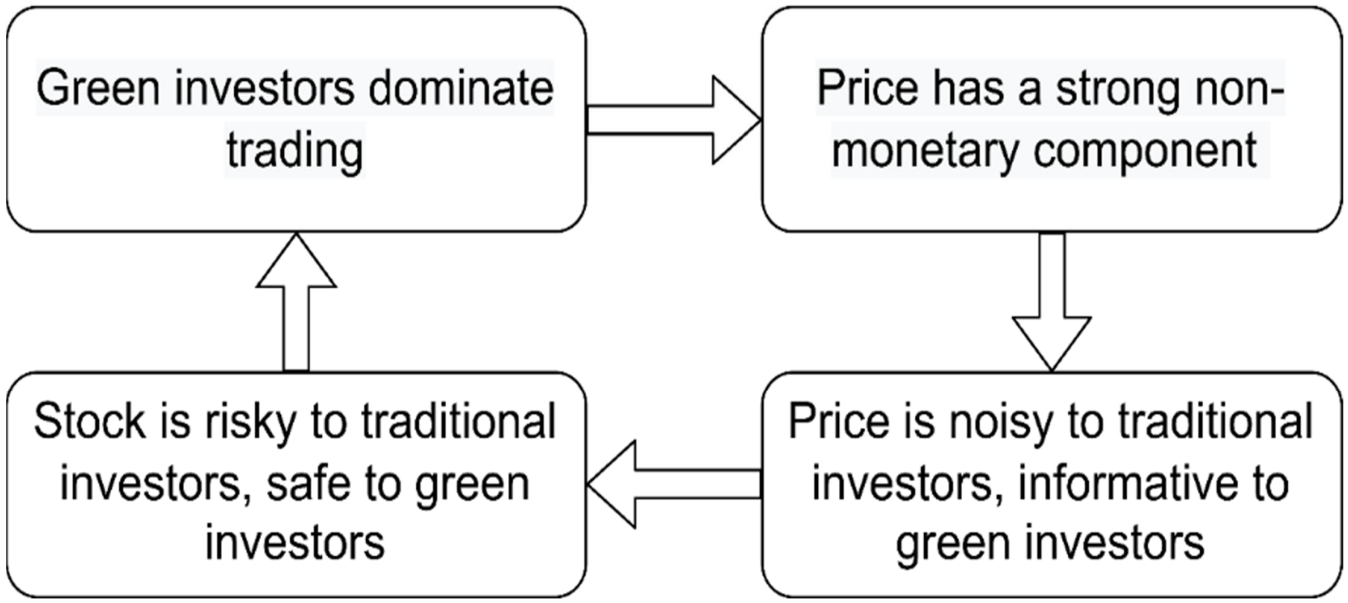
Investors' Actions and Price Formation

- Investors trade to maximize expected payoff per unit of risk
    - 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
    - Information is brought to prices via investors' trading
    - In equilibrium the price will be a function of the monetary factor z, the non-monetary factor δ, and the noise n
    - A higher weight on z (δ), 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?

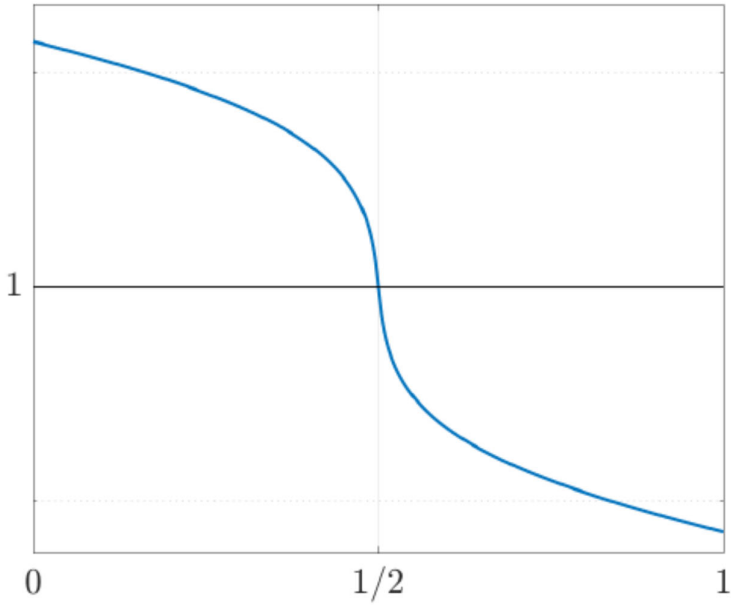
- According to model, **equilibrium multiplicity is more likely** when:
  - There is less exogenous noise in price, i.e., higher $\boldsymbol{\tau_n}$
  - Investor base is more balanced, i.e., $\boldsymbol{\alpha}$ is closer to a half
  - Investors' preferences are more heterogeneous, i.e., green investors put more weight on $\boldsymbol{\delta}$
  - 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

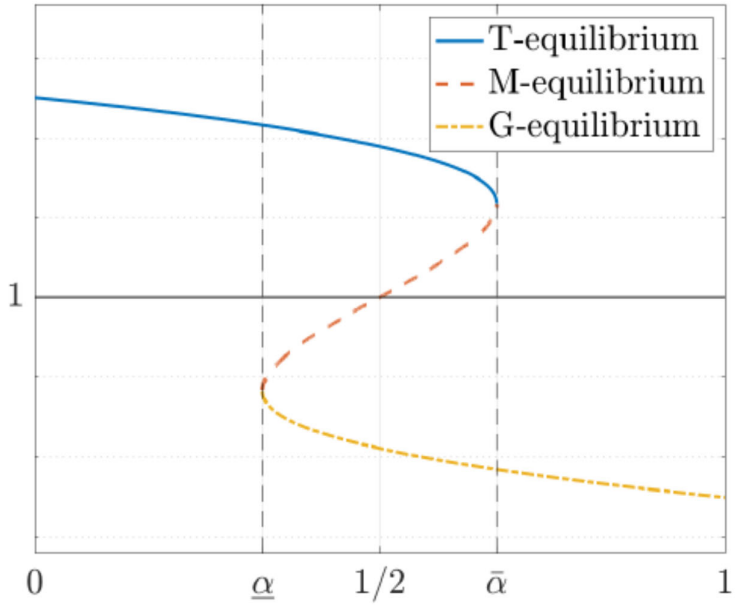
- ESG investing became more prevalent, and this trend will continue
- What changes should we expect in the pricing of stocks?
    - Prices gradually becoming more informative about ESG and less about traditional factors
    - Once a threshold is crossed, there might be a **regime shift** with a discrete 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, PI_t / PI_g

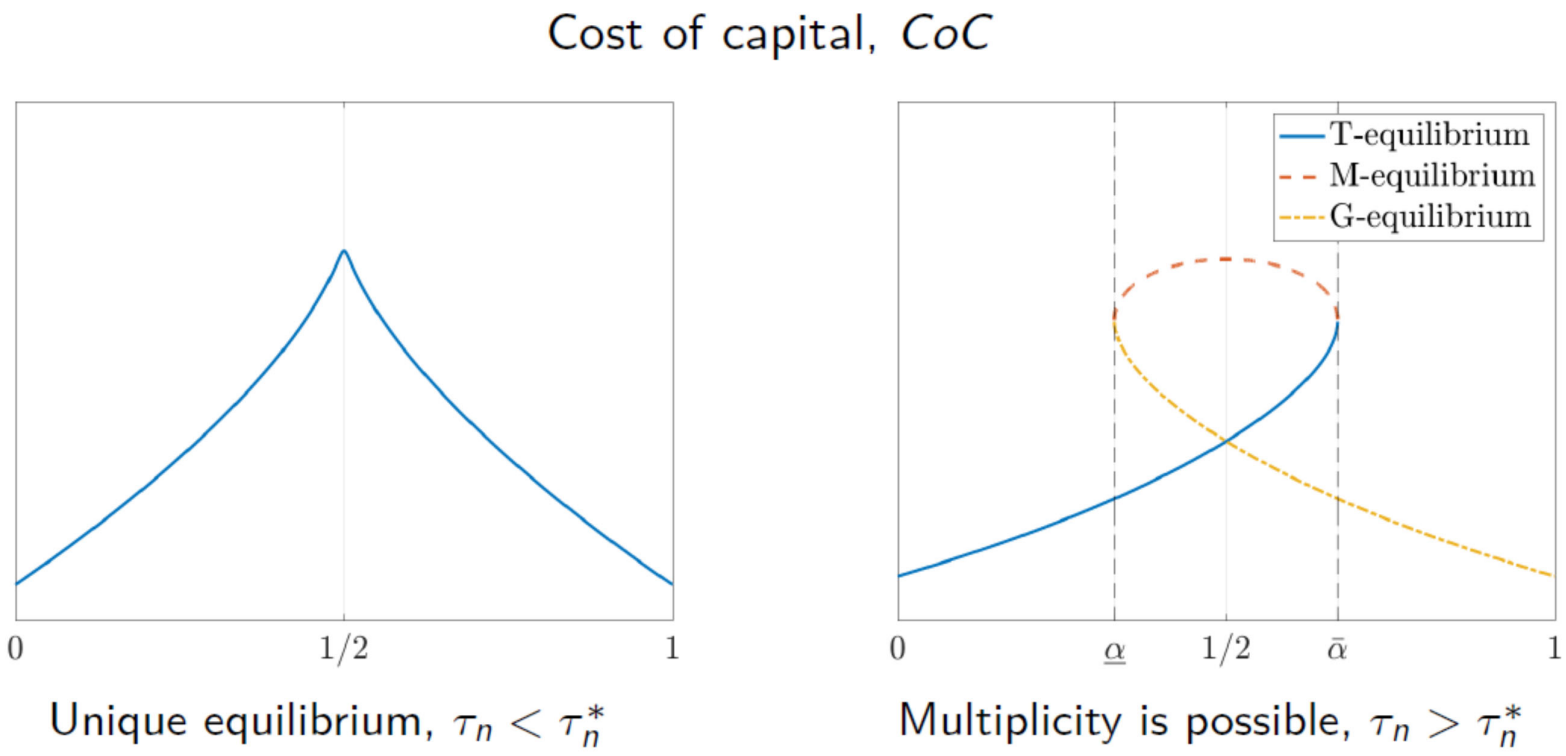


Unique equilibrium, $\tau_n < \tau_n^*$



Multiplicity is possible, $\tau_n > \tau_n^*$

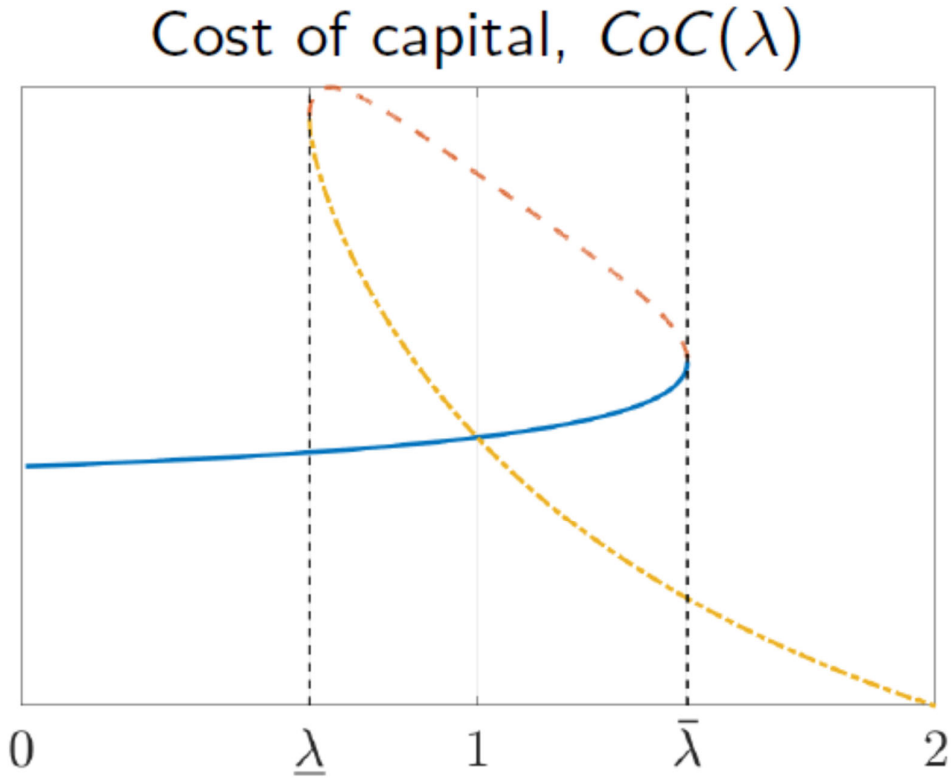
Illustration: Cost of Capital



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 λ of that on traditional factors; we ask what the implications of increasing λ on market outcomes are
- While direct effect benefits both types of investors, **green investors benefit more**; hence, informativeness about monetary factor might deteriorate 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**