Climate Stress Testing

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FED Discussion:

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October 7, 2021

Motivation

- Global warming is at the forefront of policy and social debates
- Investors exposed to two types of risks: physical risks and transition risks
- Assessing the size and the nature of such risks is important for financial stability and design of optimal policies

This paper:

(1) Design the three-step climate stress testing methodology

(2) Main focus on factors related to transition risk

(3) Evidence from 27 banks in 5 large countries: US, UK, Canada, Japan, and France

Methodology

- Step 1: Measure the climate risk factor using the methodology of Litterman

$$CF^{Str} = 0.3XLE + 0.7KOL - SPY$$

- Step 2: Estimate time-varying betas of financial institutions using dynamic conditional beta (DCB)

$$r_{it} = \beta_{it}^{Mkt} MKT_t + \beta_{it}^{Climate} CF_t + \varepsilon_{it},$$

- Step 3: Derive measure of climate risk CRISK

$$CRISK_{it} = k \cdot DEBT_{it} - (1-k) \cdot EQUITY_{it} \cdot (1 - LRMES_{it})$$

$$= k \cdot DEBT_{it} - (1-k) \cdot EQUITY_{it} \cdot \exp\left(\beta_{it}^{Climate} \log(1-\theta)\right)$$

Summary of Comments

- Interesting paper
- Pushes our understanding of economic significance of

- Conceptual framework
- Application to non-banking sectors and other markets
- Physical risk

Comment 1: Conceptual Framework

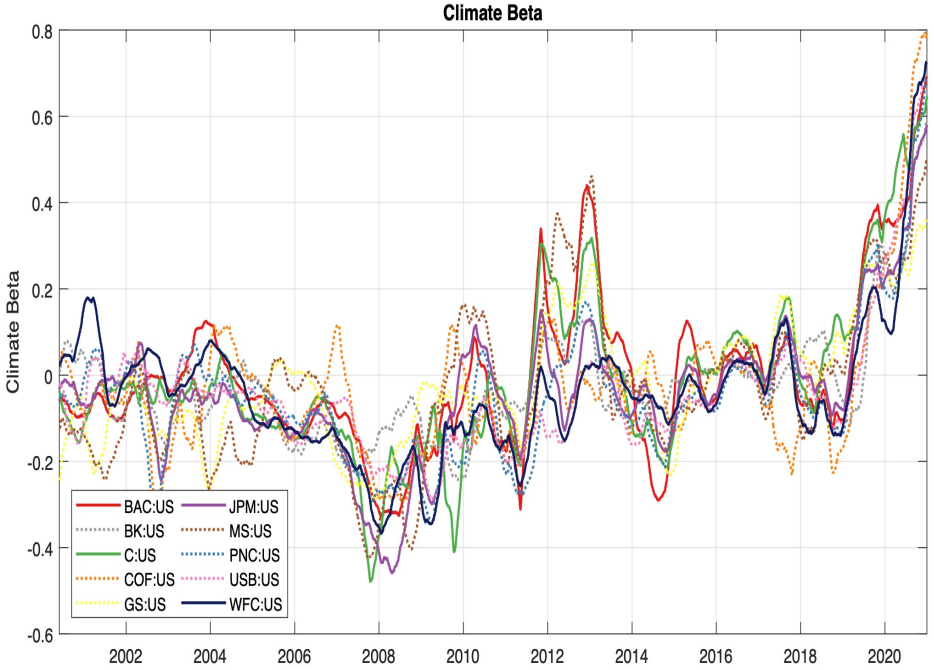
- Paper defines the climate risk factor with respect to US ETFs. While the US market is important it captures the idiosyncratic aspects of the US economy and the XLE index. May be useful to explore the robustness of the results with other choices: world index, global energy portfolio

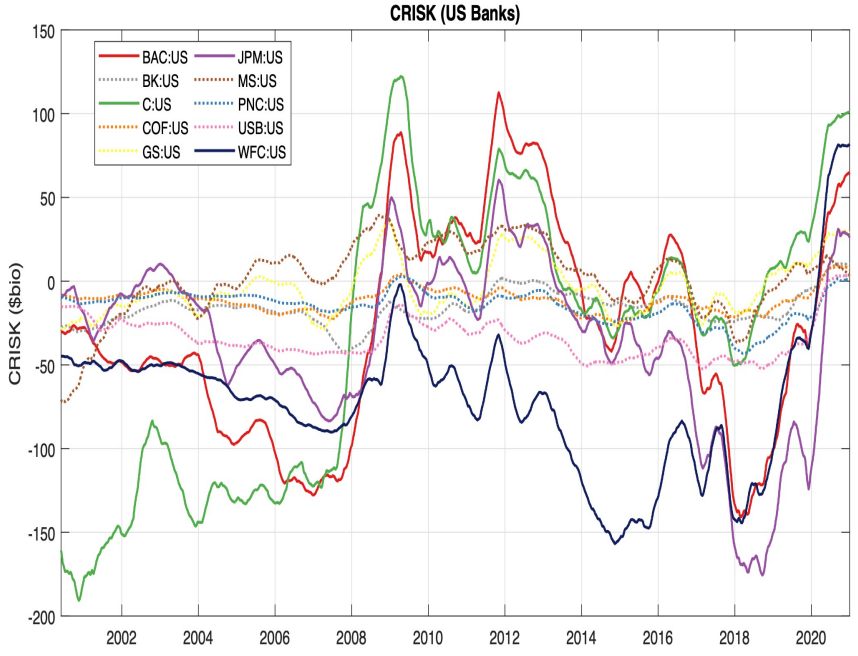
- Climate betas are obtained from the two-factor model. The framework seems sensible, but it partly abstracts from idiosyncratic elements of different banks and the environment in which they function. What is the role of implicit guarantees for the beta risk of individual banks? What is the role of bank size?

- Banks make commitments about net neutrality that could affect their future behavior (Standard Chartered or HRSBC are part of SBTi). Do these commitments matter for the risk dynamics?

- CRISK is a function of several components. What is the individual contribution of each of them to the total risk? Paper does a good job decomposing some of the effects but perhaps could do a bit more. Should we worry about future dynamics of debt or capitalization? Perhaps some sensitivity to these changes would be useful

Comment 1: Conceptual Framework





Comment 2: External Validity

- Banking sector is a good choice for an application. Question is whether it aggregates the information about the total impact of climate risk
- Look at other systemically important sectors: insurance, asset management
- Also, may be useful to explore the results for energy-sensitive sectors: utilities, transportation
- In a similar vein, the authors choose five developed markets as a testing ground. Is there a role for specialization of banks in these countries? What about other countries with more or less exposure to the energy sector?

Comment 3: Transition vs. Physical Risk

- Paper focuses on exposures to stranded asset risk, largely reflecting transition risk.
- How about physical risk? Is the methodology suitable to extend it for such risk?
- Are the same sectors systemically important? Insurance and real estate, for example, may be more exposed to physical risk than is the banking sector?
- Is transition risk independent of physical risk?

Conclusion

- This is a nice paper with an interesting set of results
- The paper enhances our understanding of the scope and the size of climate-related risks
- Some additional robustness of each of the three steps of estimation would be useful
- It would be interesting to extend the application to other sectors and markets