Discussion of "Rare Disasters and Risk Sharing with Heterogeneous Beliefs" by Chen, Joslin, and Tran

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Main contributions:

1. Disagreement about the probability/nature of rare events can go a long way in reducing their impact on the equity premium
   - Wealth distribution affects the importance of this channel
   - Agents with wrong beliefs do not disappear quickly, because of the nature of rare events
2. Trying to infer regime probabilities from asset prices can be misleading if heterogeneity of beliefs is not properly taken into account
3. A U-shaped relation between risk premium and the size of the market

Why are these results interesting?

- The mechanism does not revolve around the idea of pessimists versus optimists. What matters is the fact that agents have heterogenous beliefs
- Given that rare disasters are, well, rare, it is quite reasonable to allow for the possibility that agents have different beliefs about their frequency and magnitude
- The paper provides conditions under which the equity premium will be high:
  1. Trivially, when risk sharing is not possible
  2. More interestingly, when there is small **wealth weighted disagreement**

I will discuss three aspects of the paper:

- Empirical evidence
- The relation between time-varying probabilities and disagreement
- How the effects of learning could be easily mitigated (if I have time)

- The equity premium increases if:
  1. Wealth is concentrated in the hands of agents that fear similar disasters
  2. If beliefs converge
- Right after a disaster, the wealth weighted disagreement is likely to decrease:
  - Wealth gets automatically redistributed in favor of those agents that are more concerned about disasters
  - Heterogeneity in beliefs is likely to decline
- Therefore, the equity premium and its volatility will increase
- It would be nice if the authors could provide some support for these predictions, even if a formal test of the model is clearly beyond the scope of the paper
- Similarly, the authors could try to collect some evidence about the extent of disagreement among stock market participants

An example: The Great Depression

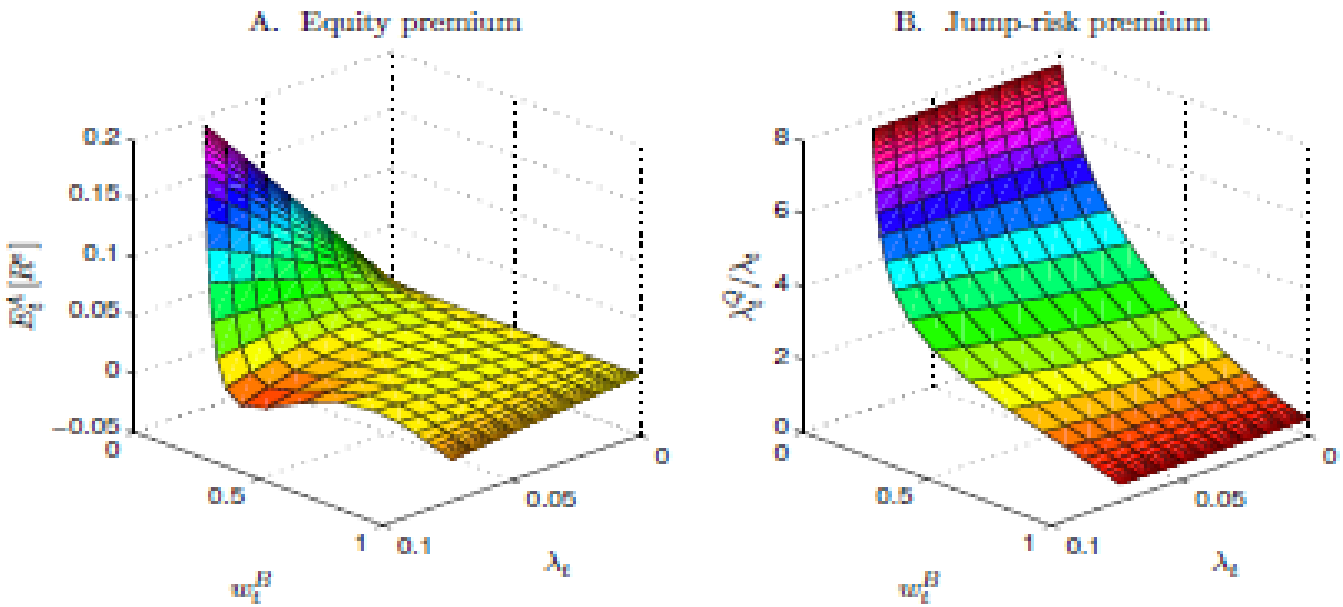
- Cogley and Sargent (2007) propose an explanation for the evolution of the equity premium based on the idea that the Great Depression created exaggerated fears of economic instability. Learning eventually erases pessimism, but while it persists, it commands a high equity premium
- This paper suggests an alternative story:
  1. When the Great Depression strikes, wealth becomes more concentrated and disagreement declines. This implies an increase in the risk premium
  2. As the Great Depression becomes a memory of the past, disagreement increases and the equity premium declines
  3. At the same time, after a long period without disasters, wealth gets partially redistributed across agents, contributing to the reduction in the equity premium

- Throughout the paper, the authors assume that agent A has the correct beliefs about the probability of a rare disaster. The disaster arrives with stochastic intensity:

$$d\lambda_t = \kappa\left(\overline{\lambda}^A - \lambda_t\right)dt + \sigma_\lambda\sqrt{\lambda_t}dW_t^\lambda$$

  where $\lambda_t = \lambda_t^A$.
- The probability of a disaster according to agent B is $\lambda_t^B = \lambda_t\left(\overline{\lambda}^B/\overline{\lambda}^A\right)$
- This assumption is technically convenient given that the model remains within the affine family

- When the probability of rare disaster is high, the desire to diversify is high, therefore the equity premium declines quickly as wealth moves from agent A to agent B ("optimist"). This is also reflected in the fast decline of the jump risk probability.
- The equity premium becomes flat when a large portion of wealth is in the hands of agent B ("optimist").



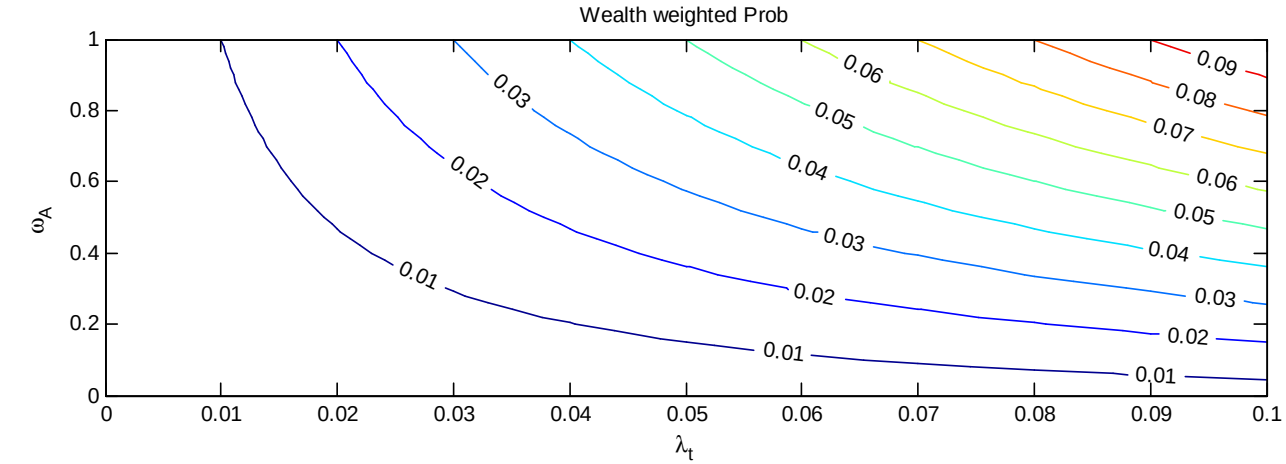
- How should we think about disagreement when the probability of rare disasters is changing over time?
- More specifically, what are the implications for disagreement of assuming $\lambda_t^B = \lambda_t \left(\overline{\lambda}^B / \overline{\lambda}^A \right)$?
- As a possible measure of disagreement, I computed the **wealth-weighted standard deviation in beliefs**:

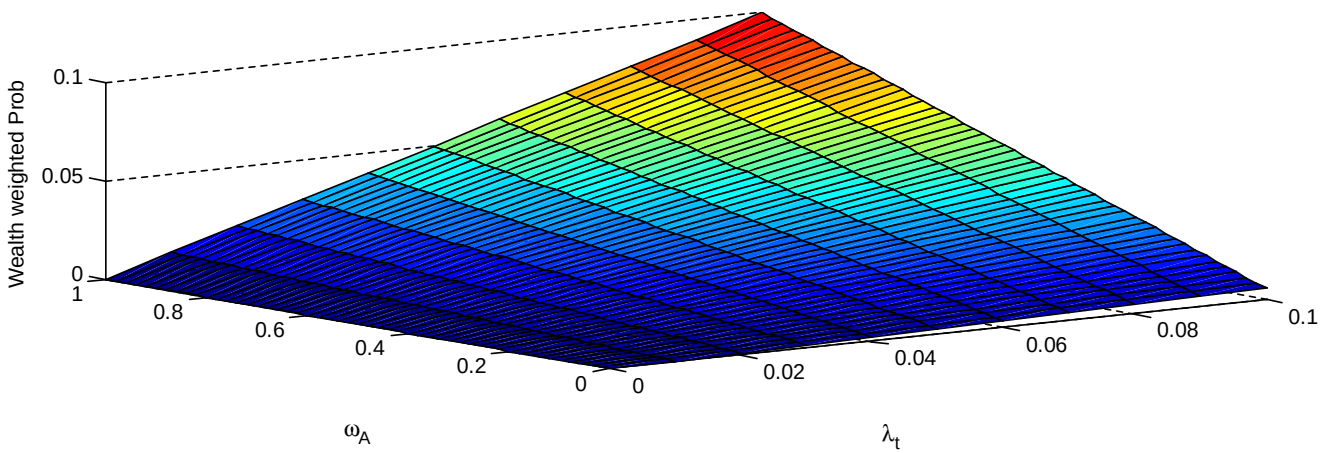
$$DM_t = \sqrt{\left(1 - \omega^B\right) \left(\lambda_t - \lambda_t^M\right)^2 + \omega^B \left(\lambda_t^B - \lambda_t^M\right)^2}$$

where λ_t^M is the wealth weighted average belief:

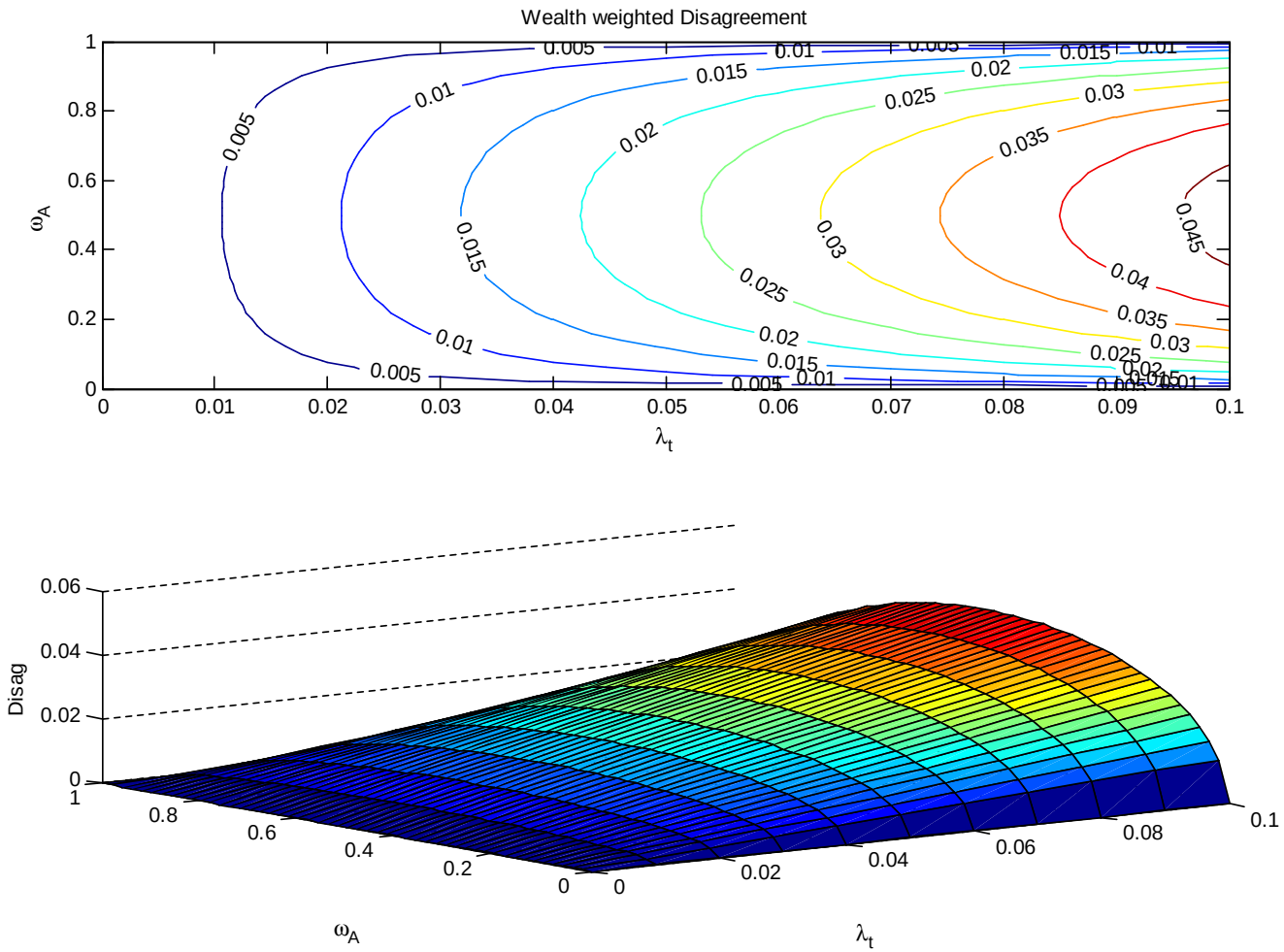
$$\lambda_t^M = \left(1 - \omega^B\right) \lambda_t + \omega^B \lambda_t^B$$

Wealth Weighted Probability





Wealth Weighted Disagreement



- The ratio between the disaster intensities under the two agents' beliefs is not changing, but the **wealth weighted disagreement** is
- For a given wealth distribution, the wealth-weighted standard deviation in beliefs **increases** with the probability of a rare disaster
- More disagreement implies a reduction of the equity premium. This channel is not discussed when describing the time varying probability case, whereas it is accurately illustrated in a separate section about **time varying disagreement**

- However, in reality disagreement could **decline** when probability of a rare disaster **increases**. For example, we might think that agents collect more information when the probability of a rare disaster is high (Rational Inattention)
- In this second case, the effects on the equity premium of an increase in the probability of rare disasters will be amplified
- If this is the right way to think about disagreement, it would be nice to have some more details

- The authors make some strong assumptions (complete markets and dogmatic beliefs)
- They discuss how the results are likely to survive once these assumptions are relaxed
- For what concerns learning, I can see at least two ways to make the learning process remarkably slow or irrelevant:
  1. Time-varying probabilities and disagreement about Brownian Motion, especially if combined with heteroskedasticity
  2. Robust control represents a simple way to preserve disagreement even when agents can learn about the probability of a rare disaster

Summarizing:

- This is a very interesting paper with lots of results and hints about future research
- It is probably beyond the scope of the paper to provide empirical evidence in support of the model
- However, even some anecdotal evidence could help in strengthening the motivation and the case for a more in-depth empirical investigation of the mechanism that the authors envisioned
- Given the crucial role played by disagreement and the growing interest in models with time-varying probabilities, I would find it interesting to have some more details about the link between the two