Discussion of
"A Theory of Power Law Distributions for the Returns to Capital and of the Credit Spread Puzzle", by Francois Geerolf

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This paper models:
- Cross section of leverage across borrowers who use collateralized credit

There are two main results
1. **Equilibrium characterization** with assortative matching and rich cross section of leverage ratios
2. **Pareto distribution** for leverage ratios

Other interesting implications
- The material on short sales and pyramiding is interesting by itself (related to Kilenthong-Townsend)
Summary

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The model

- Almost identical setup to Geanakoplos 10
  - But very different results
- Risk neutral investors maximize (subjective) expected utility (see next slide)
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- Subject to:

  \[ n^i_C + pn^i_A + \int_\phi n^i_B(\phi) \, q(\phi) \, d\phi \leq w \quad (BC) \]

  \[ \int_\phi \max\{0, -n^i_B(\phi)\} \, d\phi \leq n^i_A \quad (CC) \]

  \[ n^i_A \geq 0 \quad n^i_C \geq 0 \quad (NN) \]

- Choice variables
  1. Asset holdings \( n^i_A \)
  2. Borrowing contracts \( n^i_B(\cdot) \)
  3. Cash \( n^i_C \)
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  1. Asset holdings \( n^i_A \)
  2. Borrowing contracts \( n^i_B(\cdot) \)
  3. Cash \( n^i_C \)
- Remark: endogenous margins but exogenous contracts
Comparison to Geanakoplos 2010

![Decision Tree Diagram]
Comparison to Geanakoplos 2010

- Geanakoplos utility:

\[
V^i = n^i_C + n^i_A \{ h^i U + (1 - h^i) D \} \\
+ \int n^i_B (\phi) \left[ h^i \min \{\phi, U\} + (1 - h^i) \min \{\phi, D\} \right] d\phi
\]

- This paper’s utility:

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V^i = n^i_C + n^i_A p^i_{t+1} + \int n^i_B (\phi) \min \{\phi, p^i_{t+1}\} d\phi
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- **Remark:** different kinds of disagreement
  - Geanakoplos/Simsek: disagreement about probabilities
  - This paper: disagreement about the *residual value of the asset*
    - Paper uses expression: "disagreement about means"
  - Which form is more plausible? Do they interact?

- Interpretation?

- It would be nice to merge both frameworks
Results

- Optimality conditions + Market clearing $\Rightarrow$ Collateral equilibrium
- My "intuition":
  - Lenders discipline borrowers’ collateral choices
  - Lenders choose collateral given prices: this pins down equilibrium rates through market clearing
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- My "intuition":
  - Lenders discipline borrowers’ collateral choices
  - Lenders choose collateral given prices: this pins down equilibrium rates through market clearing

- **Question:** Is the equilibrium unique?
- **Remark:** Many markets (with many anonymous buyers and lenders) for borrowing contracts against the same asset are traded in equilibrium
Further results

1. **Allocative interest rates**
   - Also present in Geanakoplos, but only for contracts that are not traded in equilibrium

2. **Credit spread puzzle**: “likelihood and magnitude of defaults do not explain credit spreads” (quantity of risk)
   - Standard explanation: adjustment for price of risk
   - This paper: interest rates are decoupled from default probabilities
   - But credit spread puzzle also holds for non-collateralized assets

3. **Over-the-counter markets**
   - Opaqueness/Adverse selection + search + bargaining
   - This paper: disagreement/walrasian pricing
   - Not sure whether this paper justifies OTC trading
   - It predicts thick markets on borrowing contracts with different collateral
   - “each borrower is borrowing from a different lender”
   - Also there are OTC markets for non-collateralized assets
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Results on Pareto

1. General distribution of $p_{t+1}, f()$: no result
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   - Theoretical validity of the approximation?
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   - In this limit, leverage goes to infinity and the distribution $f(\cdot)$ looks like a uniform. Only the most optimistic agents borrow.
   - Theoretical validity of the approximation?
     - Maybe there is a simple way to bound the common prior solution
   - Sharp prediction
     - Is it really when disagreement goes to zero?
     - Isn’t it when the distribution becomes closer to a uniform? (see numerical example?)
   - Are there other interesting limits that can be taken?
Proposition 3 + Dynamics

- This part is very hard to follow

1. **Main result (proposition 3):** when the distribution of beliefs/wealth is a Pareto with coefficient \( \alpha \), the distribution of leverage is a Pareto (?) with coefficient \( \beta \):

\[
\frac{1}{\beta} = \frac{1}{2} \left[ 1 - \frac{1}{\alpha} \right]
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- Is this also a limit result when the distribution converges to a mass point? I believe so (no proof in the paper)
- \( \alpha = 1/3 \) is fixed point
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2. **Dynamics**

- Relies heavily on propositions 2 and 3
- Example: bounded \( \rightarrow \) Pareto \( \rightarrow \) Pareto \( \rightarrow \) etc
- Shouldn’t highly levered guys go out of business after a negative shock in returns? I think they do
- But then, how can we apply the approximation??
- Large literature on survival - focus on long run distributions
Cross section of hedge funds leverage

- Measured as \( I = \frac{Debt}{Equity} \)

Source: TASS Lipper Hedge Fund Database (approx. 50% of universe of Hedge Funds). Cross-section in August 2006.
Cross section of hedge funds leverage

- Measured as $I = \frac{Debt}{Equity}$
- Are the magnitudes plausible?
- $\log(I) = 8$ implies leverage of 3000 to 1

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