Financial crisis research

- Financial frictions models: Ability to borrow is constrained, combined with externalities in leverage choice.

- Empirical research: Predictability of economic slowdown or crisis in the time series
  - Schularick and Taylor (2012), Gilchrist and Zakrajsek (2012), Greenwood and Hanson (2013), Mian, Sufi, and Verner (2017), Baron and Xiong (2017), Lopez-Salido, Stein, and Zakrajsek (2017) etc.

→ This paper: Argue that financial frictions and sentiment need to be looked at in conjunction
A simple model

- 3 time periods: $t = 0, 1, 2$
- 2 goods: consumption ($c_t$) and capital ($k_t$)
  - Consumption goods can be turned into capital goods one for one during period 0, but not after
  - The reverse is not possible
- 2 types of agents: consumers and entrepreneurs
  - Consumers have utility $\mathbb{E}[c_0 + c_1 + c_2]$, and receive a large endowments at each period (*deep pockets*)
  - Entrepreneurs have utility $\mathbb{E}[c_2]$, and receive an endowment $n_0$ only in period 0
- Entrepreneurs have access to a sophisticated technology $z_t k_{t-1}$
  - Entrepreneurs’ technology is subject to aggregate risk
  - In period 1, capital needs to be maintained by paying a cost of $\rho$ per unit
- Consumers own firms in the traditional sector, with technology $F(k)$ satisfying $F'(0) < 1$ and $F'' < 0$
Financing investment

- Entrepreneurs need to borrow money from consumers in order to invest more than their net worth.
- Short-term debt is available, with a required interest rate of 1.
- **Friction:** Entrepreneurs can only pledge a fraction $\theta$ of future profits.

\[ d_{t,s} \leq \theta z_{t,s} k_{t-1} \]

- Which means that the amount lent must be less than:

\[ b_{t-1} \leq \theta E_{t-1}[z_t] k_{t-1} \]

<table>
<thead>
<tr>
<th>$t = 0$</th>
<th>$t = 1$</th>
<th>$t = 2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrow $b_0$</td>
<td>Pay $d_{1s}$</td>
<td>Pay $d_{2s}$</td>
</tr>
<tr>
<td>Invest $k_0$</td>
<td>Sell $k_0 - k_1$</td>
<td>Consume $z_2 k_1 - d_{2s}$</td>
</tr>
<tr>
<td>Borrow $b_1$</td>
<td>Pay $\rho k_1$</td>
<td></td>
</tr>
</tbody>
</table>
Equilibrium characterization

<table>
<thead>
<tr>
<th>$t = 0$</th>
<th>$t = 1$</th>
<th>$t = 2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k_0 = \frac{n_0}{1 - \theta \mathbb{E}_0[z_1]}$</td>
<td>$k_1 = k_0$</td>
<td>$z_2 k_0$</td>
</tr>
<tr>
<td>if $(1 - \theta)z_1 + \theta \mathbb{E}_1[z_2] \geq \rho$</td>
<td>if $(1 - \theta)z_1 + \theta \mathbb{E}_1[z_2] &lt; \rho$</td>
<td>$k_1 = \frac{\theta z_1 + q_1 k_0}{\rho + q_1 - \theta \mathbb{E}_1[z_2]}$</td>
</tr>
<tr>
<td>$q_1 = F'(k_0 - k_1)$</td>
<td>$z_1 k_1$</td>
<td>$F(k_0 - k_1)$</td>
</tr>
</tbody>
</table>

(a) Initial capital holding (b) Intermediate capital holding
Sensitivity to sentiment

Even though the first best displays absolutely no sensitivity to expectations, with financial frictions the sensitivity is increasing in $\theta$:

**Figure:** Sensitivity to expectations as a function of $\theta$ for a fixed $E_0[z_1]$
Expectations in the intermediate state

- The economy disinvests when

\[(1 - \theta)z_1 + \theta \mathbb{E}_1[z_2] < \rho\]

- When \(\theta\) increases, more weight is put on expectations rather than actual realizations

- If a deviation of expectations from a steady-state of \(\bar{z}\) causes the economy to slip in the fire sales case, capital falls with the multiplier:

\[
\frac{\partial k_1}{\partial \mathbb{E}_1[z_2]} \frac{\mathbb{E}_1[z_2]}{k_1} = \frac{\theta}{(1 - \theta) \bar{z} + F'(0)}
\]

- Once again, this multiplier is increasing in \(\theta\), and convex
Welfare and Sentiment

- Over-optimism has two effects:
  1. It exacerbates fire sales if a bad shock happens at $t = 1$
  2. It relaxes the financial constraint and brings the allocation of funds closer to the first-best

- For small deviations, the result of the trade-off depends on whether the rational expectations equilibrium is constrained efficient

“While some part of the investment which was going on in the world at large was doubtless ill judged and unfruitful, there can, I think, be no doubt that the world was enormously enriched by the constructions of the quinquennium from 1925 to 1929...”

— John Maynard Keynes
Output and initial optimism

Figure: Expected output as a function of optimism for two θ
Output and over-reaction

**Figure:** Expected output with and without reversal
Going forward

1. Dynamic setup:
   ▶ An infinite-horizon model would allow for more careful business cycles analytics
   ▶ Especially relevant to study the slow build-up of a fragile situation
   ▶ Costly in terms of tractability and transparency of relevant channels

2. Which expectation process matters?
   ▶ In principle, several deviations from rational expectations are consistent with the booms and busts narrative
   ▶ Characterizing policies that are robust to a whole range of non-rational expectations would be a key result

3. What does the Social planner know about expectations?
   ▶ To intervene optimally, one needs to know the current state of expectations as well as the true underlying process
   ▶ Even more, one needs to know how expectations of agents will predictably evolve in the future
Thank you