

The Tail that Wags the Economy: Beliefs and Persistent Stagnation

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September 25, 2017

Overview

- Why has stagnation been persistent in the aftermath of the 2008-09 crisis?
 - ▶ Persistent shock
 - ▶ Transitory shocks \rightarrow higher uncertainty \rightarrow lower output \rightarrow higher uncertainty...
- **This paper:** crisis as low probability tail event
- Two implications:
 - ▶ We did not know it could come!
 - ★ Firms unprepared: too much debt, high wages, etc...
 - ▶ Now we know it can come again: revised beliefs
 - ★ Persistent effect on expectations

Learning

- Belief formation: non-parametric estimation
 - ▶ *Kernel density estimation*
 - ★ Approximate true distribution with smoothed histogram from data
- Story: agents observe i.i.d. shock
 - ▶ Estimated distribution is a martingale
 - ▶ Agents expect future beliefs to be the same as current beliefs
 - ▶ Transitory shocks have persistent effects!

Toy (parametric) example

- Aggregate productivity ϕ_t is i.i.d.
 - ▶ Agents know distribution is uniform, i.e., $U(\phi_L, \phi_H)$
 - ▶ But ϕ_L and ϕ_H are unknown: $\phi_{L,t}$ and $\phi_{H,t}$ best estimates at t
- Realizations $\phi_t \in [\phi_{L,t}, \phi_{H,t}]$ have only transitory effects
 - ▶ Affect current productivity, but not expectations
- Realizations $\phi_t \notin [\phi_{L,t}, \phi_{H,t}]$ have permanent effects!
 - ▶ Changes expectations for all future periods

Model ingredients

- Macroeconomic environment:
 - ▶ **Households:** consume, supply labor
 - ★ Epstein-Zin preferences
 - ▶ **Firms:** accumulates capital and hires labor to produce final good
 - ★ Non-contingent debt
 - ★ Non-contingent wages (labor hired in advance)
 - ★ Strategic default/bankruptcy
- Crisis: shock to the quality of capital
 - ▶ 2008-09: fall in price of non-residential capital

Numerical results and evidence

- How did beliefs change?

- ▶ Prob. of 10% fall in price of non-residential capital:

≈ 0 in 2007 \rightarrow 2.5% in 2009

- Calibration: under new distribution

- ▶ 17% and 12% decline in steady-state capital and output, respectively
- ▶ Includes both, changes in beliefs and likelihood of tail event

- Contrast with facts

- ▶ Credit spreads low again: but debt has decreased
- ▶ Equity valuable again: but now less risky, since debt lower
- ▶ Fall in riskless rate: higher demand for safe assets

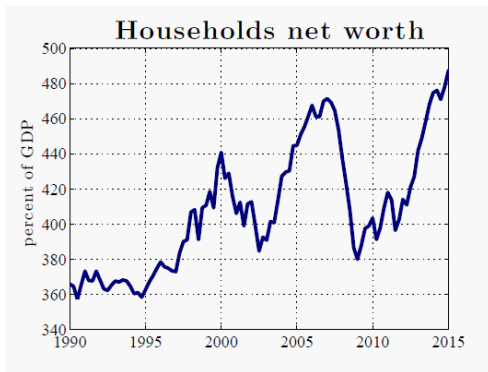
General reaction

- Very natural (and general) idea
- Very well executed paper
 - ▶ Clear, easy to read
- My discussion:
 - ▶ How convincing is it?
 - ▶ Some conceptual questions

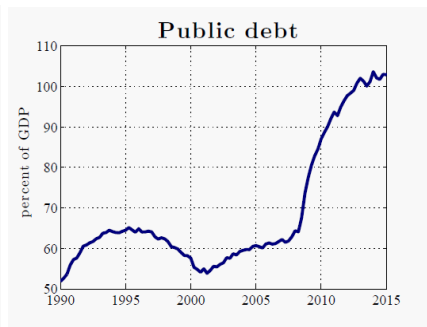
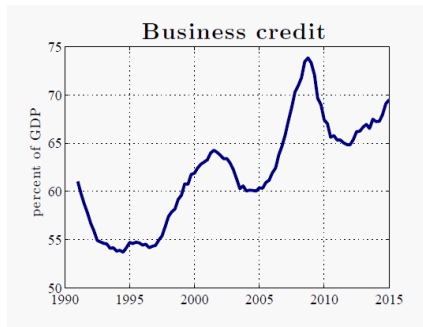
Comment 1

- Where do we see that beliefs have shifted?
 - ▶ Asset prices
 - ▶ Credit spreads (despite high debt)
 - ▶ Volatility measures

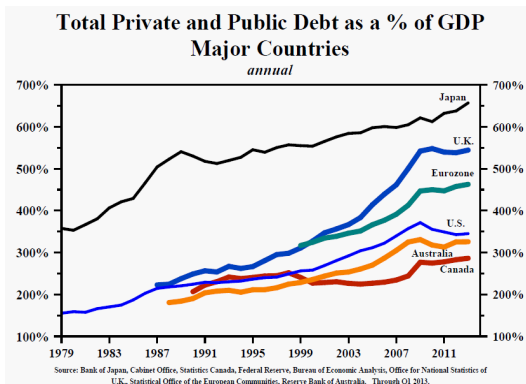
Asset prices



Credit



Credit II

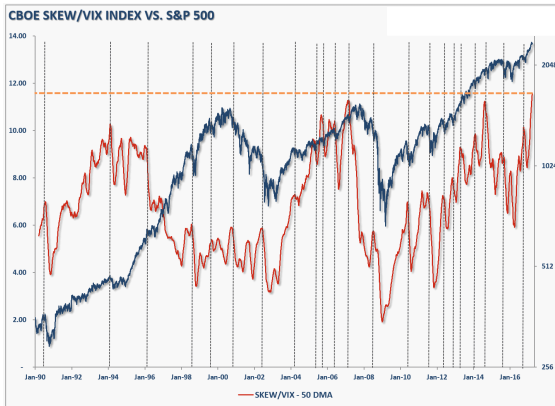




Comment 1

- Where do we see that beliefs have shifted?
 - ▶ Credit spreads (despite high debt)
 - ▶ Asset prices
 - ▶ VIX
- The authors acknowledge this: refer to SKEW Index
 - ▶ Very light discussion: much more of this required
 - ▶ How about additional evidence? Survey of forecasters, etc...
 - ▶ How about massive policy interventions?

Skew

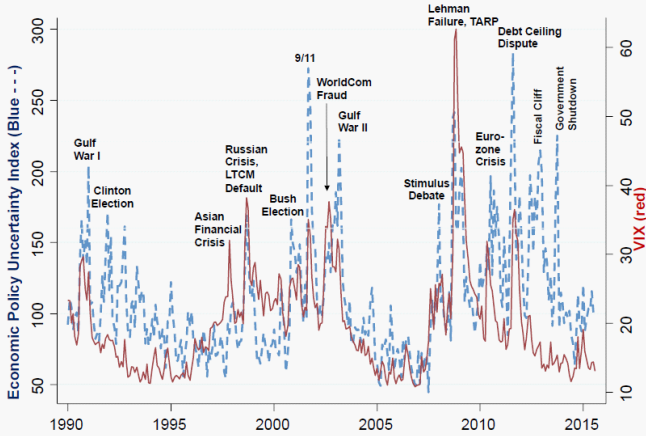


Comment 2

- Maybe there is evidence elsewhere: what do we learn about?
 - ▶ In paper: quality of capital (productivity)
 - ▶ In reality: also resilience of financial/political system
- 2001 and 2008 not too different in terms of asset price collapse
 - ▶ Yet very different effects
 - ▶ Exposure of financial system?
- Slightly different model of learning
 - ▶ In “normal” times, financial/political system performs well
 - ▶ In crisis times: stress on system, how will it react?
 - ★ Collapse of big banks? Dissolution of Eurozone? Populism?, etc...
 - ★ More generally, who bears the costs of financial crises?
 - ★ Even if distribution of productivity is known, tail risk may remain high

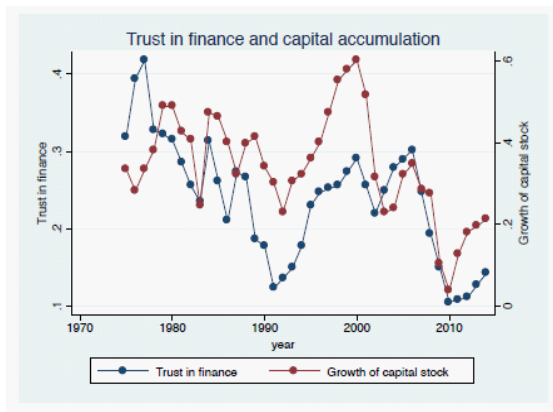
Maybe we learn about political system...

Figure 6: U.S. EPU Compared to 30-Day VIX



Notes: The figure shows the U.S. EPU Index from Figure 1 and the monthly average of daily values for the 30-day VIX.

...or about financial system



Additional comments

- In model, agents' estimate distribution of shocks optimally
 - ▶ But they also know that they do not know the true distribution
 - ▶ Does it matter for anything, e.g. precautionary behavior?
- Big shocks may lead to changes in market practices/institutions
 - ▶ In model, non-contingent debt and non-contingent wages (set in advance)
 - ▶ Maybe this is optimal given pre-2007, but not post-2009 beliefs
 - ★ Change in labor/financial regulation, contract design, etc...
 - ▶ In this sense, model may overestimate effect of changes in beliefs

Conclusion

- Excellent exploration of a natural, intuitive idea
- Paper convincing on quantitative effects of this mechanism
- Less so about its empirical relevance to explain stagnation