The Tail that Wags the Economy: Belief-Driven Business Cycles and Persistent Stagnation

Kozlowski, Veldkamp & Venkateswaran

Discusion by Franck Portier

"Secular Stagnation, Growth and Real Interest Rates"
June 18, 2015, Firenze

Toulouse School of Economics

Roadmap

1. 
2.

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Roadmap

1. A  Model

A  Model

Environment

- Small economy with integrated capital market
- Risk neutral international investors
- Hand-to-Mouth domestic consumer-workers
- Aggregate shocks to capital quality
- Modigliani-Miller holds

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  - The dynamics of shocks
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- Risk-neutral
- Require a expected return $r^\star$
- Supply as much capital K as demanded for a return $r^\star$

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Households

- Preferences

$$U_t = \log C_t - \frac{B}{1+\gamma} L_t^{1+\gamma}$$

- Budget constraint

$$C_t = w_t L_t + E$$

- Note: Final consumption good is the numéraire
- E is period exogenous endowment of consumption good
- Labor supply:

$$L_t = \frac{1}{B} - \frac{E}{w_t}$$

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Firms

- Firms operate along a Leontiev production function

$$Y_t = \min\left(v_t K_t^{\alpha}, L_t\right)$$

- v_t is an aggregate capital quality shock
- Timing of decisions within period t:
  - × Capital market opens and capital allocation is decided
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Deterministic benchmark

- $v_t = v$ for all t
- $Y = \min\left(vK^{\alpha}, L\right)$
- Firms optimal capital demand is such that

$$v\alpha K^{\alpha-1} = r^{\star}$$

- Then, given the Leontief assumption, labor demand and production are

$$Y = L = vK^{\alpha} = vv^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r^{\star}}\right)^{\frac{\alpha}{1-\alpha}}$$

- and wage is determined on the labor market:

$$w = \frac{E}{\frac{1}{B} - vv^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{r^{\star}}\right)^{\frac{\alpha}{1-\alpha}}}$$

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Stochastic Model with Perfect Information

- Assume v is *i.i.d.*
- v uniformly distributed on $[\underline{v}\ \ \overline{v}]$
- denote $E(v) = \frac{\overline{v}-\underline{v}}{2}$
- Now firms install capital according to $E(v)$, and then demand labor according to installed K and *realized* v_t
- Capital demand

$$E(v)\alpha K_t^{\alpha-1} = r^\star$$

- Production

$$Y_t = v_t E(v)^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^\star}\right)^{\frac{\alpha}{1-\alpha}}$$

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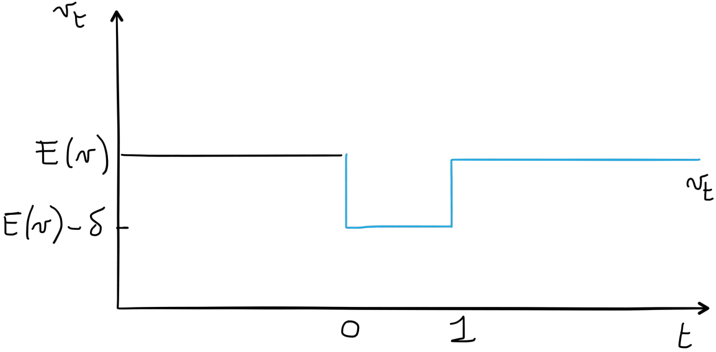

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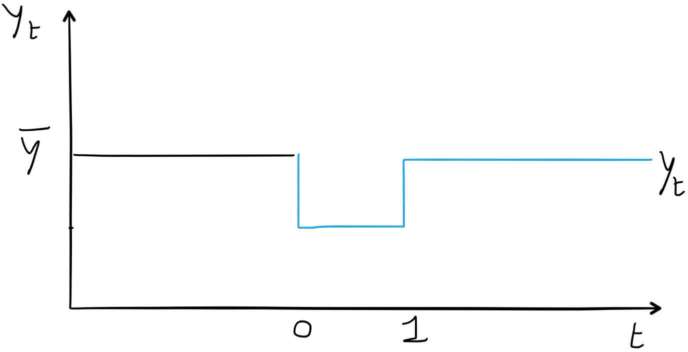

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Stochastic Model with Learning

- As in KVV, I assume that agents must estimate the aggregate shock distribution
- Their common information set includes all aggregate and shocks observed up to time-t.
- At each point in time, they use the empirical distribution of v_t up to that point to construct an estimate of v
- With uniform distribution, that problem is super simple (analytic)...
- ... but conveys the main intuition of the paper

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- I assume that it is common knowledge that shocks are uniformly distributed on $[\underline{v} \quad \overline{v}]$ ...
- ... but $\underline{v}$ and $\overline{v}$ are not known, but agent can learn about them.
- Given an history up to $t = 0$, the estimates of $\underline{v}$ and $\overline{v}$ are

$$\underline{v}_0 = \min\{v_{t<0}\}$$

$$\overline{v}_0 = \max\{v_{t<0}\}$$

- and

$$E_0(v) = \frac{\max\{v_{t<0}\} - \min\{v_{t<0}\}}{2}$$

- $E_0(v)$ is directly affected by a measure of *dispersion* of the shocks $\rightsquigarrow$ tails matter.

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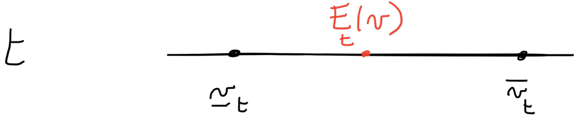

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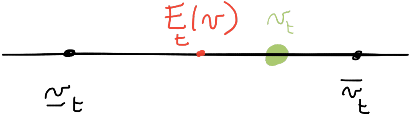

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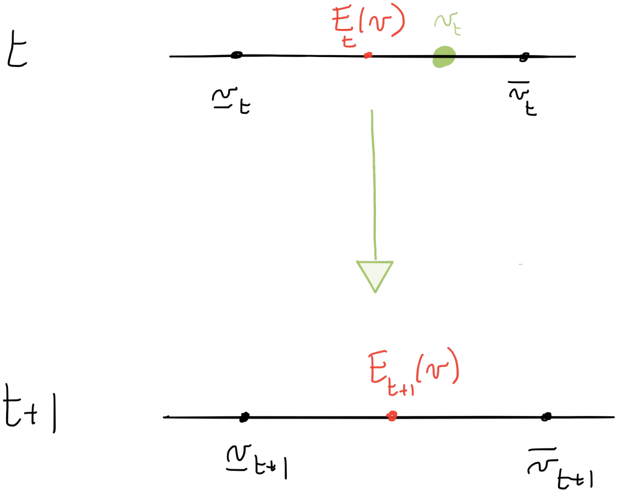

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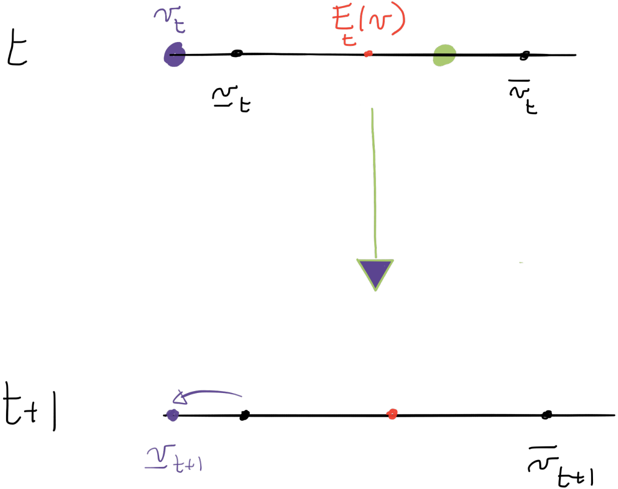

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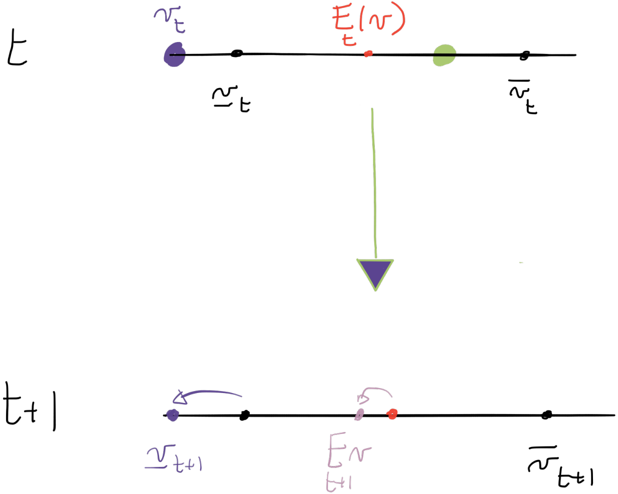

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- The model dynamics is now given by

$$E_t(v) = \frac{\max\{v_{\tau<t}\} - \min\{v_{\tau<t}\}}{2}$$

$$Y_t = v_t E_t(v)^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^\star}\right)^{\frac{\alpha}{1-\alpha}}$$

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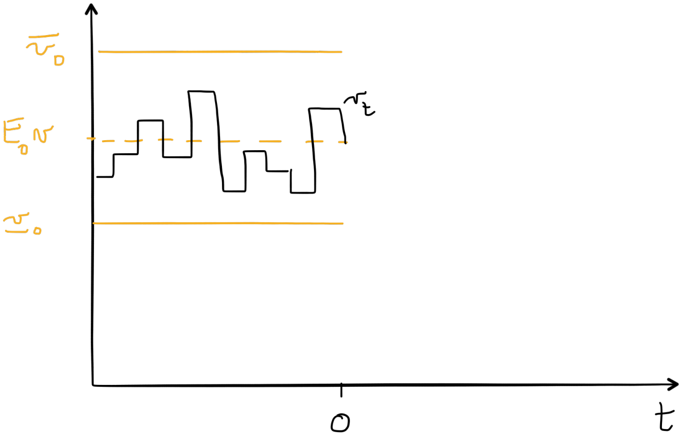

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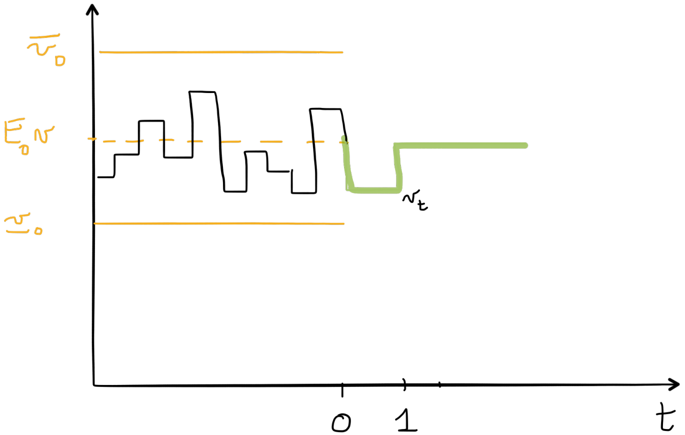

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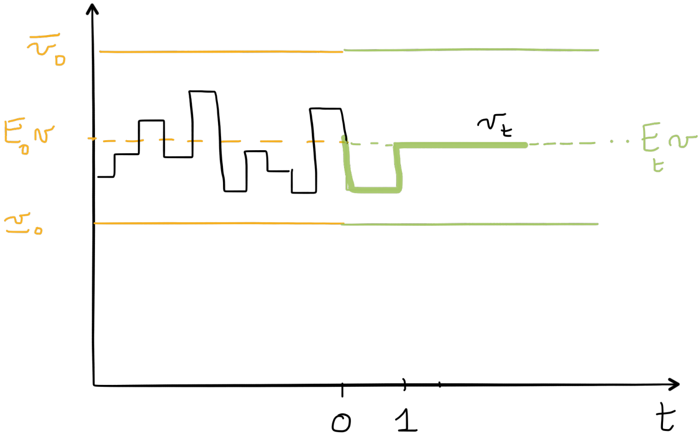

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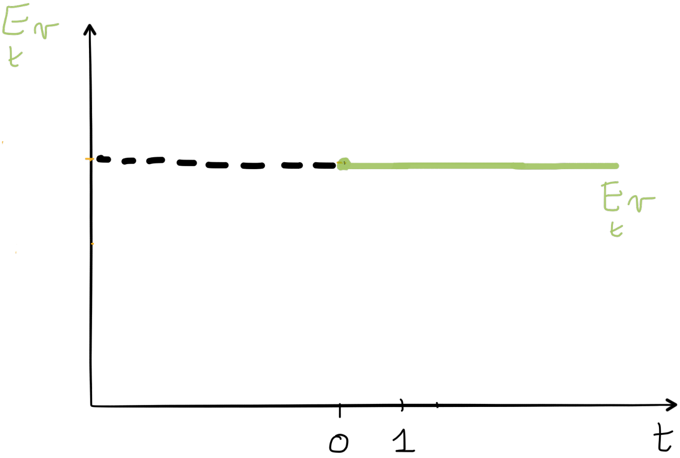

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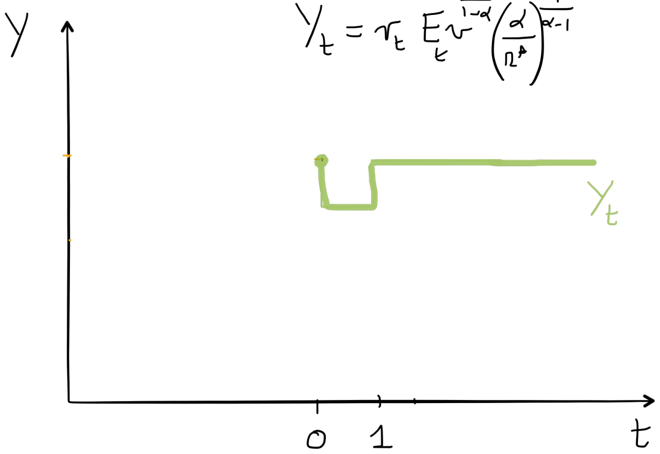
$$Y_t = r_t \, E_t \, v^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{R^A}\right)^{\frac{\alpha}{\alpha-1}}$$



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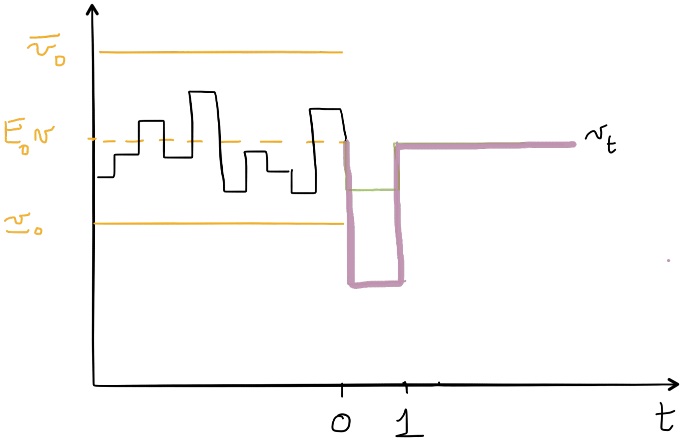

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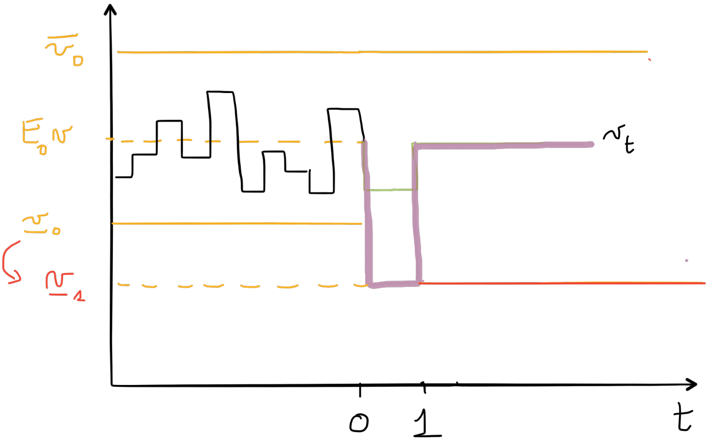
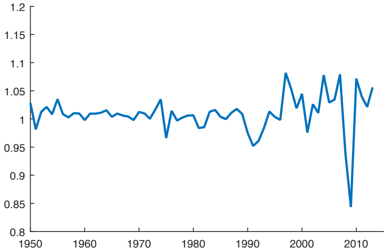
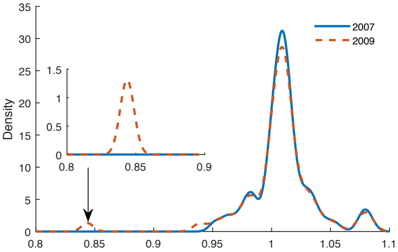


A  Model

Stochastic Model with Learning

- Note the analogy with the  Model





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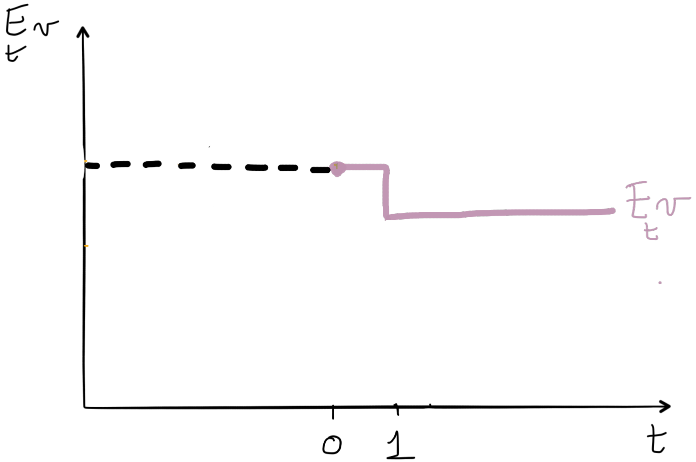

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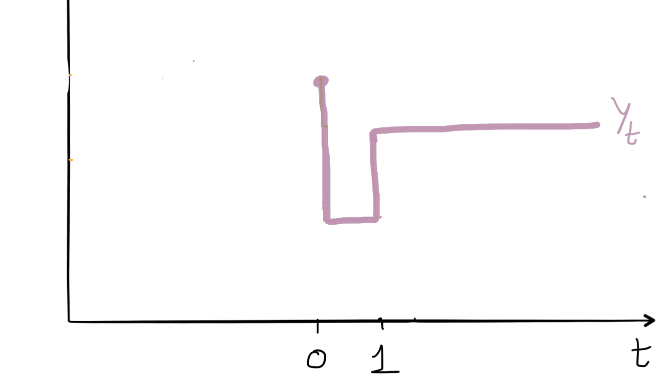
Stochastic Model with Learning

$$Y_t = v_t \, E_t \, v^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^*}\right)^{\frac{\alpha}{1-\alpha}}$$



A  Model

Including "Finance" and Default

- Add idiosyncratic risk anf fixed costs

$$Y_t = \min\left(u_{it} v_t K_t^{\alpha}, L_t\right) - F$$

- Firms that draw a too low u_{it} are not profitable ex post
- They give back their capital (the collateral of their loan) *before* producing
- At the steady state, there is always a fraction of firms that default and close.
- That fraction will be larger permanently after a big shock
- Shocks are also amplified on impact by an extensive margin adjustment : not only firms produce less and revise downward $E(v)$, but more capital is *ex post* idle.

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Roadmap

2. The  Model

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A serious model

- A fully G.E. model with intertemporal decisions
- Finance introduced, gives nice amplification ...
- ... but is not at the core of the mechanism
- Nice way to discipline the exercice by measuring the $\phi(v)$ shock
- The story is not one of the effect of a disaster that we have never observed, but that of an observed disaster.

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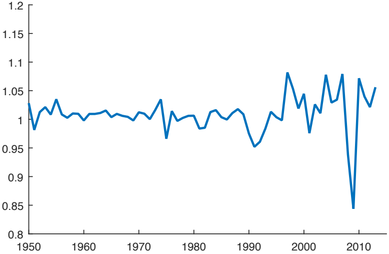
2. The  Model

The need for a big impulse



- Clearly something happened in 2008 and 2009
- Is $\phi\left(v\right)$ the primitive shock?
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- What could it be?

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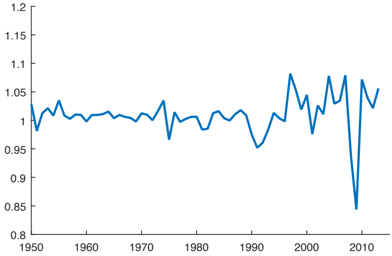

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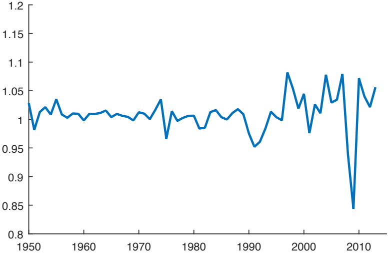

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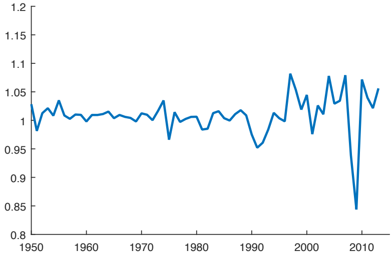

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Modeling the drop in $\phi(v)$

- Do I understand well that a drop in the observed q will be measured as a drop in $\phi(v)$
- Perception revisions of the the type: *"I realize that my investment will not be as profitable as I thought"* can be seen as an explanation for recessions
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- Do such expectation-driven booms and busts create variations in measured $\phi(v)$?

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What do we observe?

- What is an observation?
  - × a quarter? 220 observations since 1960
  - × a cycle? 7 observations
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