Discussion of

High Discounts and High Unemployment

by Bob Hall

Mark Gertler

NYU

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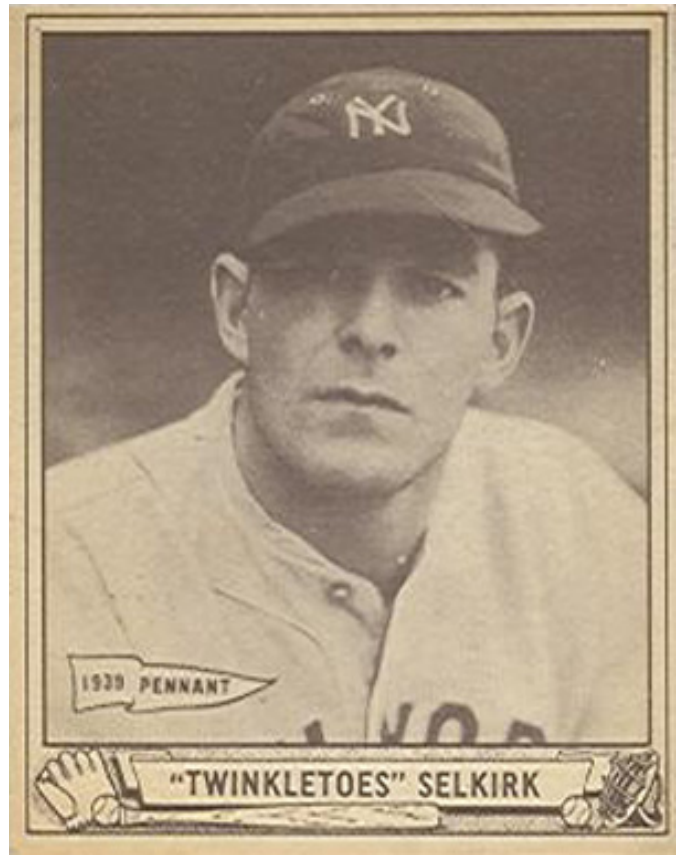
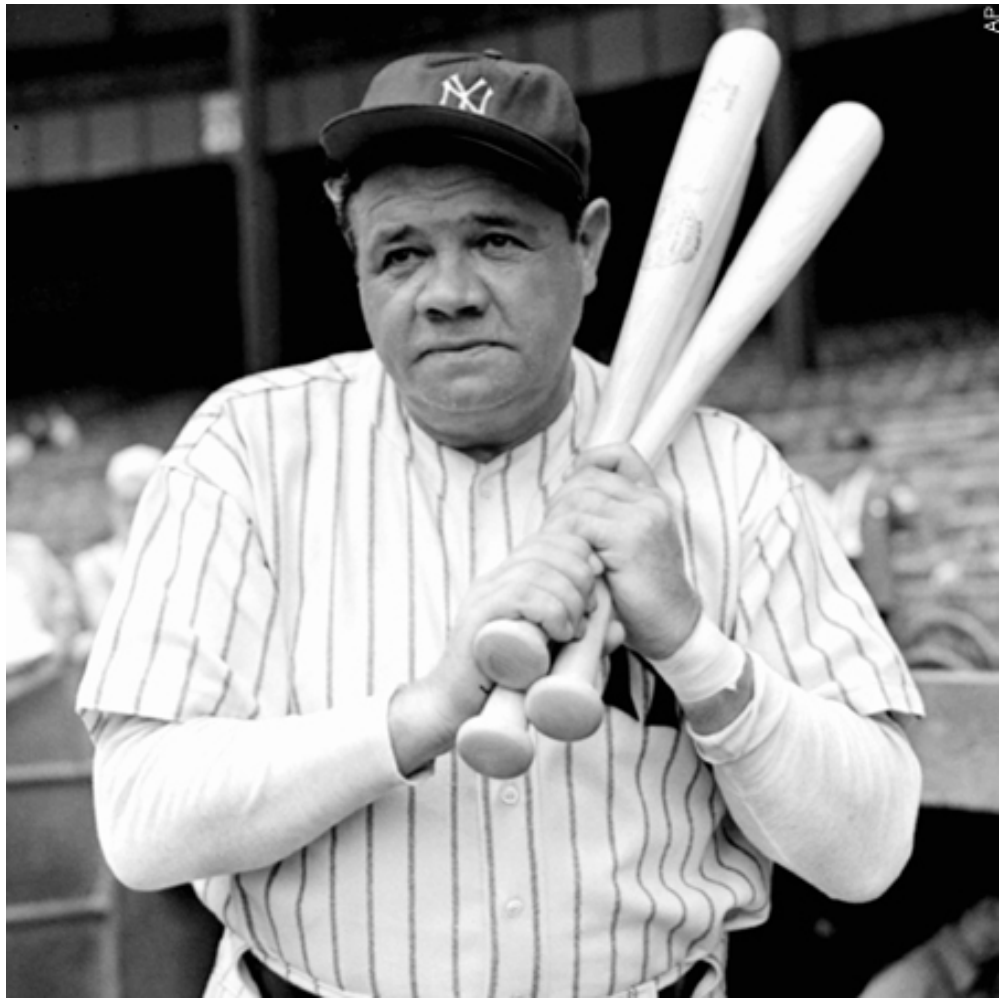
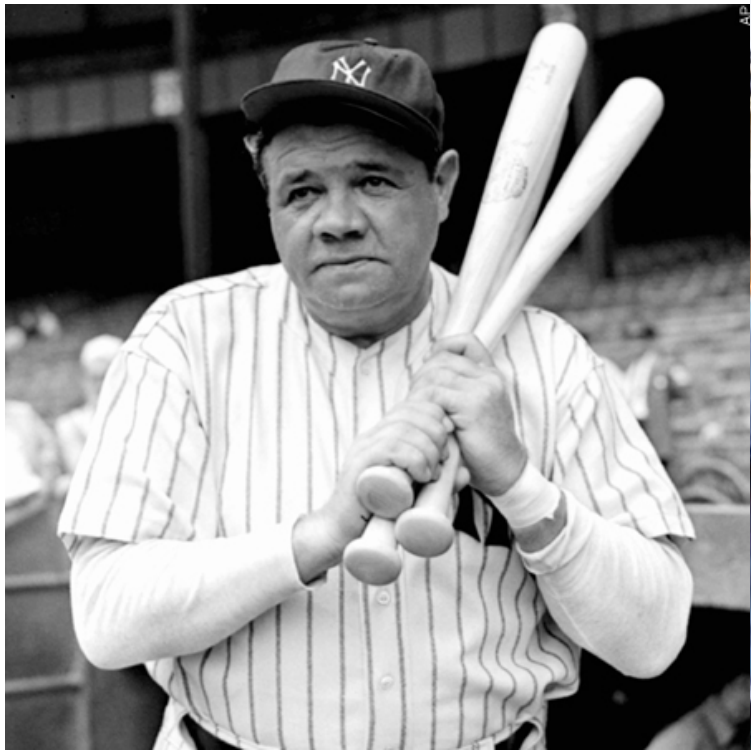
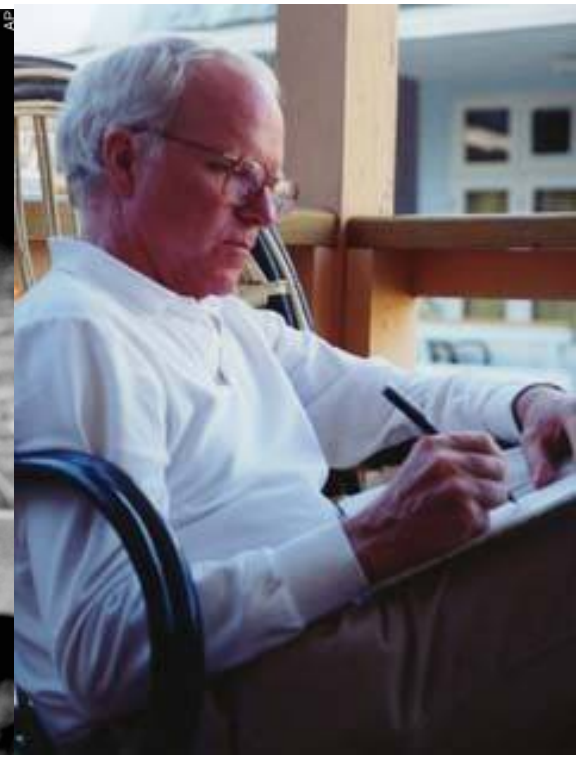

1939 PENNANT
"TWINKLETOES" SELKIRK







Motivation

Three observations:

1. Baseline DMP model cannot account for cyclicality of unemployment
2. Productivity shocks not important in past several recessions
3. Discount factor variation main source of stock price variation

This paper:

- Discount factor variation as source of unemployment fluctuations
- Key insight: with adjustment costs, input demands depend on discounted earnings streams

Baseline DMP Model

- Job value

$$J_t = (1-s)\mathbb{E}_t\left\{\Lambda_{t,t+1}\left[(x_{t+1}-w_{t+1})+J_{t+1}\right]\right\}$$

- FONC: recruitment cost = job value

$$cT_t = J_t$$

- Expected time to fill vacancy T_t :

$$T_t = \frac{V_t}{H_t}$$

- $J\uparrow \implies V_t$ (recruitment effort) $\uparrow \implies H_t$ (hiring) $\uparrow$
- Parallel to Q investment theory (see also Merz/Yashiv and Kuehn et. al)

Employment variation in DMP

- Variation in job value

$$J_t = \mathbb{E}_t \sum_{i=1} (1-s)^i \Lambda_{t,t+i}(x_{t+i} - w_{t+i})$$

  $1 - s \equiv$ job survival prob.

- Shimer (2005): with Nash bargaining too little variation in $x_t - w_t$.

- Shimer/Hall (2005): sticky wages can generate sufficient variation, given variation in x_t.

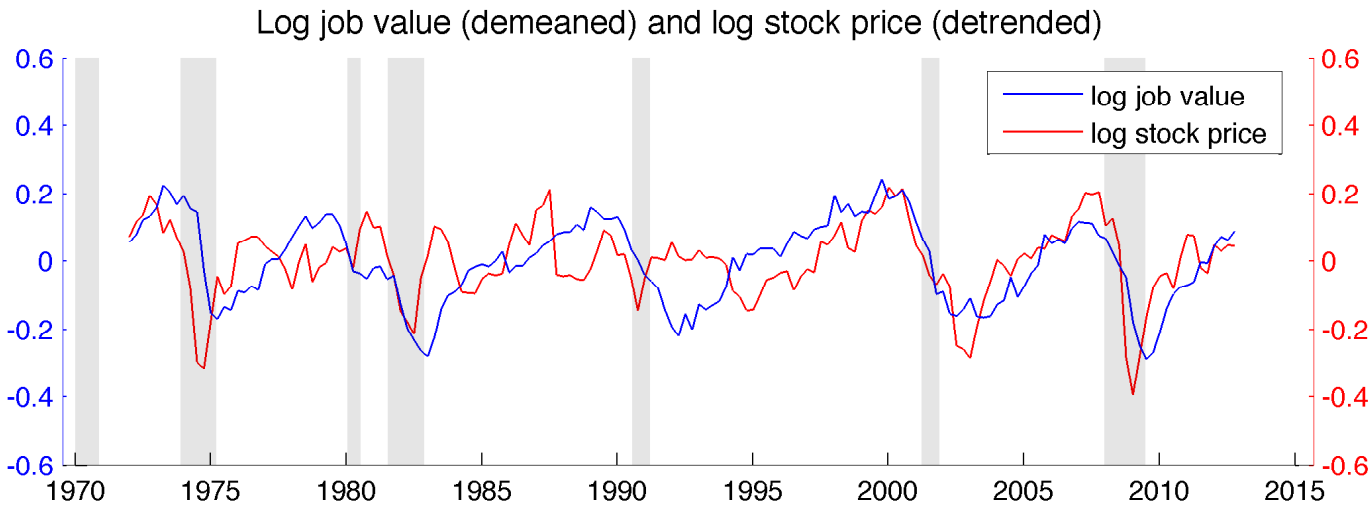
- Hall (2013): absent volatility in x_t, volatility in $\Lambda_{t,t+i}$ a candidate

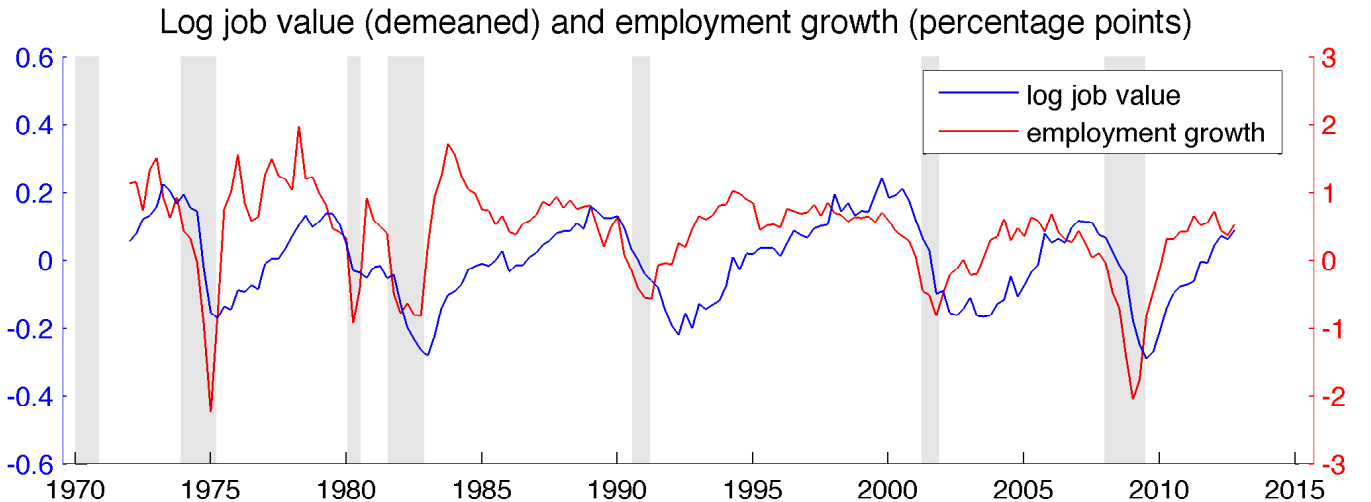
Discount factor variation and job value

- Co-movement between stock market and job value suggestive of mechanism!
- Job value identified off FONC:
  - Proportional adj. costs key:

$$cT_t = c\frac{V_t}{H_t} = J_t$$

  - vacancy/hiring ratio $\frac{V_t}{H_t}$ varies positively with J_t
  - employment growth varies positively with $\frac{V_t}{H_t}$
- Co-movement of stock market with J reflects co-movement with $\frac{V_t}{H_t}$ and emp. growth


Log job value (demeaned) and log stock price (detrended)
log job value
log stock price
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


Log job value (demeaned) and employment growth (percentage points)
log job value
employment growth
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
3
2
1
0
-1
-2
-3
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Discount factor volatility and job value: Identification

Steps:

1. Recover stochastic discount factors using stock price and earnings data
2. Confirm that SDF volatility accounts for much of stock price volatility
3. Use stochastic process for earnings and discount factor to construct a "synthetic" measure of job value J^*
4. Verify that J^* can explain the variation in J (i.e job value measured off the FONC $\equiv c\frac{V}{H}$)

Identification (con't)

1. Detrend stock price P and earnings y data
2. Divide P, y each into 3 equally likely states to construct 9 state transition matrix
3. Identify $\Lambda_{i.i'}$ off asset pricing relation

$$P_i = \sum_i \pi_{i,i'} \Lambda_{i.i'} \left(P_{i'} + y_{i'} \right)$$

4. Use $\Lambda_{i.i'}$ to identify synthetic job value J^*

$$J_i^* = (1 - s) \sum_i \pi_{i,i'} \Lambda_{i.i'} \left(J_{i'} + y_{i'} \right)$$

Identification (con't)

- Confirm that "asset value" measure explains variation of job value by regressing J_t on J_t^*

$$J_i = \alpha + \gamma J_i^* + \varepsilon_i$$

with $J_t = c\frac{V_t}{H_t}$

  - 9 observations
  - $\widehat{\alpha} = 661$; $\widehat{\gamma} = 1305$
  - $R^2 = 0.63$

- Conclusion: J_i^* accounts for much of variation in $J_t \Longrightarrow$
  - Since discount factor explains most of variation in J_t^*,it explains much of the variation in J_t.

Takeaway

- Highly plausible theory and suggestive empirical work
- Main issue: only nine observations
  - Difficult to evaluate model fit
  - Some anomolous estimates - e.g. average annual discount rate of twenty plus percent
  - Simple historical accounting difficult with coarse states

Complementary exercise: Loglinear decomposition of J

- Suppose worker surplus proportionate to profits, i.e., $x - w = \gamma y$
- FONC:

$$\begin{aligned} c\frac{V_t}{H_t} &= J_t \\ &= \mathbb{E}_t \sum_{i=1} (1-s)^i \Lambda_{t,t+i}(\gamma y_{t+i}) \end{aligned}$$

- Loglinearize to decompose variation in J_t between profit and discount factor variation
  - Analagous to loglinear decomposition of stock prices (e.g. Campbell)

Loglinear decomposition of J

- Loglinear equation for J_t:

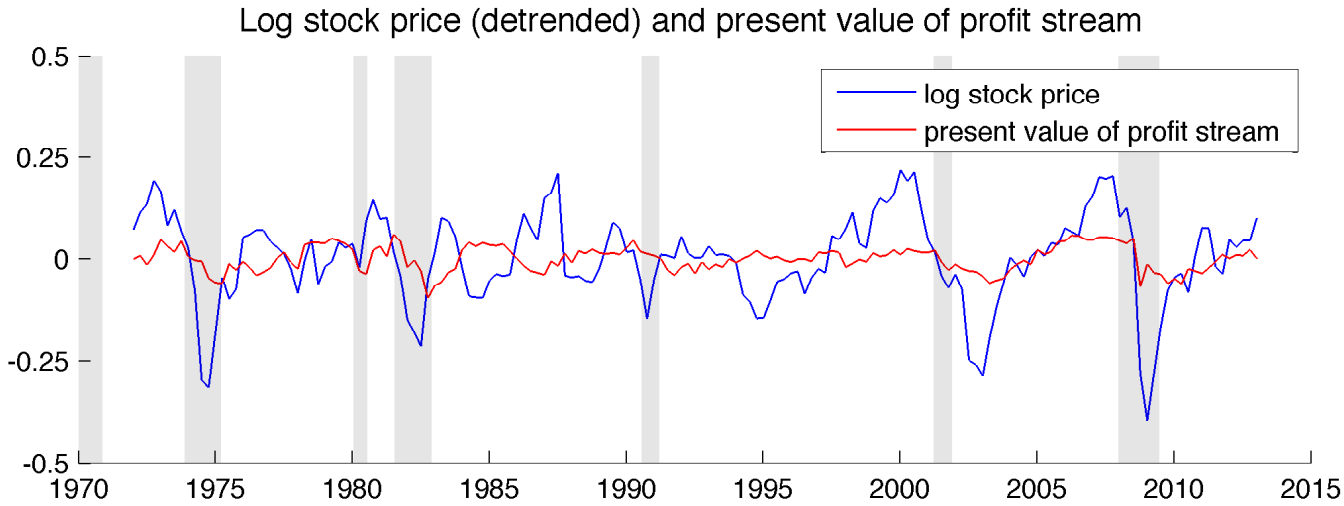
$$\widehat{J}_t = \mathbb{E}_t \sum_{\tau=0}^{\infty} \lambda^\tau \hat{\Lambda}_{t+\tau,t+\tau+1} + (1-\lambda)\mathbb{E}_t \sum_{\tau=0}^{\infty} \lambda^\tau \hat{y}_{t+\tau+1}$$

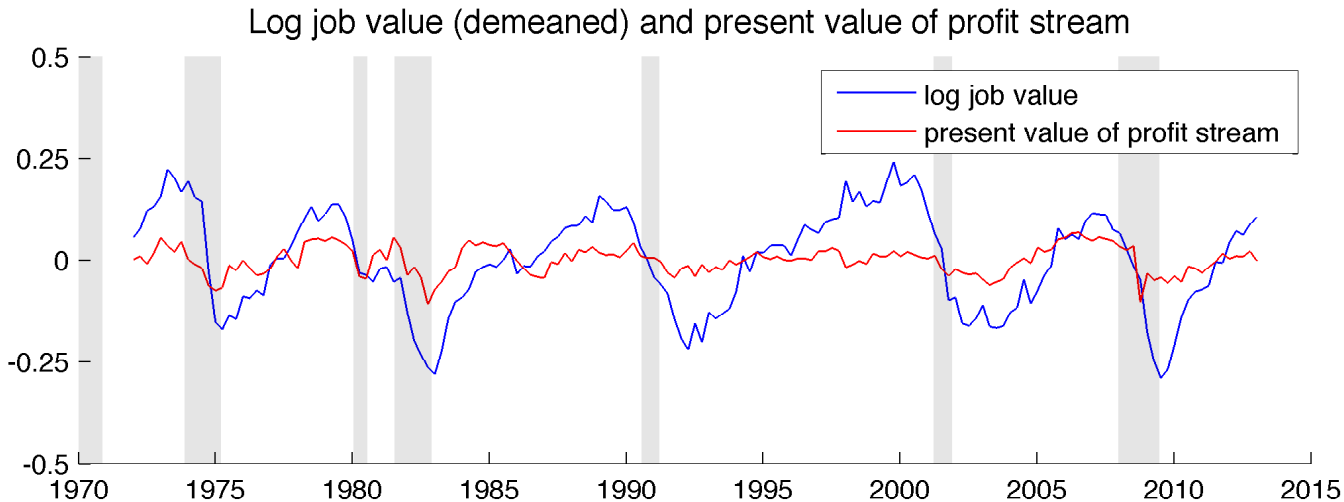
  where $\lambda = (1-s)\Lambda$

- Identifying discount factor stream

$$\mathbb{E}_t \sum_{\tau=0}^{\infty} \lambda^\tau \hat{\Lambda}_{t+\tau,t+\tau+1} = \hat{J}_t - (1-\lambda)\mathbb{E}_t \sum_{\tau=0}^{\infty} \lambda^\tau \hat{y}_{t+\tau+1}$$

  - set $\hat{J}_t = \widehat{V}_t - \widehat{H}_t$
  - use forecasting model for $\hat{y}_t$ to compute PV of profits


Log stock price (detrended) and present value of profit stream
log stock price
present value of profit stream
0.5
0.25
0
-0.25
-0.5
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


Log job value (demeaned) and present value of profit stream
log job value
present value of profit stream
0.5
0.25
0
-0.25
-0.5
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Discount factor streams: stock prices $\widehat{P}_t$ vs. job value $\hat{J}_t$

- variation in $\widehat{P}_t$ due to discount factor:

$$\mathbb{E}_t \sum_{\tau=0}^{\infty} \Lambda^\tau \hat{\Lambda}_{t+\tau,t+\tau+1}$$

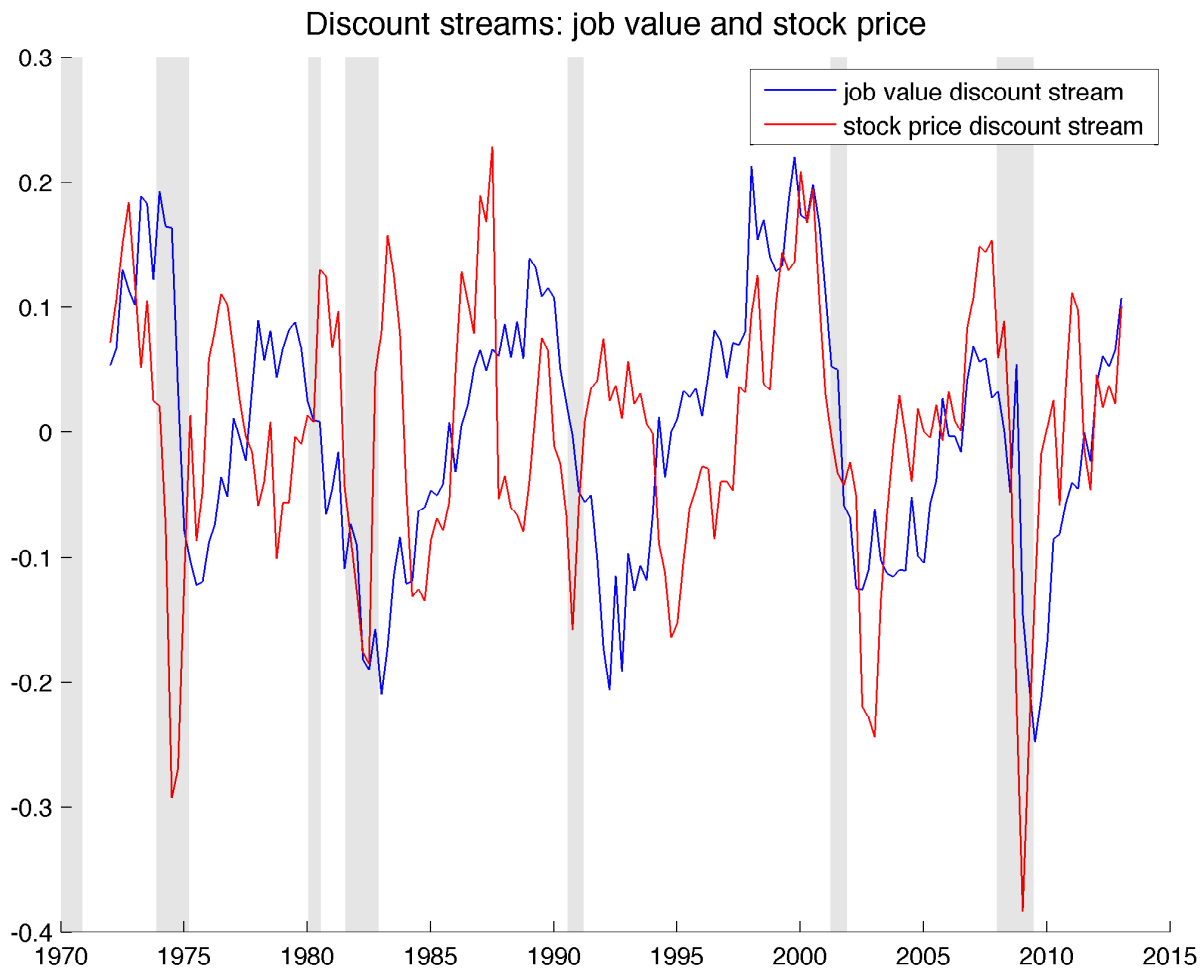
  $\Lambda \equiv$ steady state SDF

- variation in $\hat{J}_t$ due to discount factor:

$$\mathbb{E}_t \sum_{\tau=0}^{\infty} \lambda^\tau \hat{\Lambda}_{t+\tau,t+\tau+1}$$

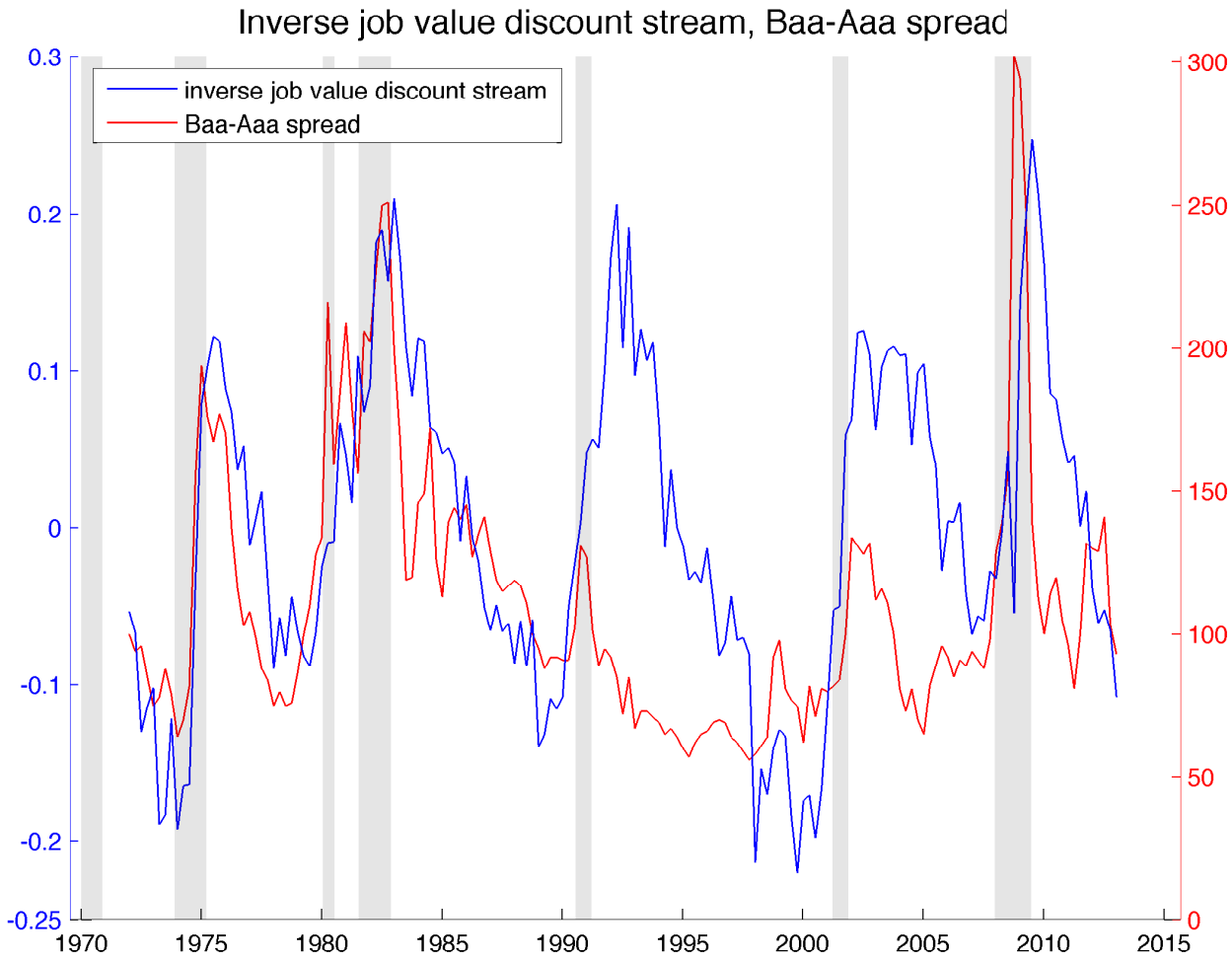
  $\lambda \equiv (1-s)\Lambda \approx 0.9 \cdot \Lambda$

- Two streams should be closely correlated


Discount streams: job value and stock price
job value discount stream
stock price discount stream
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Sources of discount factor variation

- Evidence of countercycical movement in excess equity returns and credit spreads
  - Consequences for cyclical spending decisions
- Finance economists have been hard at work on these facts
  - See Cochrane (2011) for a survey
    - Taxonomy: without vs. with frictions
  - Macroeconomists need to join the hunt (in greater numbers)
- Suggestion in this paper: financial crises source of major discount rate increases
  - Implies co-movement between discount rates and credit spreads


Inverse job value discount stream, Baa-Aaa spread
inverse job value discount stream
Baa-Aaa spread
0.3
0.2
0.1
0
-0.1
-0.2
-0.25
300
250
200
150
100
50
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Some Final Remarks

- This paper: cyclical movement in discount rates is likely an important source of employment (as well as investment) fluctuations.
  - Theory compelling
  - Empirical work creative and suggestive
- More work needed on:
  - Identification of discount factor variation
  - Theory of discount factor variation
- Look forward to hearing Bob's next edition at future EFG meeting!