The Great Moderation in the Japanese Economy

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December 19, 2010

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Great Moderation and Japanese Economy

- Great Moderation (GM):
  Stable Process of GDP volatility

- Why Now?
  - no discussion on Jap. economy.
  - very useful tool to analyze economic fluctuations.

Big Picture

- Introduction (3 minutes)
- Rolling Standard Deviation (SD) (5 minutes)
- Time Varying Parameter VAR (5 minutes)
- Results and Discussion (5 minutes)
- Conclusion (1 minute)

Introduction

Former Literature on Structural Changes

1. Higo et al. (2005)
   - output and inflation
   - relationship btw Phillips curve
2. Kimura and Shiotani (2010)
   - output and inventory
3. Watanabe (2009)
   - CI
   - MS model with structural changes

Our Goals to find, Method

- This paper
  1. output , labor productivity , and labor input
  2. Changing Dynamics in the labor market
  3. Contribution of technology and non-technology shocks
  4. Connections to GM
- Methods
  1. Rolling SD and Correlations
  2. Time-varying coefficient VAR
     - $\boldsymbol{x}_t = \boldsymbol{\mu}_t + \boldsymbol{\beta}_t \boldsymbol{x}_{t-1} + \boldsymbol{u}_t,\ \boldsymbol{u}_t \sim N(0, \Sigma_t)$

Basic Results

1. 5 Phases in the postwar economy
2. GM starts from mid-1970s in Japan:
   but two other upheavals:
   - the bubble periods
   - the recent financial boom and crisis
3. Contribution: output T shock
   while labor input NT shocks.
4. Possible changes in the labor mkt structure
   but No Contribution Changes to Output Variations

Japanese Economy

- Data
- Rolling SD
- Rolling Correlation

Data

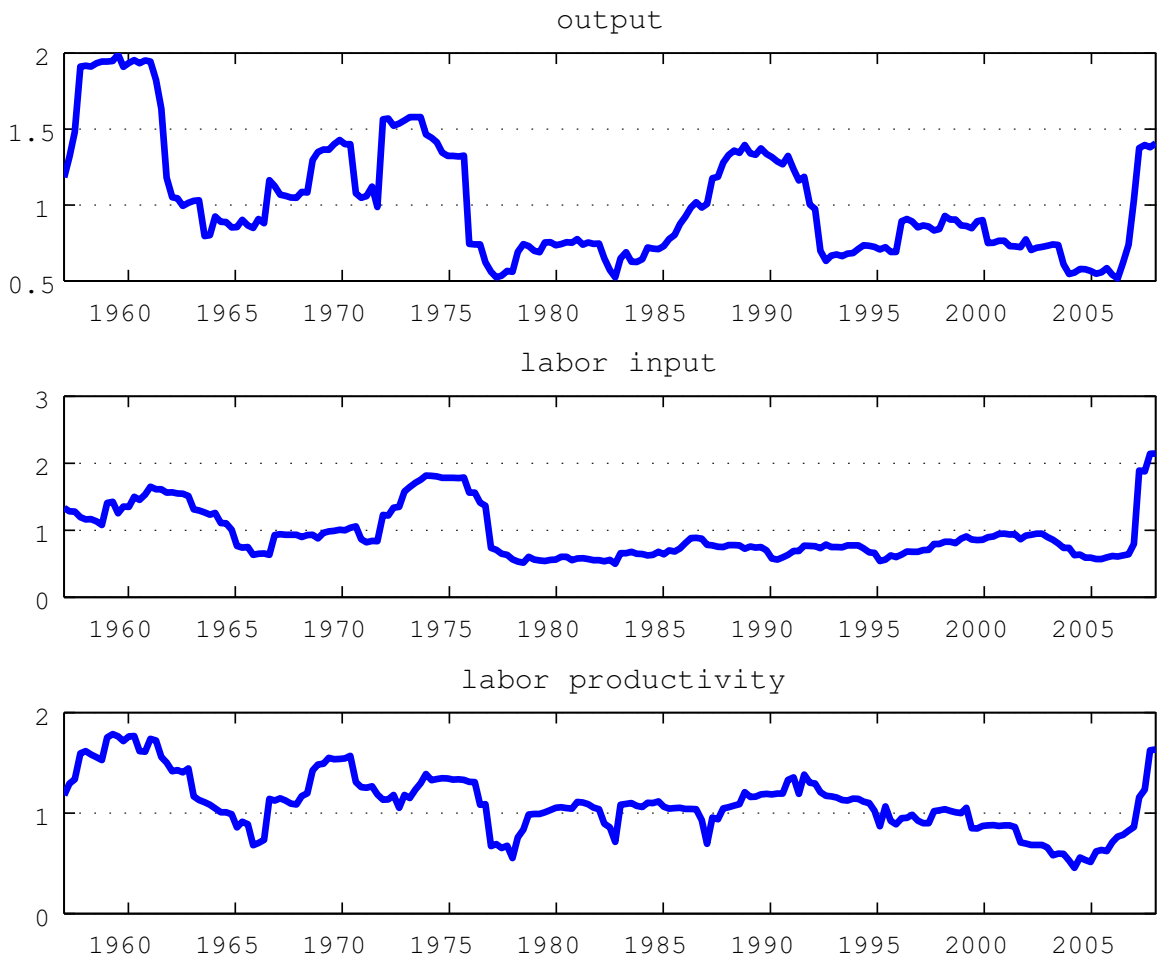
Table: Benchmark Data

Data	Sources
output (Y_t)	68SNA and 93SNA
working population over 15 (N_t)	Japanese Census Population
employment (E_t)	Labor Force Survey
working hours (H_t)	Monthly Labor Survey

Notes: sample periods are from 55q2 to 09q4.

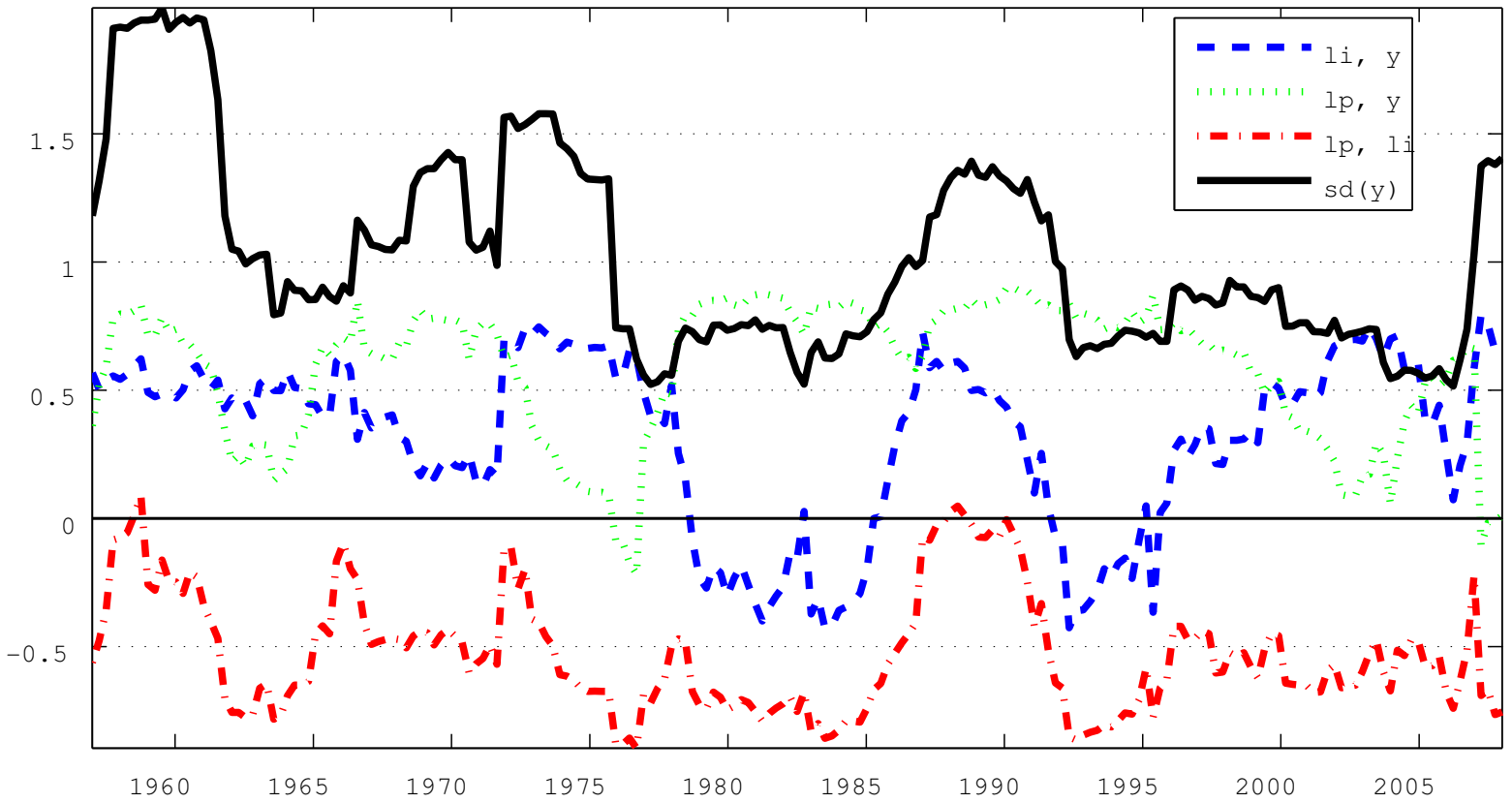
- Output : $y_t = \ln \frac{Y_t}{N_t}$
- Labor input : $li_t = \ln \frac{E_t H_t}{N_t}$
- Labor productivity : $lp_t = y_t - li_t$

Rolling SD



- 5 phases in the postwar economy.

Rolling Correlations



- Negative sign btw labor input and productivity

Framework of the analysis

- TVP VAR
- Identification

Time-Varying Parameter VAR

- TVP VAR with $x_t \equiv [\Delta lp_t, li_t]$

$$x_t = \beta_{0,t} + \beta_{1,t} x_{t-1} + \beta_{2,t} x_{t-2} + \cdots + \beta_{p,t} x_{t-p} + u_t. \quad (1)$$

  - $\beta_{0,t}$: a vector of time-varying intercepts,
  - $\beta_{i,t}$ $(i = 1, \cdots, p)$: matrices of time-varying coeffients.
  - u_t: reduced form error terms ($u_t \sim N(0, \Sigma_t)$).

- $\theta_t = vec(\beta_{0,t}, \cdots, \beta_{p,t})$ evolves

$$\theta_t = \theta_{t-1} + \omega_t, \quad (2)$$

where $\omega_t \sim N(0, \Omega)$

Assumptions

- $\Sigma_t \equiv A_t^{-1} H_t A_t'^{-1}$ where

$$H_t \equiv \begin{bmatrix} h_{1,t} & 0 \\ 0 & h_{2,t} \end{bmatrix} \quad A_t \equiv \begin{bmatrix} 1 & 0 \\ \alpha_t & 1 \end{bmatrix}. \tag{3}$$

- $h_t = vec(H_t)$ and α.

$$\log h_t = \log h_{t-1} + \xi_t, \tag{4}$$

$$\alpha_t = \alpha_{t-1} + \zeta_t, \tag{5}$$

where $\xi_t \sim N(0, \Xi)$ and $\zeta_t \sim N(0, \Psi)$.

Identification

- T shocks and NT shocks
- T shocks can influence productivity in the long run.
- Identification with Long run restrictions:

$$u_t = K_t \varepsilon_t$$

$$C_t(L) = B_t(L) K_t$$

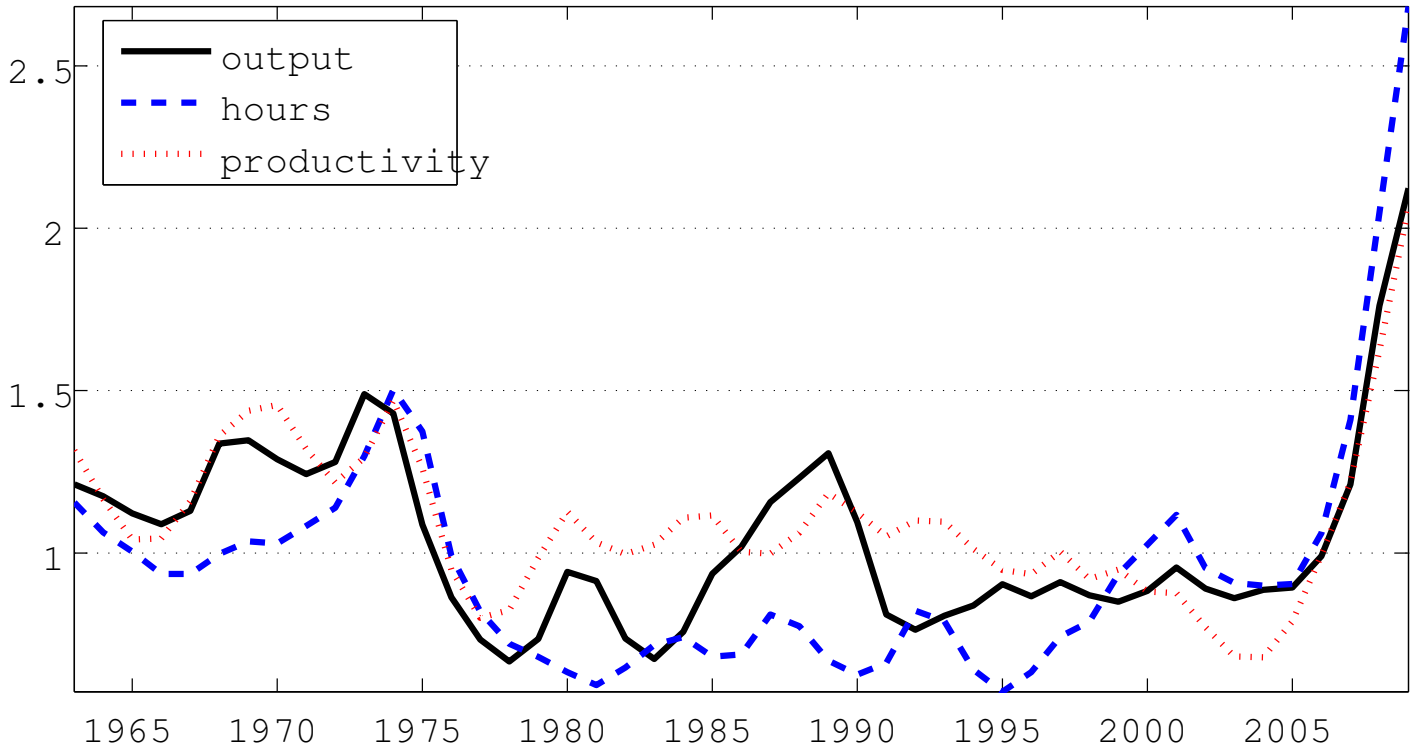
$$C_t(1) C_t(1)' = B_t(1) \Sigma_t B_t(1)' \quad (\because K_t K_t' = \Sigma_t)$$

$$C_{12t}(1) = 0. \tag{6}$$

Main Results

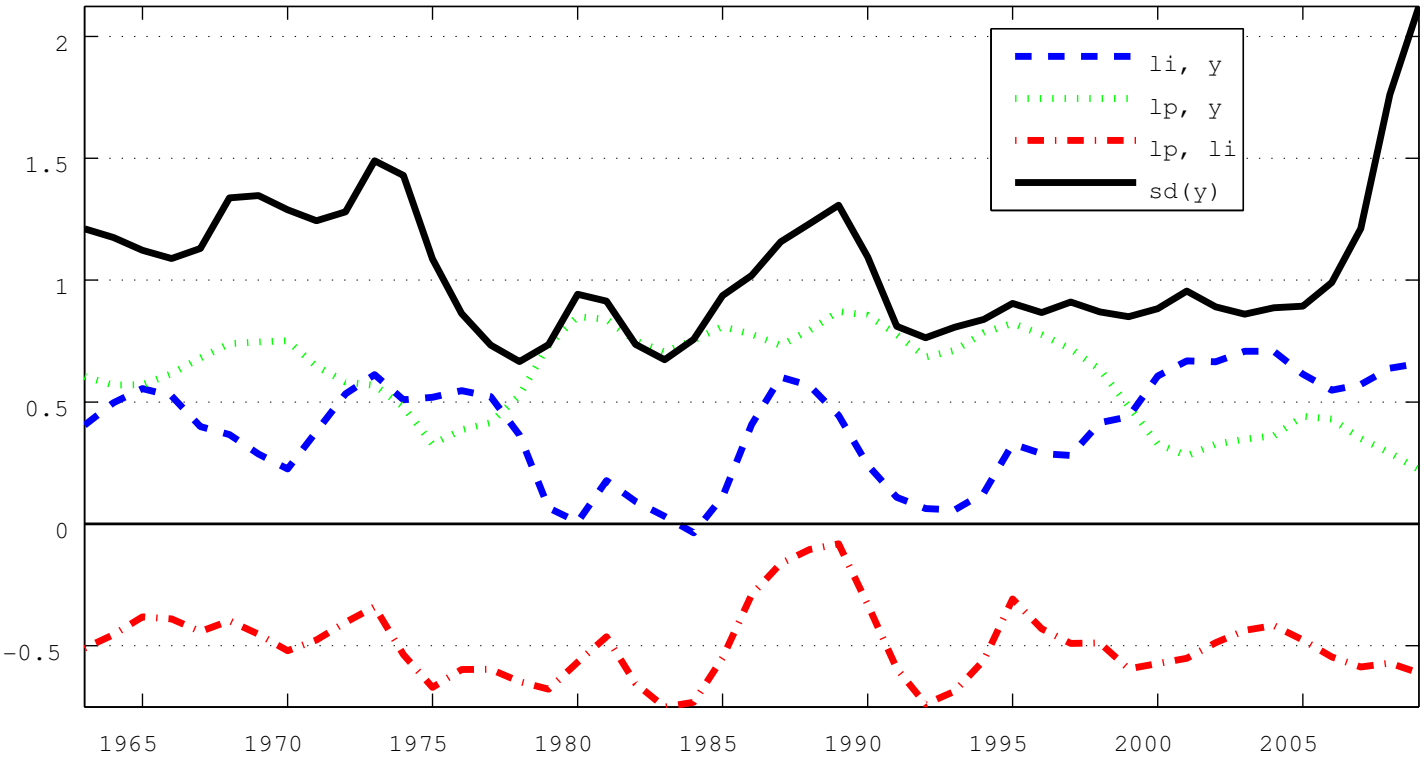
- Unconditional (Conditional) Second Moments
- IRF

Unconditional SDs



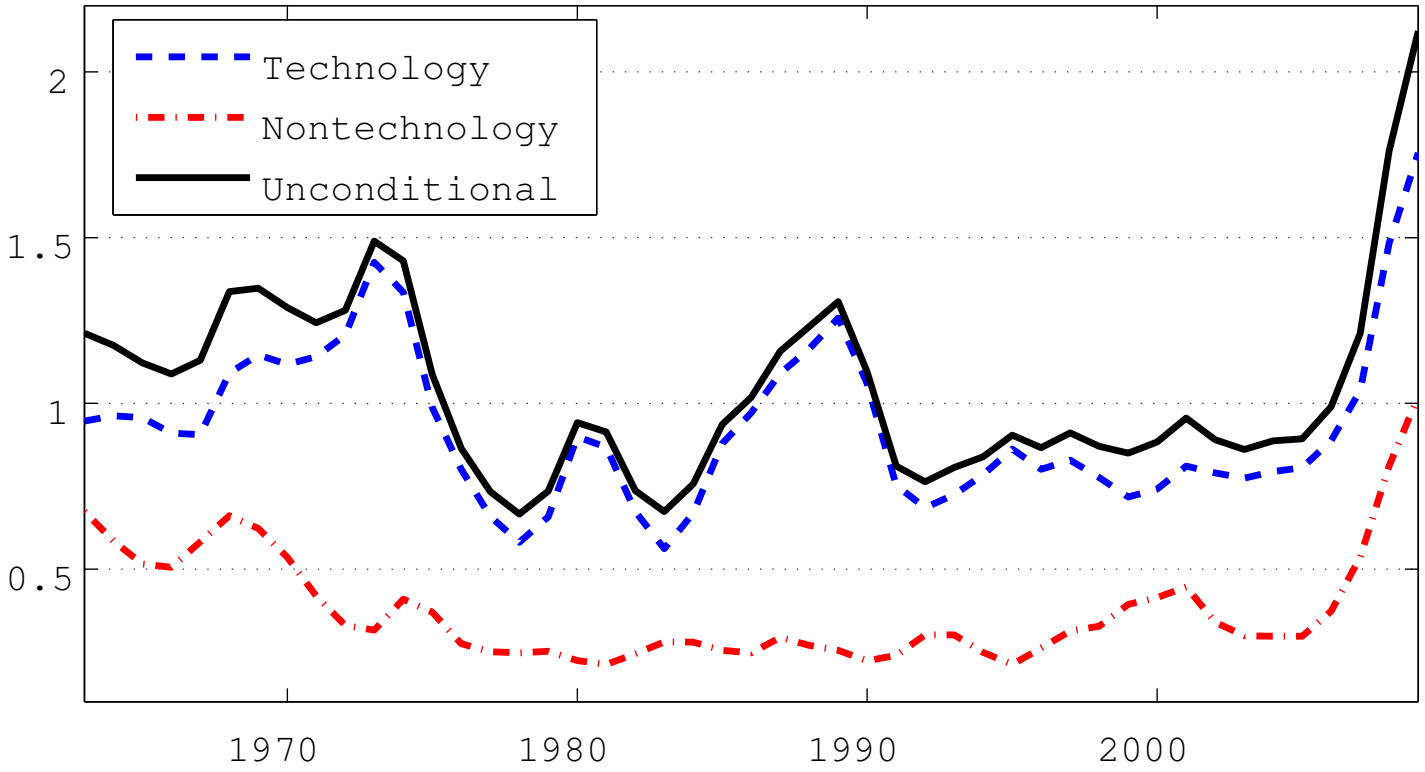
- 5 Phases
- Not persistent GM

Unconditional Correlations



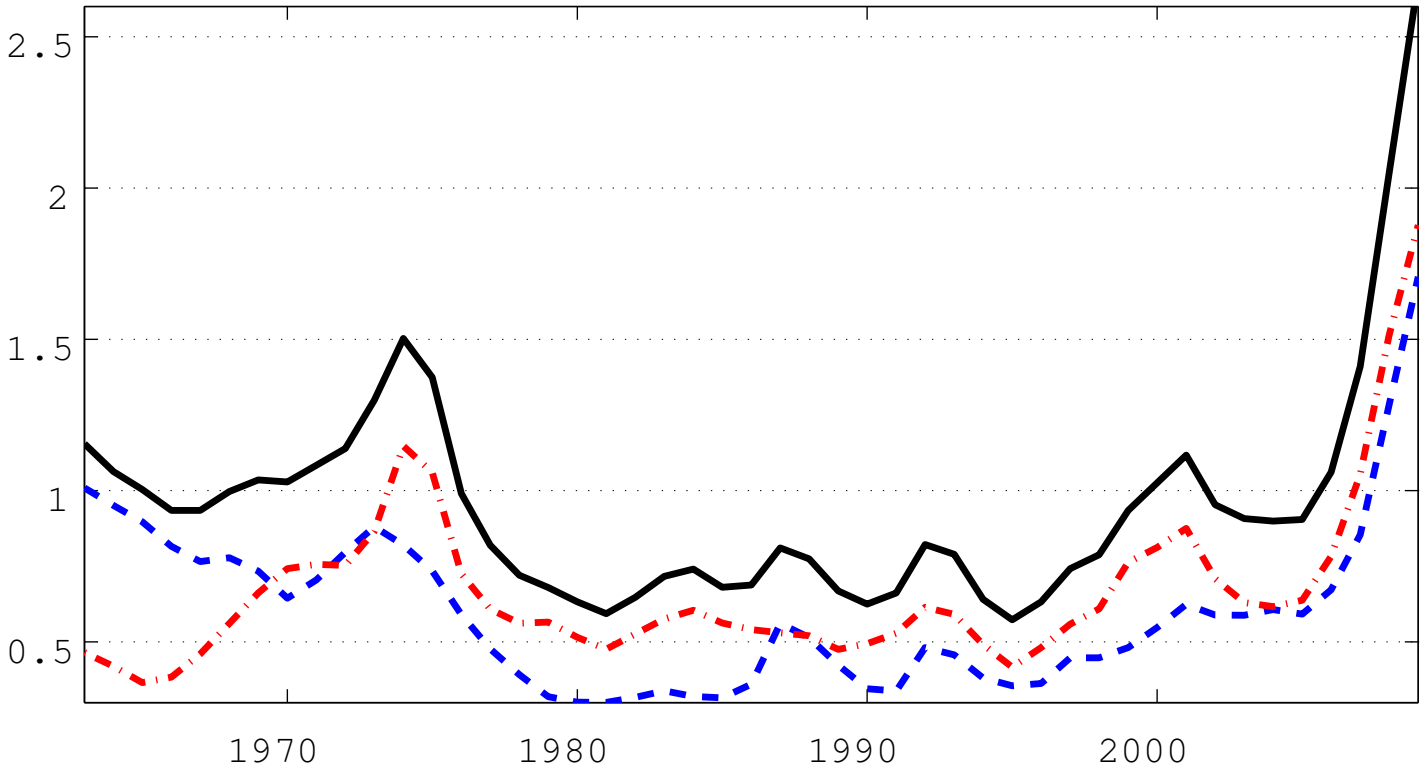
- Negative sign btw labor input and productivity

SD of Output



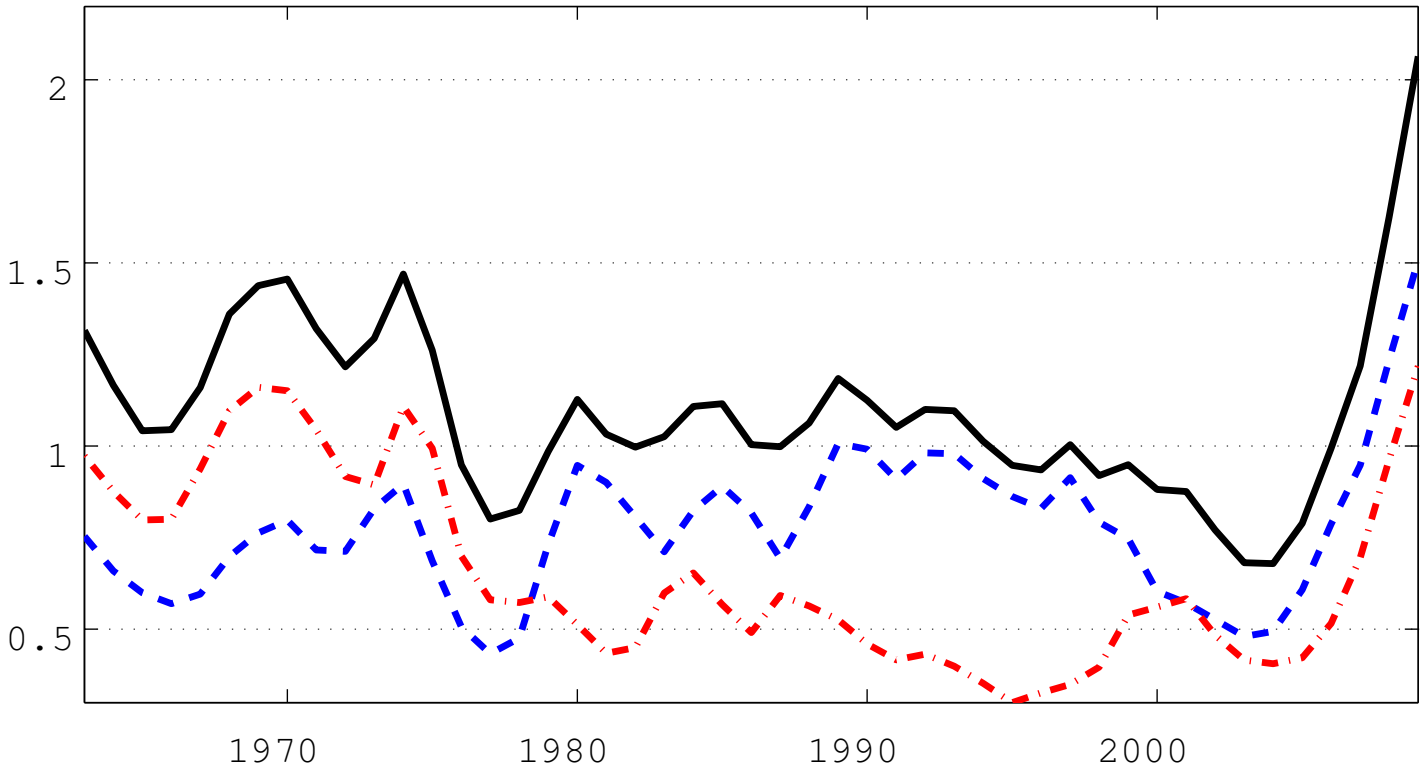
- T shocks contribute most in all sample periods.

SD of Labor Input



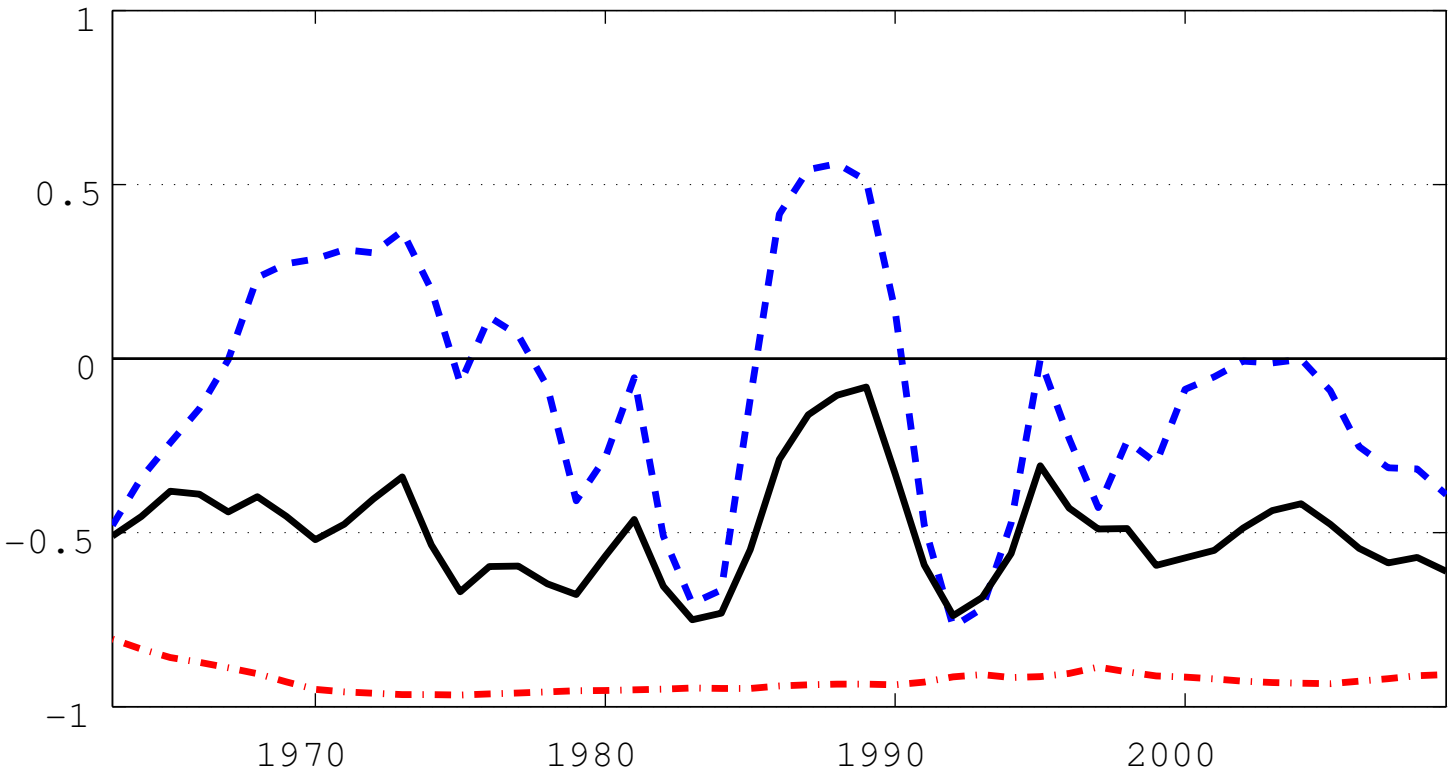
- NT shocks contribute most.

SD of Labor Productivity



- T shocks contribute most.

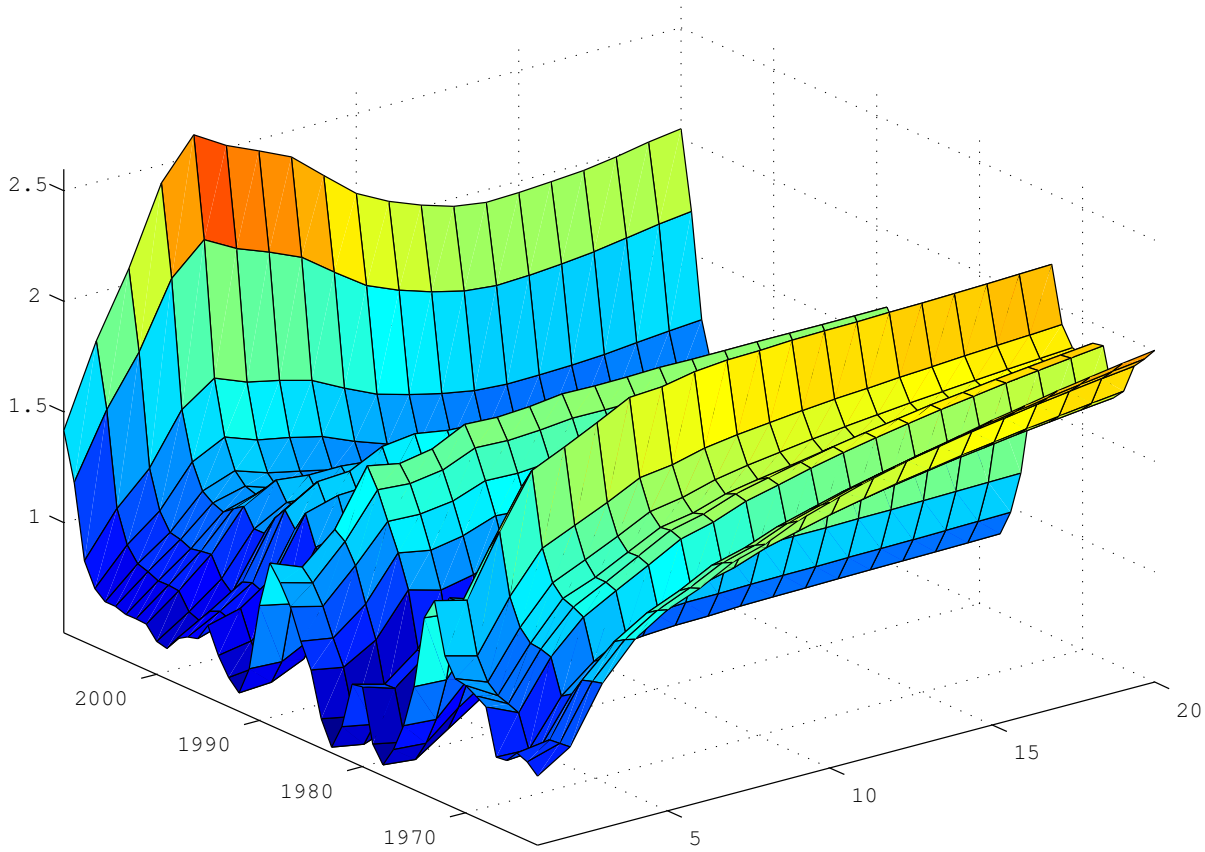
Conditional Correlations



- Minus-Unity correlation under NT shocks

Impulse Responses

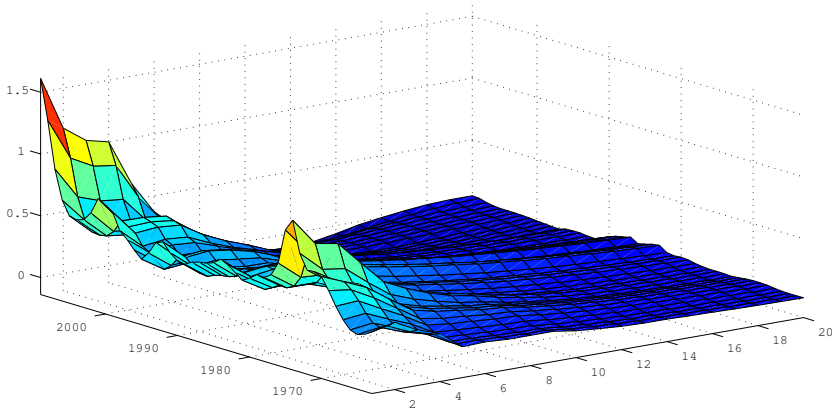
Output Response to T shocks

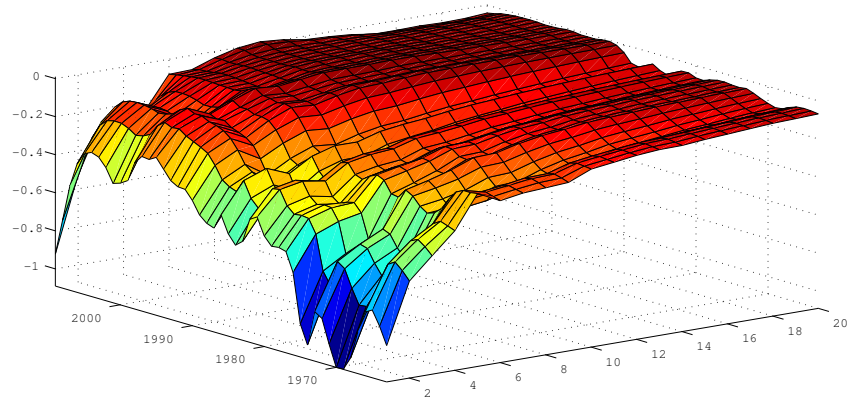


- Consistent with output volatility

Responses to NT shocks

Labor input and labor productivity

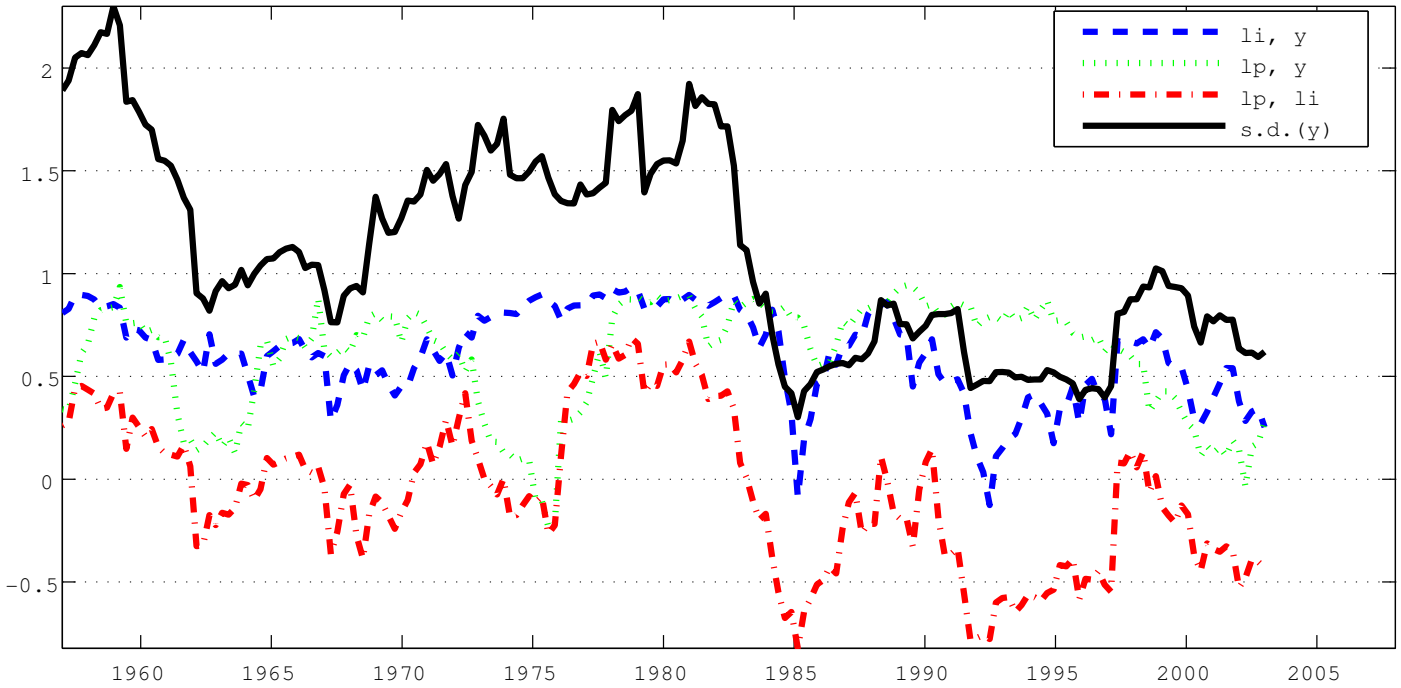




- Opposite responses of productivity
- ∴ mute response of output on NT shocks

Comparison

Fig: Rolling Correlations of the U.S.



- procyclical movement of productivity under NT shocks
- sign changes of correlation btw li and lp

Conclusion

Conclusion

- No Persistent GM
- Output: contributed by T shocks
- Labor Input: mainly by NT shocks
- No Contribution Changes of the labor mkt dynimics to GM
- Negative Correlation of li and lp