The flow approach to labor markets: an empirical motivation

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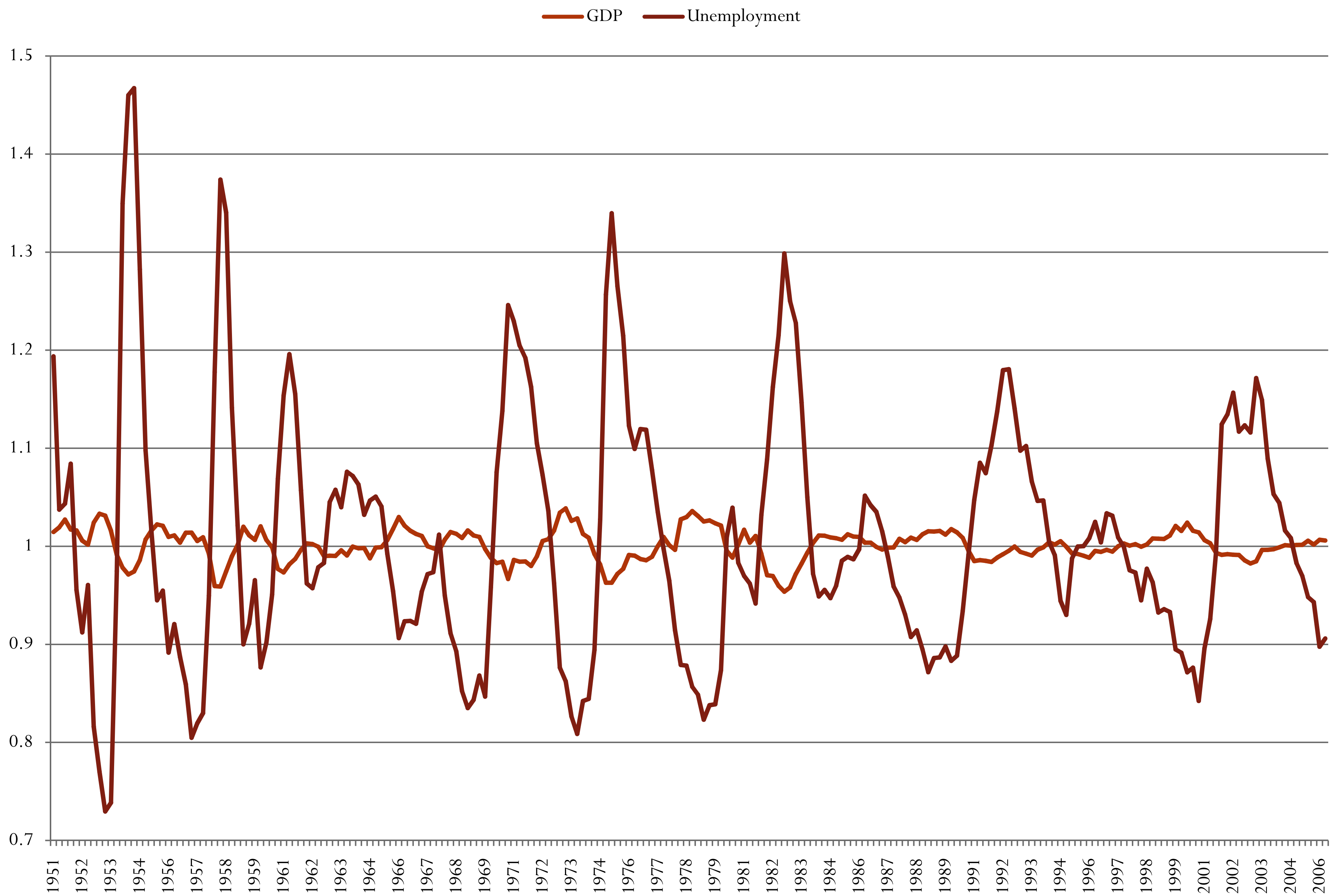
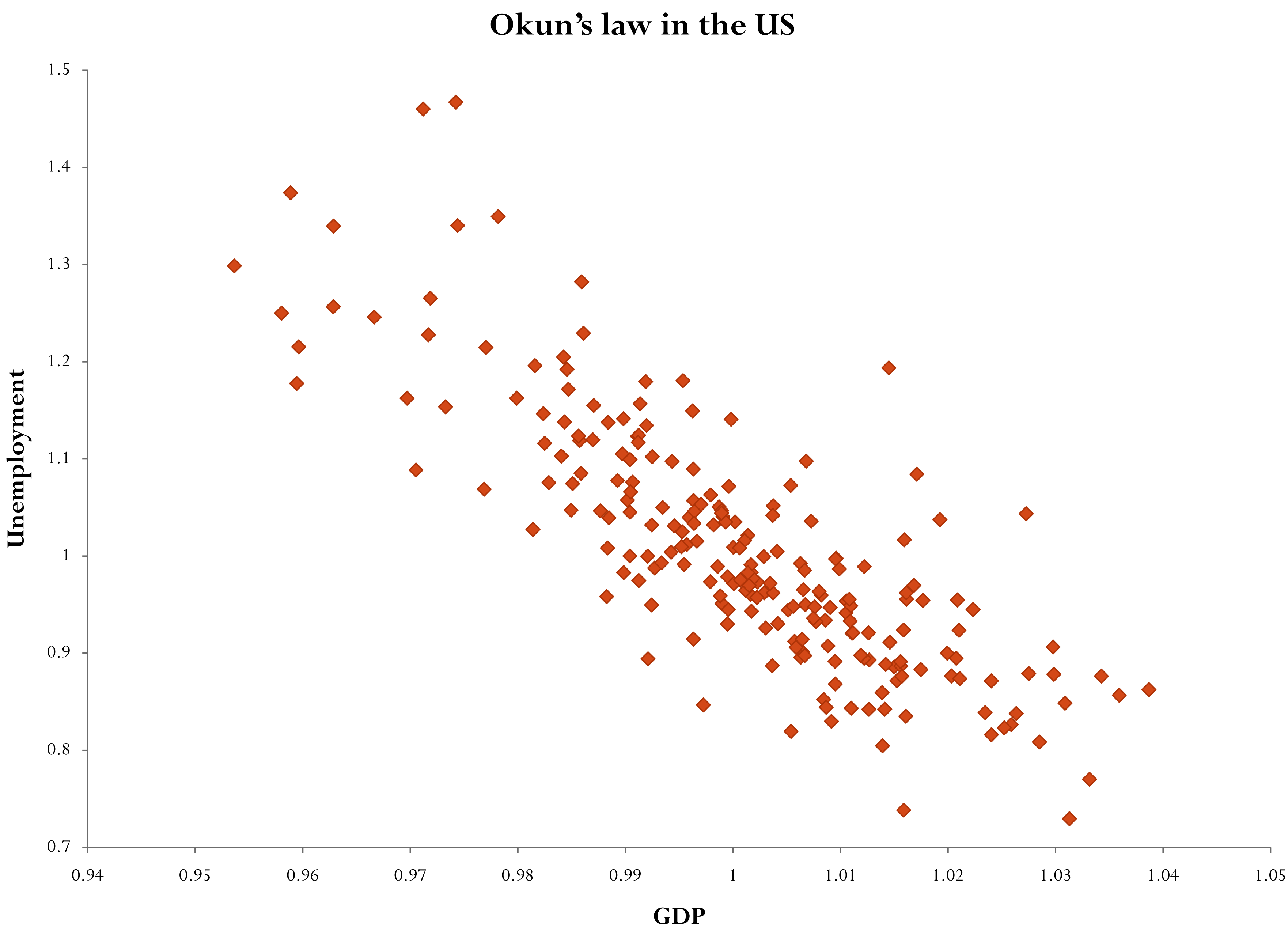
What the hell are we going to do?

Source: Bureau of Labor Statistics y NBER

Cyclical part of GDP and unemployment in the US

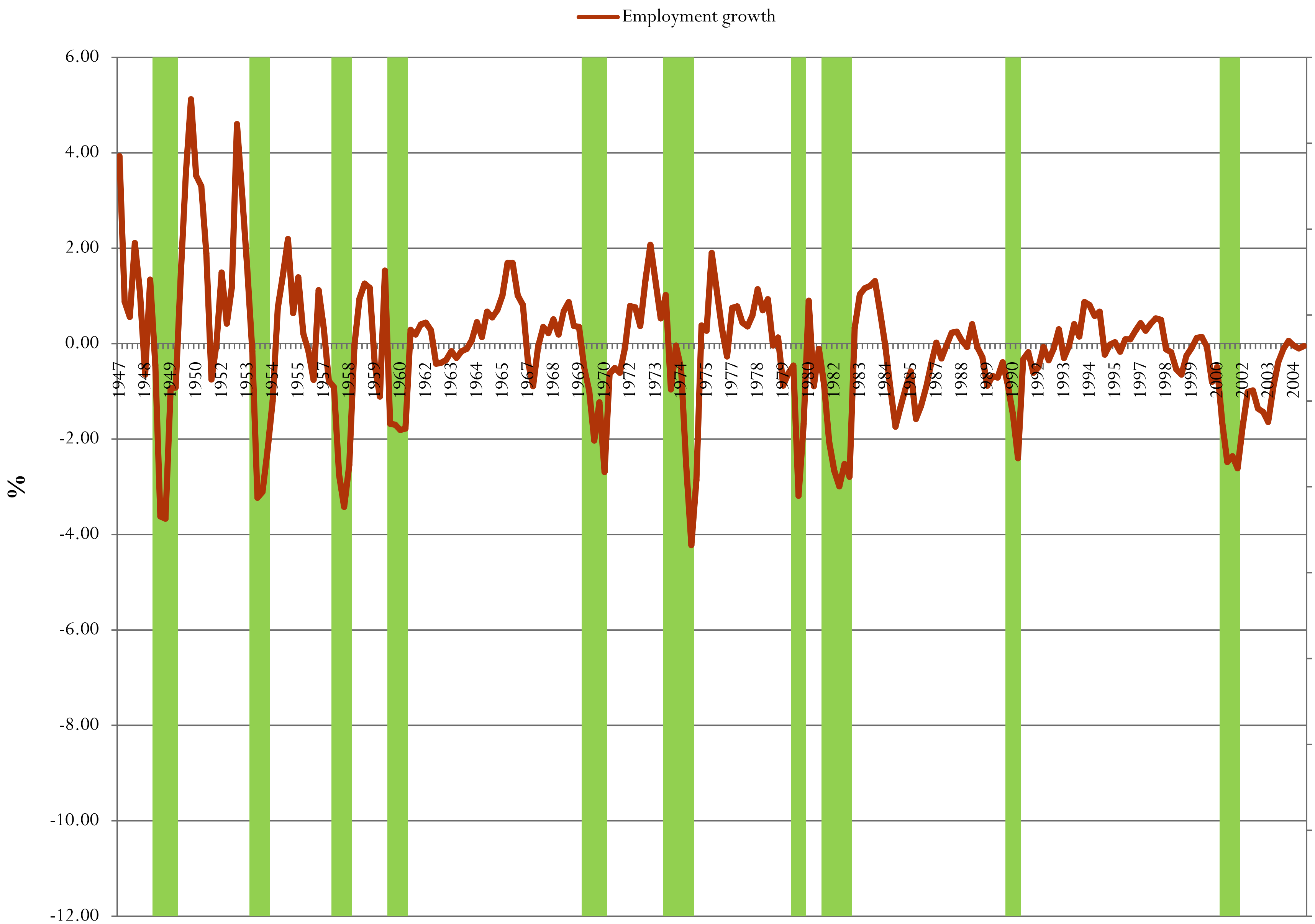


Source: BLS and BEA



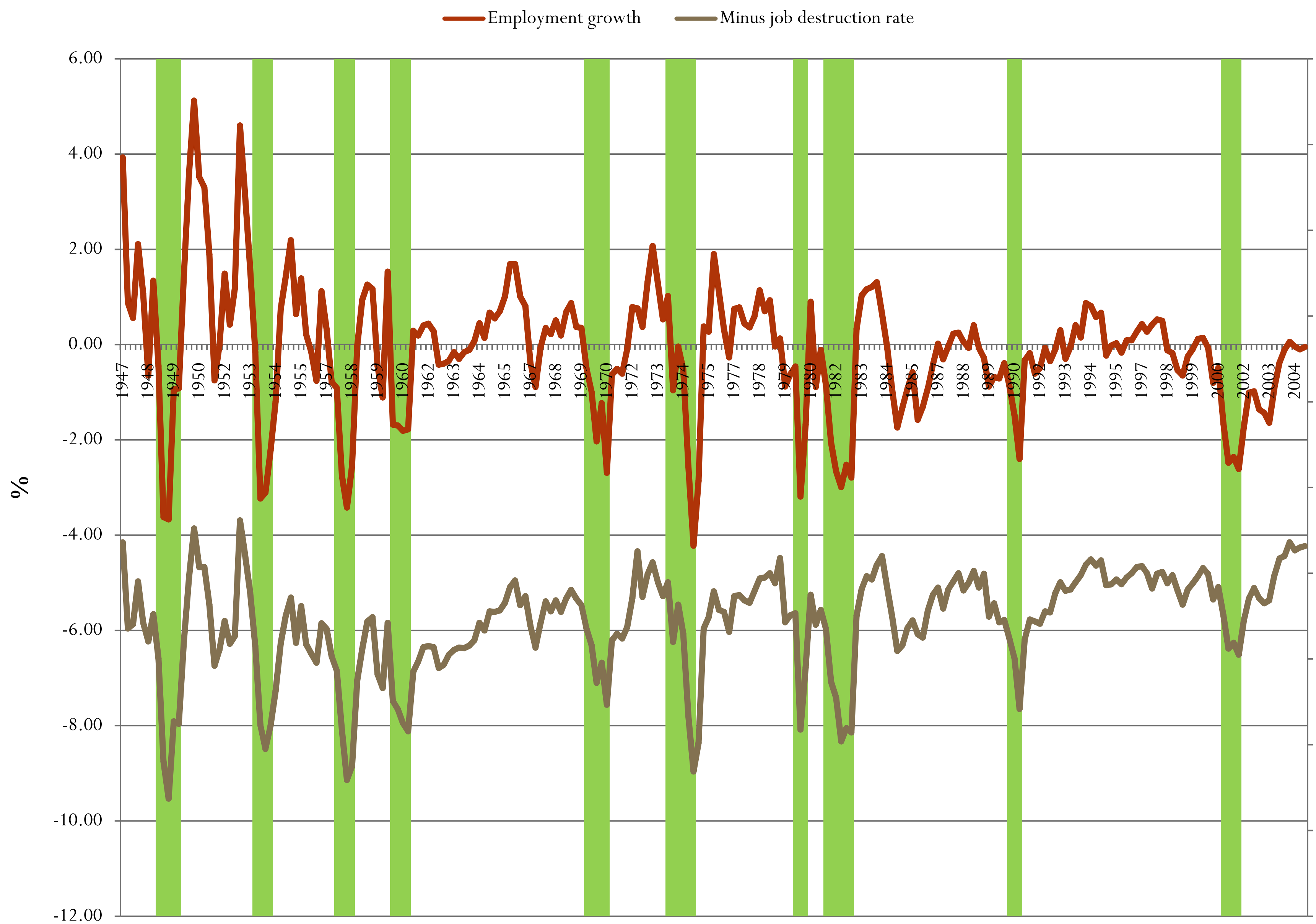
Source: BLS and BEA

Net employment growth in the US manufacturing sector



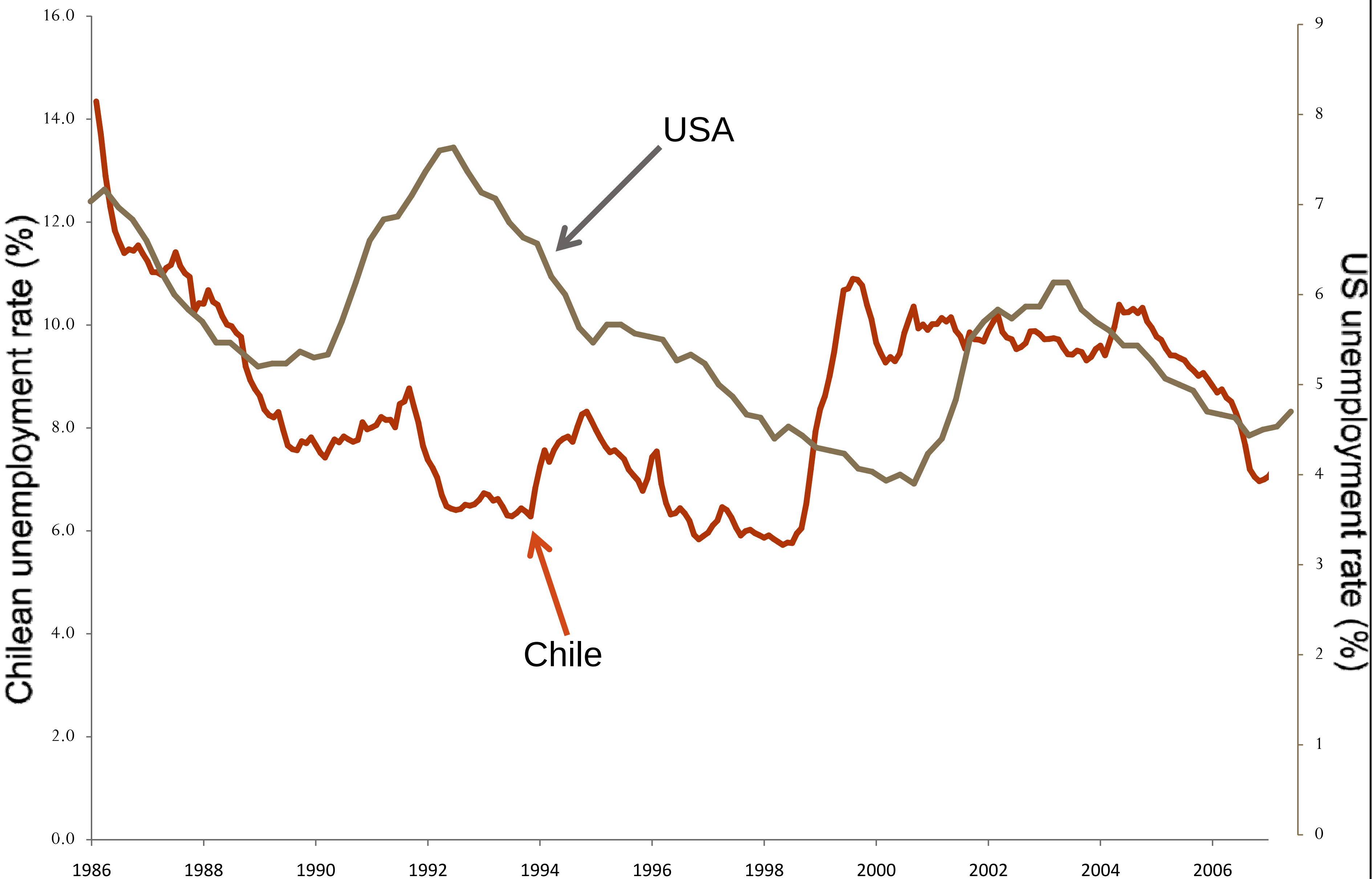
Source: Davis and Haltiwanger

Net employment growth and job destruction in the US manuf. sector



Source : Davis and Haltiwanger

Unemployment rate in Chile and the US



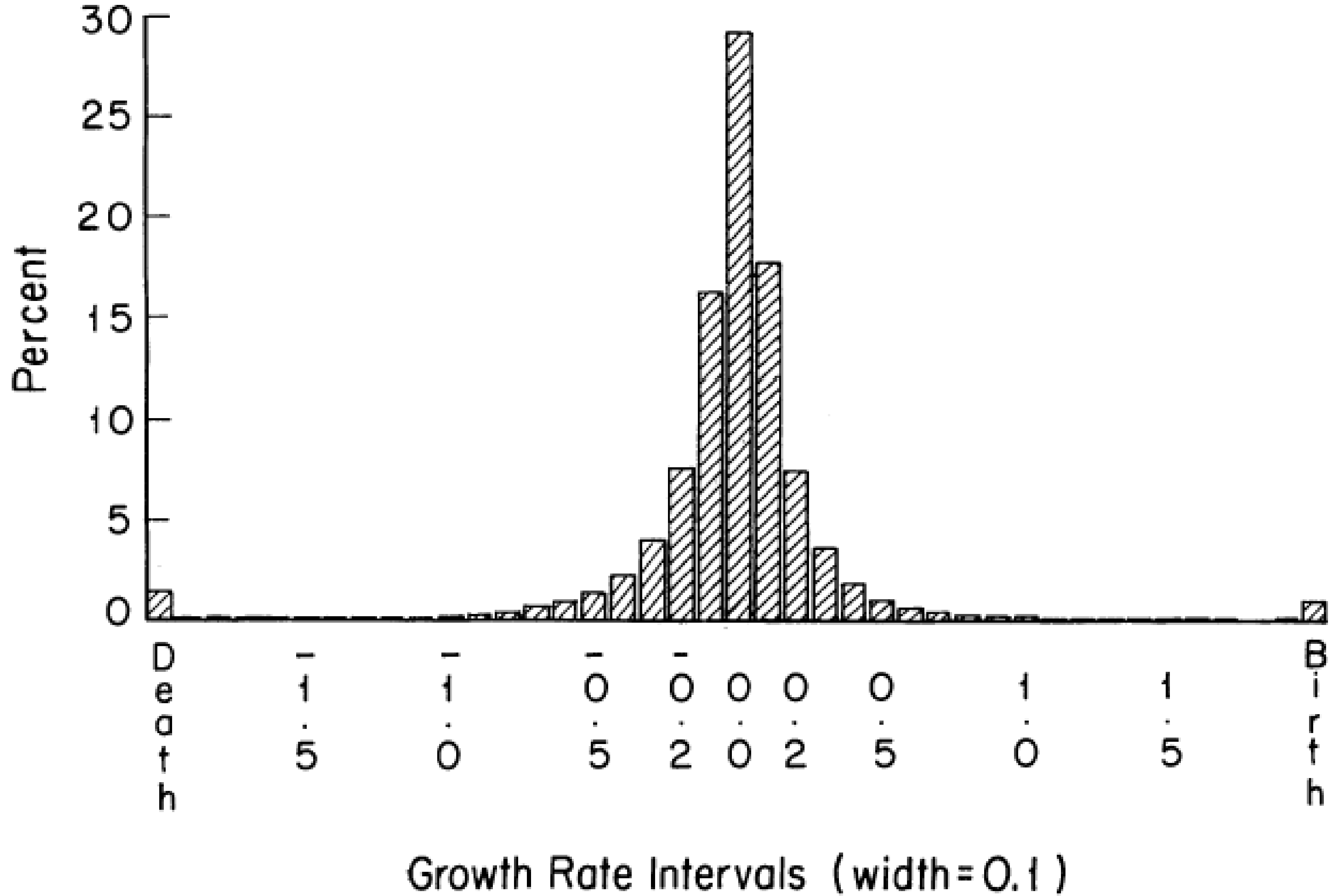
The importance of flows

The Davis and Haltiwanger study

- Job creation and destruction rates at establishment level:

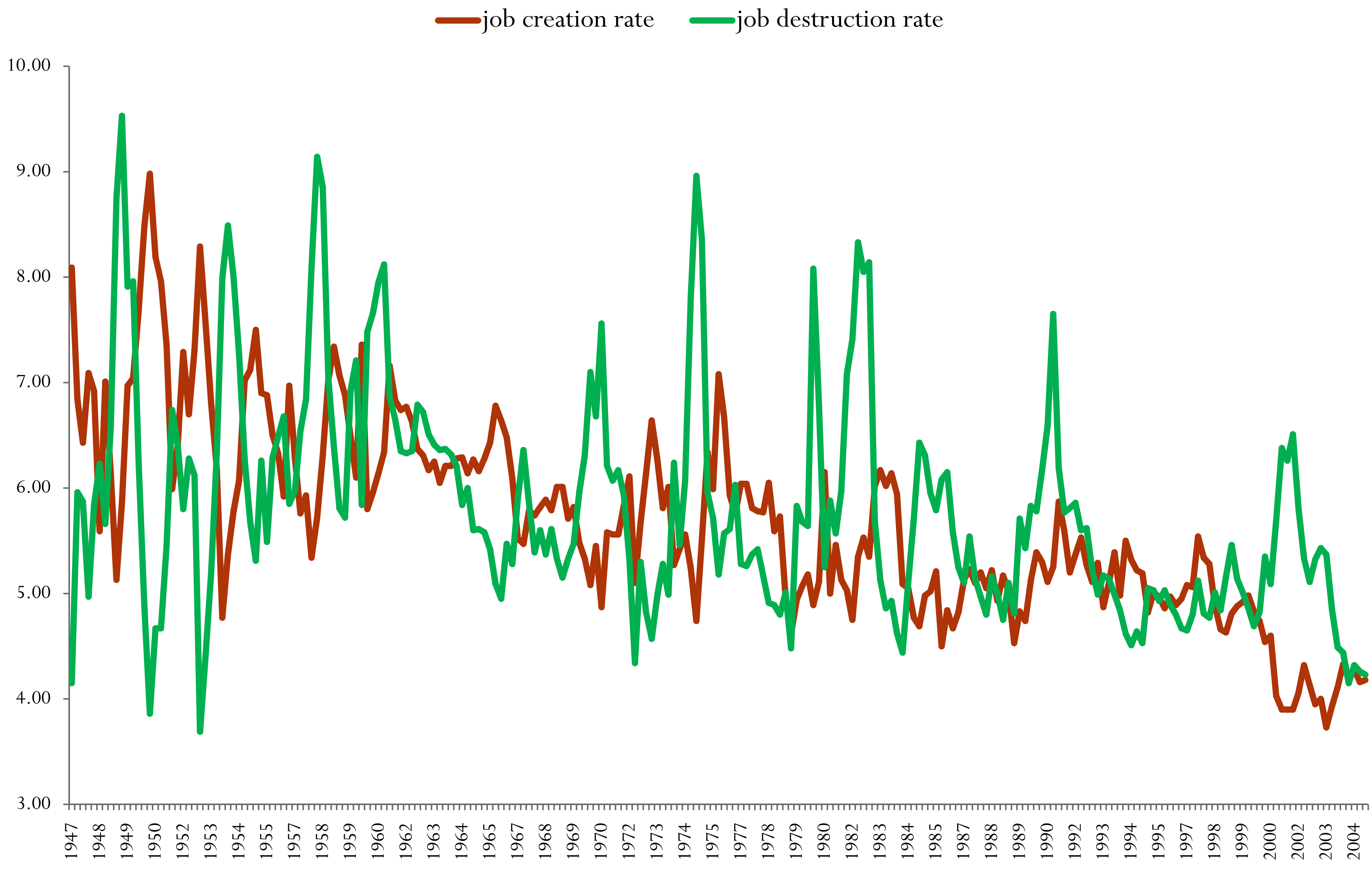
$$JC_t = \frac{\sum_i \left(n_{i,t} - n_{i,t-1}\right) I\left[n_{i,t} > n_{i,t-1}\right]}{0.5\left(\sum_i n_{i,t} + \sum_i n_{i,t-1}\right)}$$

$$JD_t = \frac{\sum_i \left(n_{i,t-1} - n_{i,t}\right) I\left[n_{i,t} < n_{i,t-1}\right]}{0.5\left(\sum_i n_{i,t} + \sum_i n_{i,t-1}\right)}$$



Source : Davis and Haltiwanger (1992)

Evolution of job creation and destruction rates in the US manufacturing sector



Source : Davis and Haltiwanger

Before analyzing business cycle facts...

- Macroeconomists use « filters » to study aggregate series

- They assume aggregate series have two components:
  - Trend
  - Cycle

- Formally:

$$y_t = g_t + c_t$$

The Hodrick-Prescott filter

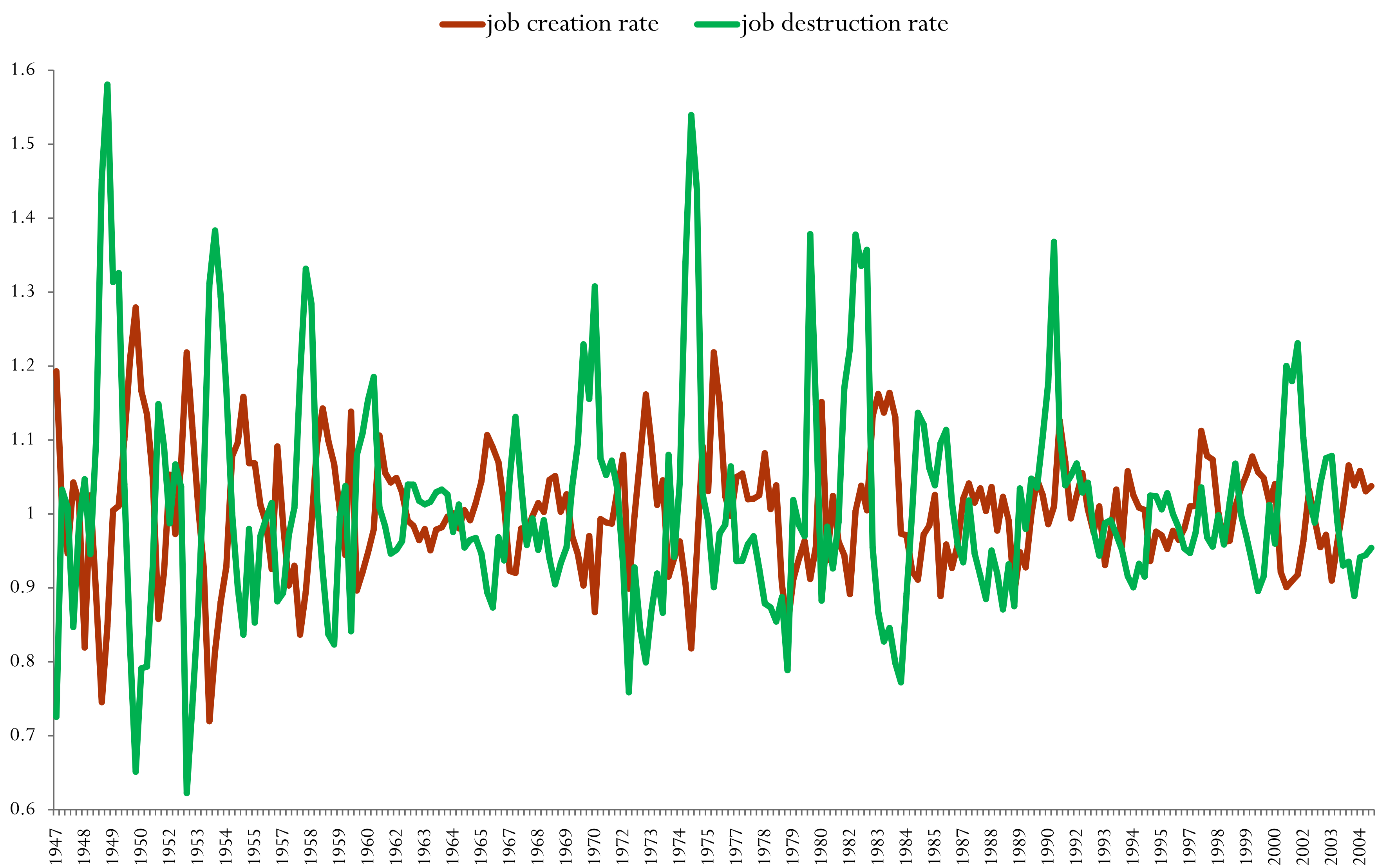
- Hodrick and Prescott (1997) compute the trend as

$$\underset{\{g_t\}_{t=1}^{T}}{Min}\left\{\sum_{t=1}^{T} c_t^2 + \lambda \sum_{t=1}^{T}\left[\left(g_t - g_{t-1}\right) - \left(g_{t-1} - g_{t-2}\right)\right]^2\right\}$$

- They want the trend component to be smooth
- And the cycle to be zero on average

- λ is penalizes variability in the trend component
- When λ is infinite, the trend is linear
- Consensus for quarterly data: $\lambda = 1600$

Cycle in job creation and destruction rates (HP filter) manufacturing sector, USA

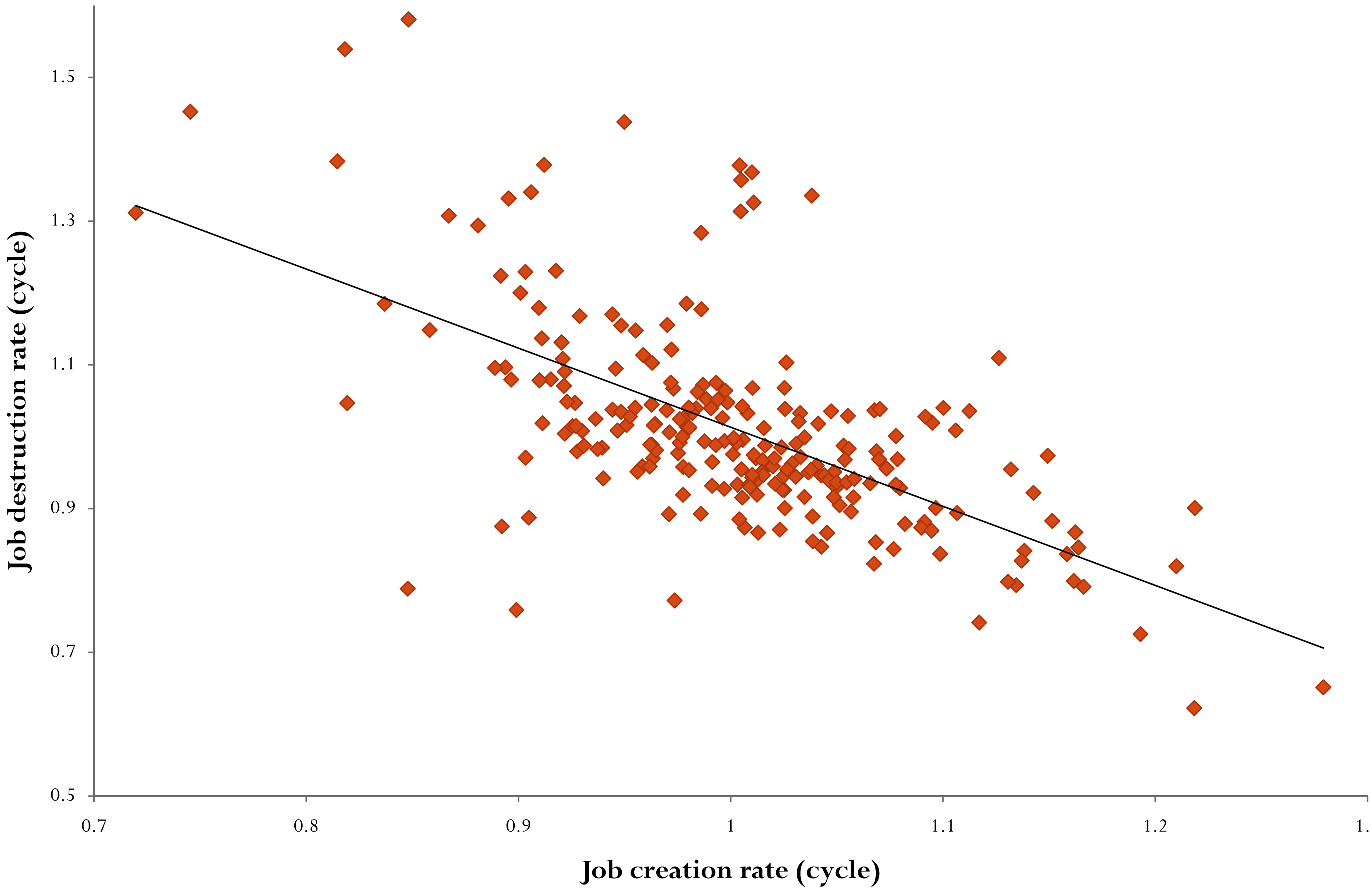


Source : Davis and Haltiwanger

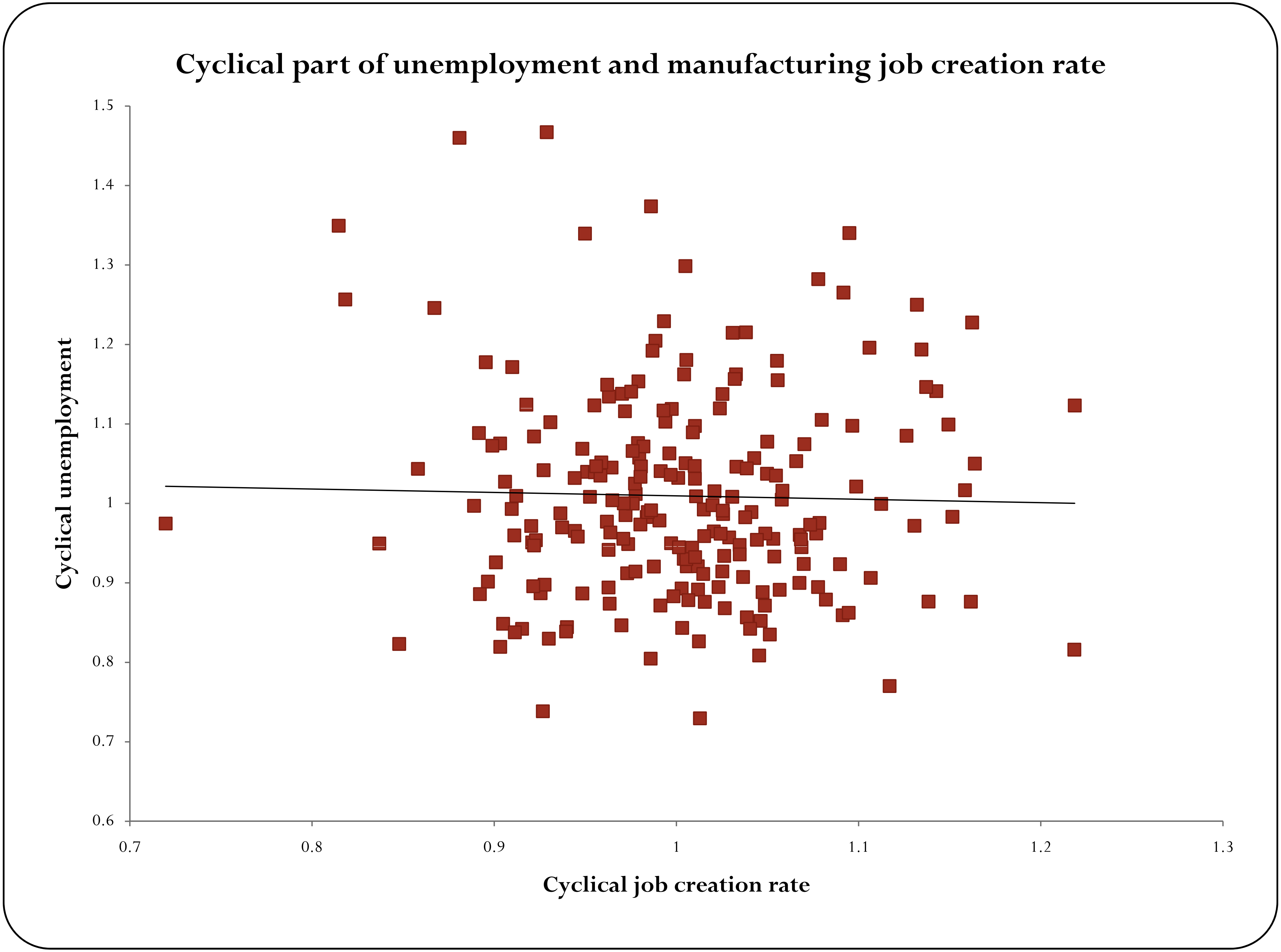
Gross job flows

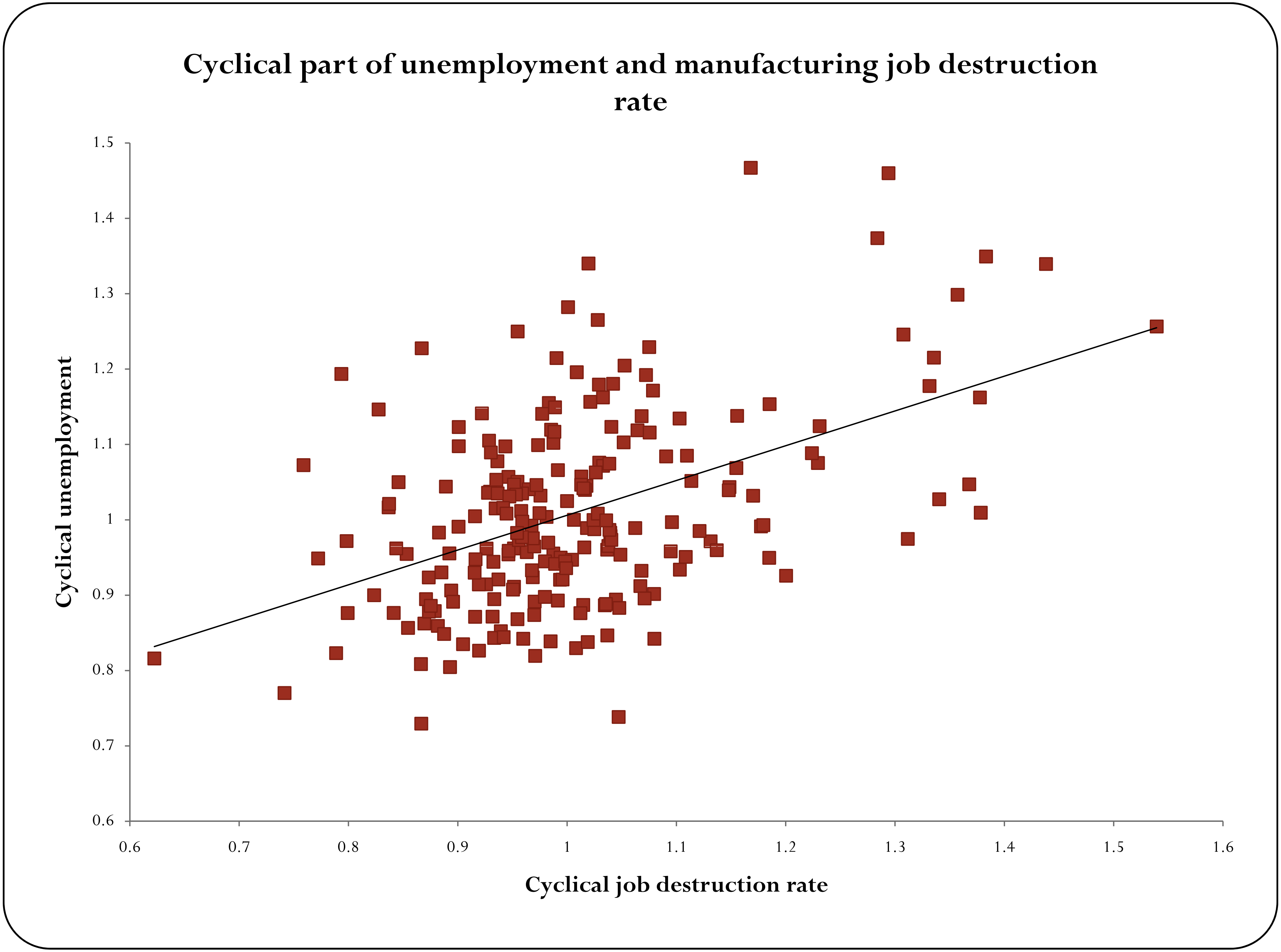
- We apply HP filter to the logged series
- Business cycles facts:
  - Job creation and destruction rates are neg. correlated (-0.62)
  - Job destruction rate is more volatile (coef. var.: 14.3% vs 8.1%)
  - Correlation with cyclical unemployment
    - Job creation: -0.03
    - Job destruction: 0.47
  - Persistence: « cleansing » effect of recessions
    - Creation: 0.54 as AR1 coefficient
    - Destruction: 0.67 as AR1 coefficient

Scatter plot of job creation and destruction rates (HP filtered) in the US manufacturing sector



Source : Davis and Haltiwanger


Cyclical part of unemployment and manufacturing job creation rate
Cyclical unemployment
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
Cyclical job creation rate



Cyclical part of unemployment and manufacturing job destruction rate
Cyclical unemployment
Cyclical job destruction rate
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6

Job flows: more concepts

- Job reallocation rate

$$JR_t = JC_t + JD_t$$

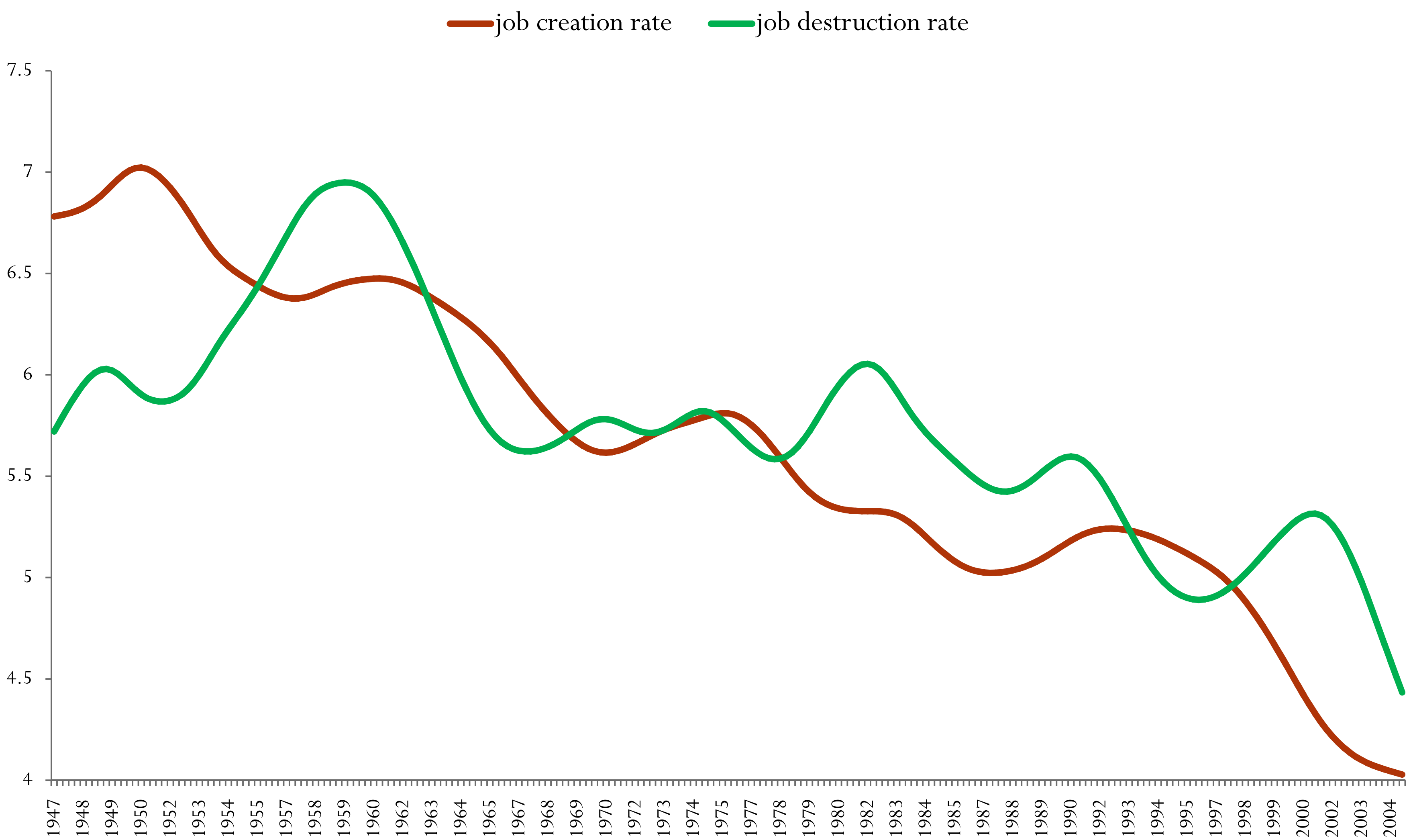
- Excess reallocation

$$\sum_{s=1}^{S} |\text{Net Employment Change in } s| - |\text{Overall Net Employment Change}|$$

- Within sector job reallocation

$$\sum_{s=1}^{S} (\text{Job Reallocation in } s - |\text{Net Employment Change in } s|)$$

Trend in job creation and destruction rates (HP filter) manufacturing sector, USA



Source : Davis and Haltiwanger

Gross job flows: trend

- Evidence of great moderation ?

- Caveat:
  - Data is on manufacturing
  - Is this due to the diminishing importance of the sector?

Worker flows

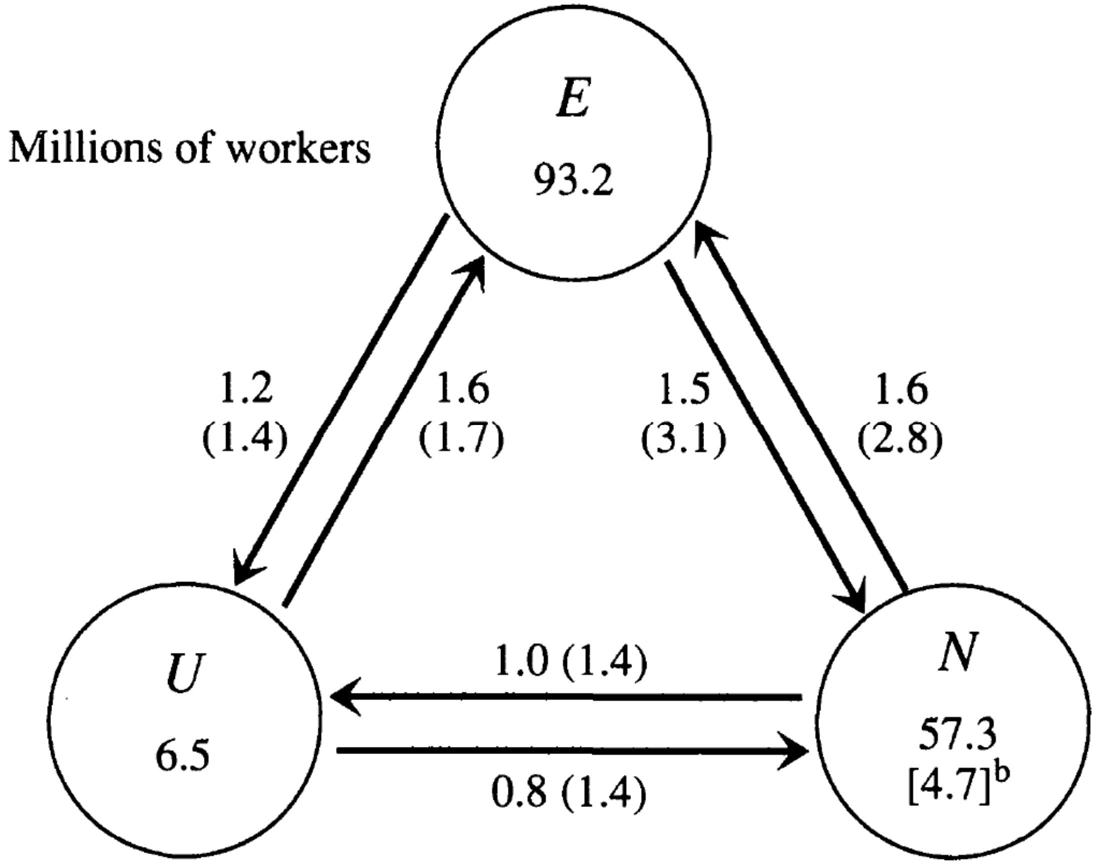
Difference between job and worker flows

- Employment at the establishment level
  - May be constant
  - But workers may move between establishments

- Quits:
  - High in expansion
  - Low in recession
  - Tend to compensate the excessive destructions in recessions

- Drawback: classification errors lead to overestimates

Figure 1. Average Values of Gross Stocks and Flows for Employment, Unemployment, and Not in the Labor Force, January 1968–May 1986[a]



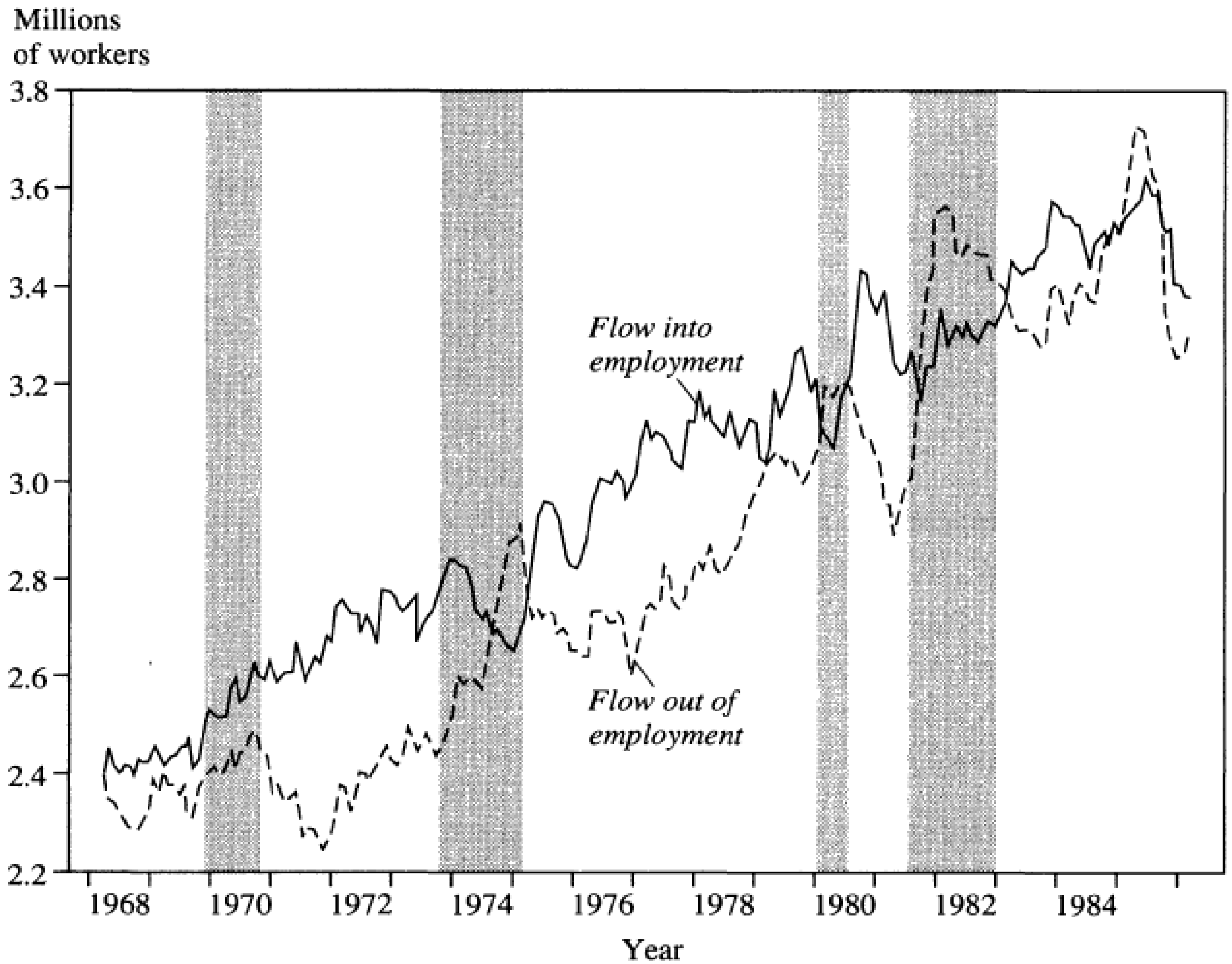
Source: Stock numbers are from the Current Population Survey (CPS). For the flow data, we use the Abowd-Zellner adjusted gross flow series. The original unadjusted numbers from the CPS appear in parentheses. All numbers are in millions.

a. The variables *E*, *U*, and *N* represent employment, unemployment, and not in the labor force respectively.

b. The bracketed stock figure for *N* equals the number of people who "want a job."

Source: Blanchard and Diamond (1990)

Figure 6. Flows into and out of Employment, January 1968–May 1985



Source: Authors' own calculations using Abowd-Zellner data that have been seasonally adjusted and filtered using a seven-month moving average. Shaded areas represent recessions.

Source: Blanchard and Diamond (1990)

Flows: the current debate

Before entering the debate: A short intro on duration analysis

- Let T denote the duration of a given state, with cdf F:

$$F(t) = P(T \leq t)$$

- Survivor function

$$S(t) = P(T > t) = 1 - F(t)$$

- Hazard function

$$\lambda(t) = \lim_{h \to 0} \frac{P\left(t \leq T < t + h \mid T \geq t\right)}{h}$$

A short intro on duration analysis

- Notice

$$P\left(t \le T < t+h \mid T \ge t\right) = \frac{P\left(t \le T < t+h\right)}{P\left(T \ge t\right)}$$

$$P\left(t \le T < t+h \mid T \ge t\right) = \frac{F(t+h) - F(t)}{1 - F(t)}$$

A short intro on duration analysis

- We can rewrite the hazard rate as

$$\lambda(t) = \lim_{h \to 0} \frac{F(t+h) - F(t)}{h} \frac{1}{1 - F(t)} = \frac{f(t)}{S(t)}$$

$$S'(t) = -f(t) \Rightarrow \lambda(t) = -\frac{d \log S(t)}{dt}$$

- Hence,

$$F(t) = 1 - e^{-\int_0^t \lambda(s) ds} \Rightarrow f(t) = \lambda(t) e^{-\int_0^t \lambda(s) ds}$$

A short intro on duration analysis

- Memoryless process

$$\lambda(t) = \lambda \Rightarrow F(t) = 1 - e^{-\lambda t} \Rightarrow f(t) = \lambda e^{-\lambda t}$$

$$E(T) = \int_0^\infty t f(t) dt = \int_0^\infty t \lambda e^{-\lambda t} dt = \frac{1}{\lambda}$$

- Positive duration dependence

$$\frac{d\lambda(t)}{dt} > 0$$

- Negative duration dependence

$$\frac{d\lambda(t)}{dt} < 0$$

Entering the debate

Shimer's methodology

- Shimer (2007) computes the job finding and separation rates from data on
  - Unemployment at t and $t+1$
  - Short-term unemployment (are unemployed between at $t+1$, but employed at t)
- Controls for time aggregation bias
  - Workers can move between states several times between two observations
  - This generates large bias for separations when the job finding rate is large

Shimer's methodology

$$\begin{cases} \dot{u}_{t+\tau} = e_{t+\tau} s_t - u_{t+\tau} f_t \\ \dot{u}_t^s(\tau) = e_{t+\tau} s_t - u_t^s(\tau) f_t \end{cases}$$

$$\Rightarrow \dot{u}_{t+\tau} = \dot{u}_t^s(\tau) - f_t\left(u_{t+\tau} - u_t^s(\tau)\right)$$

Shimer's methodology

- Job finding rate:

$$u_{t+1} = \left(1 - F_t\right) u_t + u_{t+1}^s$$

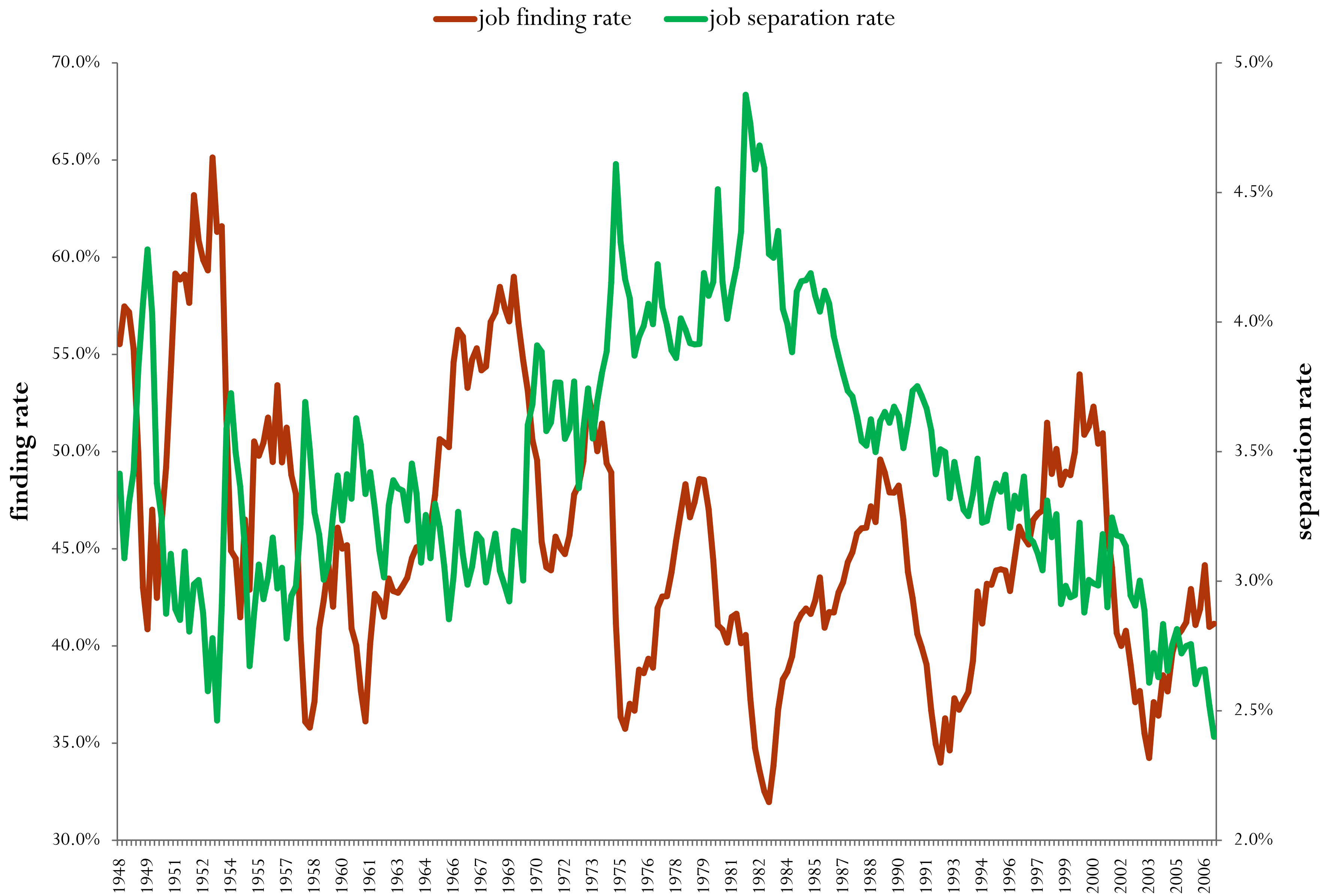
$$\Rightarrow F_t = 1 - \frac{u_{t+1} - u_{t+1}^s}{u_t}$$

Shimer's methodology

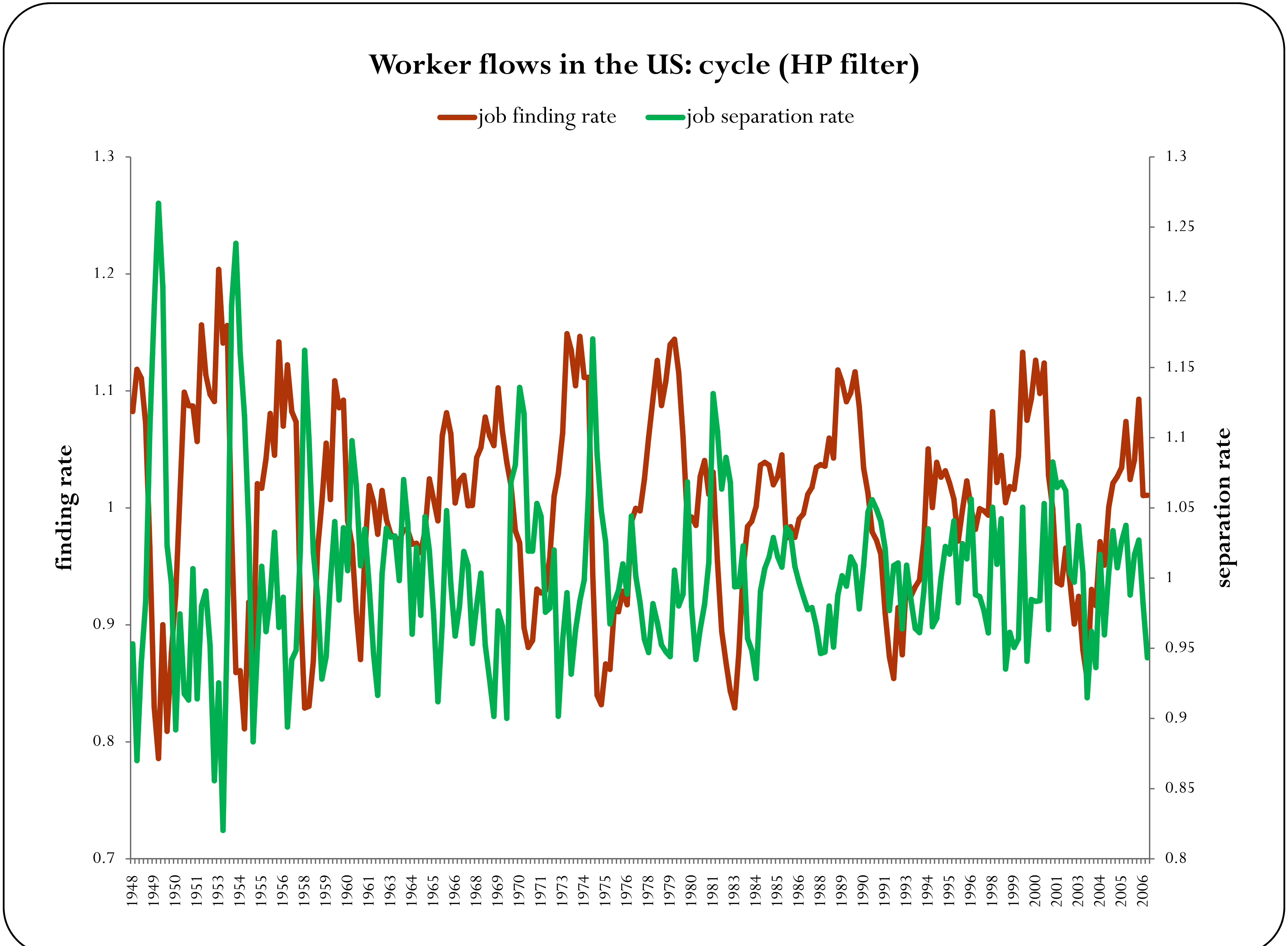
- Job separation rate:

$$u_{t+1} = \frac{\left(1 - e^{-f_t - s_t}\right) s_t}{f_t + s_t}\left(u_t + e_t\right) + e^{-f_t - s_t} u_t$$

Worker flows in the US



Source: Shimer (2007)


Worker flows in the US: cycle (HP filter)
job finding rate
job separation rate
finding rate
separation rate
1.3
1.2
1.1
1
0.9
0.8
0.7
1.25
1.15
1.05
0.95
0.85
1948
1949
1950
1951
1953
1954
1955
1956
1958
1959
1960
1961
1963
1964
1965
1966
1968
1969
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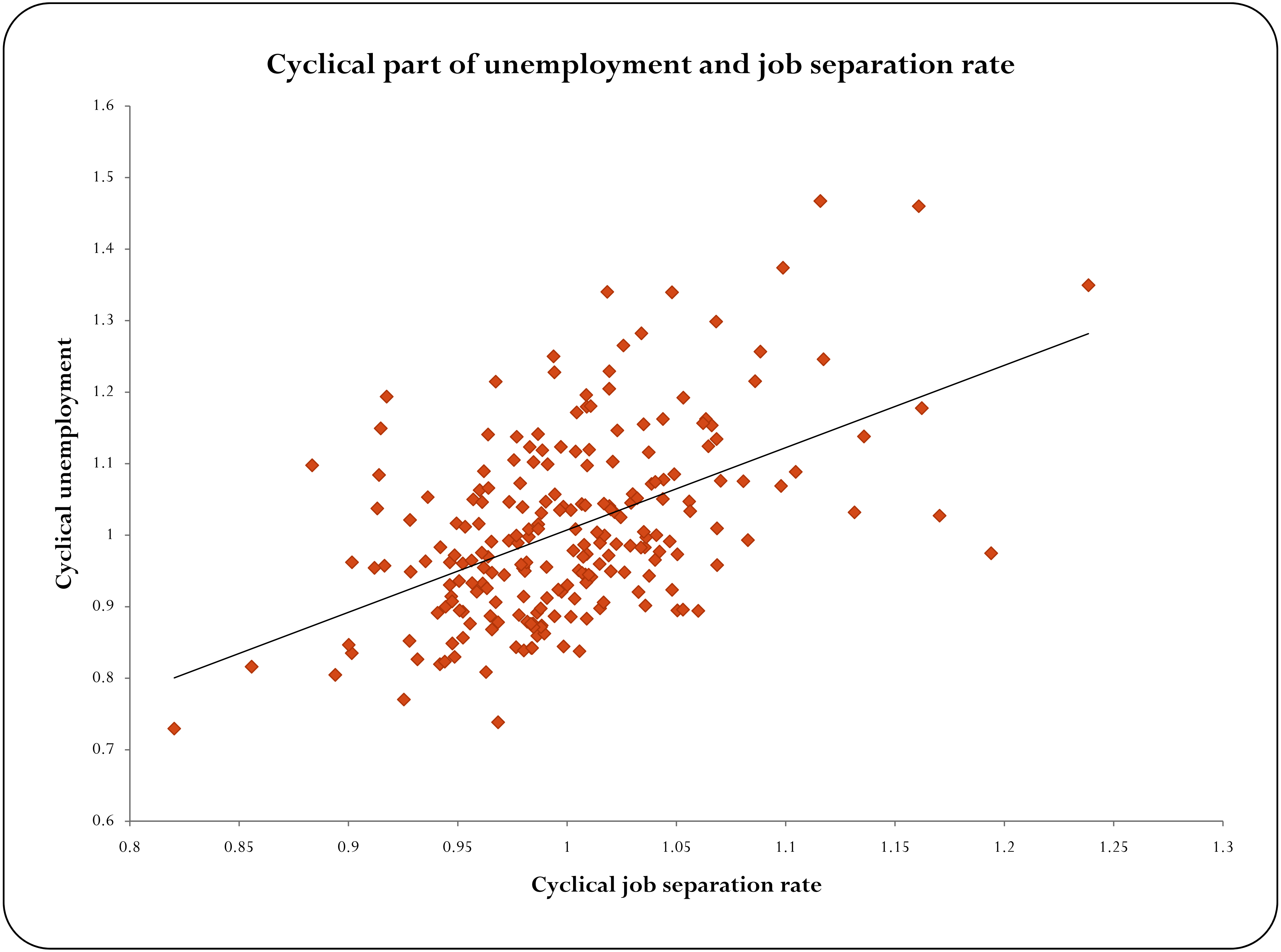
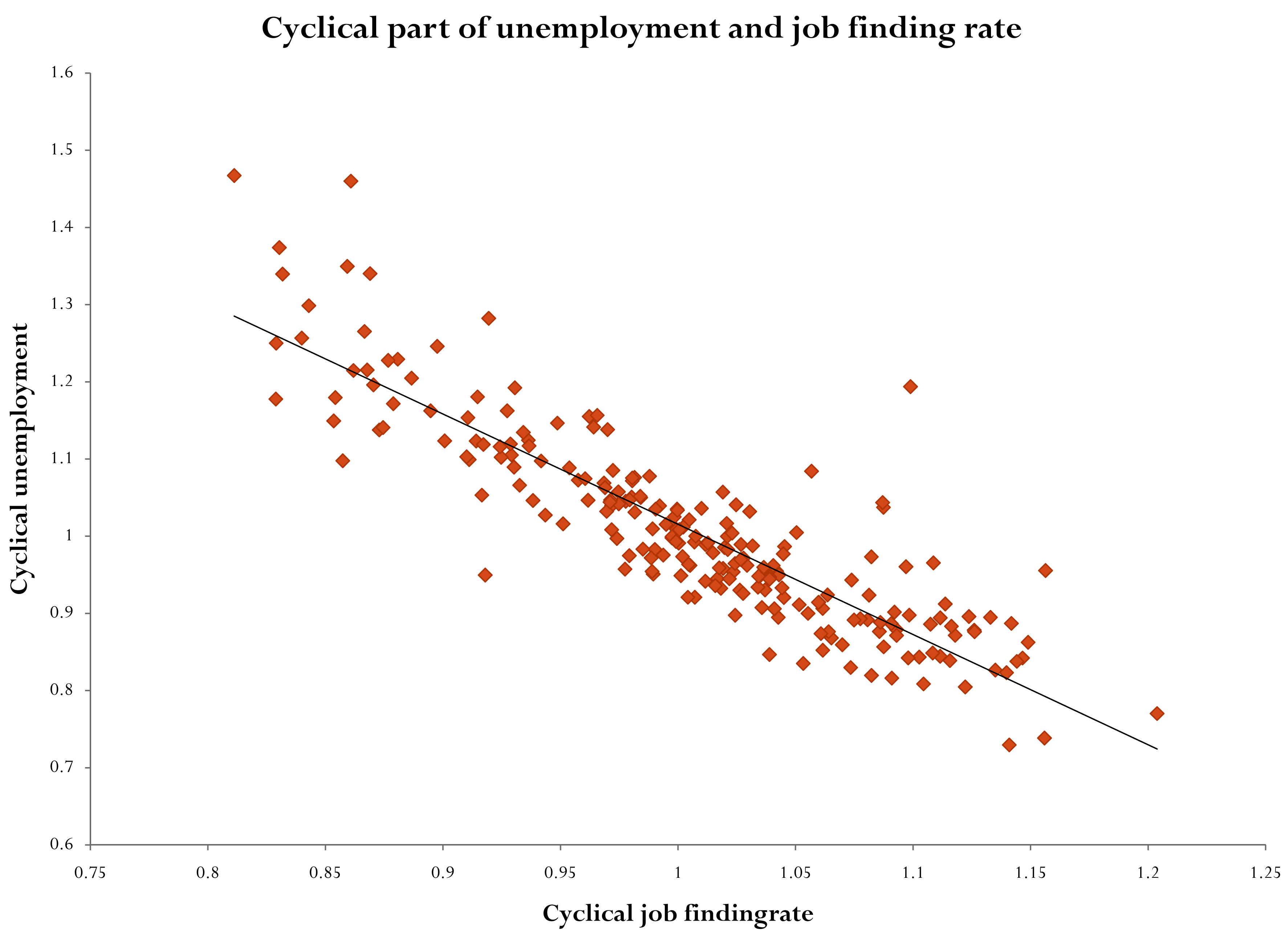
2001
2003
2004
2005
2006

Shimer's flows

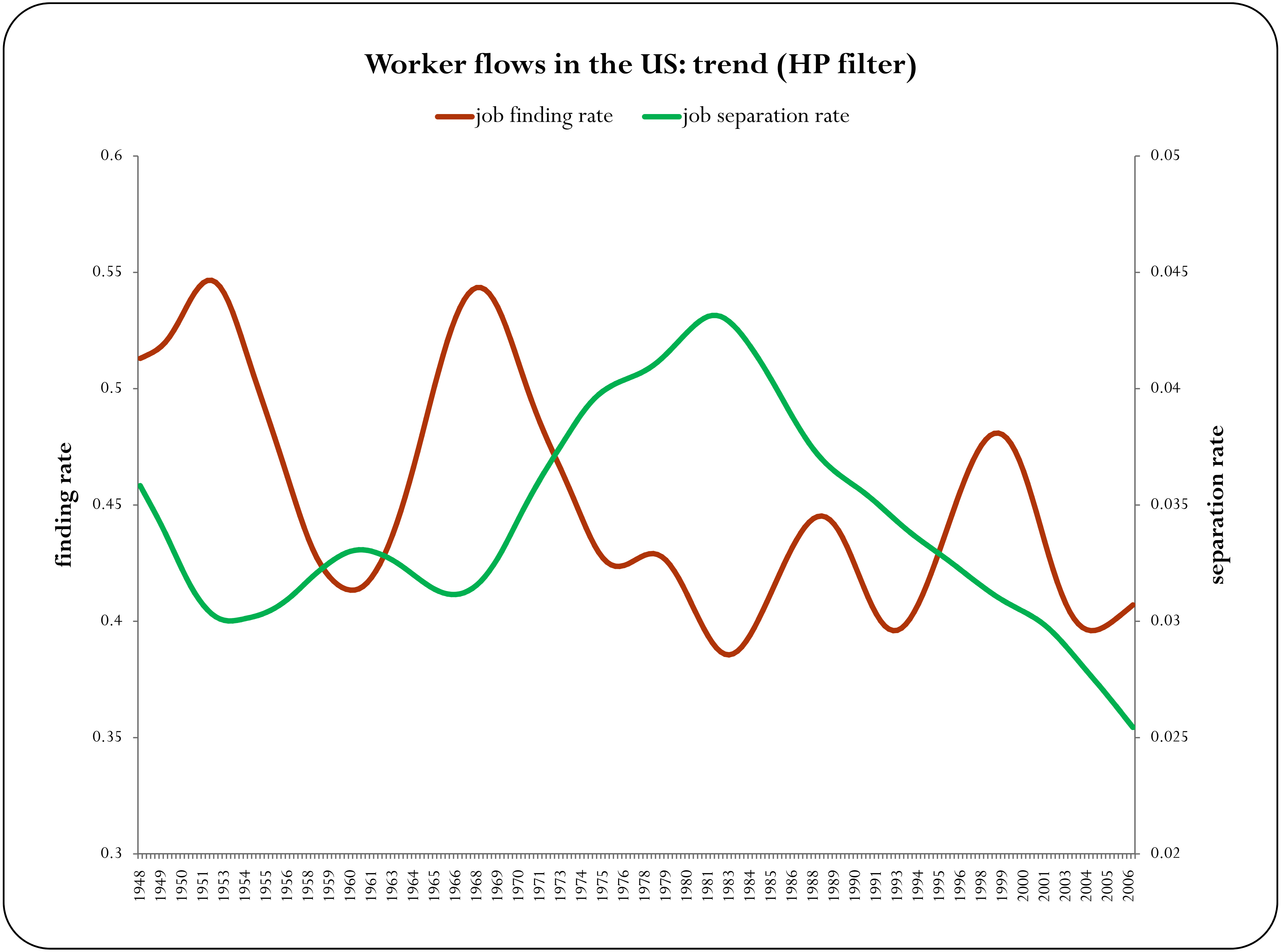
- We apply HP filter to the logged series
- Business cycles facts:
  - Job finding and separation rates are neg. correlated (-0.43)
  - Finding rate is more volatile (coef. var.: 8.1% vs 6.1%)
    - Inconsistence?
  - Correlation with cyclical unemployment
    - Separation rate: 0.50
    - Finding rate: -0.88
  - Persistence:
    - Creation: 0.81 as AR1 coefficient
    - Destruction: 0.58 as AR1 coefficient



Cyclical part of unemployment and job separation rate
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
Cyclical unemployment
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
1.3
Cyclical job separation rate



Cyclical part of unemployment and job finding rate
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
Cyclical unemployment
0.75
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
Cyclical job findingrate



Worker flows in the US: trend (HP filter)
job finding rate
job separation rate
finding rate
separation rate
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.05
0.045
0.04
0.035
0.03
0.025
0.02
1948 1949 1950 1951 1953 1954 1955 1956 1958 1959 1960 1961 1963 1964 1965 1966 1968 1969 1970 1971 1973 1974 1975 1976 1978 1979 1980 1981 1983 1984 1985 1986 1988 1989 1990 1991 1993 1994 1995 1996 1998 1999 2000 2001 2003 2004 2005 2006

Conclusion

- Job and worker flows are potentially important to understand the dynamics of labor markets
  - Large flows = fast adjustment
  - Small flows = sticky adjustment

- Debate: which margin is important to explain unemployment at business-cycle frequencies?
  - Conventional view: flows out of employment
  - Shimer's view: flows into employment