discussion of
Cogley, Sargent and Surico

# The Return of the Gibson Paradox

Lawrence Christiano

February 17, 2012
Conference in honor of Warren Weber

# Summary

- The Gibson Paradox has returned
  - Gibson Paradox: negative or zero long-run relationship between the interest rate and rate of inflation.
  - It has returned in the sense that the relationship was positive 1965-1985 and flipped negative or zero after 1995.

- Result documented in two ways:
  - Estimated time-varying VAR.
  - DSGE models estimated over the two periods.

- Use DSGE model to uncover economic reason for the return of the Gibson paradox.
  - Change in monetary policy and in a parameter governing the private economy.

# What 'Long Run' Does *Not* Mean Here

- It does *not* mean....
  - 'steady state'.
  - A negative relationship between $R$ and $\pi$ in steady state would be truly hard to explain.
    - I am not aware of interesting theories with the property $\pi \uparrow$ , $R\downarrow$ .

# The Concept of 'Long Run' Here

- Lucas ('Two Illustrations of Quantity Theory', AER, 1980) low-frequency idea
  - First, smooth data for β close to, but less than unity:

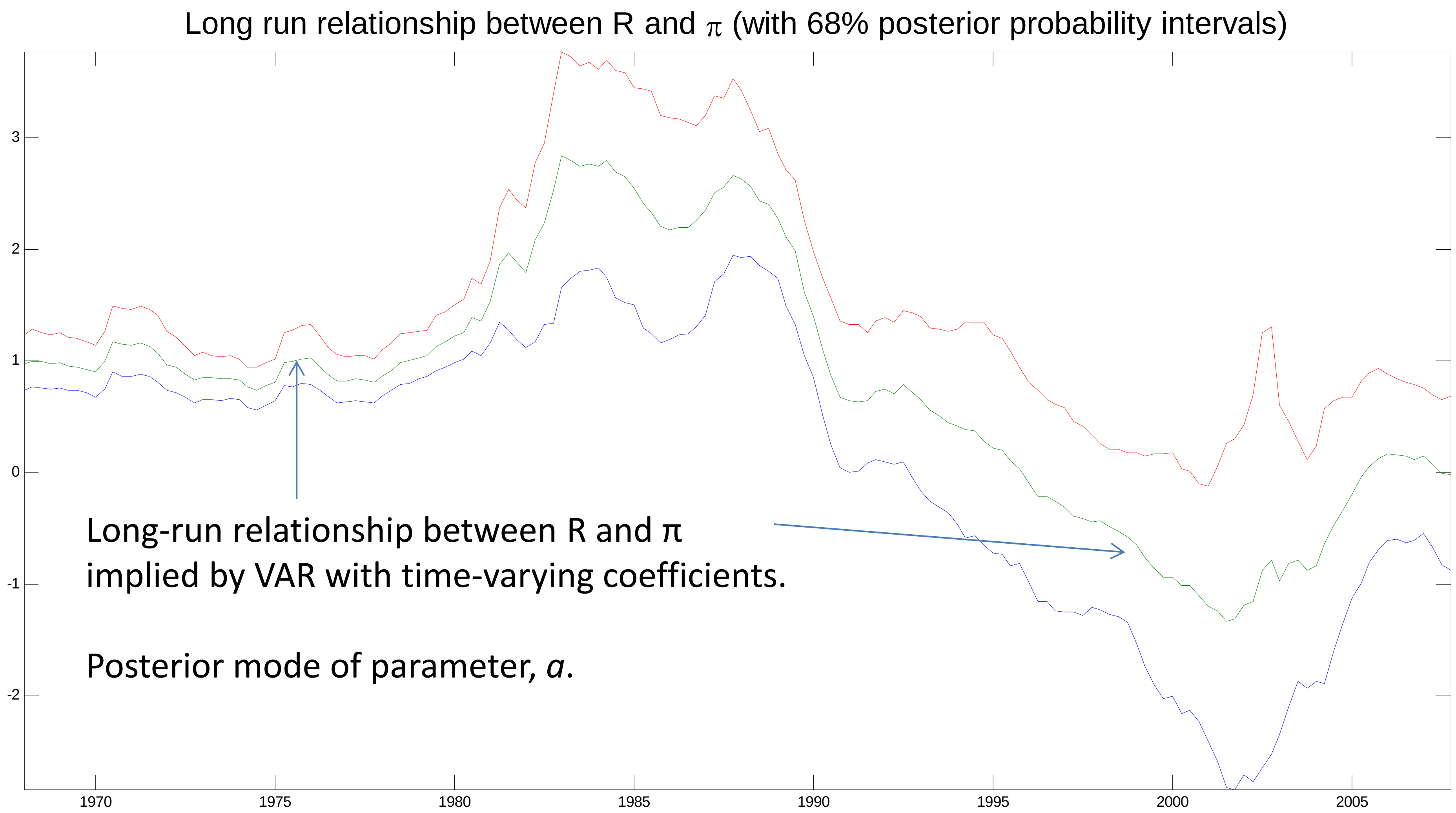
$$\pi_t(\beta) = \frac{1-\beta}{1+\beta}\sum_{k=-\infty}^{\infty}\beta^{|k|}\pi_{t+k},\ R_t(\beta) = \frac{1-\beta}{1+\beta}\sum_{k=-\infty}^{\infty}\beta^{|k|}R_{t+k}$$

  - Second, perform regression

$$R_t(\beta) = a\pi_t(\beta) + \varepsilon_t$$

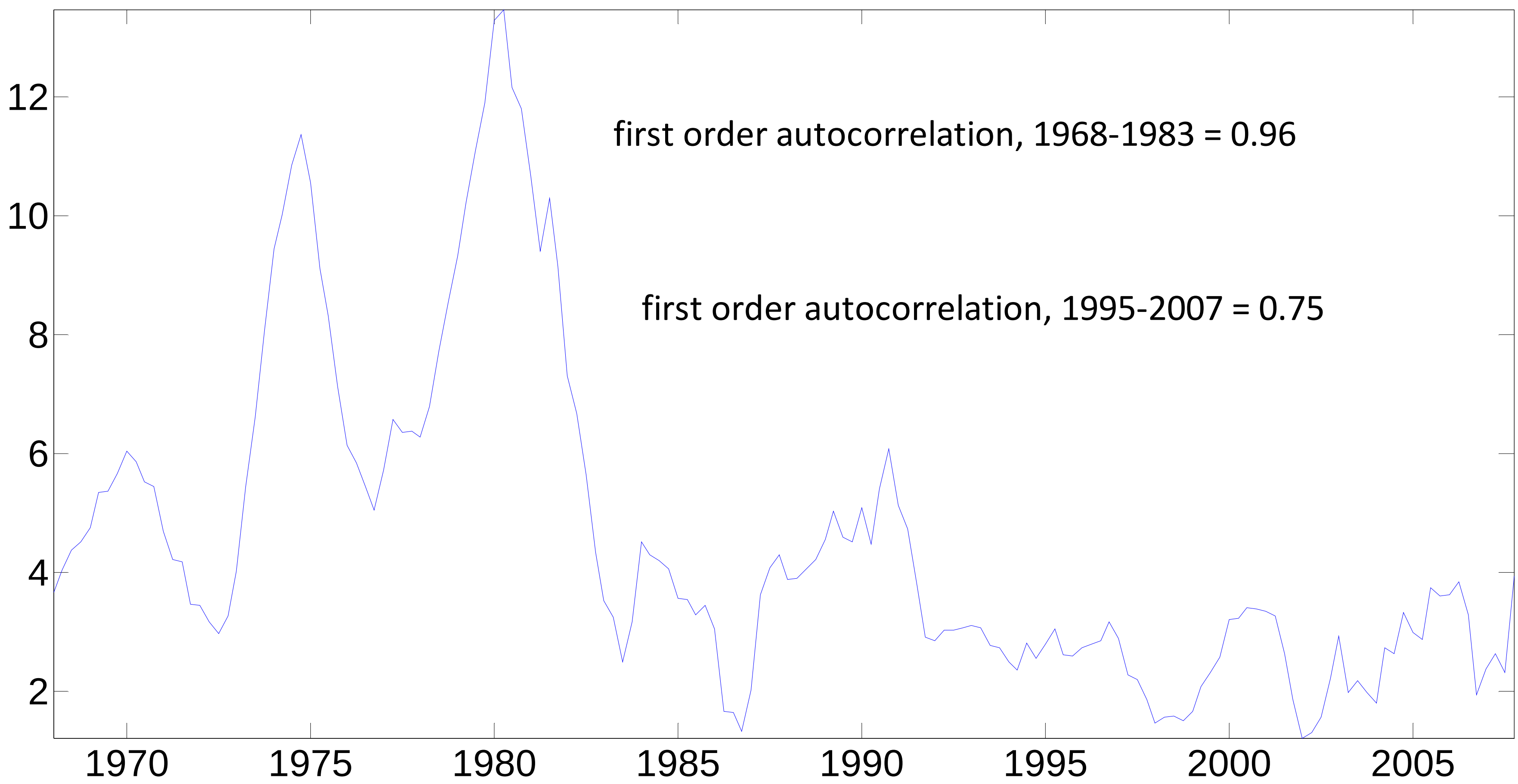
  - In practice, authors exploit connection between *a* and features of the spectrum of ($R_t$, $\pi_t$) at frequency zero (Whiteman (1984)).

- The return of the Gibson paradox: *a* flipped from positive in early post-war, to negative more recently.


Long run relationship between R and π (with 68% posterior probability intervals)
3
2
1
0
-1
-2
1970
1975
1980
1985
1990
1995
2000
2005
Long-run relationship between R and π
implied by VAR with time-varying coefficients.
Posterior mode of parameter, *a*.

# At the same time, there has been a decline in inflation persistence

# US Annual Inflation



# Reduced Form 'Explanation'

- Suppose

$$\overbrace{R_t}^{\text{nominal rate}} = R^{\text{real}} + E_t \pi_{t+1}$$

- If π is a random walk, then

$$R_t = R^{\text{real}} + \pi_t \rightarrow corr(R_t, \pi_t) = 1$$

- If π is iid, then

$$R_t = R^{\text{real}} + \text{constant} \rightarrow corr(\text{constant}, \pi_t) = 0$$

- This story leaves details unspecified:
  – Real rate held constant.
  – What are the economics behind the changes that have occurred?

# Remarks

- Long-standing theme in time series analysis:
  - Long run relationships are hard to pin down in the data.
- With a specific statistical model, long-run relationships may appear easy to pin down.
  - Lag length and other restrictions set up a link between high frequency component of the data (easy to estimate) and low frequency component of the data.

$$y_t = \overbrace{\rho}^{\text{identified from high-frequency, first order autocorrelation in data}} y_{t-1} + \varepsilon_t$$

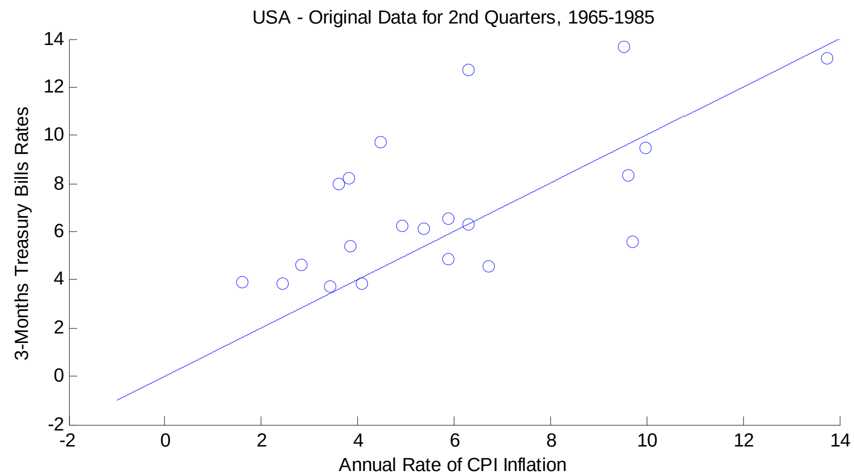
$$\overbrace{S(0)}^{\text{zero-frequency spectral density}} = \frac{\sigma_\varepsilon^2}{(1-\rho)^2}$$

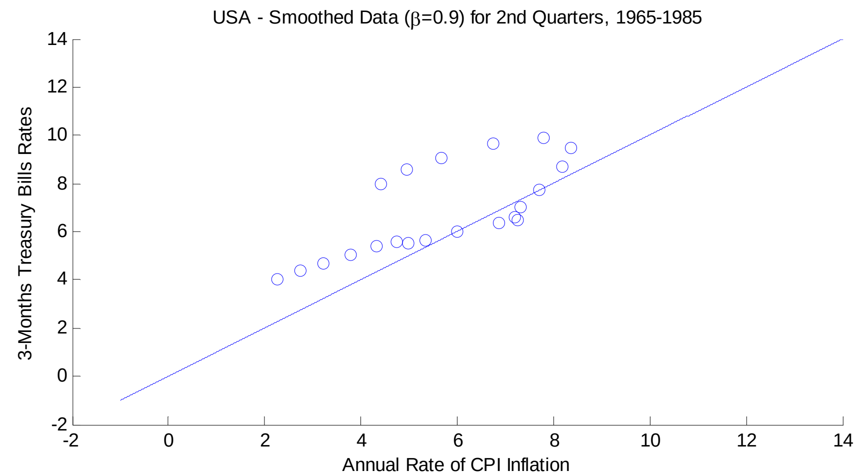
  - Difficulty of pinning down long-run relationships is manifested in a lack of robustness…not necessarily in large prob. intervals.

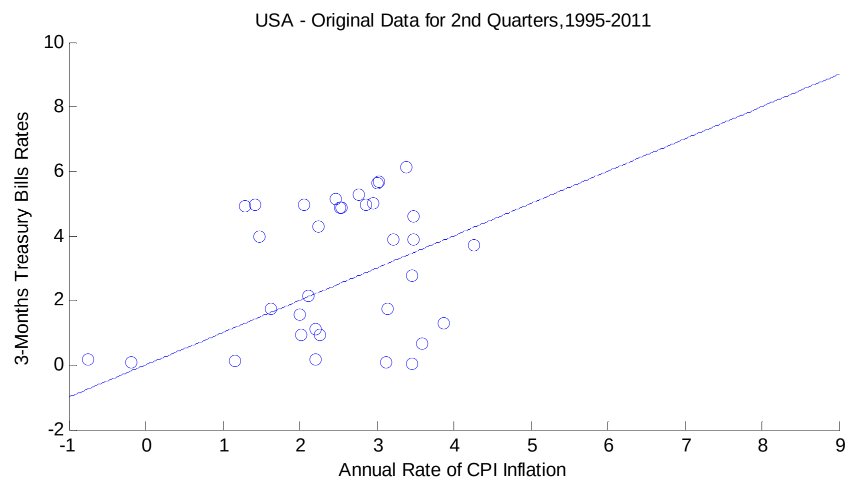
# Robustness of Inference About *a*

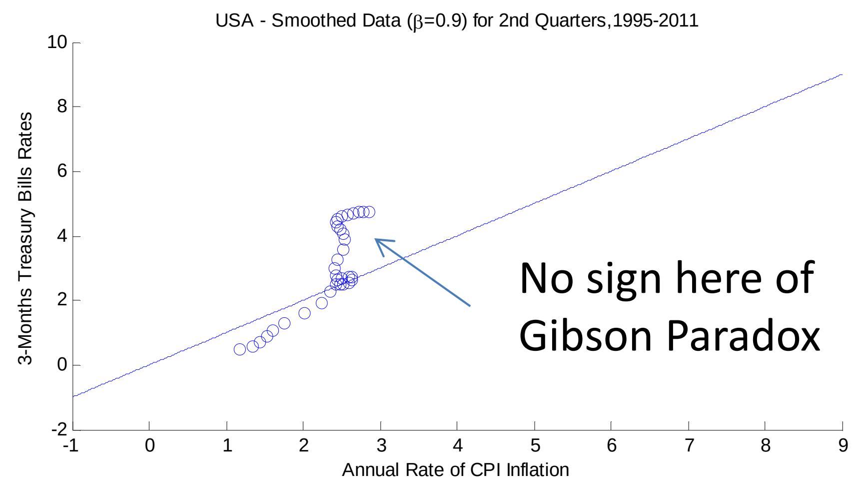
- Would like to see robustness of Gibson Paradox finding to:
  - Including more variables in the VAR analysis.
  - Including more lags in the VAR (say lags = 4 rather than 2).
- Concern:
  - When I apply Lucas' inefficient (but, presumably, robust) procedure, fail to find Gibson Paradox.
  - When I estimate a different DSGE model, fail to find Gibson Paradox.

# Appying Lucas’ Procedure



# DSGE-based Estimate of *a*

- In the paper, C-S-S estimate a simple NK model without capital over 1995-2007 period:

  The C-S-S model estimated over the earlier period has positive *a*, the two models have the same steady state ($R_t$,$\pi_t$).

  – At posterior mode, *a=-0.278 (-1.4,1.2)*

- I estimated a version of the Christiano-Eichenbaum-Evans (2005) model with 8 shocks and using 8 time series, 1985Q1-2010Q2.

  – At posterior mode, *a=1.15*

# Conclusion

- The C-S-S paper suggests that interesting changes in the low frequency relationship between inflation and the interest rate have occurred.

- They provide an interesting economic interpretation of why the changes happened.

- This work is in the best tradition of using equilibrium models to interpret data.

- Still, would like to see a defense of robustness.