The Demise of Okun's Law and of Procyclical Fluctuations in Conventional and Unconventional Measures of Productivity

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Documenting and Explaining the Change in Cyclical Labor-market Behavior

- Documenting
  - A new approach to disentangling trends and cycles
    - Use of "outside information" from inflation equation to determine the unemployment rate gap
  - A new approach to data
    - Total Economy not NFPB Sector
    - Conventional vs. Unconventional Measures
  - A key finding: hours gap > output gap in 2008-09, the reverse of 1980-82
- Productivity no longer exhibits procyclical fluctuations

Preview of Substantive Hypothesis to Explain Change

- The "Disposable Worker" Hypothesis combines
  - Increase in managerial power, linked to stock option compensation and stock market volatility
  - Increasing management emphasis on maximizing shareholder value, leading to more aggressive cutting of all costs in a downturn, including not just labor but also investment
  - Decline in labor power, linked to minimum wage, unions, imports, and immigration
- Explains both structural shift in labor market response but also secular increase of inequality in the income distribution

The Output Identity: Simple Version and Conventional Version

$$Y \equiv \frac{Y}{H} \cdot \frac{H}{E} \cdot \frac{E}{L} \cdot \frac{L}{N} \cdot N$$

$$Y^P \equiv \frac{Y^P}{H^P} \cdot \frac{H^P}{E^P} \cdot \frac{E^P}{E^H} \cdot \frac{E^H}{L} \cdot \frac{L}{N} \cdot N$$

Introducing Unconventional Identity

- Nalewaik's 2010 Brookings Paper:
  - GDP and GDI are conceptually identical
  - But they differ (statistical discrepancy)
  - GDI is more procyclical
  - When GDP is revised, it tends to be revised toward what GDI already shows
- Hours
  - All existing work uses hours based on payroll employment
  - There is a little-known series on hours based on the household survey
- In principle 2 numerators, 2 denominators = 4 possible productivity measures

Conventional Compared to Unconventional Identity

$$Y^P \equiv \frac{Y^P}{H^P} \cdot \frac{H^P}{E^P} \cdot \frac{E^P}{E^H} \cdot \frac{E^H}{L} \cdot \frac{L}{N} \cdot N$$

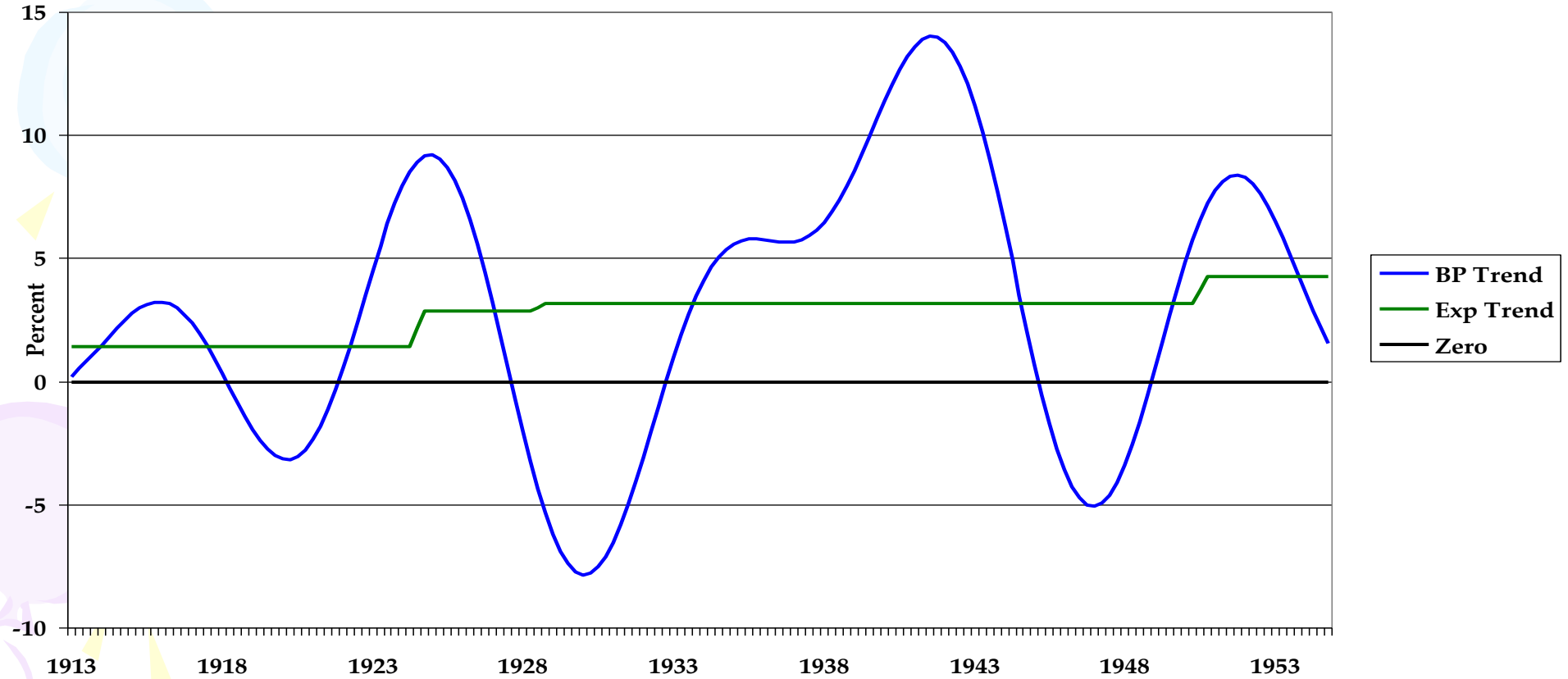
$$Y^I \equiv \frac{Y^I}{H^H} \cdot \frac{H^H}{E^H} \cdot \frac{E^H}{L} \cdot \frac{L}{N} \cdot N$$

Disentangling Trends and Cycles of Identity Components

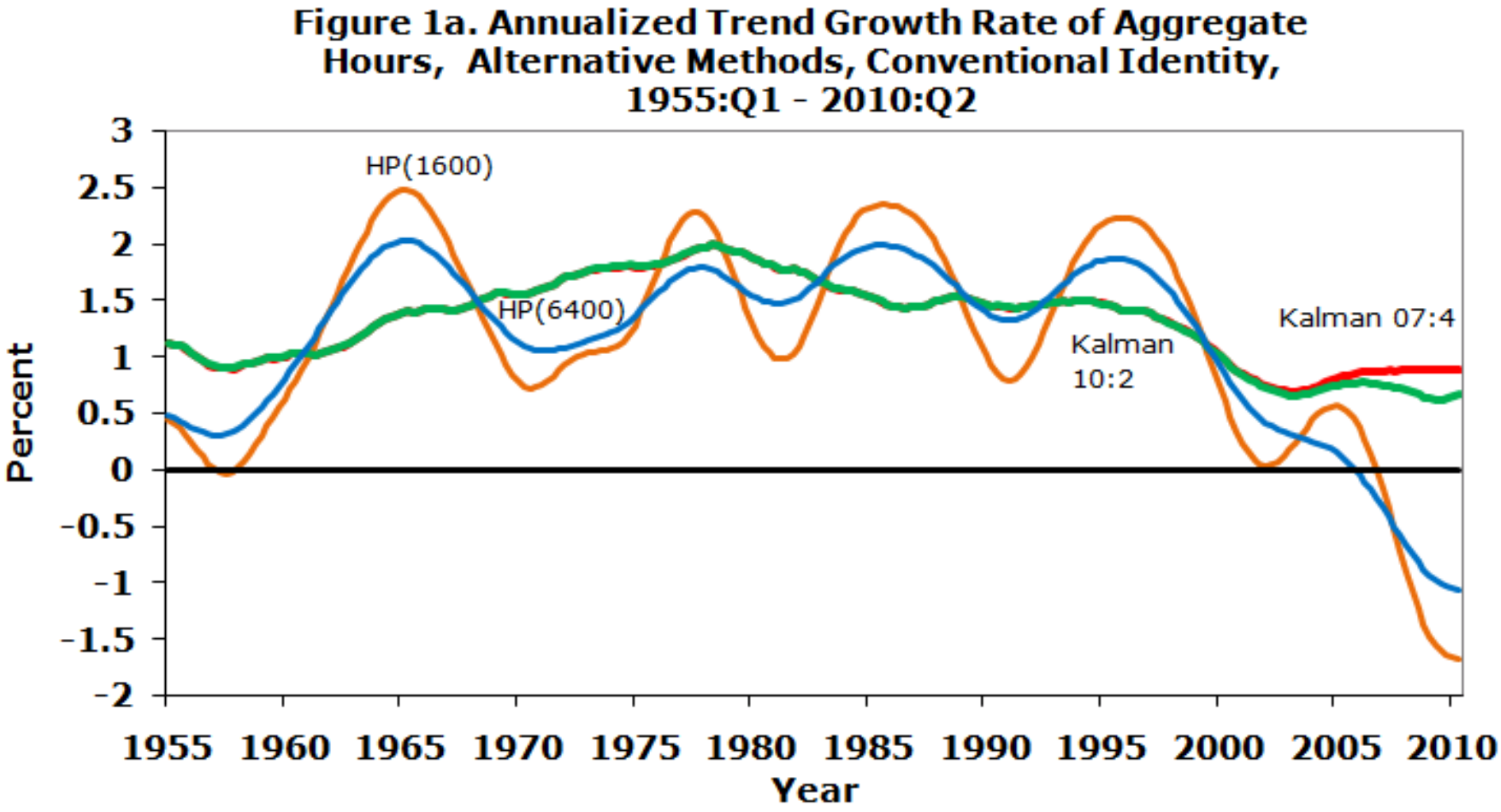
- Modern macro is dominated by two detrending techniques
  - Hodrick-Prescott and Band-Pass filter
- Both are unacceptable because the trends do not reflect underlying changes in the productive capacity of the economy but exhibit major responses to the business cycle itself
- Examples for both (band-pass for 1913-1954, HP for 1954-2010)
- Superior Alternative: Kalman Trend with Cyclical Feedback
  - Where does the cyclical feedback variable come from?

The Folly of Band-Pass Filter for 1913-54 (created by G. Primiceri)

Figure 3. Annual Rates of Change of Band-Pass Filtered and Exponential-through-Benchmarks Estimates of Real GDP, 1913-54



1955-2010: H-P for Hours Oscillates Too Much



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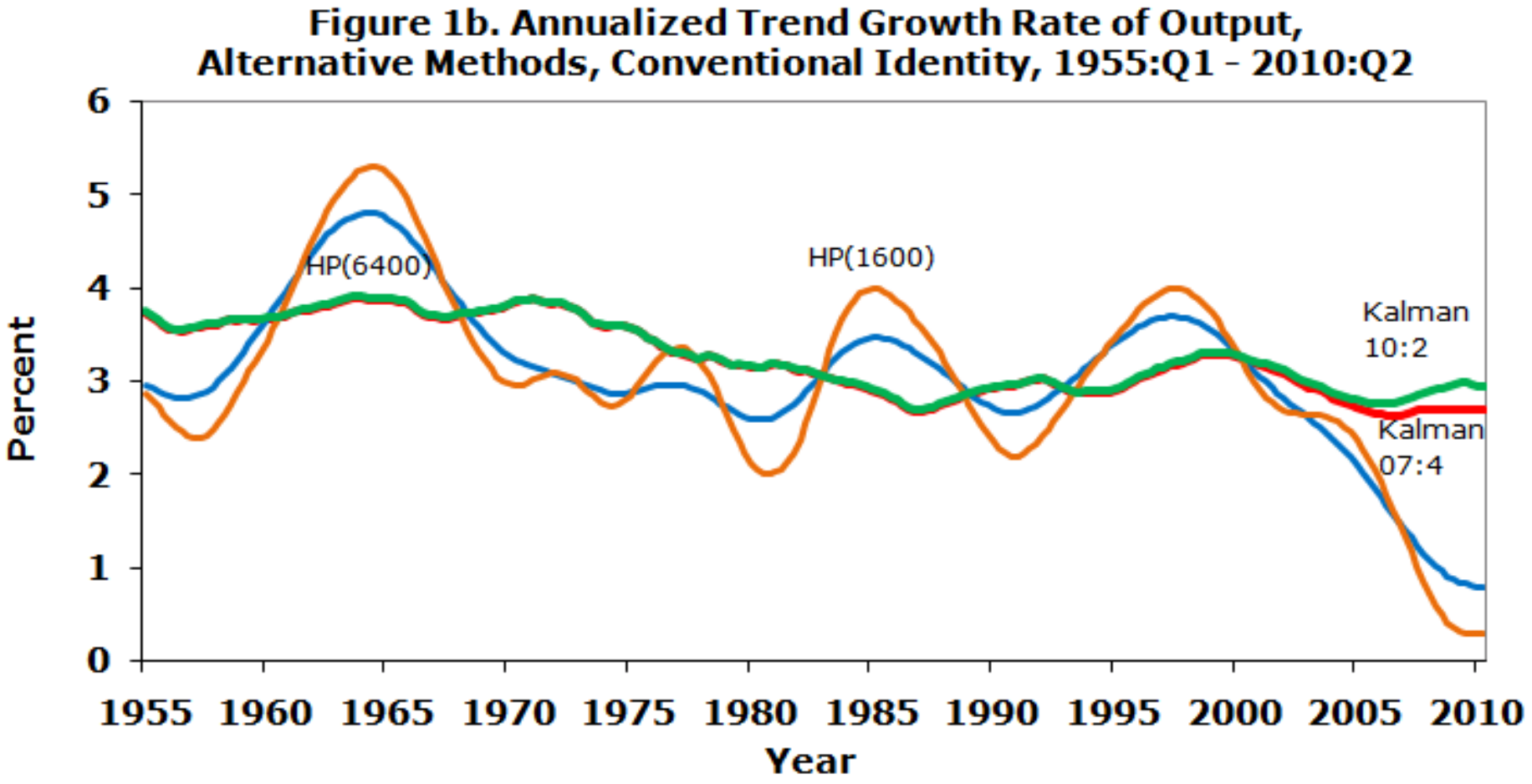
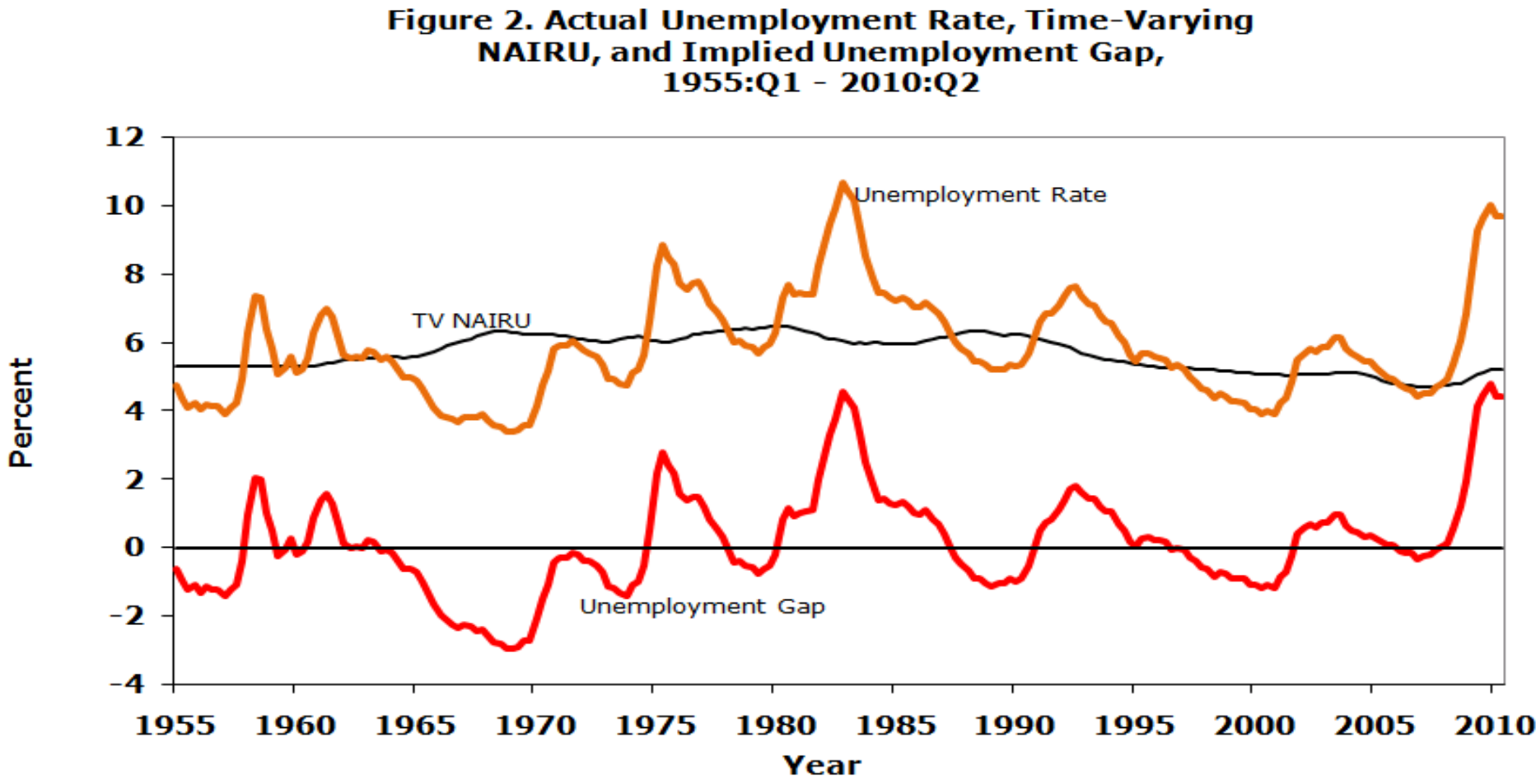


Kalman Filter: Where to Find Outside Information on The Business Cycle?

- Fed's capacity utilization index?
  - Too narrow
- Can't use output gap, because you have to know the trend to calculate the gap. You get back what you put in
- Solution: inflation behavior provides extra information
- "Triangle" inflation model: inflation depends on its own lags, the unemployment gap, and specific supply shock terms
- The NAIRU and unemployment gap can be *backed out* of this independent information about inflation, given the lags and supply shock variables

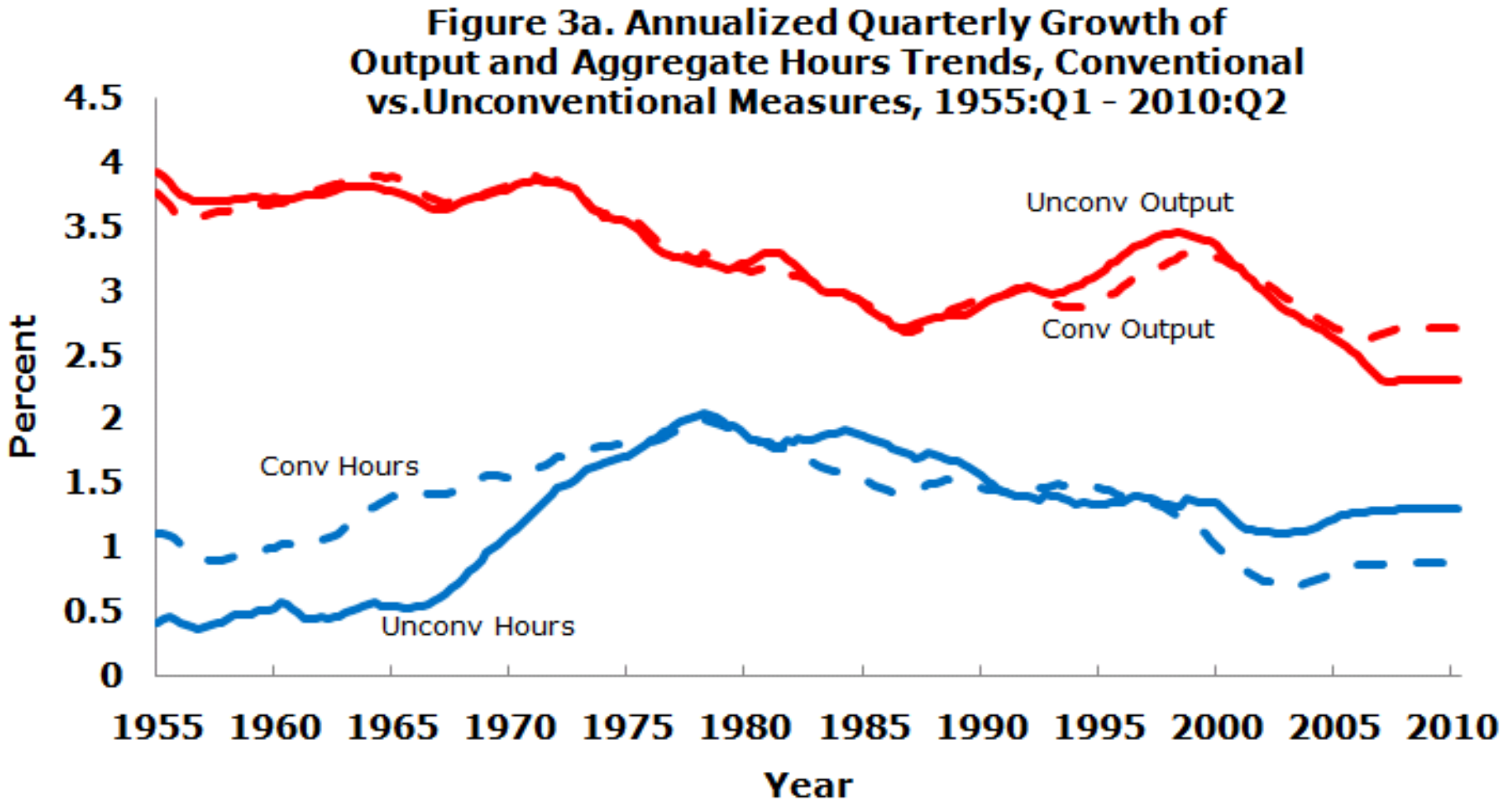
The Unemployment Gap Controls for the Cycle in Estimating the Kalman Trend



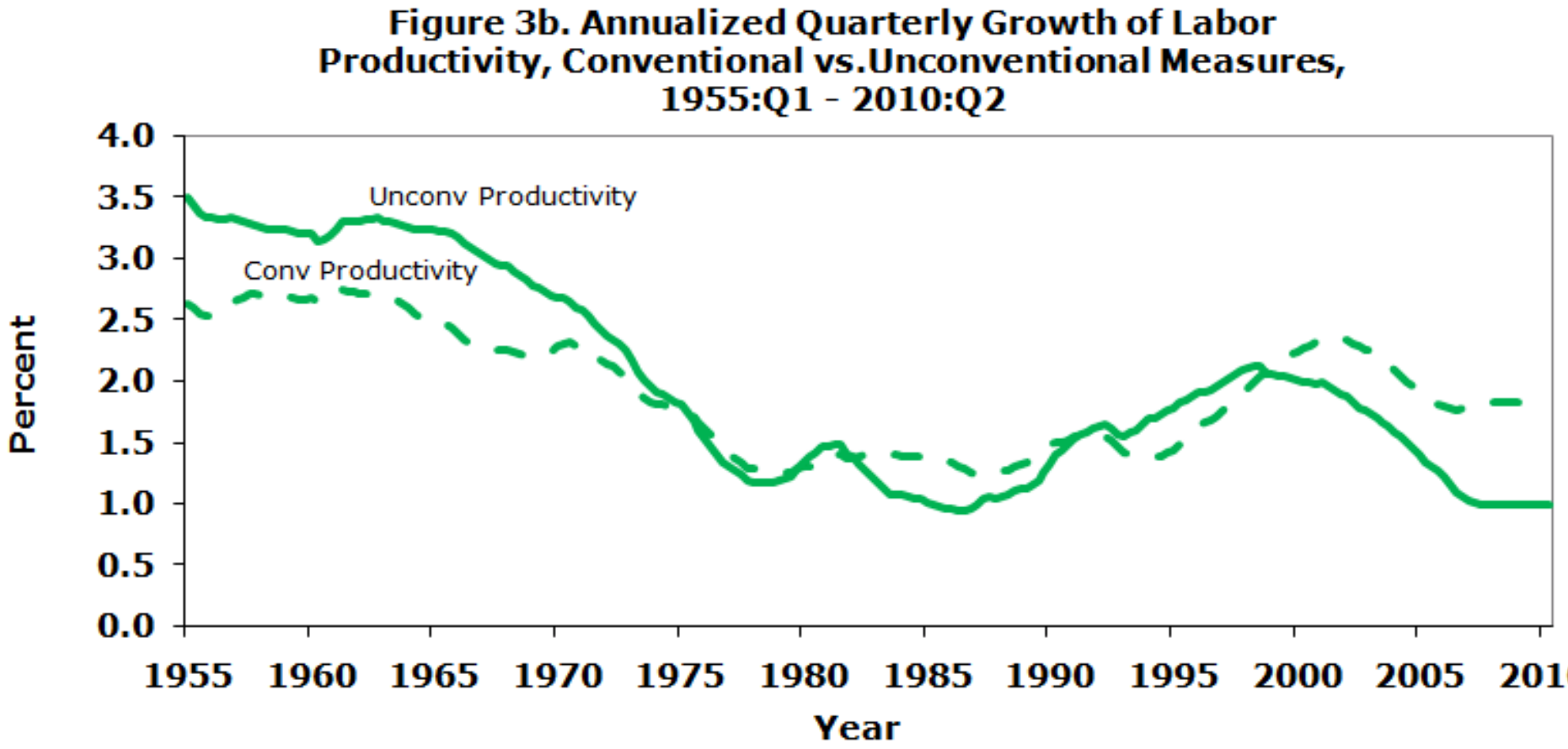
Special Problem Posed by 2008-10 Cycle

- Hours and employment gaps respond more than output gap
- The Unemployment gap drives the trend adjustment
- Estimated through 2010:Q1, the Kalman procedure thinks that output growth trend must have increased
- We avoid making judgments on 2008-10 cycle by constraining all trends as equal to 2007:Q4 values throughout 2008-10

Kalman Trends: Conv vs. Unconv Output & Hours



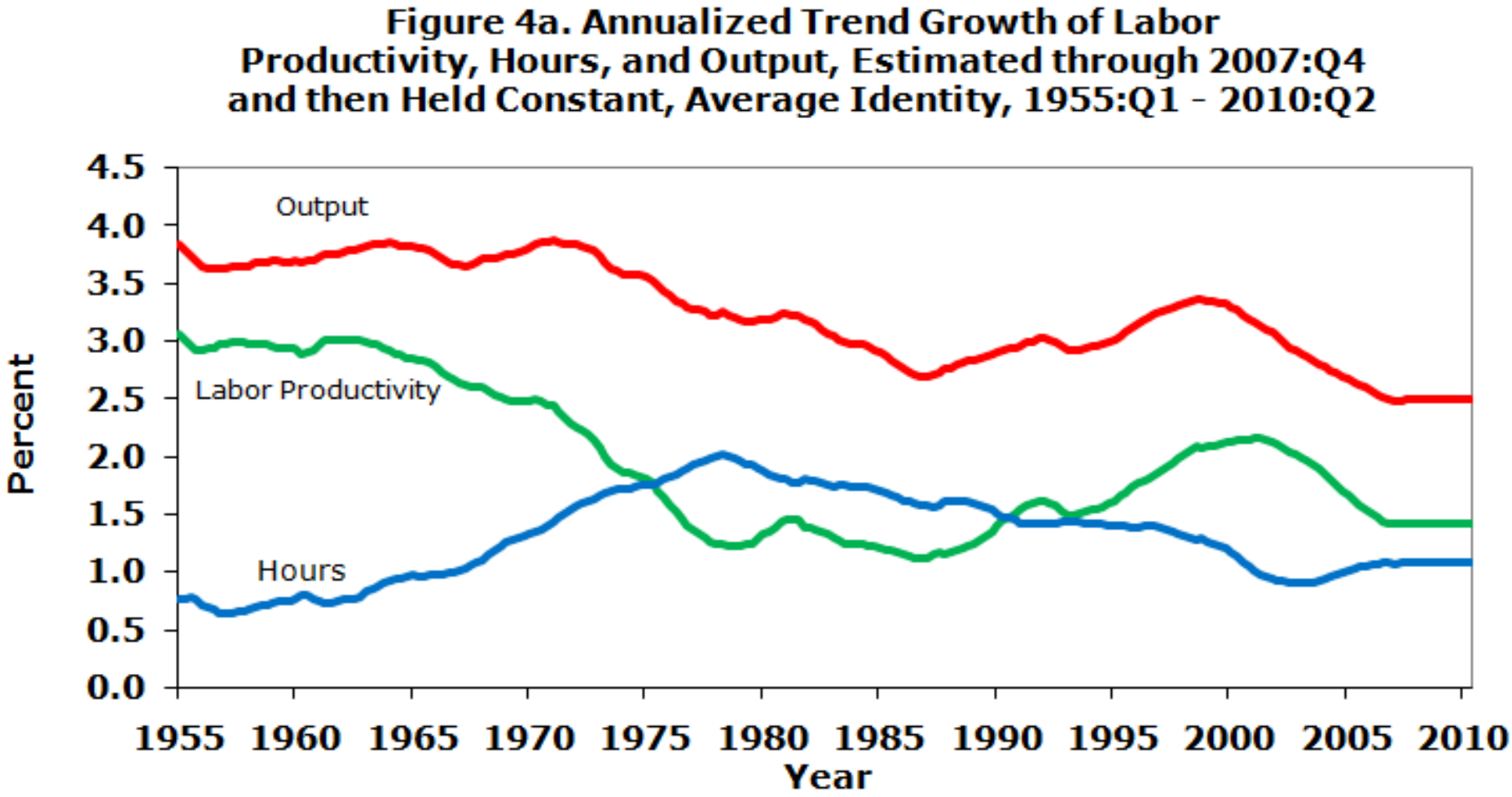
Unconventional Productivity: New Story for 1994-2007



Conventional (C) vs. Unconventional (U): Medium-run Growth Trends

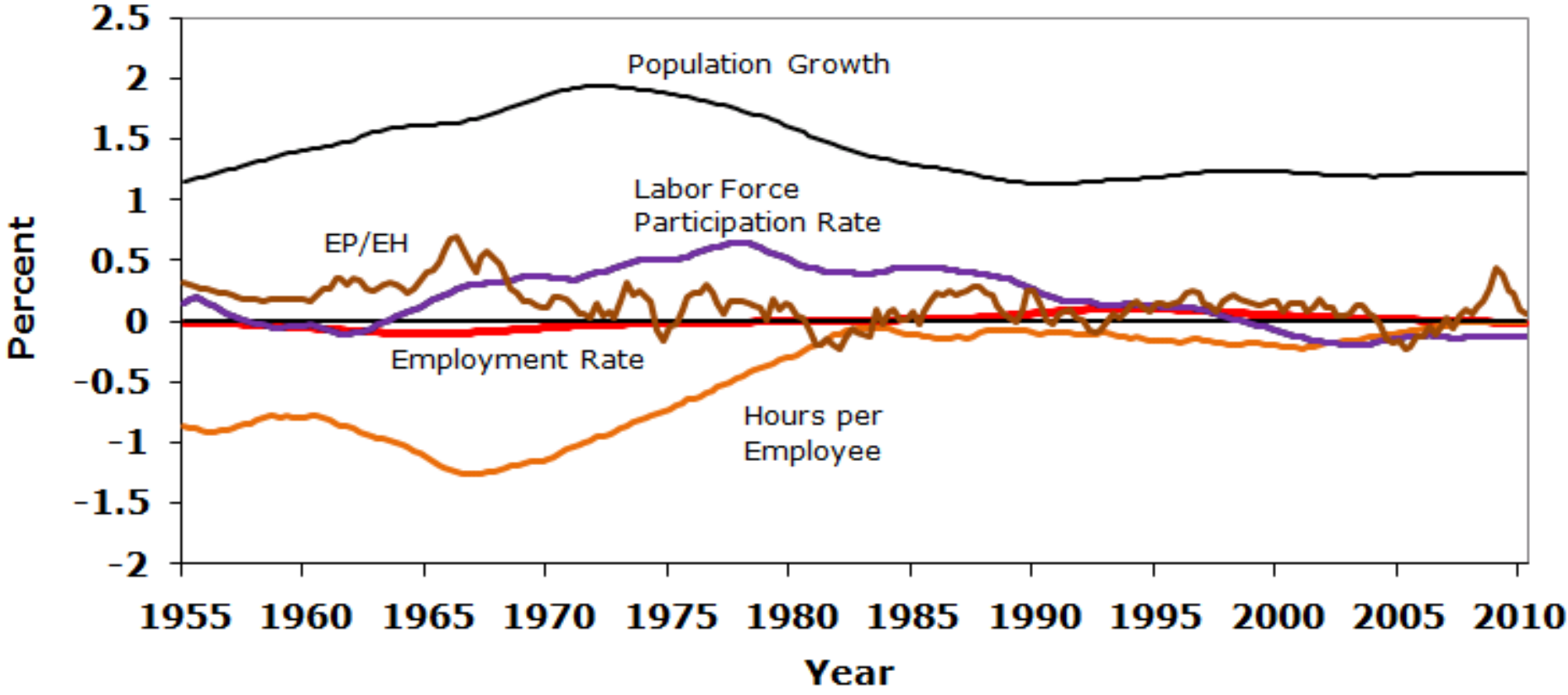
- Major findings in Table 1
- The mysterious upsurge in LP growth 2001-07 in C data does not exist in U data
- Big differences in AAGR of LP growth
- Conventional 96-01 2.11 01-07 2.13
- Unconventional 96-00 2.34 01-07 1.23

Kalman Trends for Average of Conv & Unconv



Kalman Trends: Components of Hours

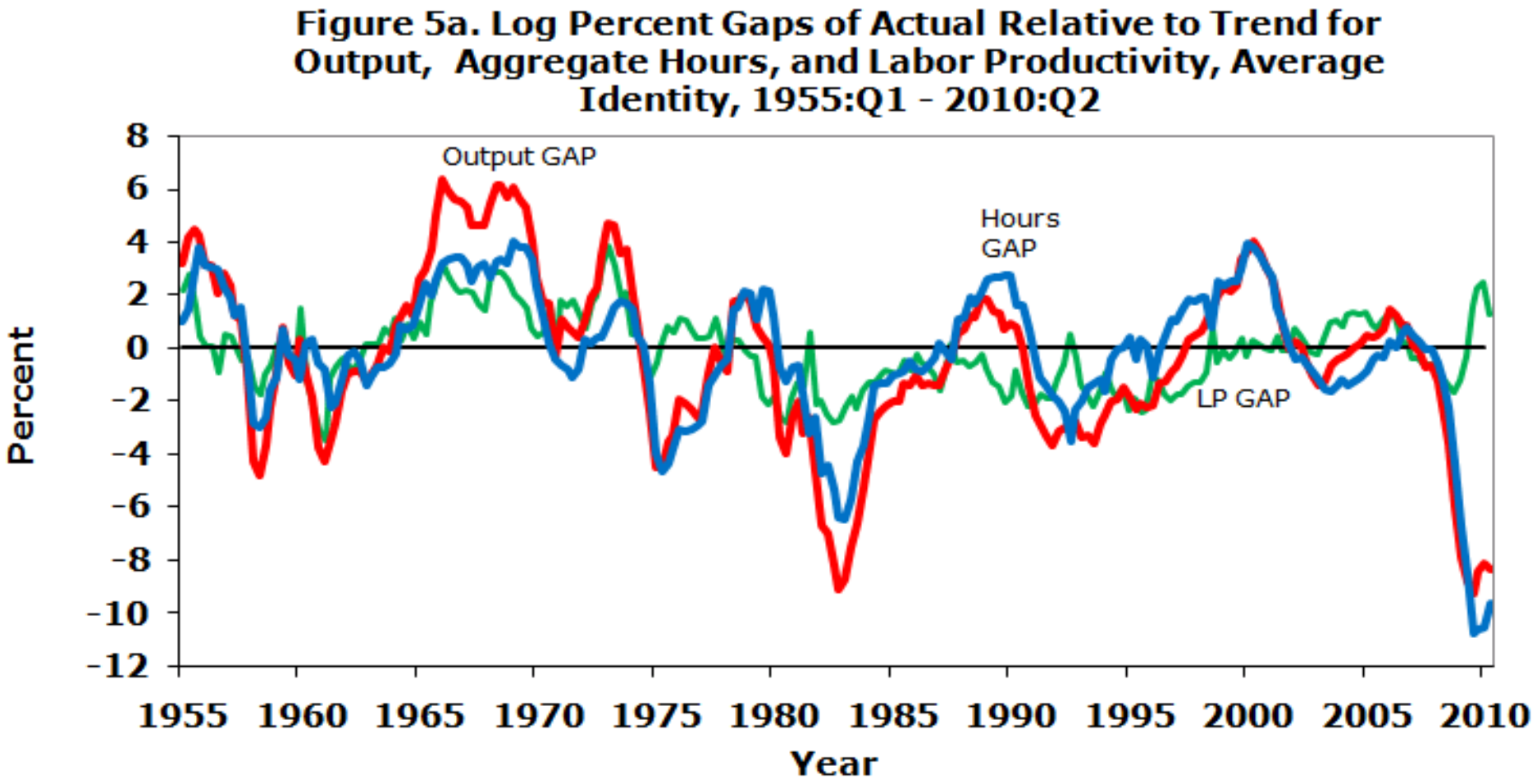
Figure 4b. Annualized Trend Growth of Hours per Employee, the Employment Rate, the Labor Force Participation Rate, and Working-Age Population, Average Identity, 1955:Q1 - 2010:Q2



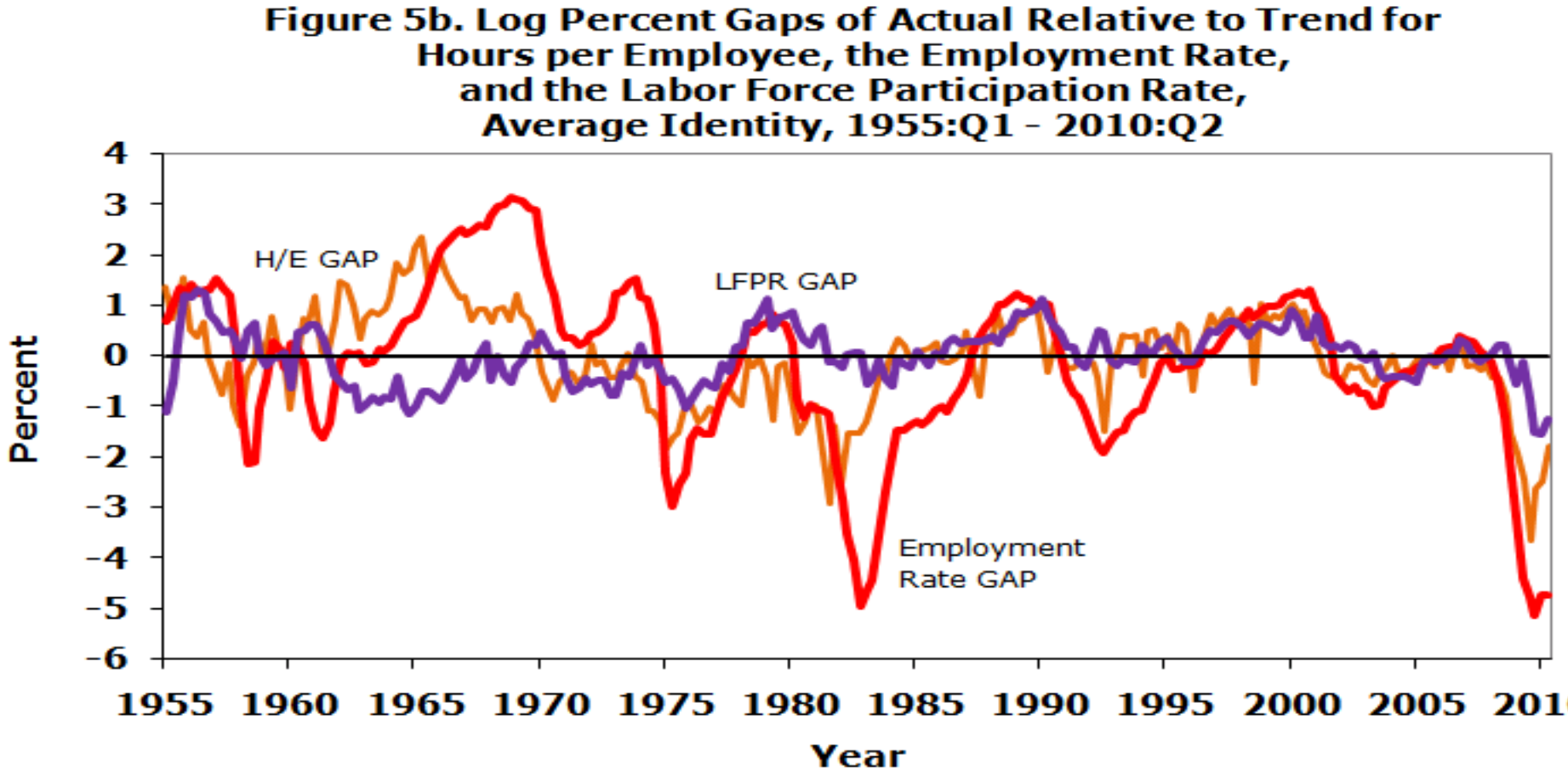
What We Learn from Cyclical Deviations from Trend (Next Slide)

- The most interesting results
  - Okun's 2/3 hours vs. 1/3 productivity result worked perfectly in late 1960s and early 1980s but almost no other time
- Most important, the 2008-09 cycle has been bigger for hours than for output, while 1980-82 was the reverse

Gaps for C & U Average: Output, Hours, Productivity



Gaps for Three Components of Aggregate Hours



Regression Analysis

- All variables expressed as *FIRST DIFFERENCES OF DEVIATION FROM TREND, i.e. Δ log gap in X*
- Changes in gaps for components of output identity explained by
  - Changes in output gap (with lags for hours & leads for LP)
  - Lagged dependent variable (lags 1-4)
  - Error correction term
  - End-of-expansion dummies
    - Not 0,1 dummies. They enter in the form 1/M, -1/N
    - These sum to zero
    - Productivity slows late in expansion
    - Constrained to be completely offset by faster productivity growth early in recovery ("Early Recovery Productivity Bubble")

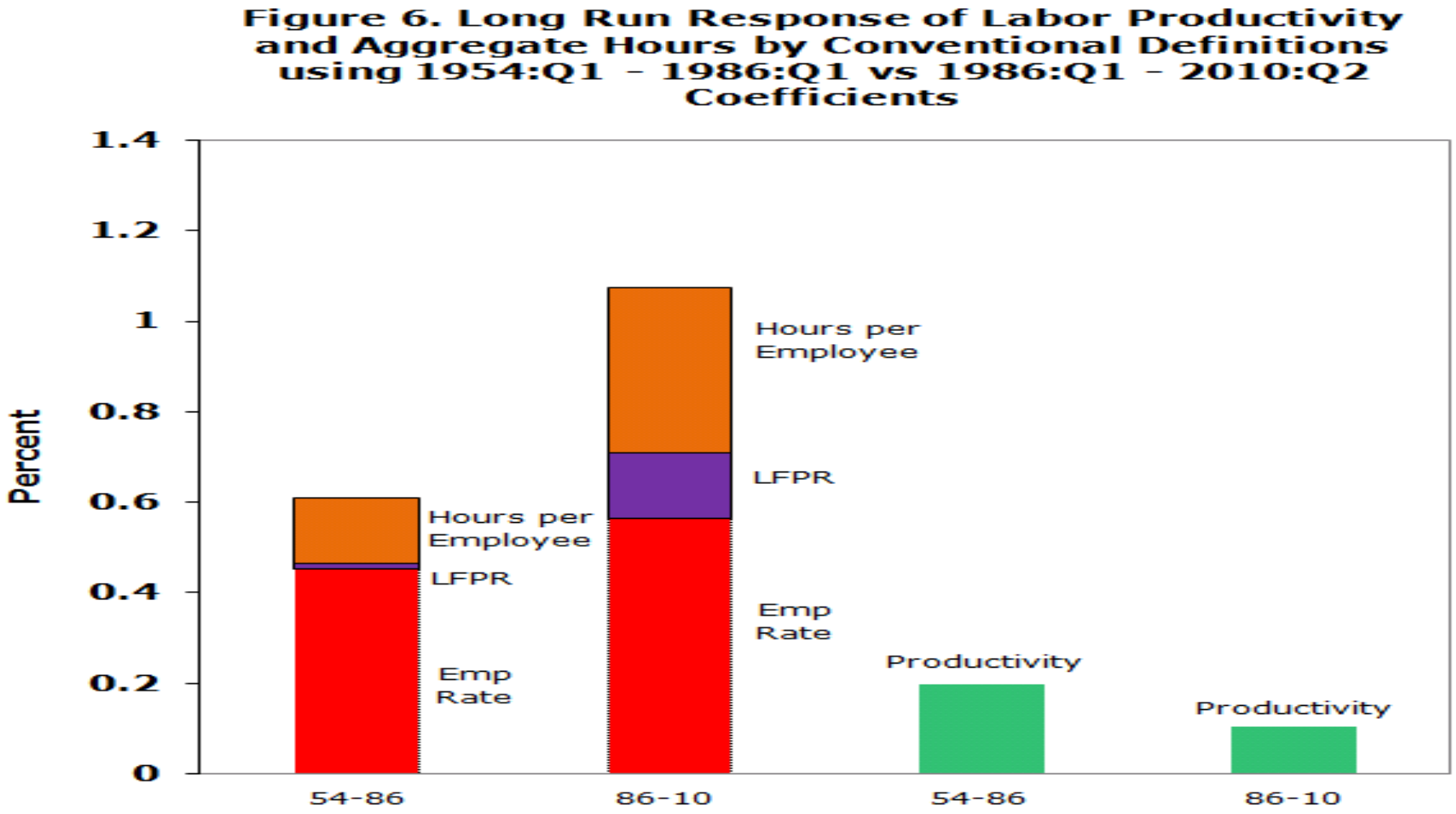
Main Regression Results, 1955-86 vs. 1986-2010

- Hours gap lags output by roughly one quarter
- Productivity leads output by roughly two quarters
- End-of-expansion dummies (8 recessions)
  - To simplify tables, constrained to be equal within subsample
  - Significant in LP equations pre and post 1986
  - Not significant in hours equation post 1986
- Split sample: 1954-86 vs 1986-2010
  - Big change in long-run responses
  - Chow tests however do not support significance of structural change
- To simplify paper, regressions are presented only for conventional concept of hours & LP

Table 2. Regressions Explaining Cyclical Deviations from Trend in Conventional Output Identity Components[a], 2007:4 Trend End

	Dependent variable, 1954:1 - 1986:1			Dependent variable, 1986:1 - 2010:2		
Independent Variable	Hours		Output per Hour[b,g]	Hours		Output per Hour[b,g]
Lagged dependent variable[c]	-0.55	**	-0.72 **	0.02		-0.54 **
Output deviation from trend[d]	1.18	**	0.37 **	1.18	**	0.13
Error correction term[e]	-0.12		-0.18	-0.25	**	-0.40 *
End-of-expansion (EOE) dummy variable[f]	1.88	**	-2.16 **	0.67		-2.49 **
Adjusted R^2	0.71		0.65	0.66		0.41
Standard error of estimate	1.81		1.76	1.45		1.62
Sum of squared residuals	388.34		367.52	182.18		228.93
Chow Test[h]				1.50		0.38
Mean Lag/Lead Response to Output Changes	0.90		-2.19	1.40		-1.70
Long Run Response to Output Changes[i]	0.76		0.21	1.20		0.09

Long-Run Responses, Before and After 1986



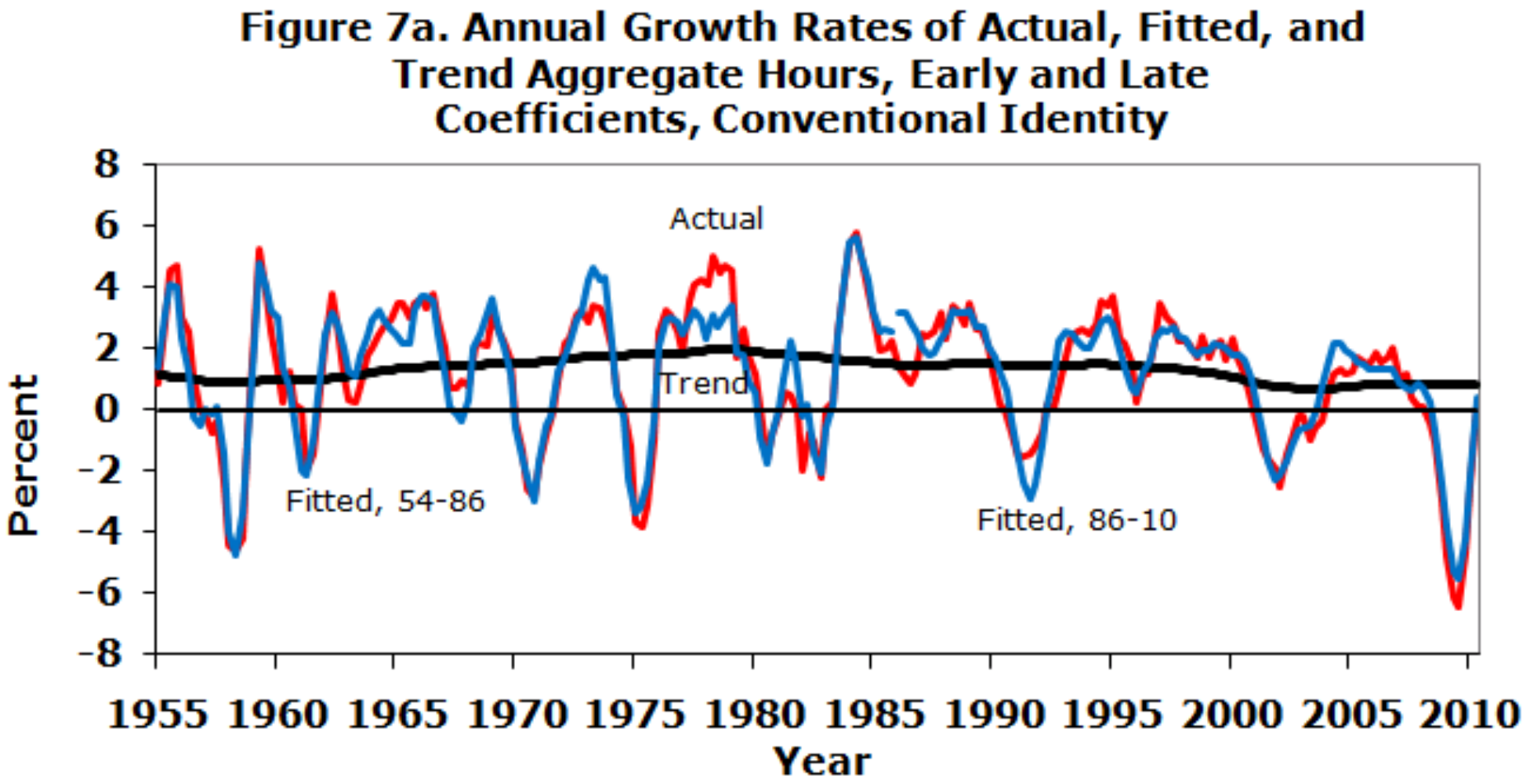
Implications of Regression Analysis

- Okun's Law is overturned, Hours now respond by >1 to output deviations, not <1
- Productivity no longer responds procyclically to output fluctuations
  - No more Okun's Law
  - No more SRIRL
  - No more RBC
  - No more procyclical productivity fluctuations as exogenous inputs in DSGE and other modern macro theories

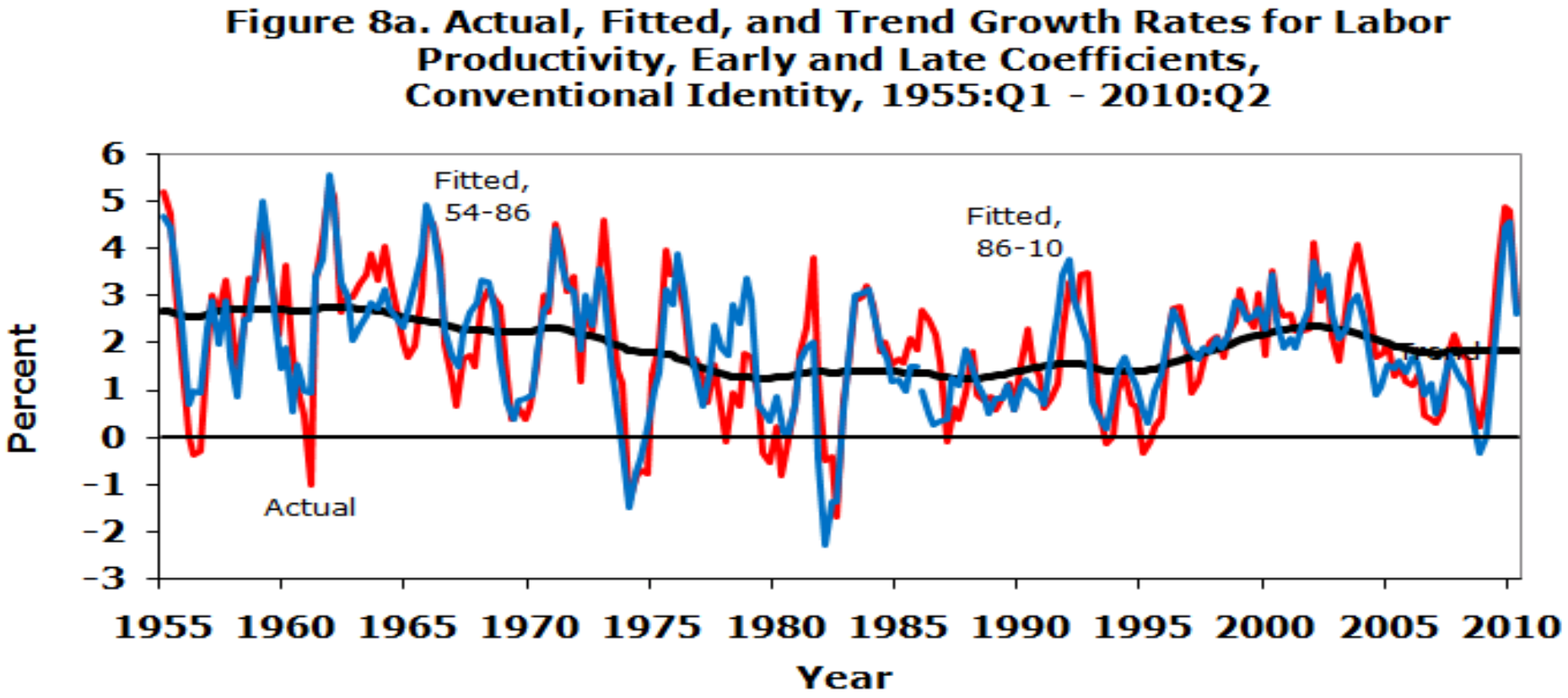
The "Early Recovery Productivity Bubble"

- On average since 1970 LP has grown 1.4 percent AAGR faster than trend in first four quarters of recovery
- 0.00 percent faster in following eight quarters
- 2002-03 was unusual because fast growth continued in the subsequent 8 quarters
- EOE effect explains about 2/3 of first four quarters
- For decomposition refer to Table 7 in paper

Actual and Fitted, Early and Late Equations for Hours



Actual and Implied Fitted for LP, Backed Out of Hours Equation



Explanatory Hypothesis: The Disposable Worker

- Explains both rise in cyclical responsiveness and of income inequality
- Ingredients in increased management power: exec pay based on stock options, sensitivity to 2000-02 and 2007-09 stock market debacles
- Stock options help explain huge increase in share of top 1% 1982-2000 and fluctuating share since then
- Increased emphasis by management on *maximizing shareholder value*

Not just Strong Management, Weak Workers

- Contributions of weak labor bargaining power the same list as the sources of increased income inequality in the bottom 90 percent
- Lower real minimum wage, reduced penetration of unions in the private sector, more imports, more low-skilled immigration

Application of this Hypothesis to 2000-04

- 2001-03, large employment response and long period of employment decline (19 months after NBER trough month, Nov 2001)
  - Output recovery was so weak that output gap got worse, not better
  - Savage corporate cost cutting (intertwined nexus of executive compensation, stock market, profit collapse)
  - Why did productivity rise so fast? Delayed spillover of ICT inventions of the late 1990s
- The savage cost-cutting hypothesis has been validated by industry cross-section results of Oliner-Sichel-Stiroh (2007)

2008-09 Responses: Similarities and Differences

- Similar: collapse of stock market and corp. profits (bigger than 2000-02)
  - Same incentive for savage cost cutting
- Different: It was much much bigger
  - Output gap widened by 5x as much
  - Apocalypse Now: Fear in late 2008 and early 2009 of another Great Depression
- For every deck chair thrown off the Titanic in 2001-02, five deck chairs were tossed over in 2008-09
- Management didn't just pick on labor costs, but also on capital investment.
  - GDPI declined at annual rate of -32% 2008:Q4-2009:Q2

Conclusions for Macro

- Changes after 1986
  - Okun's Law is Dead
  - Procyclical productivity innovations are dead
  - RBC model and "technology shocks" are no longer relevant as core determinants of business cycles
- Conventional vs. unconventional measures of output identity
  - Big puzzle why conv. LP so high 2001-04 when ICT investment had collapsed
  - Puzzle goes away with unconventional LP

Further Conclusions

- Pitfalls of detrending with univariate filters (band-pass or HP)
  - These are *always* too sensitive to the actual cycle (esp. 1980-82 and 2008-10, not to mention interwar period)
- Additional dimensions of labor market dynamics in U.S.
  - End-of-expansion overhiring
  - "Early Recovery Productivity Bubble" as firms struggle to clean up from previous overhiring

Substantive Explanation of Increased Flexibility of Labor Input

- Disposable worker hypothesis
- Based on increased managerial power, diminished worker power
- Separate causes at top and bottom
- Same set of causes that has been developed previously to explain rising U.S. inequality

Caution: What About Europe?

- NL, GE, AU: Government subsidized work sharing
- In these countries productivity has been very procyclical
- Graph drop in output gap (horizontal) vs. rise in unemployment rate (vertical)
  - U. S. is an extreme outlier
- Unified explanation of "American Exceptionalism" regarding both labor-market dynamics and rising inequality