Measuring Trends and Gaps in Real Time

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Overview

- **Motivation**
  - Why Trends and Cycles?
  - Why Measurement Error?
- **Sources of Measurement Errors**
- **Examples**
  - Output Gaps
  - Productivity Growth
  - Structural Deficits
- **Limits**
  - Some results from Spectral Analysis

Motivation

What's important for *macroeconomic* policy?

Microeconomic policy (aka *growth*) also important.

Macroeconomics cares about trends.

Critical for intertemporal budgeting.

***Aggregate* Trends**

- "Potential Output", "NAIRU", "Equilibrium"

Macroeconomics cares about cycles.

Cycle = deviation from trend

Critical for counter-cyclical policy.

How reliable are the signals for policy?

Can we improve them?

Sources of Measurement Error

1. Model Misspecification

$c = f(X)$ **instead of** $c = g(X)$

2. Parameter Uncertainty

$c = f(X, \theta)$ **instead of** $c = f(X, \Theta)$

3. Measurement Error

$c = f(\tilde{X}, \theta(\tilde{X}))$ **instead of** $c = f(X, \Theta)$

4. Forecast Error

$c = f(\bar{\tilde{X}}, \theta(\bar{\tilde{X}}))$ **instead of** $c = f(X, \Theta)$

Stark has talked about $\tilde{X}$ **vs.** X**.**

Tetlow will talk about $f(.)$ **vs.** $g(.)$

Model Misspecification

Orphanides and van Norden 2002 Figure 1.

Figure 1

Real-Time Estimates of the Business Cycle

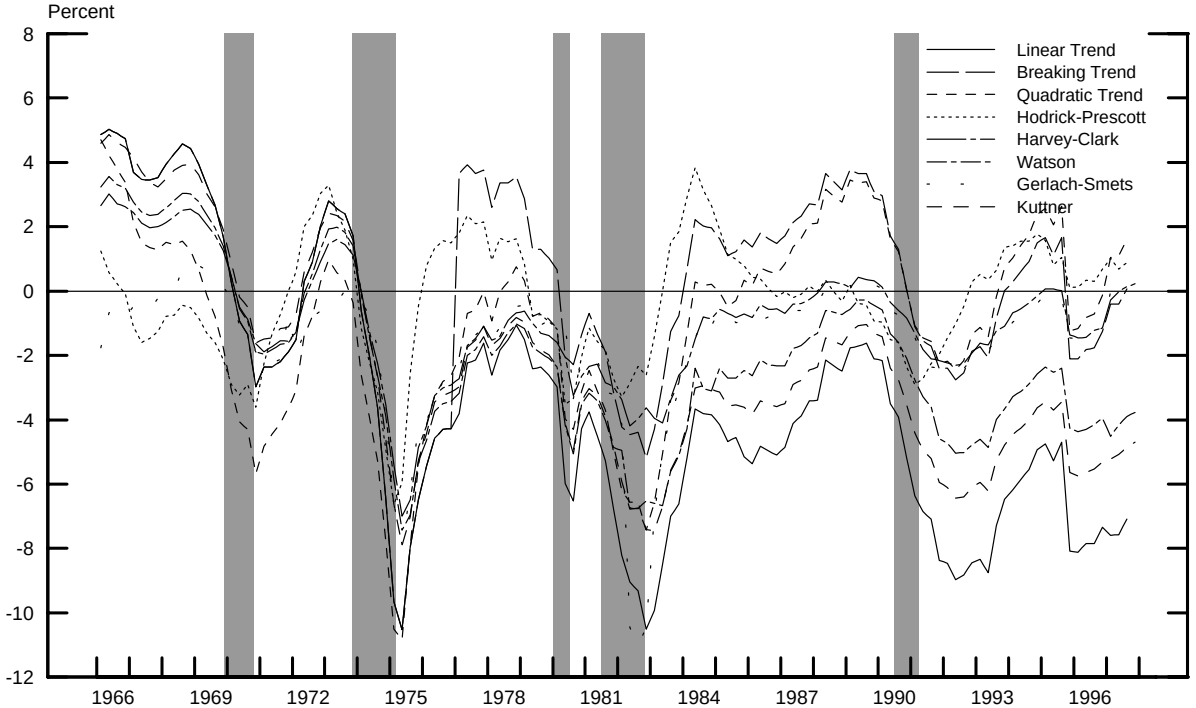


Figure 2

Total Revision in Business Cycle Estimates

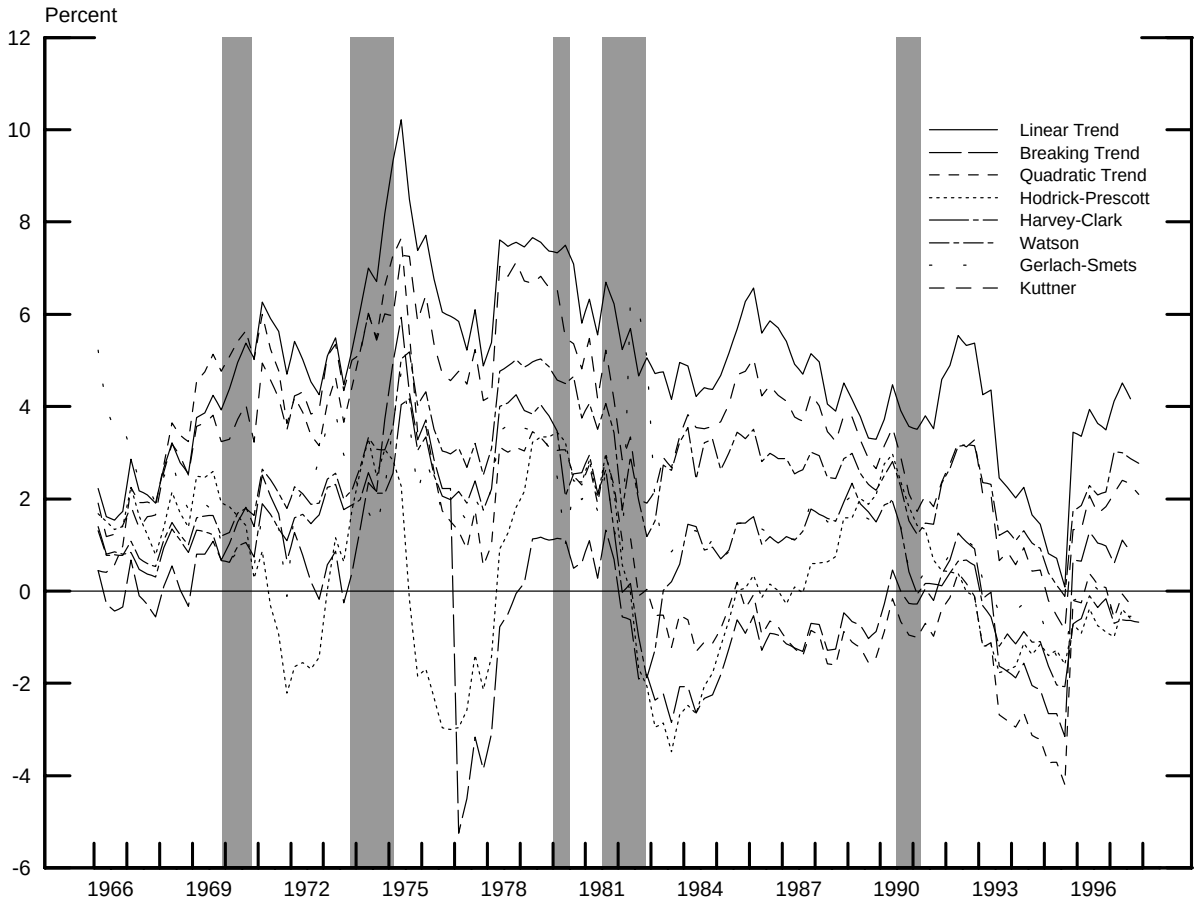


TABLE 3.—SUMMARY RELIABILITY INDICATORS

Method	*COR*	*NS*	*NSR*	*OPSIGN*
Hodrick-Prescott	0.49	1.10	1.11	0.41
Breaking trend	0.82	0.69	0.69	0.22
Quadratic trend	0.58	0.97	1.07	0.35
Linear trend	0.89	0.47	1.32	0.49
Watson	0.89	0.49	1.17	0.42
Kuttner	0.88	0.48	1.09	0.49
Harvey-Clark	0.77	0.64	0.84	0.34
Gerlach-Smets	0.75	0.73	1.11	0.41

The table shows measures evaluating the size, sign, and variability of the revisions for alternative methods. *COR* denotes the correlation of the real-time and final estimates (from Table 1). *NS* denotes the ratio of the standard deviation of the revision to that of the final estimate of the gap. *NSR* denotes the ratio of the root mean square of the revision to the standard deviation of the final estimate of the gap. *OPSIGN* denotes the frequency with which the real-time and final gap estimates have opposite signs.

Forecast and Measurement Error

Orphanides and van Norden (2002)

Figure 2.

Table 3.

Policy Implications

Orphanides and van Norden (2005)

- No evidence that such gaps help forecast inflation.

Orphanides

- The Great Inflation was caused by trend mismeasurement, not “wimping out.”

This is not primarily a data measurement problem.

This is a forecast error problem.

Fiscal Surveillence

Central Role in EMU via SGP & EDP

European Commission assessments use EcoFin's Cyclically-Adjusted Balance

- Revisions to Estimates of Cycles
- Revisions to Government Fiscal Estimates

Hughes Hallet, Kattai, Lewis (2007)

Compare "Real-Time" and "Final Estimates" of CAB.

- OECD Estimates

Figure - Appendix F

- Revisions to both components matter.

Table 3 - revisions persist, but vary across countries.

False Alarms are more numerous than True Alarms.

Appendix F. Real time CAB *vs ex post* CAB

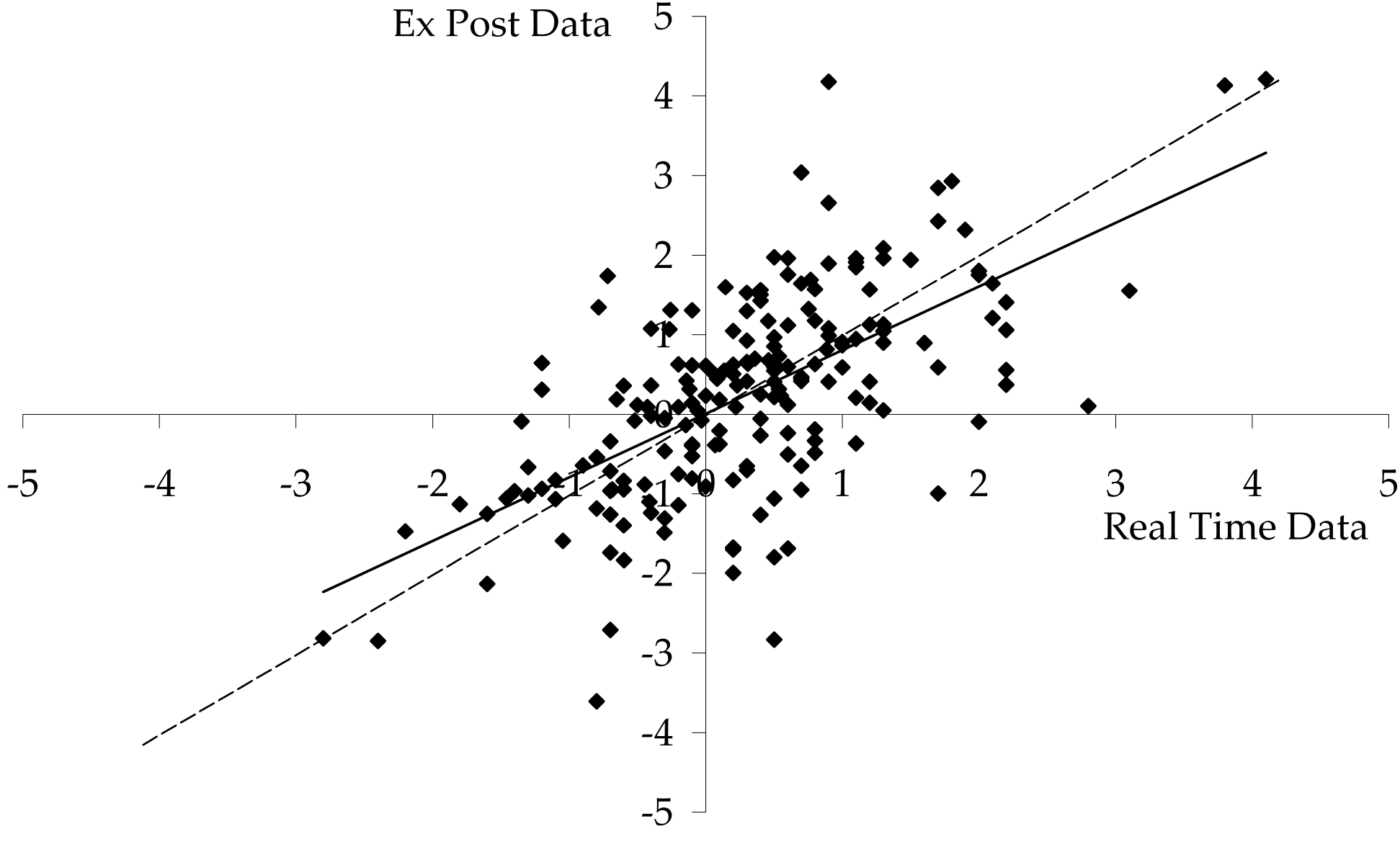


Table 3: Revisions in OECD's CAB estimates: RMSE

s=	0	1	2	3	4	Mean
Australia	1.04	0.72	0.87	0.78	0.48	0.78
Austria	0.91	0.86	0.75	0.58	0.34	0.69
Belgium	0.57	0.33	0.43	0.68	0.54	0.51
Canada	1.27	1.02	0.78	0.67	0.40	0.83
Denmark	1.58	1.62	1.53	1.41	1.28	1.49
Finland	2.18	1.83	1.70	1.11	0.53	1.47
France	0.52	0.50	0.38	0.40	0.17	0.39
Germany	0.94	0.73	0.54	0.36	0.21	0.56
Greece	3.06	2.70	2.72	2.10	1.54	2.42
Ireland	2.05	1.08	0.94	0.93	0.84	1.17
Italy	1.56	1.01	0.63	0.49	0.30	0.80
Japan	1.94	1.56	1.12	0.85	0.71	1.23
Netherlands	1.30	0.95	0.45	0.30	0.51	0.70
Norway	2.13	1.17	0.35	0.82	0.35	0.96
Portugal	2.05	1.49	1.04	0.80	0.50	1.18
Spain	0.83	0.80	0.97	1.16	0.88	0.93
Sweden	1.55	1.52	1.39	1.35	1.04	1.37
United Kingdom	0.96	0.46	0.31	0.26	0.12	0.42
United States	0.53	0.49	0.50	0.51	0.42	0.49
Mean	1.38	1.09	0.95	0.82	0.60	0.97

Source: OECD *Economic Outlook* 58-78, authors' own calculations.

The Gordon Problem

What about Productivity Growth?

Data revisions look important.

- unpublished figure.

Difficulty in detecting changes in trend.

- van Norden (2006) Figures 7A, 9A

GAUSS Fri May 27 09:00:33 2005

Output per Person—Hour
US Non—Farm Business Sector

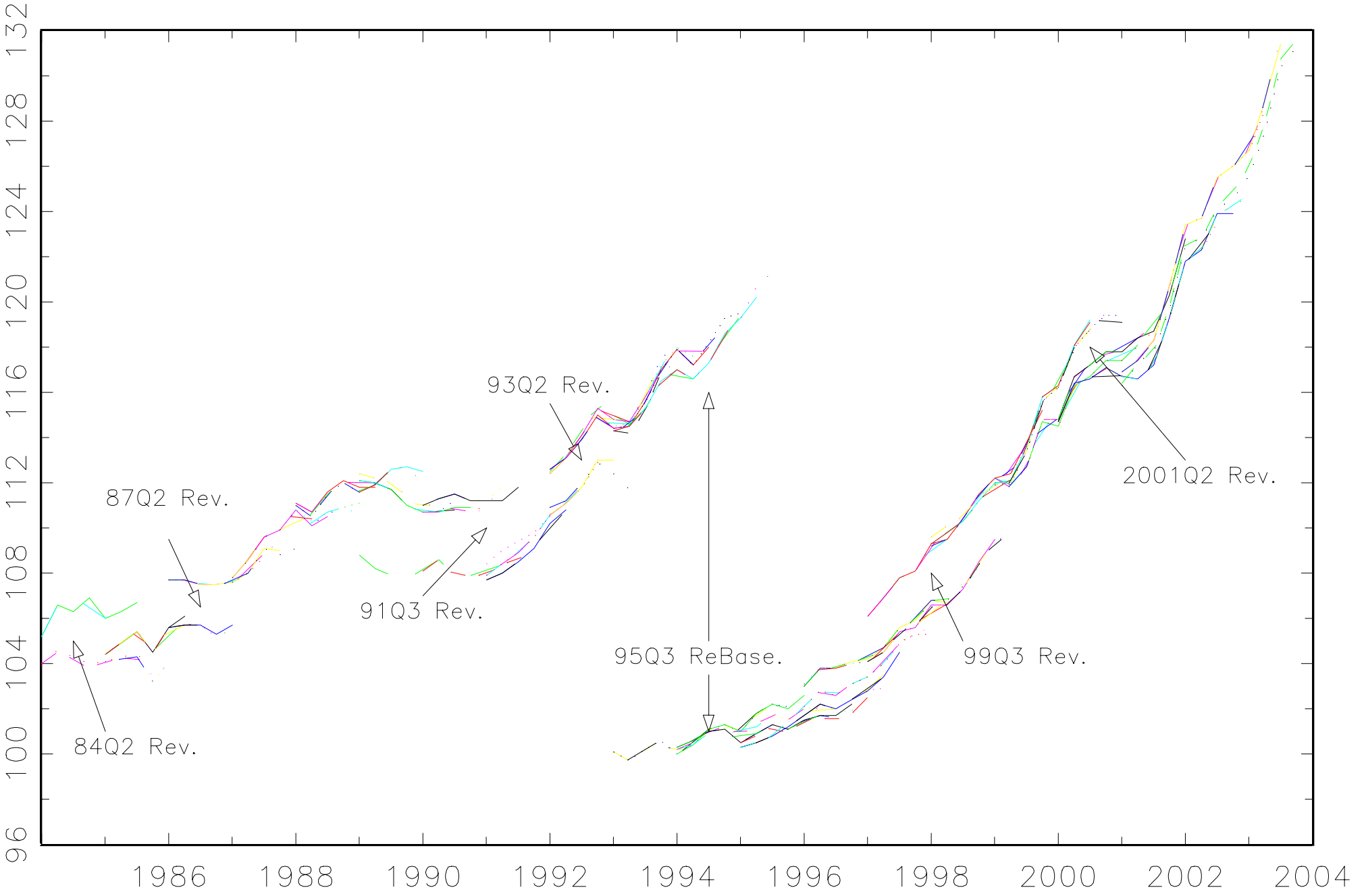


Figure 7A - End of Sample Breakpoint Tests
RealTime - US Output per Hour - Non Farm Business

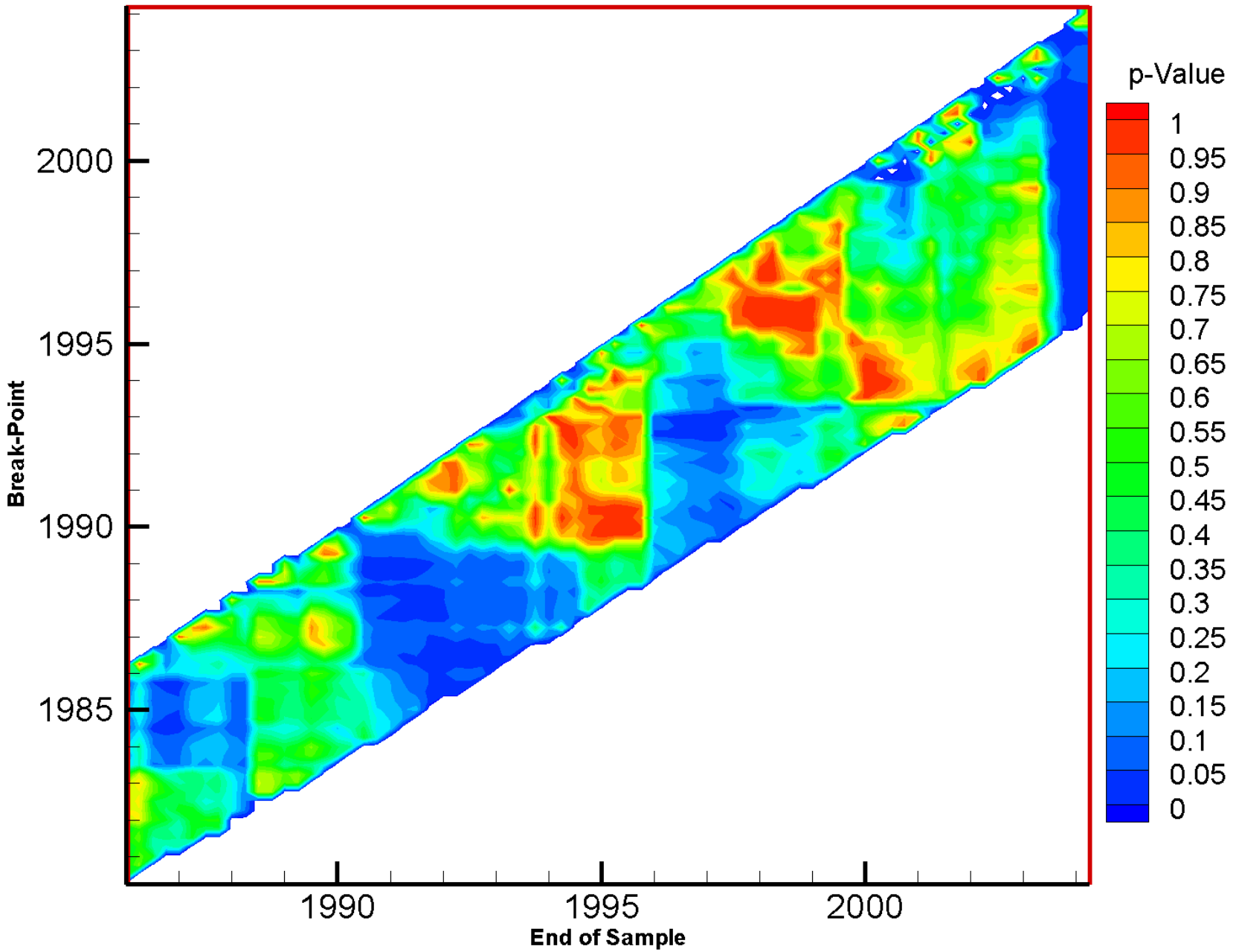
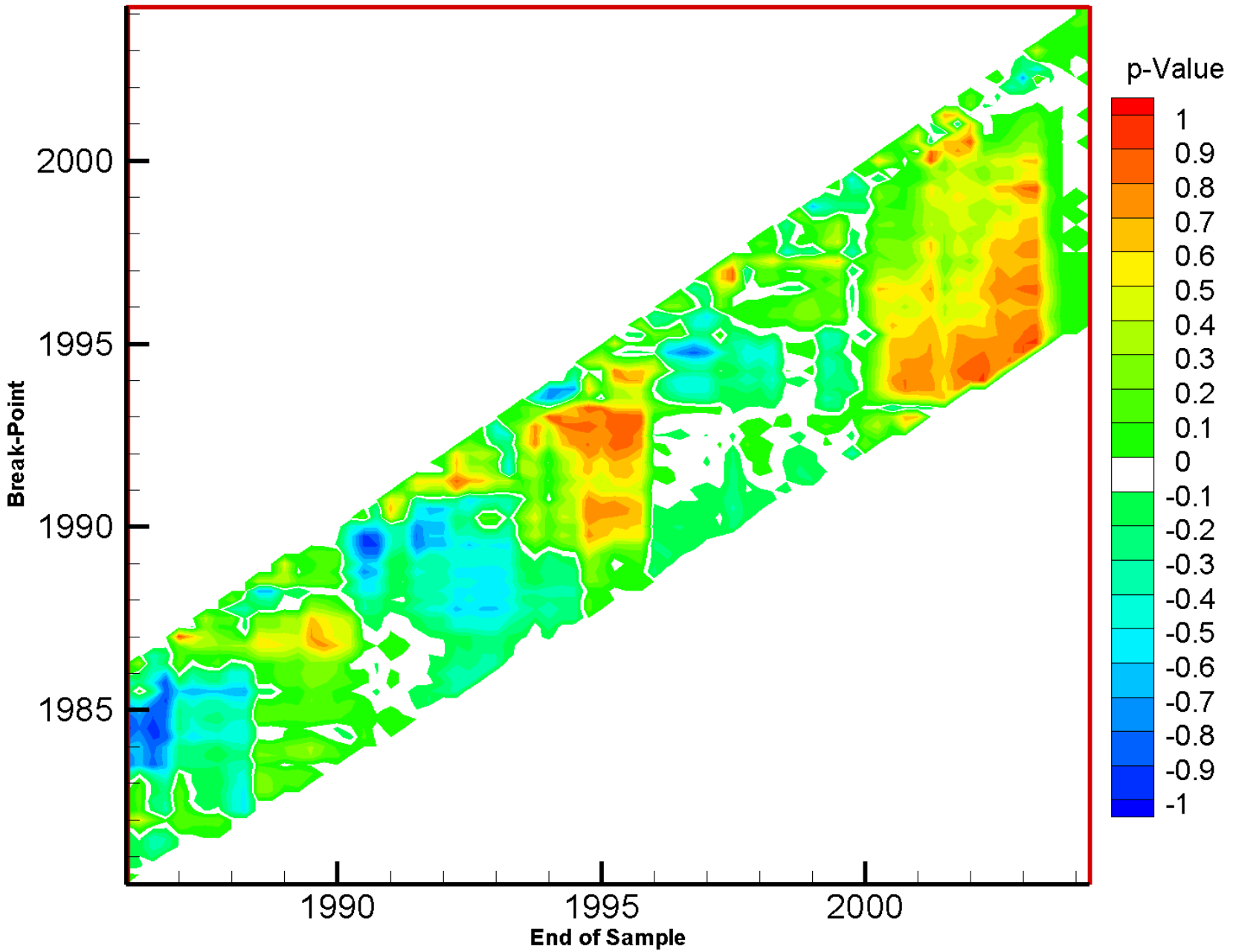


Figure 9A - End of Sample Breakpoint Tests
RealTime - Final p-values



Limits of Accuracy

1. Assume that we want a frequency-based measure of trends (or cycles.)

- **Burns and Mitchell, Stock and Watson.**
- **This is not an innocuous assumption.**

2. Ignore all data measurement error.

Optimal (MSE) estimates only depend on

- **1) The frequencies that we want to isolate.**
- **2) Available data + optimal forecasts of missing obs.**

Better Measurement of Trends & Gaps

Hard Choices

1. Change the definition of what we're trying to measure.

Ignore the frequency-based approach.

- "Structural" Models?
- "Factor" Models?
  - Giannone's remarks

2. Forecast Better.

That's hard.