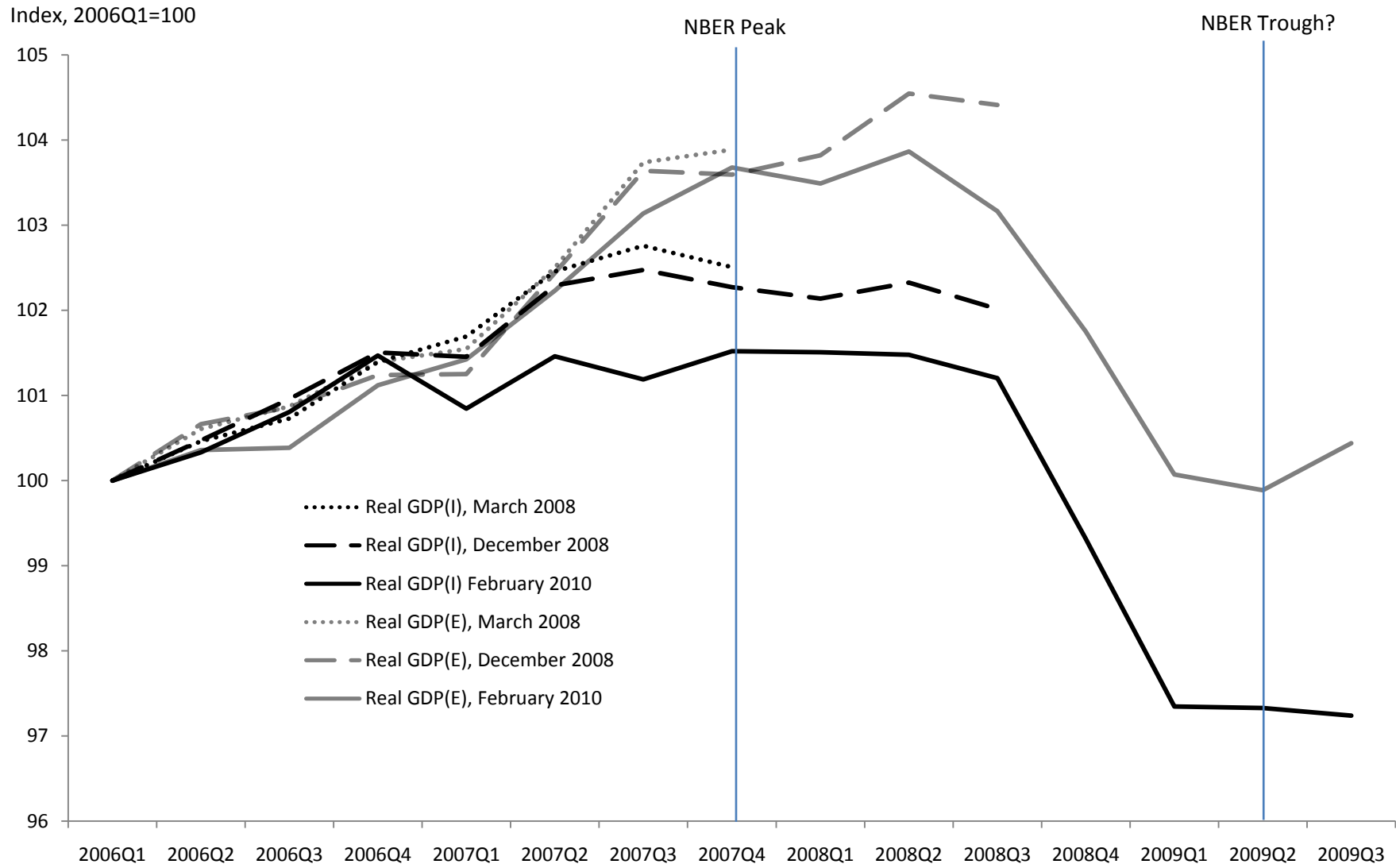


The Income- and Expenditure-Side Estimates of U.S. Output Growth

- GDI sounds like something different than GDP, but absent measurement error, they are equal.
- To make clear that the estimates measure the same thing, we will call the income-side estimates GDP(I), and the expenditure-side estimates GDP(E).
- Paper compares both the initial estimates released a couple months after each quarter closes, and the latest estimates that have passed through numerous revisions.
- Bottom line: statistical evidence strongly supports notion that GDP(I) is at least as good a measure of output as GDP(E).
- Why should we care? There are sizable cyclical differences between the estimates, especially lately: Figure 8.

Figure 8: Behavior of Real GDP(E) and Real GDP(I) Estimates over the Most Recent Downturn

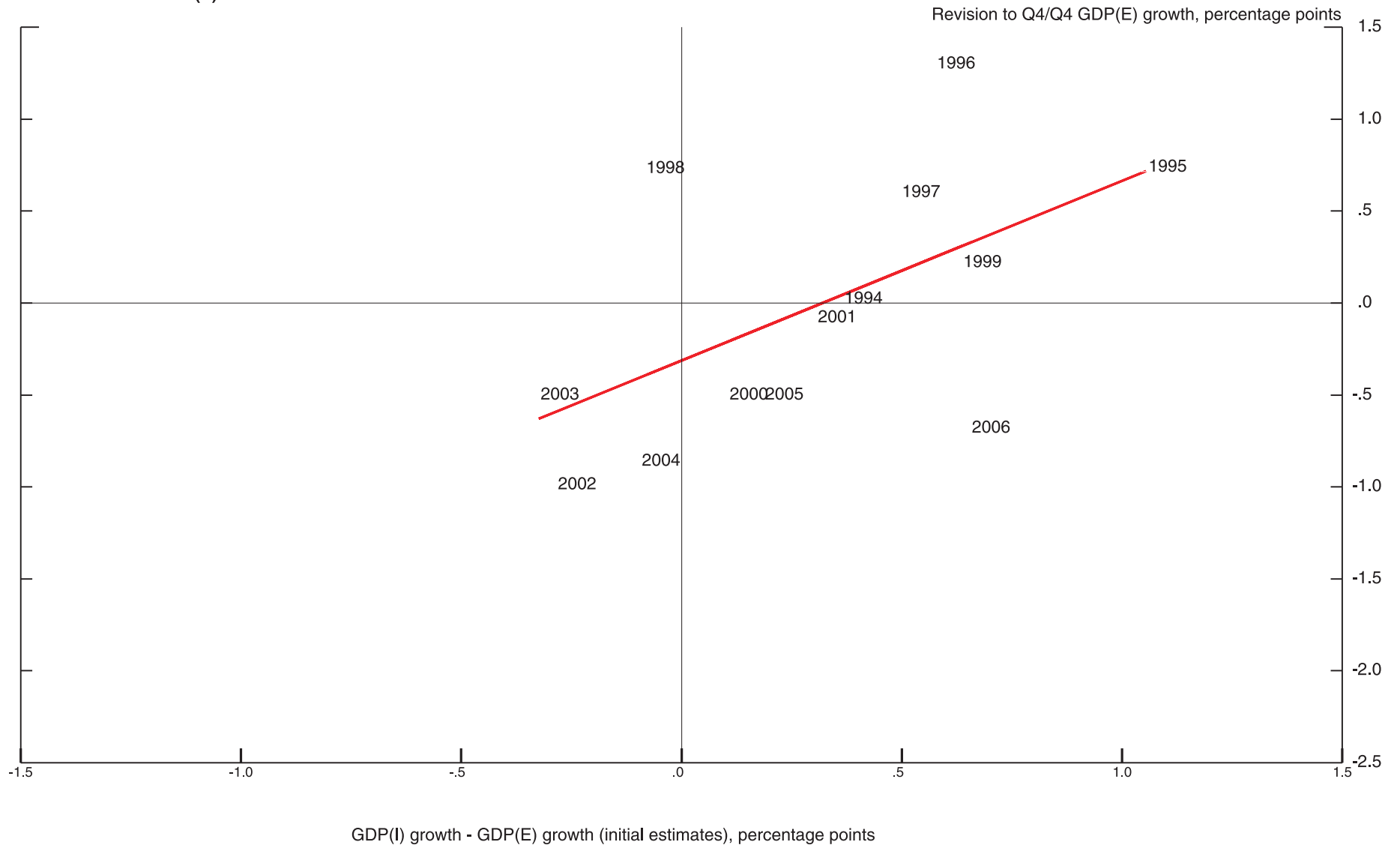


Initial Estimates

- Initial GDP(I) released with a lag: for a month or two, GDP(E) is only game in town.
- After initial GDP(I) growth released, its variance exceeds the variance of initial GDP(E) growth. How is this possible if 63% percent of GDP(I) is trended, compare to only 23% of GDP(E)?
- Initial estimates are highly correlated (0.90 from mid-1980s to mid-2000s).
- But there are important divergences, and lots of statistical evidence suggests GDP(I) is the better estimate:
- 1. Revisions: since mid-1990s, initial GDP(E) growth revises towards initial GDP(I) growth. GDP(E) missed:
 - strength of growth in mid-to-late 1990s
 - sluggishness of recovery after 2001 recession.

Figure 3

Revisions to Real GDP(E) Growth



Initial Estimates

- 2. Regressions: Find tie-breaker variables Y not used in the construction of either estimate, and regress:
$$Y = \beta_E \Delta GDP(E) + \beta_I \Delta GDP(I) + U.$$
 Over past 30 years, β_E insignificant, but β_I significant, for all these Y :
 - Unemployment rate change in current and subsequent quarters
 - Employment growth (household survey) in current and subsequent quarters
 - ISM purchasing managers index in current and subsequent quarters
 - Stock price changes over prior quarters
 - Yield curve slope in prior quarters
 - Output growth next quarter (measured any way)
 - and SPF forecasts of GDP(E) growth from current and prior quarters!

Initial Estimates

- Two most likely interpretations of tie-breakers:
 - GDP(E) growth driven out of regression because it is noisier.
 - GDP(E) growth misses fluctuations in “true” output that appear in GDP(I) growth and all these other variables.
- Both estimates suffer from missing data for some components, sampling errors, survey non-response, and lack of timely incorporation of firm births and deaths. Why is GDP(I) growth better?
 - Services: lack of official expenditure data for much of services over most of this sample.
 - BLS employment and income data might be better than Census expenditure data—larger and more representative samples, higher response rates, and better corrections for firm births and deaths (perhaps facilitated by QCEW).

Latest, Revised Estimates

- There are currently very sizable cyclical differences from mid-1980s to present. GDP(I) grows faster in periods of robust growth, and slower in recessions and periods of sluggish growth around recession: see Figures 5 and 6.

Figure 5:
1985Q1 to 2009Q3 Year-Over-Year Growth Rates of Real GDP(E) and Real GDP(I) Growth,
Latest Available data as of February 2010

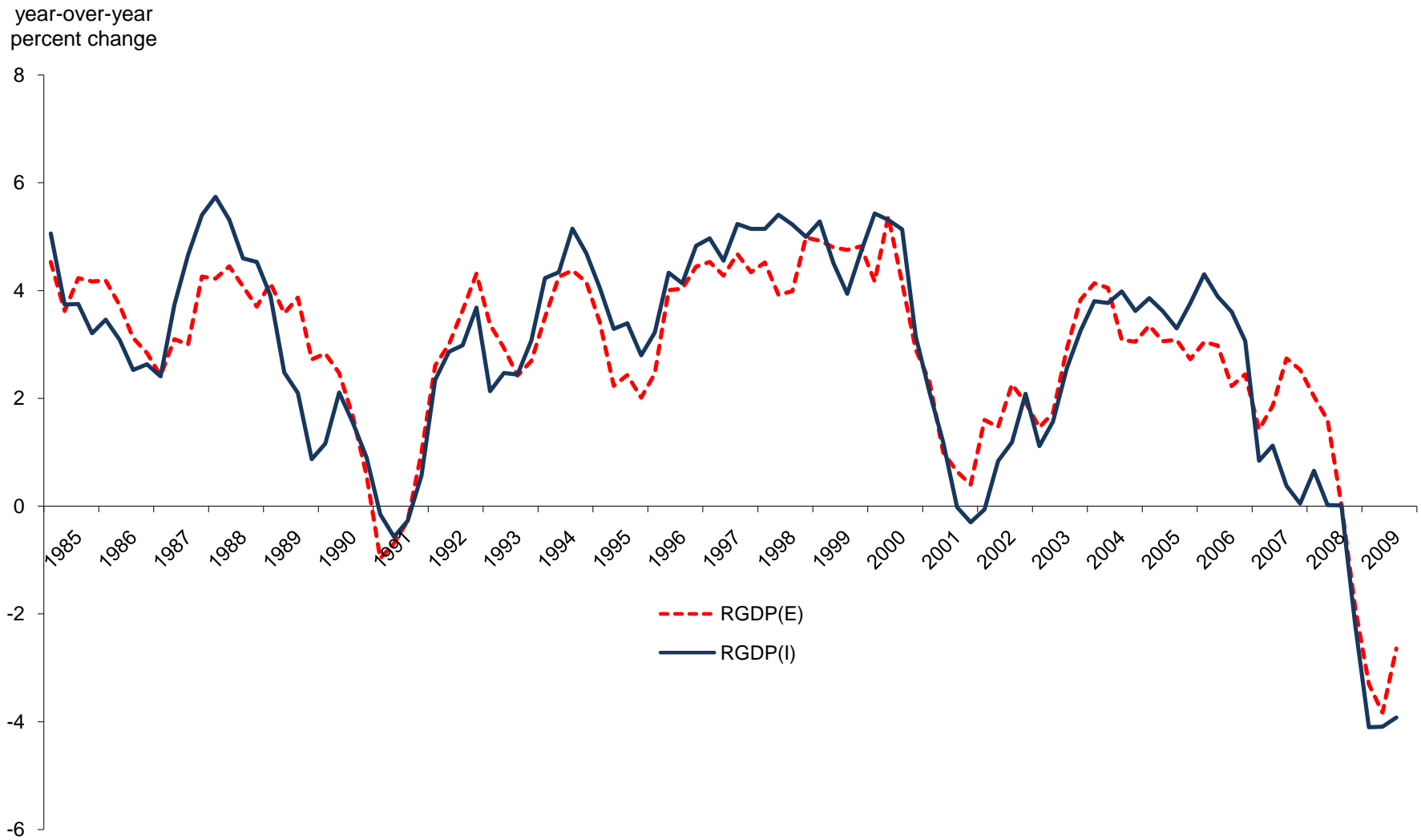
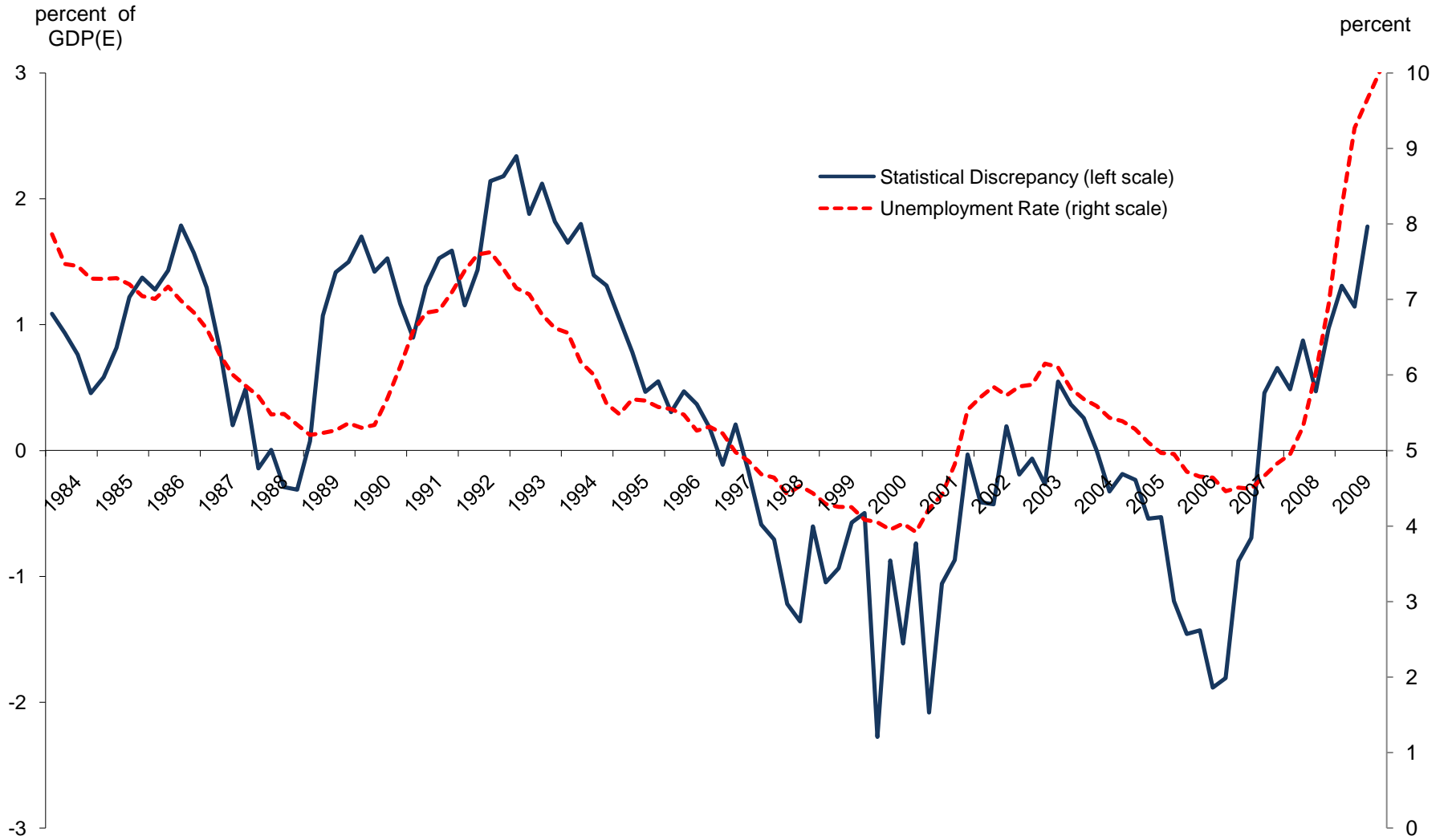


Figure 6:
Statistical Discrepancy and Unemployment Rate, 1984Q1 to 2009Q3,
Latest Available data as of February 2010



Latest, Revised Estimates

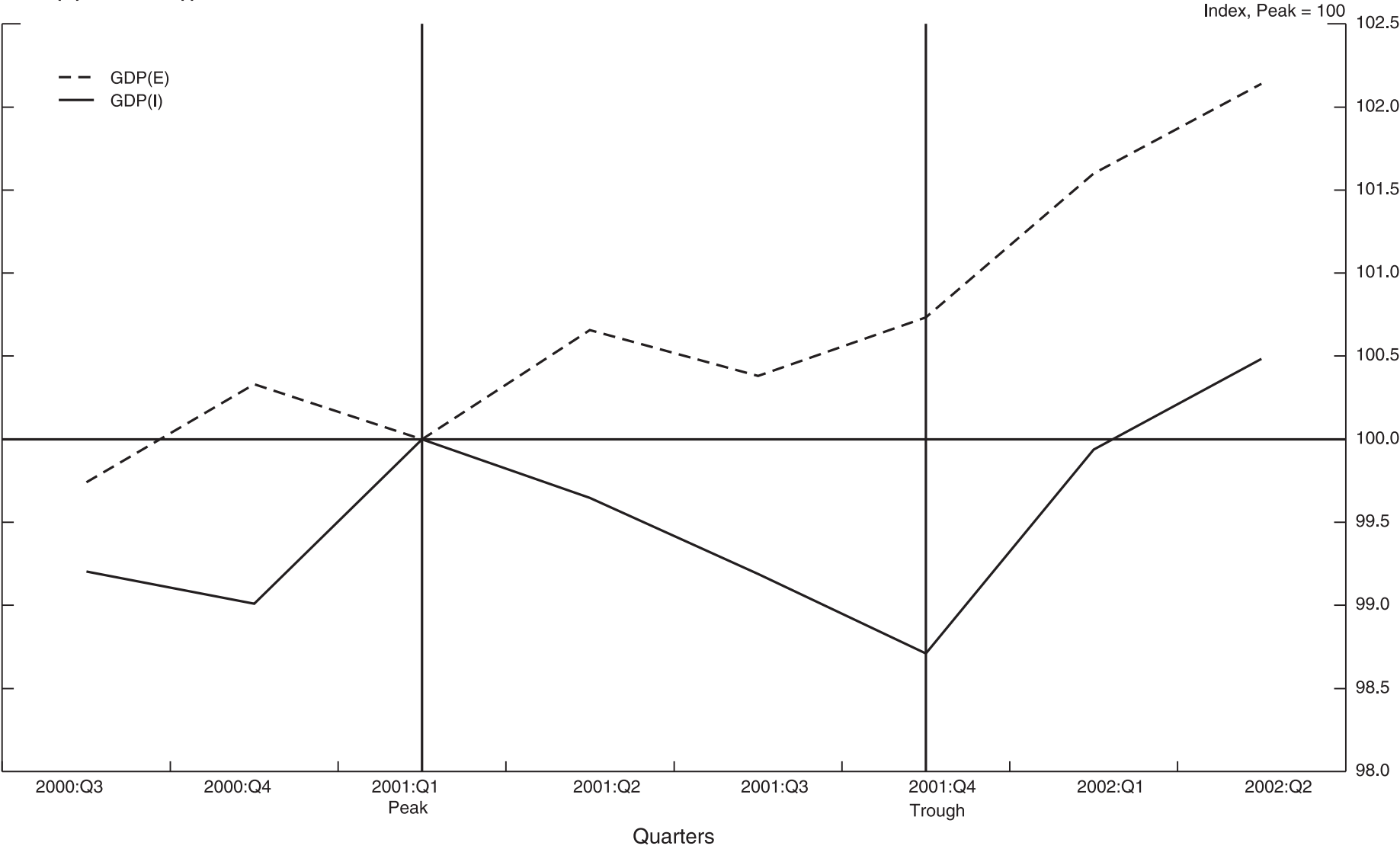
- Why might GDP(E) miss part of the business cycle?
 - Services: lack of official expenditure data for much of services over most of this sample.
 - Construction estimates: could be smoothed more in GDP(E); poor data on residential improvements (small sample from consumer expenditure survey → BEA takes 3-year moving average).
 - Nothing like income-side QCEW (quarterly census of employment and wages, covering a large fraction of variability of output) on expenditure side.
- Why might GDP(I) be too cyclical? Stock option treatment might be inconsistent in quarterly data (profits vs. compensation), but not annual. Capital gains and losses may enter GDP(I) through misreporting as ordinary income in tax data, but aren't capital gains taxed at a lower rate than ordinary income?

Latest, Revised Estimates

- Counterintuitively, the estimates diverge with revisions, with their cyclical correlation falling from 0.90 to 0.60. This provides the first clue that GDP(I) is the better estimate:
- Revisions to GDP(I) growth are larger, on average, adding more variation and cyclical variation (see Nalewaik FEDS, 2007-23).
 - If we assume the revisions improve the estimates (as the BEA does), then bigger revisions improve GDP(I) more than GDP(E) (see Fixler and Nalewaik, FEDS 2007-34).
 - Revisions add some news—cyclical variability in “true” output growth—to GDP(I) but not GDP(E), implying latest, revised GDP(E) does not pick up some business cycle fluctuations. For example, the 2001 recession.

Figure 7c

GDP(E) and GDP(I): 2001 Recession



Latest, Revised Estimates

- Use tie-breaker variables to test whether GDP(E) growth misses cyclical fluctuations in “true” output growth that appear in both GDP(I) growth and the tie-breakers—Nalewaik FEDS 2008-15.
- Using mid-1980s to 2006 sample (so all observations have passed through the BEA’s three annual revisions), all the tie-breakers were more correlated with GDP(I) growth than GDP(E) growth, using annual or quarterly frequency data. Next two slides show annual results (so stock options are not an issue).

Explanatory Variable	Adjusted R^2		β		p-val., equal β s
	$GDP(I)_t$	$GDP(E)_t$	$GDP(I)_t$	$GDP(E)_t$	
$\log(SP500_t/SP500_{t-1})$	0.18	0.19	5.58 (2.32)	4.64 (1.44)	0.30
$\log(SP500_{t-1}/SP500_{t-2})$	0.27	0.13	6.50 (1.51)	3.94 (1.43)	0.00
$r_t^{HYcorporate} - r_t^{Treas.(7yr)}$	0.58	0.39	-0.74 (0.10)	-0.50 (0.11)	0.00
$r_{t-1}^{HYcorporate} - r_{t-1}^{Treas.(7yr)}$	0.53	0.37	-0.73 (0.13)	-0.50 (0.15)	0.00
$r_{t-2}^{Treas.(10yr)} - r_{t-2}^{Treas.(2yr)}$	0.07	-0.00	0.68 (0.43)	0.34 (0.39)	0.00
$U_t - U_{t-1}$	0.64	0.49	-2.08 (0.29)	-1.48 (0.33)	0.00
$E_t^{household} / E_{t-1}^{household}$	0.62	0.59	1.30 (0.18)	1.02 (0.20)	0.03
$ISM_t^{manuf.}$	0.40	0.30	0.25 (0.05)	0.18 (0.05)	0.00

Explanatory Variable	Adjusted R^2		β		p-val., equal β s
	$GDP(I)_t^{xfc}$	$GDP(E)_t$	$GDP(I)_t^{xfc}$	$GDP(E)_t$	
$\log(SP500_t/SP500_{t-1})$	0.14	0.19	5.15 (2.54)	4.64 (1.44)	0.66
$\log(SP500_{t-1}/SP500_{t-2})$	0.24	0.13	6.32 (1.51)	3.94 (1.43)	0.01
$r_t^{HYcorporate} - r_t^{Treas.(7yr)}$	0.56	0.39	-0.74 (0.10)	-0.50 (0.11)	0.00
$r_{t-1}^{HYcorporate} - r_{t-1}^{Treas.(7yr)}$	0.49	0.37	-0.72 (0.14)	-0.50 (0.15)	0.00
$r_{t-2}^{Treas.(10yr)} - r_{t-2}^{Treas.(2yr)}$	0.10	-0.00	0.77 (0.43)	0.34 (0.39)	0.00
$U_t - U_{t-1}$	0.67	0.49	-2.16 (0.26)	-1.48 (0.33)	0.00
$E_t^{household} / E_{t-1}^{household}$	0.59	0.59	1.29 (0.19)	1.02 (0.20)	0.05
$ISM_t^{manuf.}$	0.45	0.30	0.27 (0.05)	0.18 (0.05)	0.00

Possible Measurement Problems in the Great Recession

- Huge increase in statistical discrepancy, in 2007 in particular.
- GDP(I) may not have fully stripped out capital losses (house flipping?). This is possible, but I am aware of little evidence to corroborate this story.
- GDP(E) may have missed:
 - a big deceleration (and outright decline) in proprietors' income in 2007. It's likely some of this should have appeared in residential improvements, which may have plunged as home equity extraction came to a screeching halt.
 - a massive drop in the output of financial services companies, as securitization markets dried up. Trillions of dollars in securities stopped being issued, which must have generated a big drop in fees. In general, the BEA's data on services is of questionable quality, although things are improving.

The BEA may want to consider:

- Adopting GDP(E) and GDP(I) nomenclature.
- Reporting annualized growth rates of GDP(I) in its press releases.
- Discussing those growth rates in its press release. The BEA's discussion of corporate profits could be folded into a more general discussion of GDP(I).
- Producing an “advance” GDP(I) estimate, and a “second” GDP(I) estimate for fourth quarters. Interesting exercise in forecasting corporate profits based on available company releases.
- Releasing a “fourth” estimate of GDP(E), incorporating the relevant information from the QCEW.
- Ultimately, the best solution would be to feature an average of the two measures, which we could call GDP(A). Other countries (the UK, Australia) do something like this.