Revenue Forecast Errors and Business Cycles: The Case of Wisconsin

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Motivation

"The troubling, long-term trend is that overestimates have gotten larger during each of the past three economic downturns, and more states have made them."

"Errors in revenue estimates have worsened progressively during the fiscal crises that have followed the past three economic downturns."

"State's Revenue Estimating: Cracks in the Crystal Ball," Pew Center on the States and The Nelson A. Rockefeller Institute of Government, March 2011.

Wisconsin Forecast Schedule

- The Department of Revenue presents revenue forecasts to the Governor by November of each even-numbered year as part of the biennial budget process, (e.g., in November 2010 the forecast includes FY11, FY12 and FY13).

- Therefore, the forecast leads the end of each FY by 8, 20 and 32 months.

- Additional independent forecasts are prepared by the Legislative Fiscal Bureau for the Legislature.

Have Wisconsin revenue estimates worsened progressively?

20 Months Lead GPR Forecast Error Since 1989
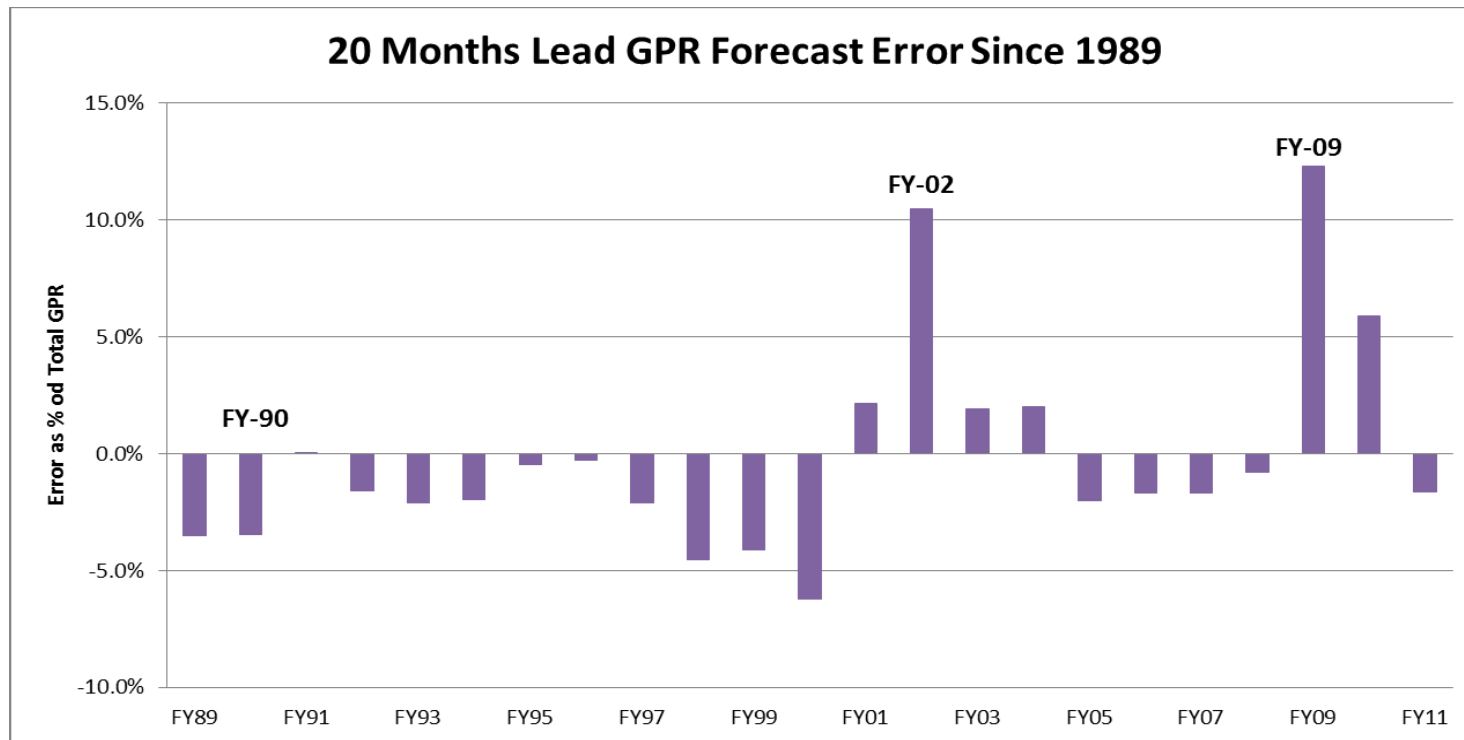
It seems so looking at the raw forecast error of the last 23 years…

…It was expected given the magnitude of the decline in each of the last three recessions…

Job Losses Of The Last Three Recessions
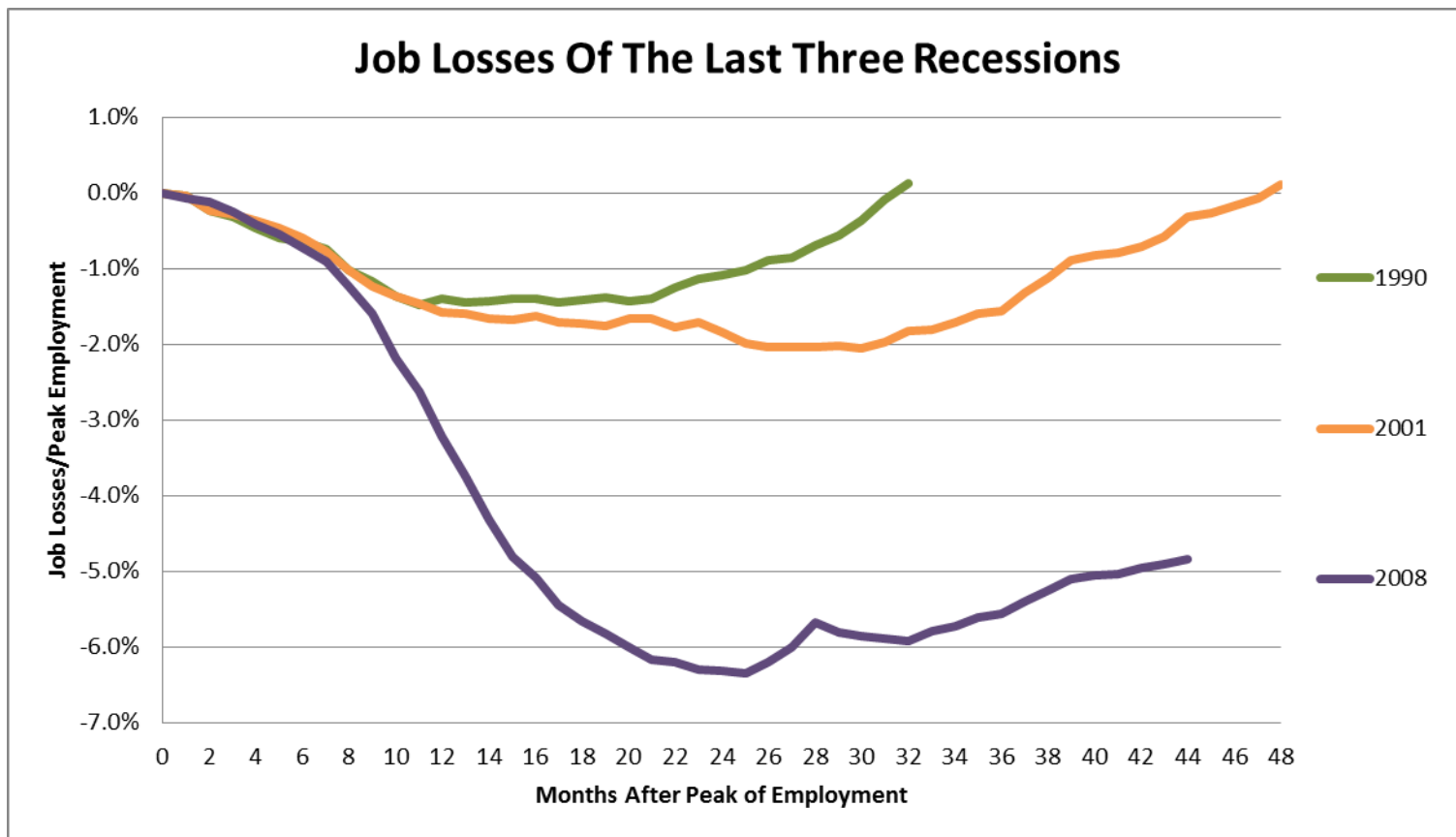
## …But to make a valid assessment we should:

- Look into a **longer history** to determine if there is a long-term trend of worsening GPR forecast errors
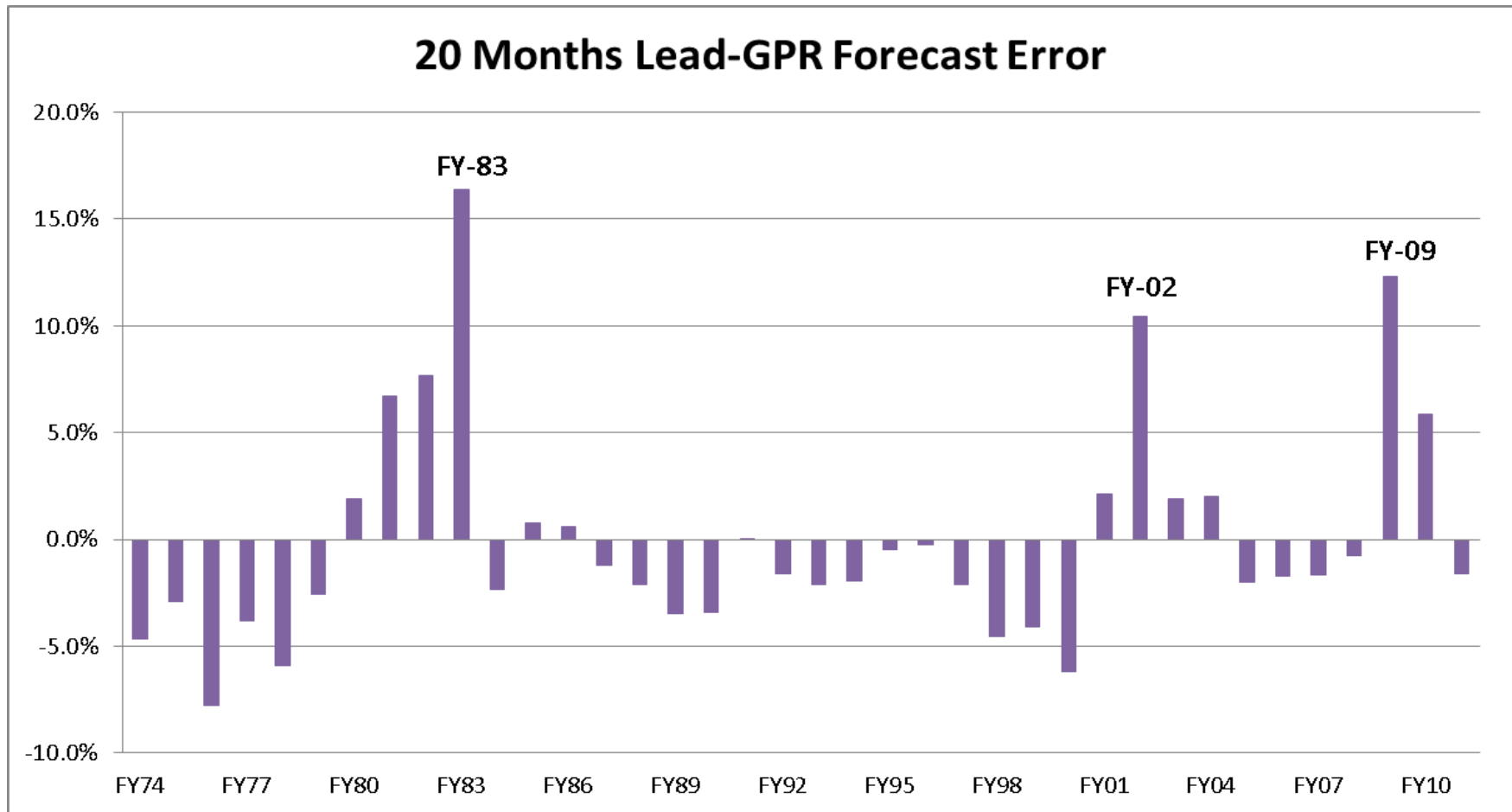
and

- Look at the forecast errors **adjusted** by some measure that captures the magnitude of each recession in order to make them comparable over time.

Taking a longer history, there is not a long-term trend of worsening forecast error
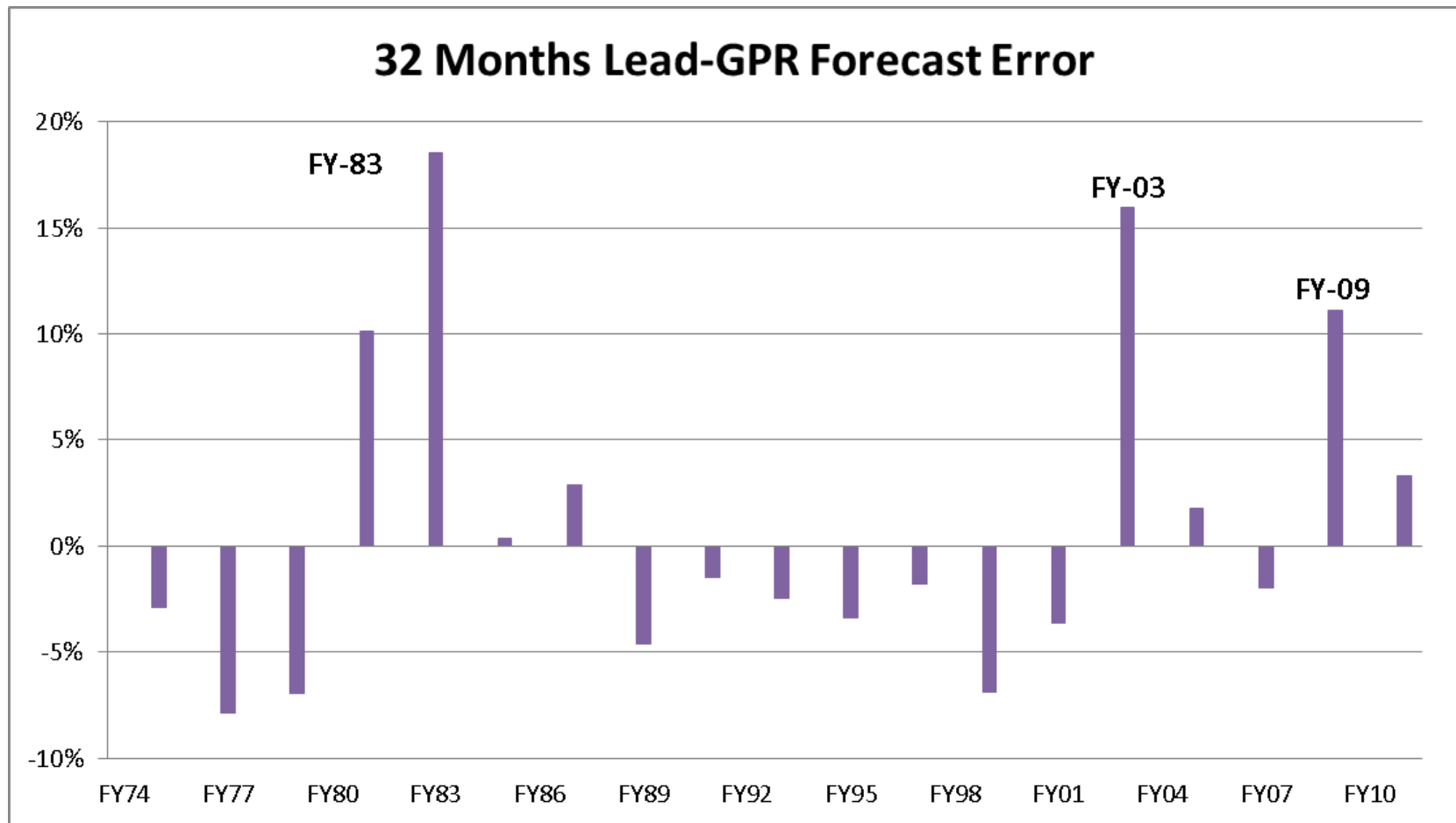
No long-term trend at the 20 months lead forecasts either…
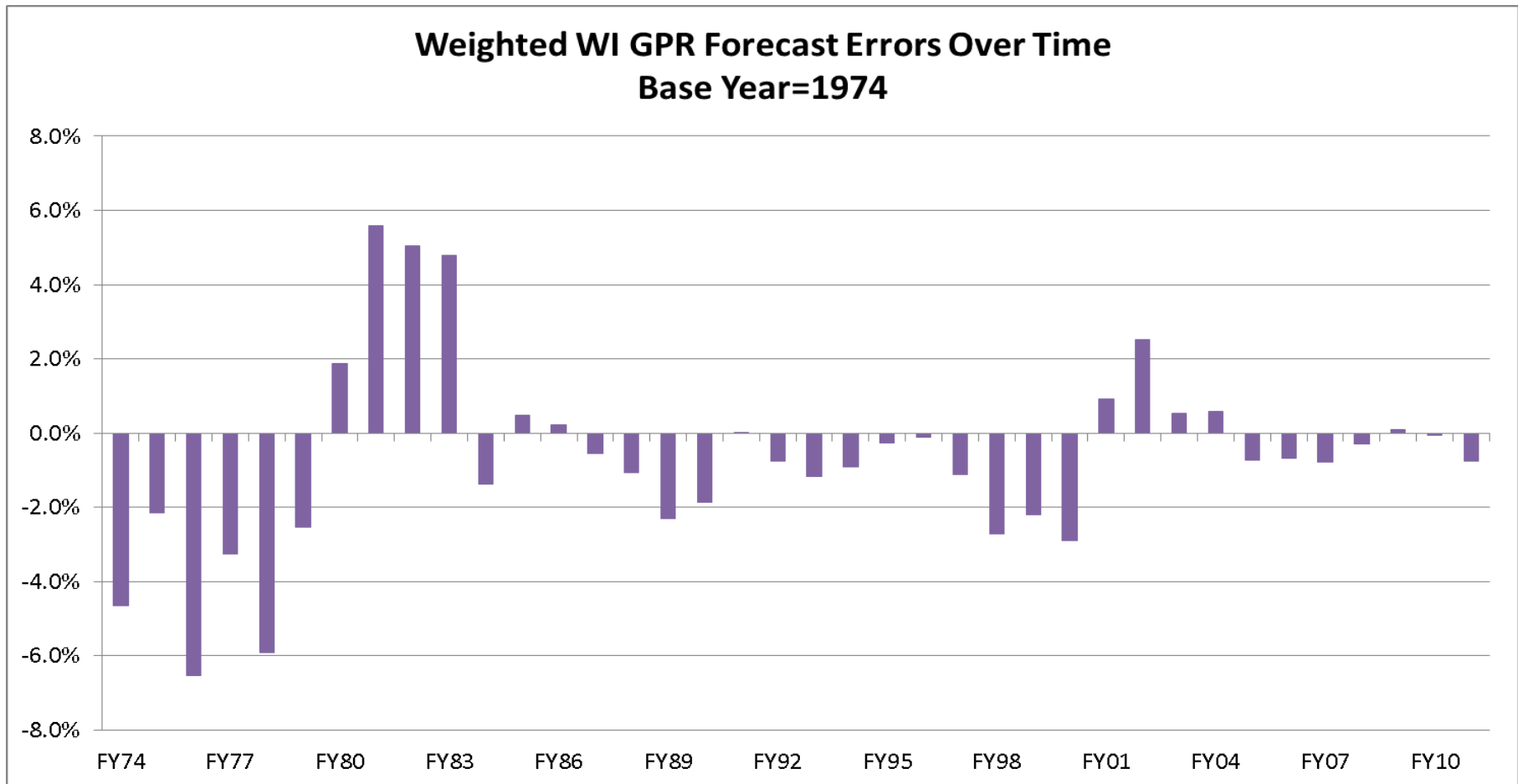

20 Months Lead-GPR Forecast Error

…But to determine if there is a trend of the forecast errors over cycles, we should **adjust** the errors by the magnitude of the recessions.

In order to make forecast errors comparable over time, the errors were weighted by the **normalized change in personal income** as follows:
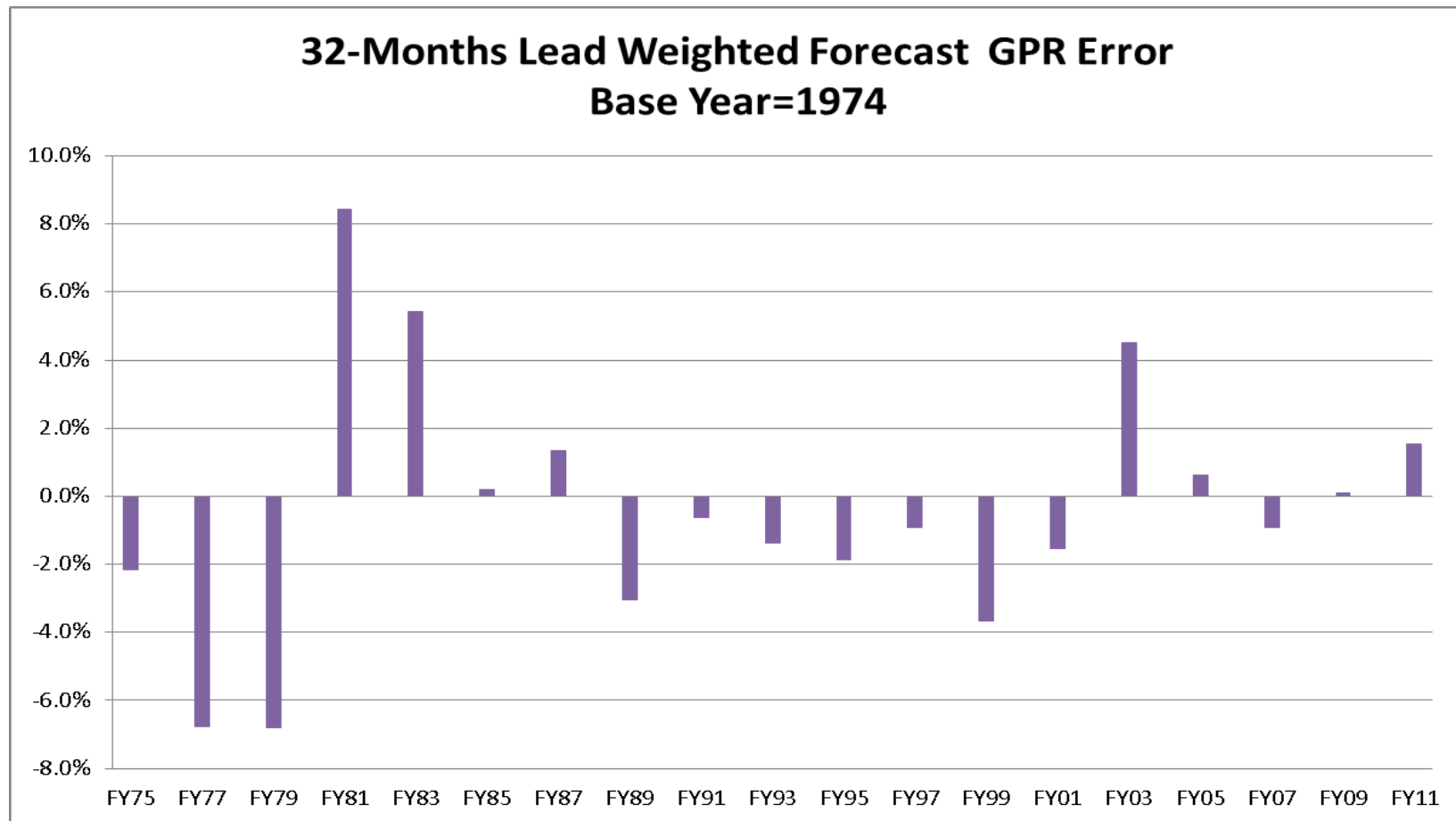
Weighted forecast error with normalized personal income change

- $Weighted\ error_i =$ $Forecasted\ error_i \times Personal\ income\ change\ idex_i$

- $Forecast\ error_i = Forecasted\ GPR_i \times Actual\ GPR_i$

- $PIC\ index_i = \frac{Y_i - Y_{i-1}}{Y_{i-1}} / \frac{Y_{74} - Y_{73}}{Y_{73}}$

- $WE_i = \frac{Forecasted\ GPR_i - Actual\ GPR_i}{Actual\ GPR_i} \times \left(\frac{Y_i - Y_{i-1}}{Y_{i-1}} \times \frac{Y_{73}}{Y_{74} - Y_{73}} \right)$
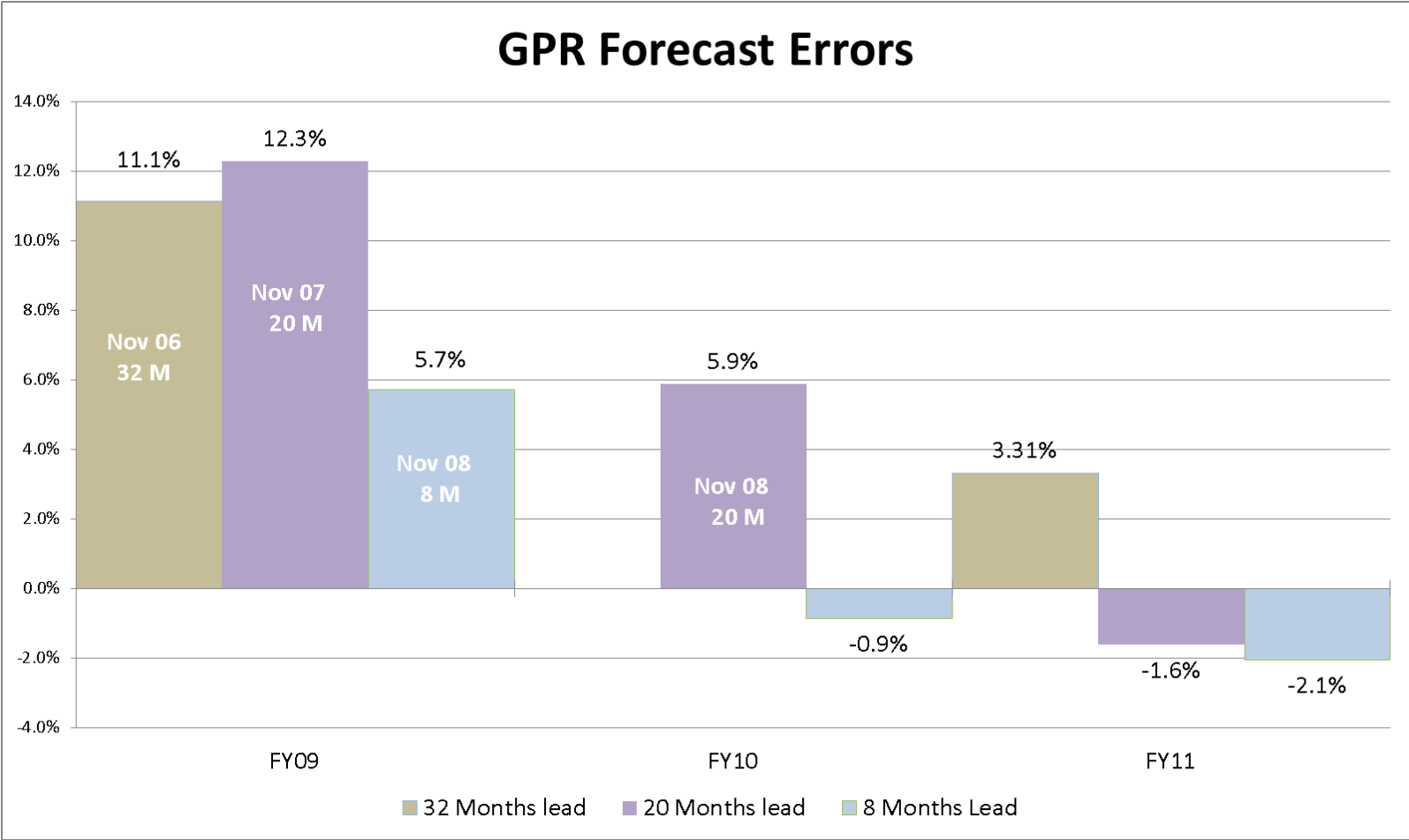
Evidence shows no worsening trend of GPR forecast errors

Again, no long-term worsening trend in the 32-months lead GPR forecast errors

What can be done to minimize errors during recessions? The case of the 2007-09 recession

GPR Forecast Errors

- 32 Months lead
- 20 Months lead
- 8 Months Lead

FY09: Nov 06 32 M = 11.1%, Nov 07 20 M = 12.3%, Nov 08 8 M = 5.7%

FY10: Nov 08 20 M = 5.9%, 8 Months Lead = -0.9%

FY11: 32 Months lead = 3.31%, 20 Months lead = -1.6%, 8 Months Lead = -2.1%

The large error for FY09 in November of 2006 could not have been avoided given the national economic forecast

No major forecasters were anticipating even a deceleration in November of 2006 or 2007

There were 6M less jobs in FY09 and 13M in FY10 and FY11 than what Global Insight forecasted in November 2006

Legend: Nov 2006 — Nov 2007 — Nov 2008 — Nov 2008 Pess — Oct 2011

Y-axis: Millions of U.S. Jobs (128 to 148)
X-axis: 2007, 2008, 2009, 2010, 2011
Chart labels: FY09, FY10, FY11
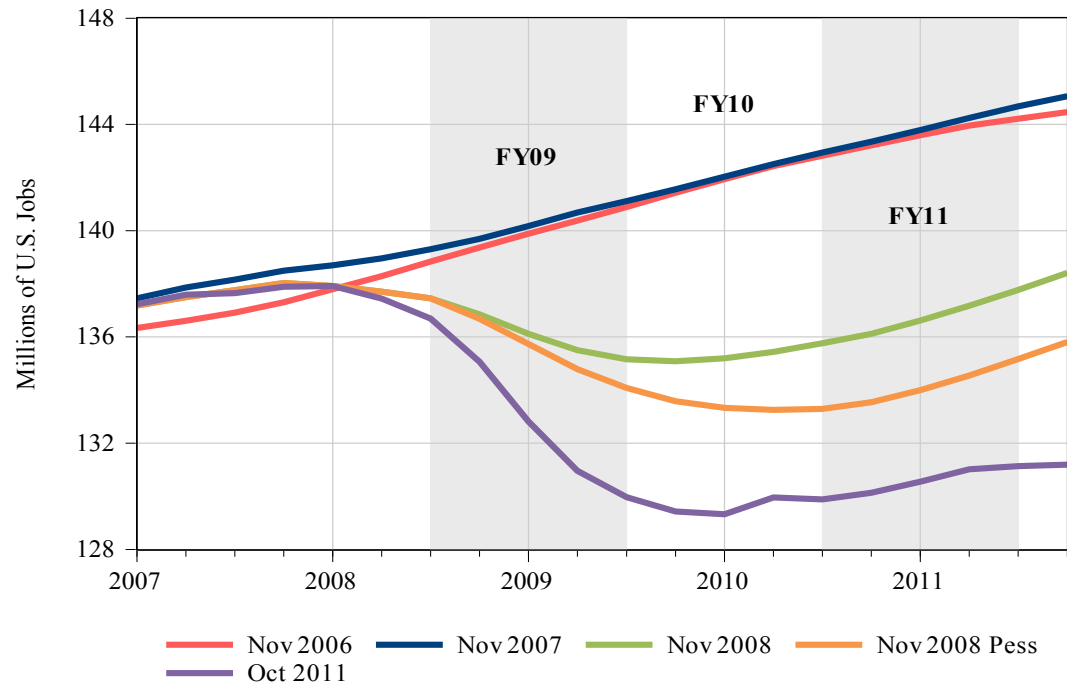
Unprecedented declines of tax bases…Personal income declined for the first time in 50 years

Personal Income
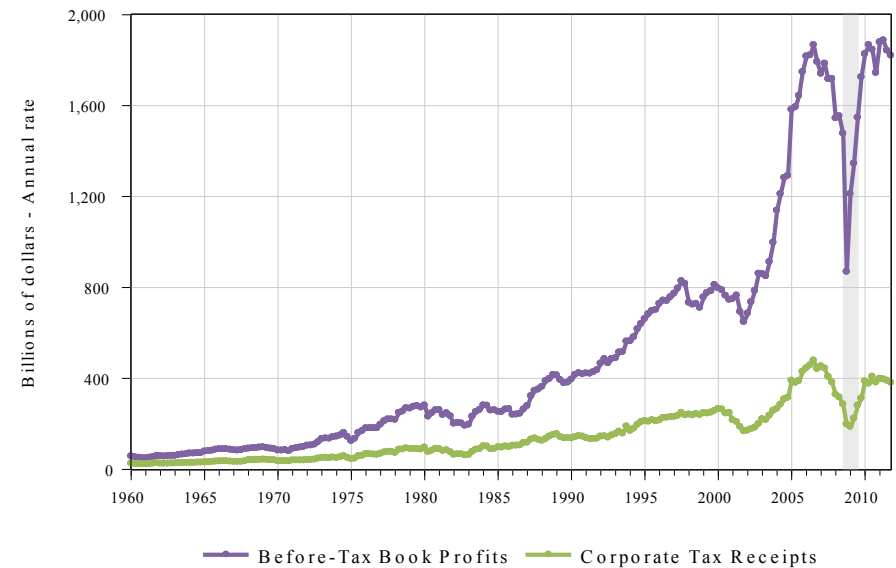
Year-over-Year Growth
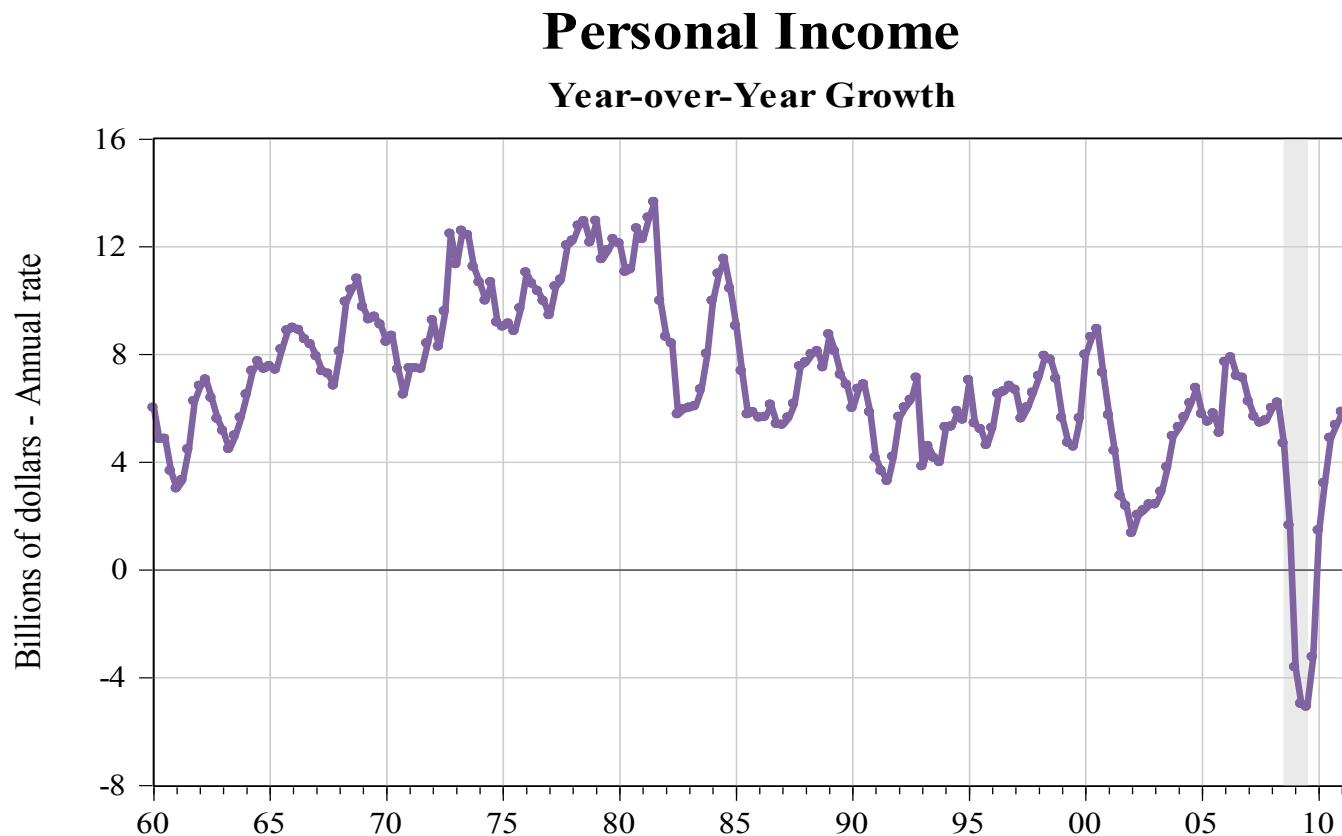
Consumption always grew above 4%, but declined for the first time in 2009

Consumption
Year-over-Year Growth
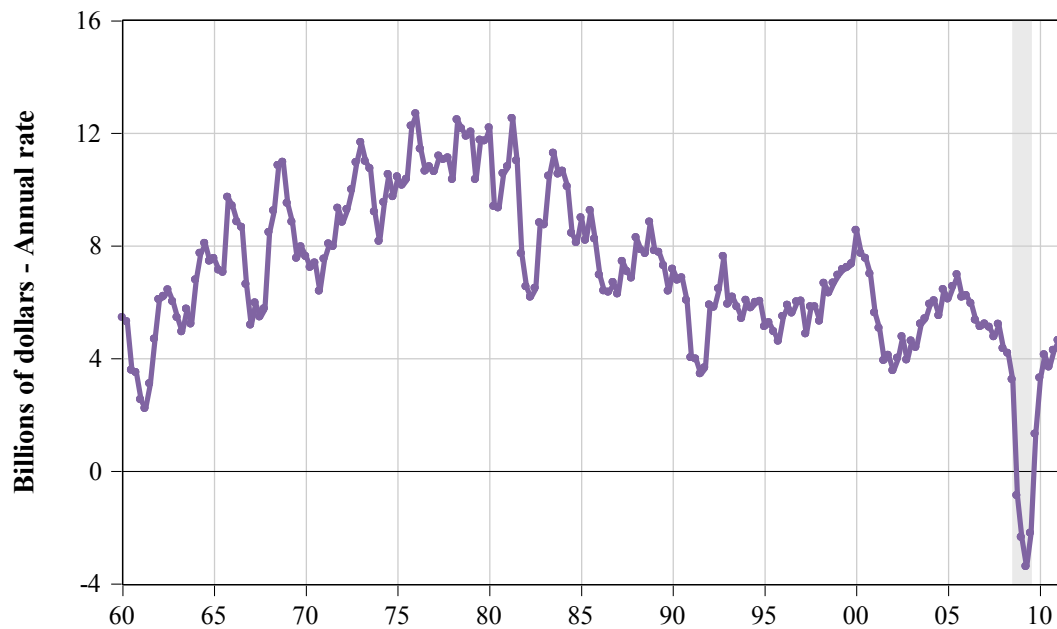
Corporate Tax Profits and Tax Receipts

Before-Tax Book Profits   Corporate Tax Receipts

Baseline vs. Pessimistic Scenarios

November 2008 + Law Changes Budget 2009	FY09	FY10	FY11	FY09-FY11
Actual	**12,113**	**12,132**	**12,912**	
Official = Baseline 70%+ Pessimistic 30	12,804	12,844	13,340	
Error	691	712	428	1,831
% Error	5.7%	5.9%	3.3%	4.7%
Baseline	12,838	12,982	13,509	
Error	725	851	597	2,173
% Error	6.0%	7.0%	4.6%	5.5%
Pessimistic	12,726	12,517	12,941	
Error	613	386	29	1,028
% Error	**5.1%**	**3.2%**	**0.2%**	**2.7%**

Two key decisions helped to avoid a larger forecast error in November 2008:

- I developed a new PIT model that reacted more timely to turning points because:
  - Quarterly instead of annual model.
  - Collections data rather than aggregated statistics.
  - ➡ This reduced the error by $210 million over the three FYs.

- I decided to use a blend of the Baseline and the Pessimistic scenario from Global Insight.
  - ➡ This reduced the error by $340 million over the three FYs.

Conclusions

- There is not a long-term trend of worsening forecast errors in Wisconsin.

- With the appropriate analysis, I would guess that this is also the case for most states.

- The reason for the recent revenue volatility is simply economic volatility. The last recession showed an unprecedented decline in economic activity.

- The high volatility of capital gains only accounted for one percentage point of the 7.8% decline in net tax for tax year 2009.

Conclusions (cont.)

- Timely data and timely models will help to pick up turning points more quickly.

- Consider the use of the pessimistic scenario when incorporating the national forecast.

- Future research: analyze microdata to get a better understanding of final settlement payments (refunds and final payments).