

PJM Long-Term Load Forecasting Methodology: Proposal Regarding Economic Forecast (Planning Committee Agenda Item #5)

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PJM's Peak Load Forecasts Are Driven By Forecasts of Economic Growth ("GDP", "GMP")

- PJM uses "Gross Metropolitan Product" by state and metro area from Moody's Economy.com
 - Equivalent to US-level Gross Domestic Product
- The GMP forecasts have a large impact on the peak load forecasts

Rule of thumb: 1% growth in RTO GMP → approx. 1,000 MW growth in forecast RTO peak load

The Economic Downturn Has Led To Greater Differences Among Economic Forecasts

- Forecasts of economic growth were generally stable in recent years, with a relatively high level of consensus among forecasters -- until 2008
- Surveys of economic forecasts show how expectations changed as the recession deepened, and what most forecasters now expect

Aspen Publishers' "Blue Chip" Survey and the Blue Chip Consensus US GDP Forecast

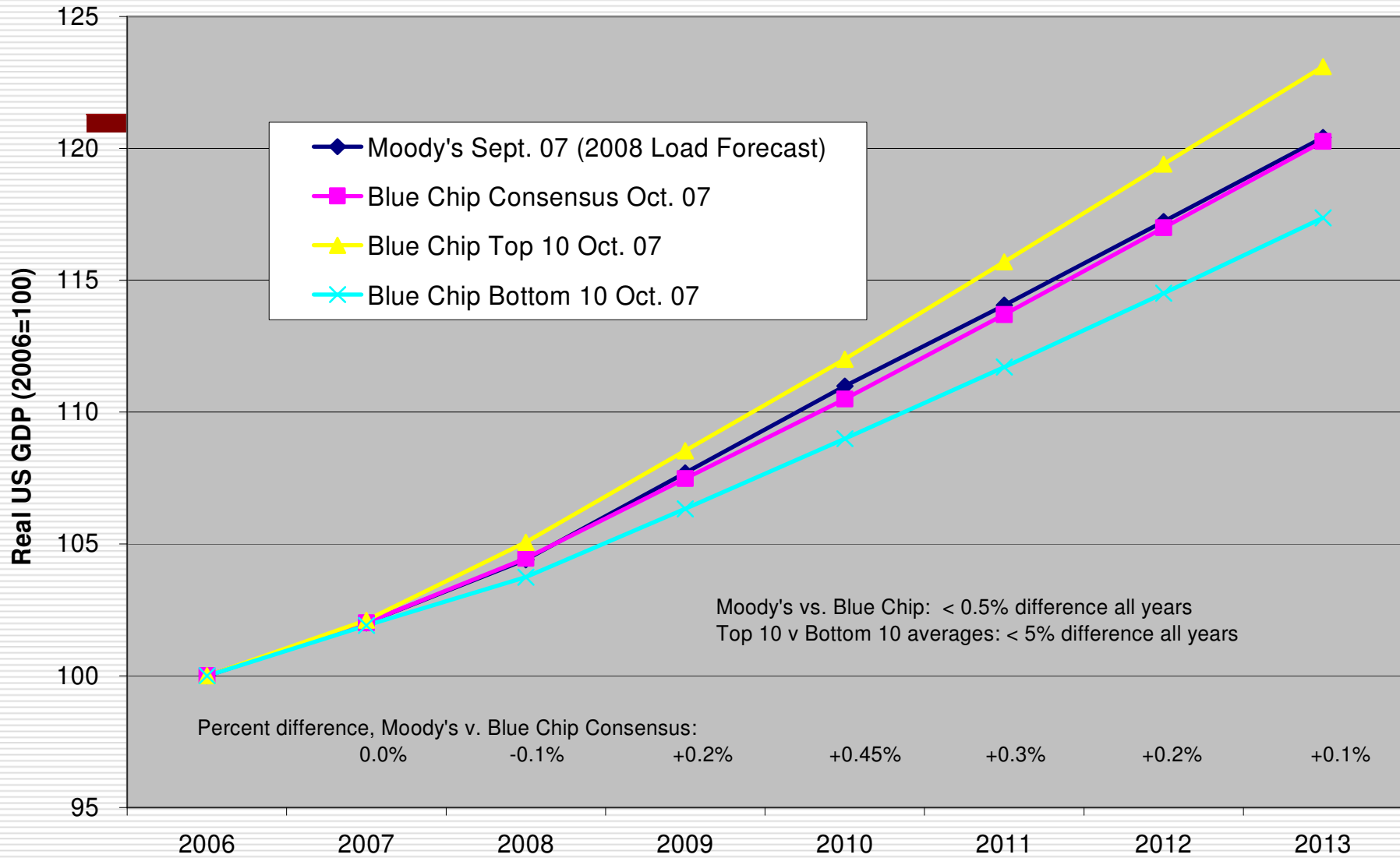
- For over 30 years, Aspen Publishers has surveyed over 40 professional economic forecasters on a monthly basis
 - GDP and other leading economic indicators
 - "Consensus" – mean of all 40+ forecasts
 - "Top 10 average", "Bottom 10 average"
 - Long Term Forecast survey 4 times per year
- The "Blue Chip" consensus GDP forecast is a highly regarded and oft-cited indicator of expected growth
 - Government agencies, including U.S. Congressional Budget Office and U.S. Energy Information Administration, routinely compare their GDP forecasts to the Blue Chip as an indicator of the reasonableness of their forecasts

Moody's Economy.com Forecast of US GDP Growth Recently Has Exceeded the Blue Chip Top Ten Average

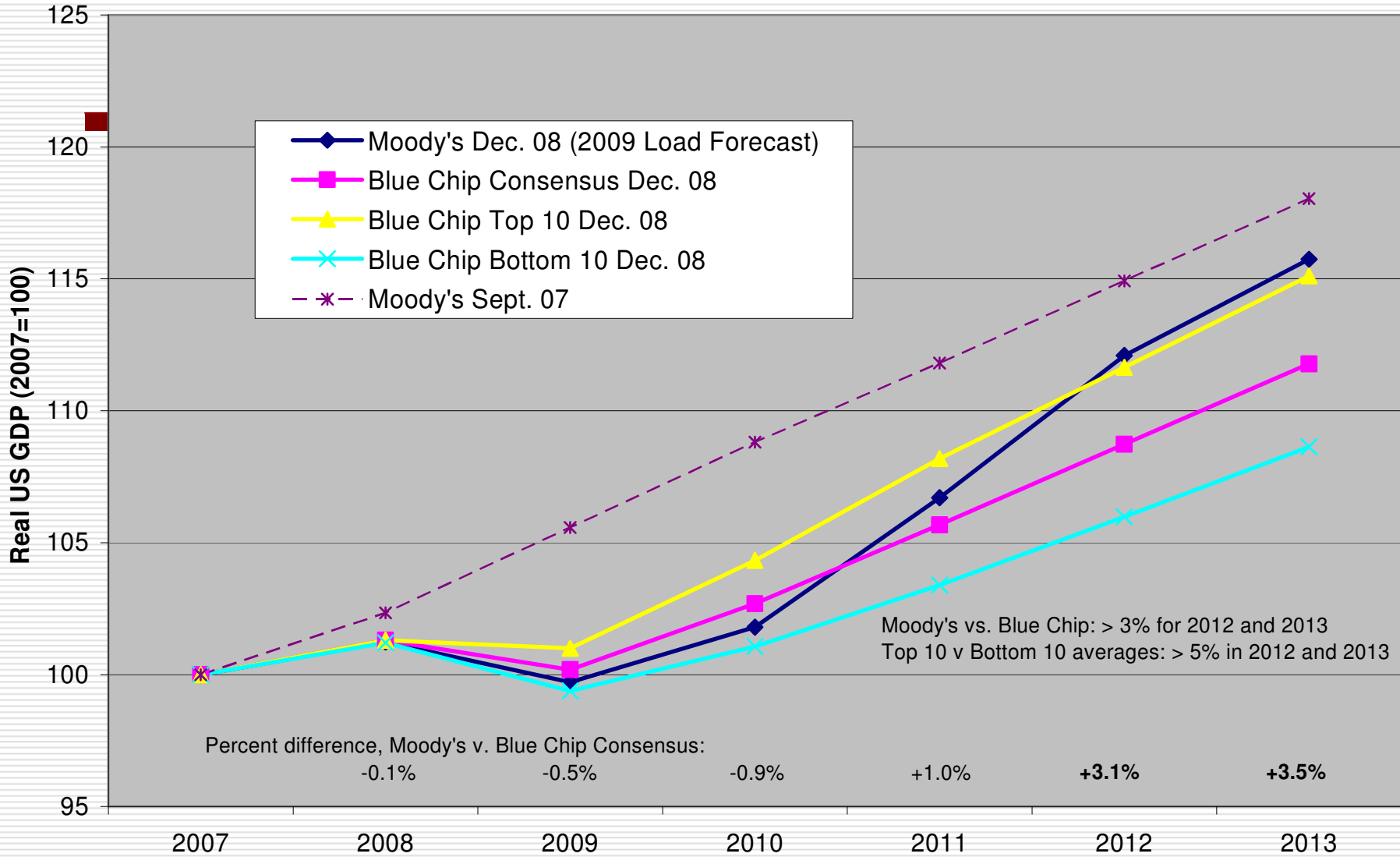
Since December 2007, Moody's Economy.com's forecasts of GDP growth have been higher than nearly all other forecasts for some of the coming years

| Forecast date | Forecast years for which Moody's > B.C. Top 10 |
|---------------|--|
| Oct. 2007 | None |
| Dec. 2007 | 2009, 2010 |
| June 2008 | 2009, 2010 |
| Oct. 2008 | 2010, 2011 |
| Dec. 2008 | 2011, 2012, 2013 |
| June 2009 | 2011, 2012, 2013 |

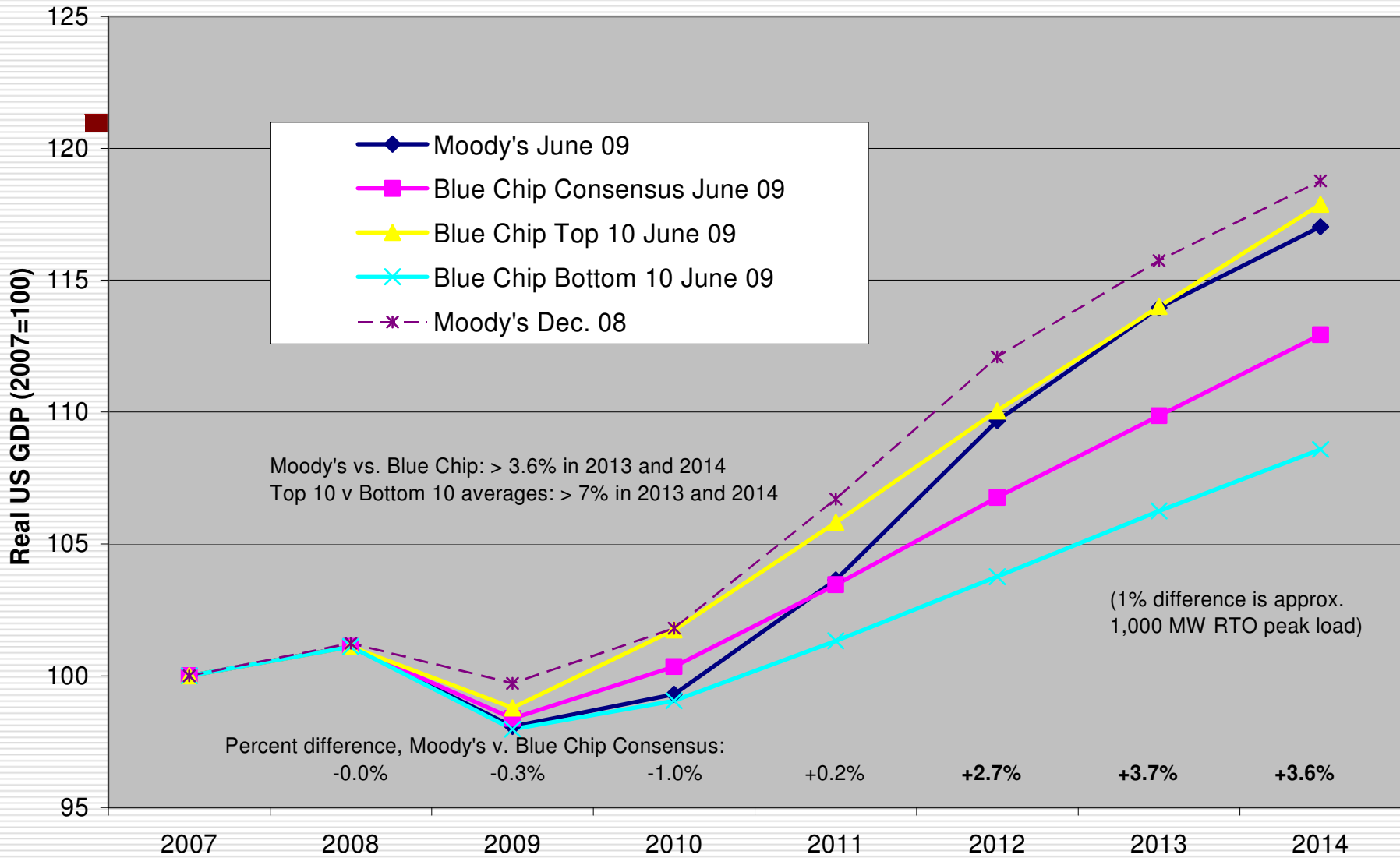
US GDP Forecasts, September-October 2007



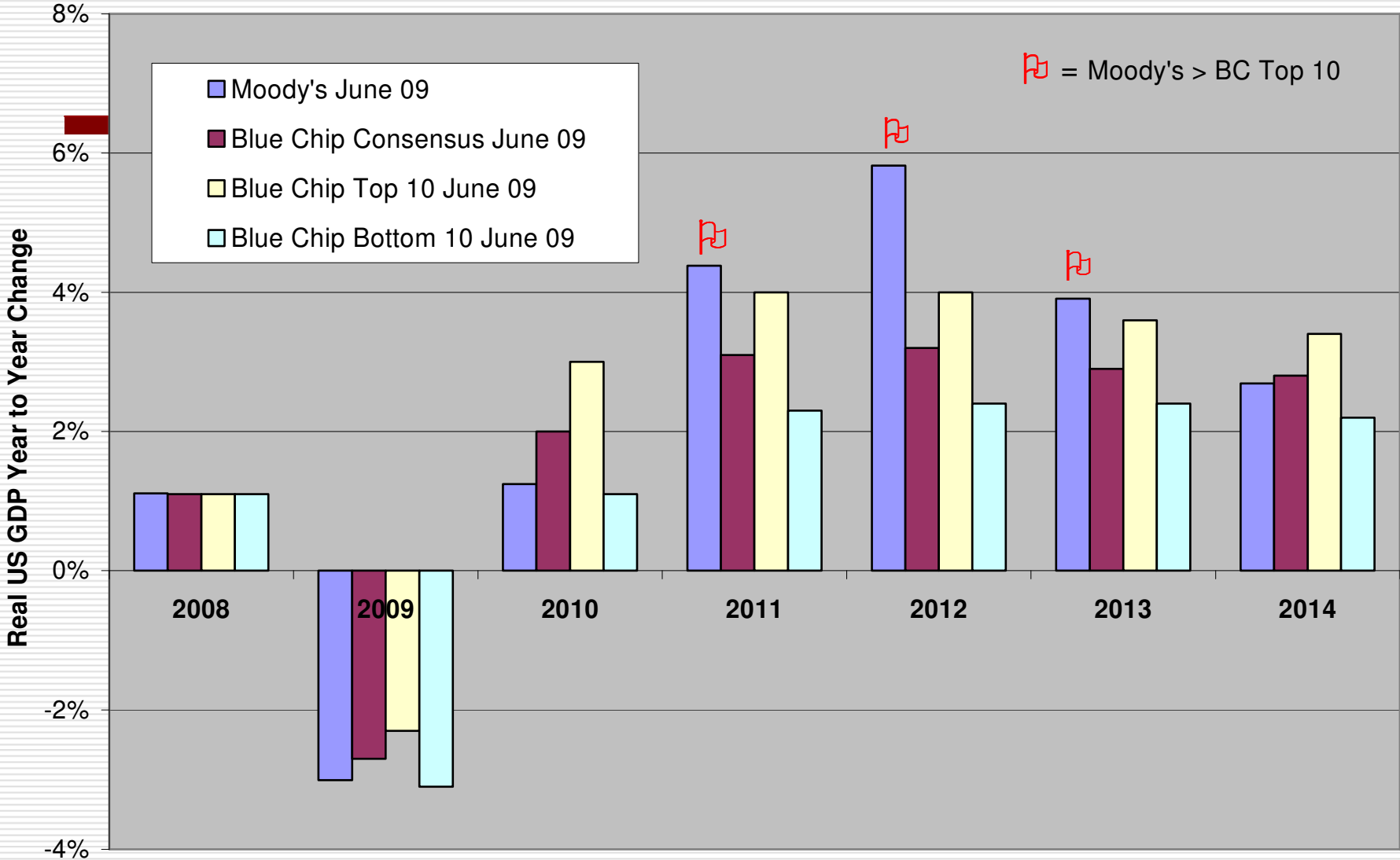
US GDP Forecasts, December 2008



US GDP Forecasts, June 2009



US GDP Forecasts, June 2009



Individual and “Consensus” Forecasts: What is the Track Record?

- ❑ Many studies have compared the performance of individual forecasters and “pooled” forecasts; many have evaluated the Blue Chip
- ❑ Studies generally conclude that pooled forecasts tend to be more accurate and show less bias (tendency to be consistently high or low) than individual forecasts
- ❑ While some individual forecasters outperform the consensus over some period of time, the outperforming forecasters change over time and are not predictable (*Batchelor 1990*)

Individual and “Consensus” Forecasts: What is the Track Record? (cont’d)

- ❑ Studies show that consensus forecasts show little or no bias; where small bias is found it is toward optimism (*Batchelor 2007, Batchelor 2000, CBO 1999*)
- ❑ Studies do find bias in some individual forecasts, with some forecasters consistently optimistic, others pessimistic (*Batchelor 2007*)
- ❑ The literature also suggests that when conditions change, individual forecasters often will not fully reflect the new information and will update their forecasts too slowly

Individual and “Consensus” Forecasts: What is the Track Record? (cont’d)

- One study distinguished two types of firms that forecast GDP and participate in the Blue Chip:
 - Industrial firms, banks, etc. who prepare forecasts primarily for *internal business planning purposes*
 - Forecasting firms who prepare forecasts that they sell in the marketplace as a *forecast product*
- And found that the former group was generally more accurate and exhibited less bias in its GDP forecasts than the latter group; the average errors were more than twice as large for the latter group. (*Laster, Bennett, Geoum, 1997*)

Individual v. Consensus Forecasts: Conclusion

Bottom line: a “consensus” forecast such as the Blue Chip survey can be expected to be:

- more accurate (*likely to be closer to actuals*)
- less biased (*less likely to be chronically high or low*)
- more stable (*less likely to exhibit large swings*)
and, ultimately
- more defensible

than the product of one individual forecaster.

The issue is important: the difference between Moody's and Blue Chip at present translates into over 3,000 MW of RTO peak load growth to 2013

Additional Reasons to Prefer the Blue Chip Consensus GDP Forecast Over Moody's (#1)

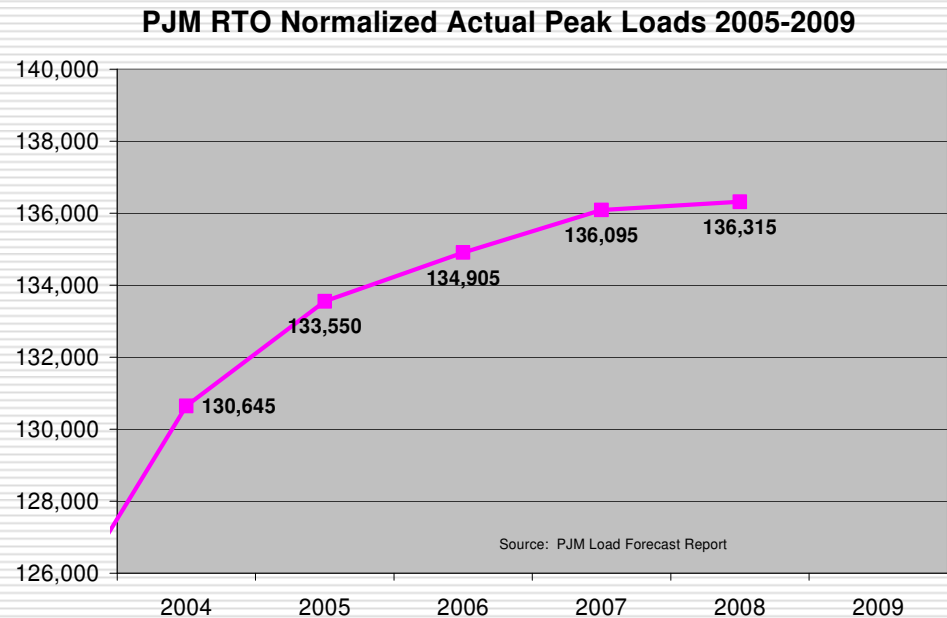
PJM forecasts median or "50/50" peak loads; the economic forecast should also be a 50/50

- But Moody's "Baseline" forecast is a "most likely" (not a "median") forecast
- Moody's acknowledges the risks are skewed to the downside (30% downside, 20% upside) (*Zandi, 2009*)

Even a Moody's "median" forecast, if there was one, would be lower than Moody's "baseline"

Additional Reasons to Prefer the Blue Chip Consensus GDP Forecast Over Moody's (#2)

Even if the Blue Chip consensus GDP/GMP forecast is used, PJM's peak load forecast will likely still overstate future peak loads



- The trend since 2005 of slowing W/N peak load growth:
- is only partly a result of the recent economic downturn
 - is only weakly reflected in PJM's methodology and forecast

Proposal: Base PJM's Load Forecasting on the Blue Chip Consensus US GDP Forecast

- Moody's Economy.com routinely inserts alternative US GDP forecasts into its US Macro and State models, generating all regional details on that basis, at client request
 - Representatives say they do this "all the time"
- Moody's Economy.com representatives confirm the feasibility of developing the GMP forecasts PJM needs for load forecasting anchored on the Blue Chip Consensus US GDP forecast

Details: Suggested Chronology

- The Blue Chip Consensus long-term US GDP forecast is published October 10 of each year (*Blue Chip Economic Indicators*); Moody's Economy.com's October update is available about a week later
- Moody's inserts the Blue Chip Consensus US GDP forecast into its US Macro model, which drives its US State Economic Model System ("top down"), and develops all GMP values
 - Changes to other macro assumptions may also be needed for consistency
- Moody's provides PJM with the required GMP forecasts by the first week of November

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Questions or Comments?

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