

MEMORANDUM

TO: Joint Budget Committee Members

FROM: John Ziegler

SUBJECT: Comparison of Past Revenue Forecasts to Actual Revenues

DATE: December 11, 2013

Attached is a slide show presentation that compares past LCS and OSPB General Fund (GF) revenue forecasts to actual General Fund revenues. The graphs on slides 2 through 4 reflect the total GF dollar amounts as forecasted in each quarterly forecast from 2000 through 2012 for both LCS and OSBP as compared to the eventual actual revenues. These are the graphs staff has typically used to show the comparison of forecast to actual. The comparison on slide 4 illustrates the difficulty of determining from these graphs which forecast is nearer to accurate.

In an effort to better understand which forecast is nearer, staff prepared several more graphs using measures called Mean Percentage Error (MPE) and Mean Absolute Percentage Error (MAPE). MPE measures the percent variance of the forecast to the actual. MPE can be a positive or a negative number. If the percentage is positive, the forecast was LOWER than the actual. If the percentage is negative, the forecast was HIGHER than the actual. MAPE measures the percent variance from the forecast but eliminates the positive and negative differences and isolates only the degree to which the forecast did not meet the actual. The fact that MAPE utilizes absolute numbers means the calculation reflects solely the degree to which there is a variance. One cannot determine from MAPE if the forecast was higher or lower, but can determine if it is closer to the actual. The primary advantage to MAPE is that it is more meaningful than the MPE when determining which forecast is nearer to correct as the negatives and positives tend to negate each other when calculating an average of the variance and this effect is eliminated by using absolute numbers in the MAPE calculation.

When staff used these two calculations to measure all of the quarterly forecasts and graphed them (slides 5-8), it was again difficult to determine which forecast is nearer to the actual as the graphs look strikingly similar. In an effort to bring more clarity to the comparison, staff decided to graph only the results of the March quarterly forecasts from 2000 through 2012 as these are the forecasts the General Assembly utilizes to set the budget each year (slides 9-12).

Slides 9 and 10 contain the March forecast MAPE calculations and slides 11 and 12 contain the MPE calculation results for LCS as compared to OSPB. These slides present the difference to actual for the fiscal year in which supplemental and figure setting appropriations were being made for each forecast. The General Assembly utilized these forecasts to set the budgets in each of those years. I also included the average variance for all the March forecasts based both on the MPE and the MAPE calculations.

Staff would like to make two very general observations about the results. First, neither forecast is clearly closer to actual consistently over time. Depending on the year, LCS or OSPB may have been closer. Second, the LCS forecast appears to be very slightly more near to actual based

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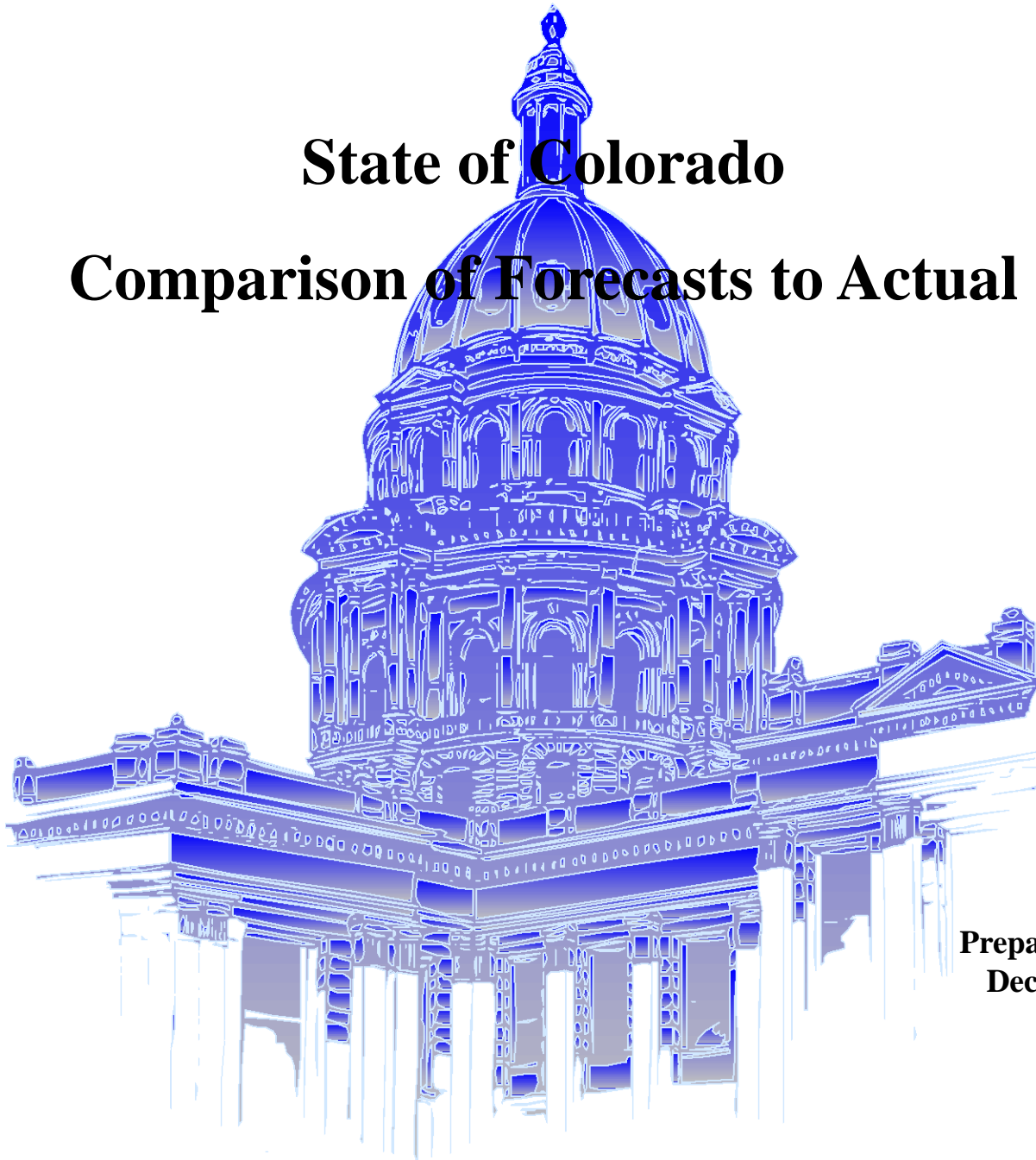
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on the average of all the forecasts. However, the difference between the forecasts, on average, is extremely minimal.

State of Colorado

Comparison of Forecasts to Actual

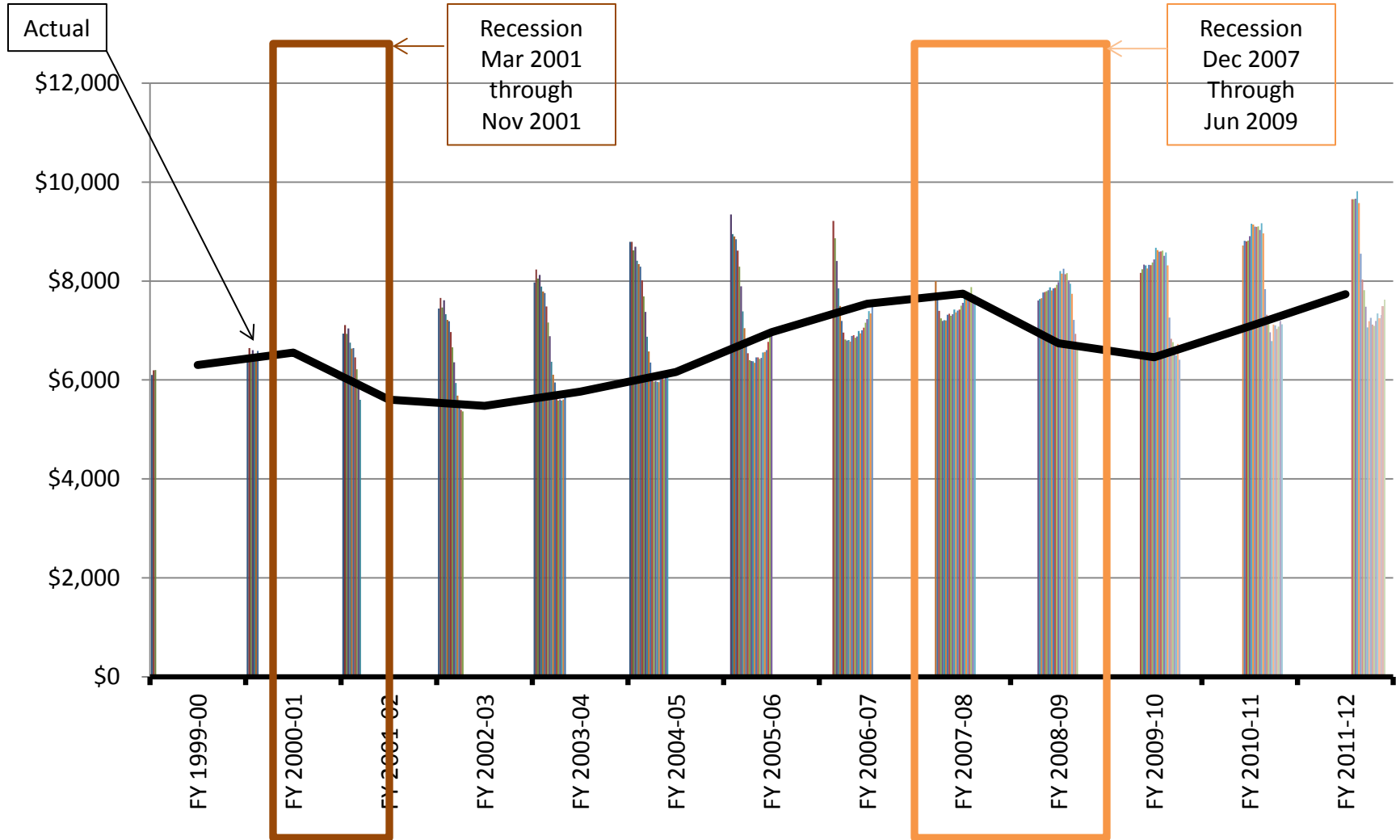


**Prepared by JBC Staff
December 11, 2013**

Comparison of LCS General Fund Forecast to Actual

All LCS Revenue Forecasts – 2000 through 2012

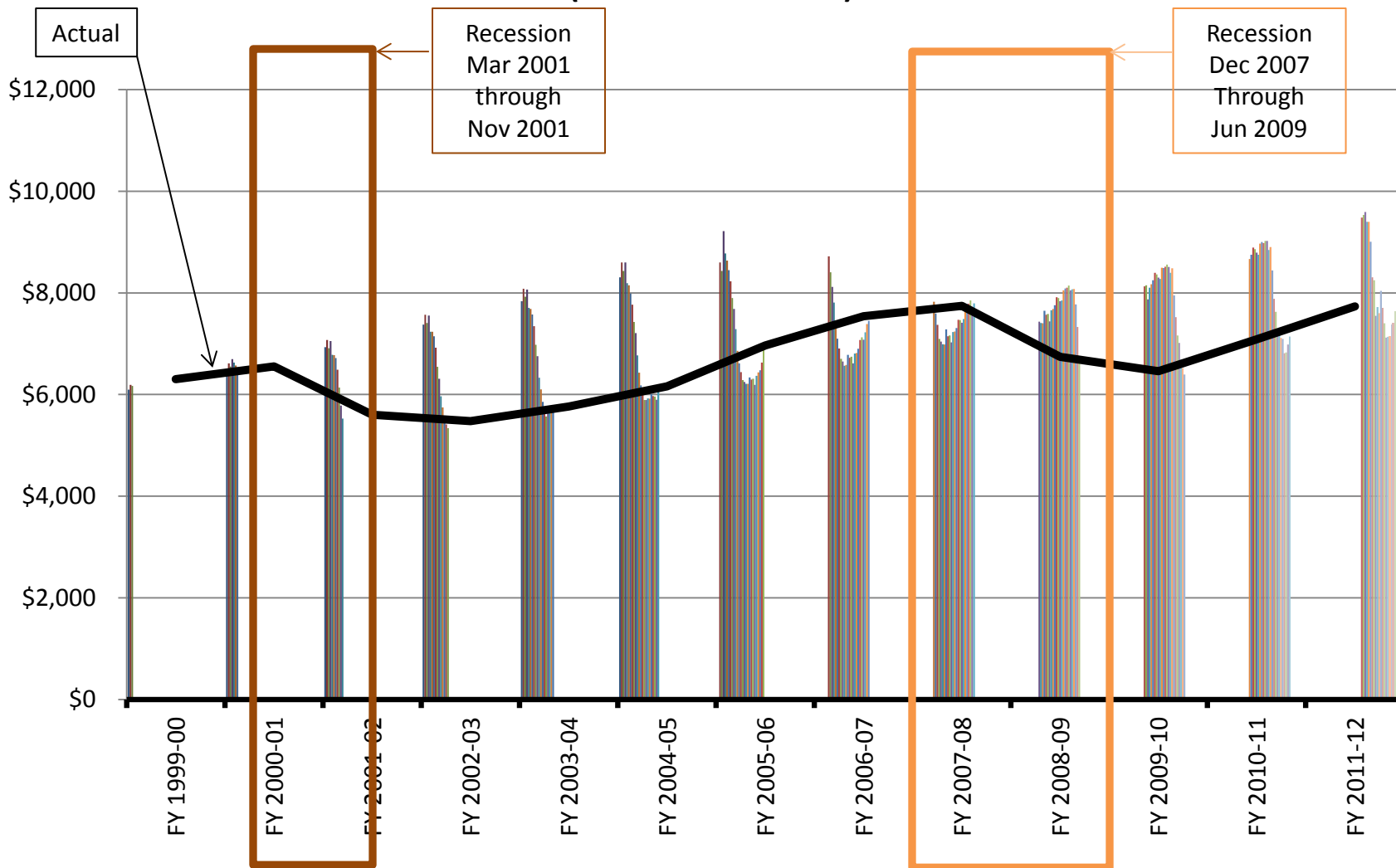
(Dollars in Millions)



Comparison of OSPB General Fund Forecast to Actual

All OSPB Revenue Forecasts – 2000 through 2012

(Dollars in Millions)

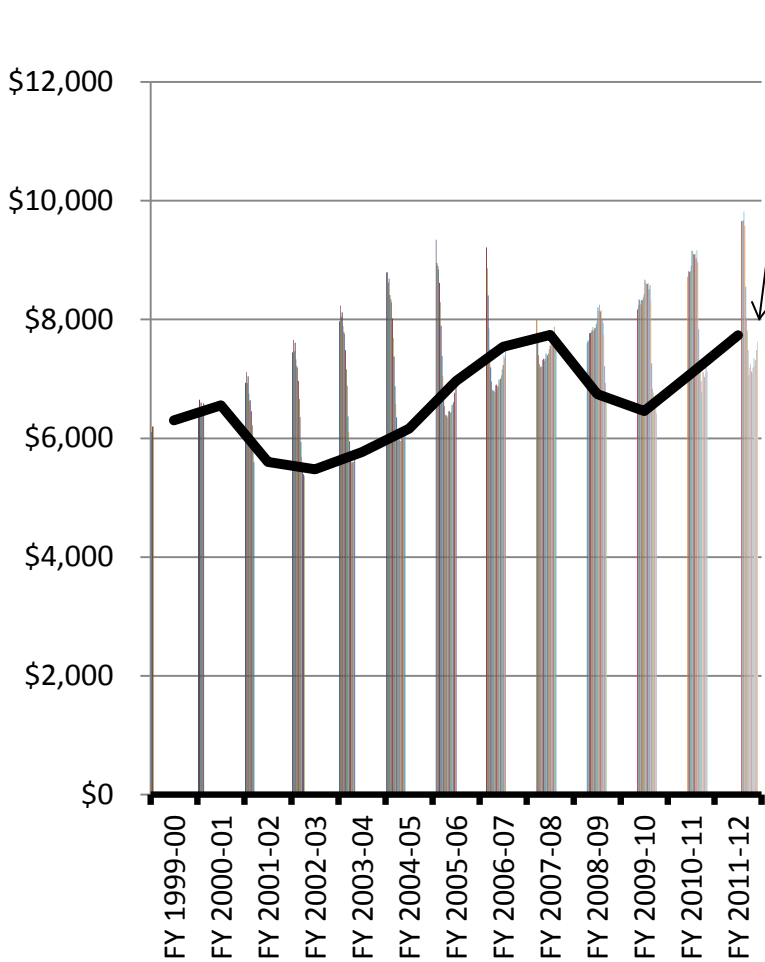


Comparison of LCS and OSPB General Fund Forecasts to Actual

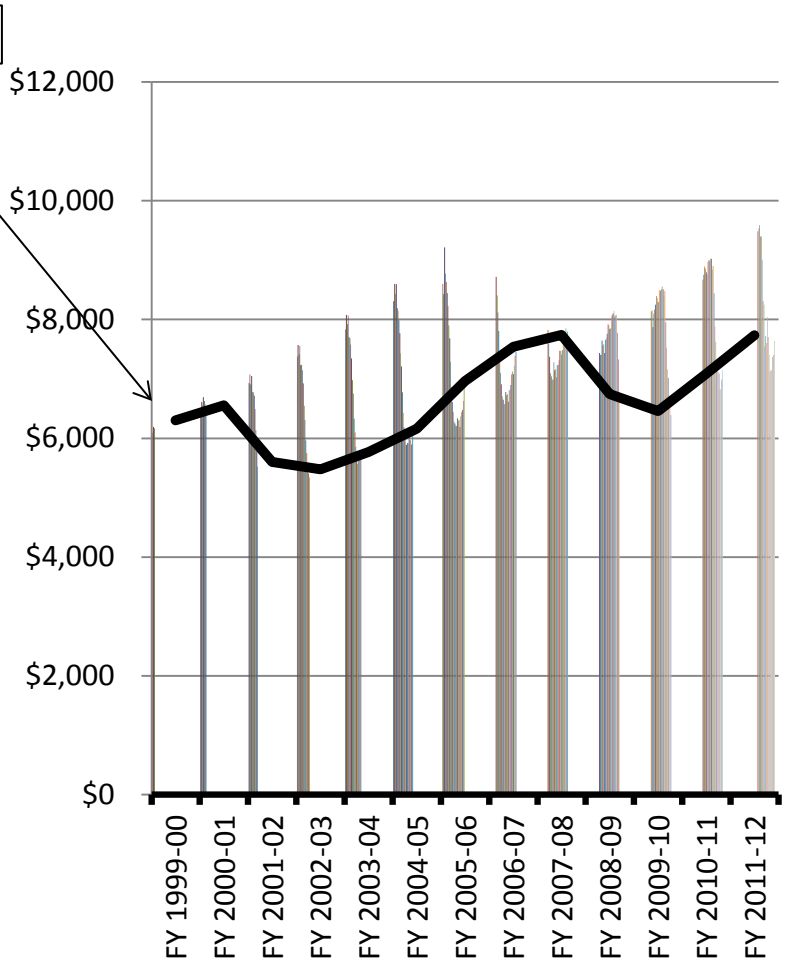
All Revenue Forecasts – 2000 through 2012

(Dollars in Millions)

LCS Compared to Actual

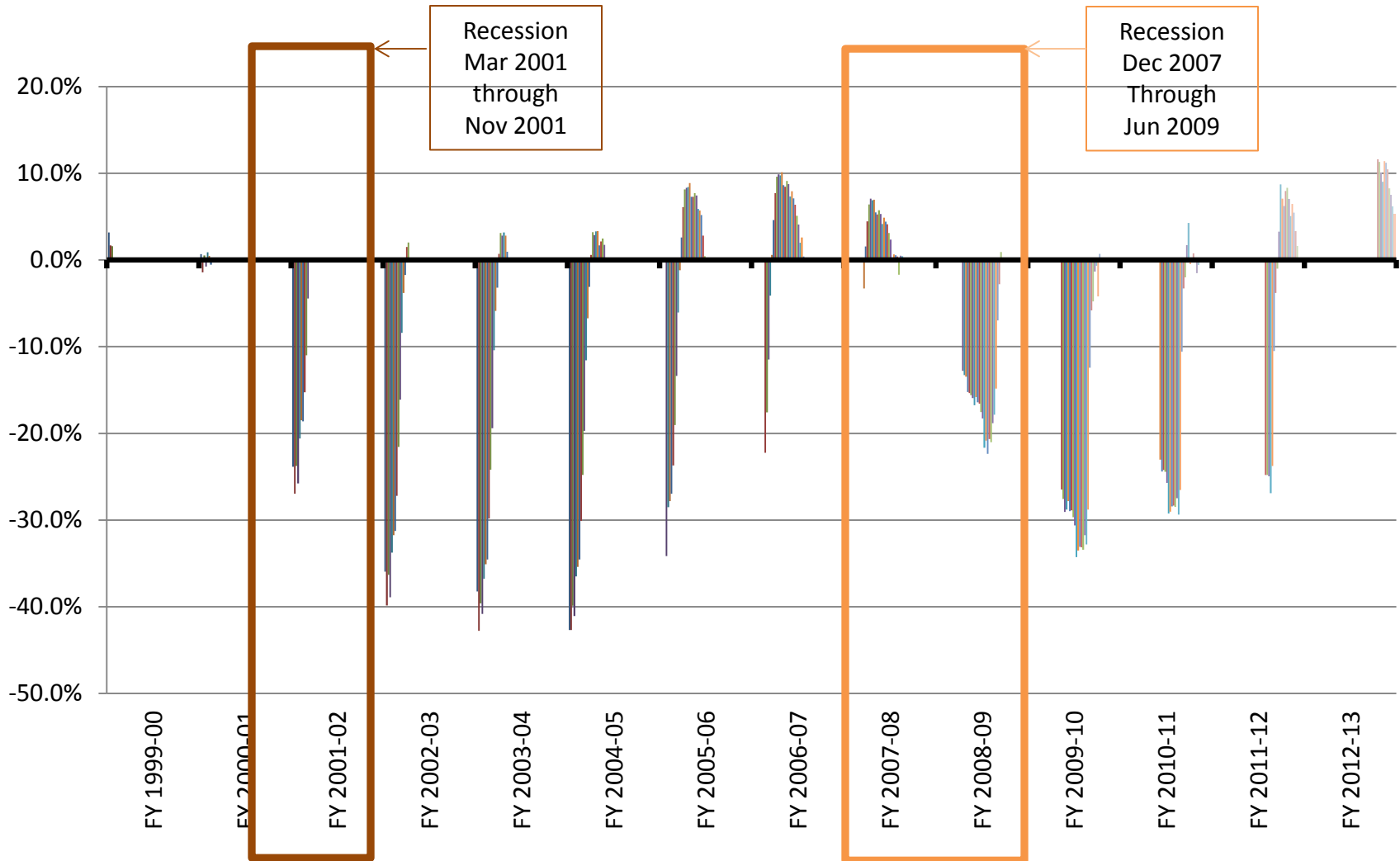


OSPB Compared to Actual



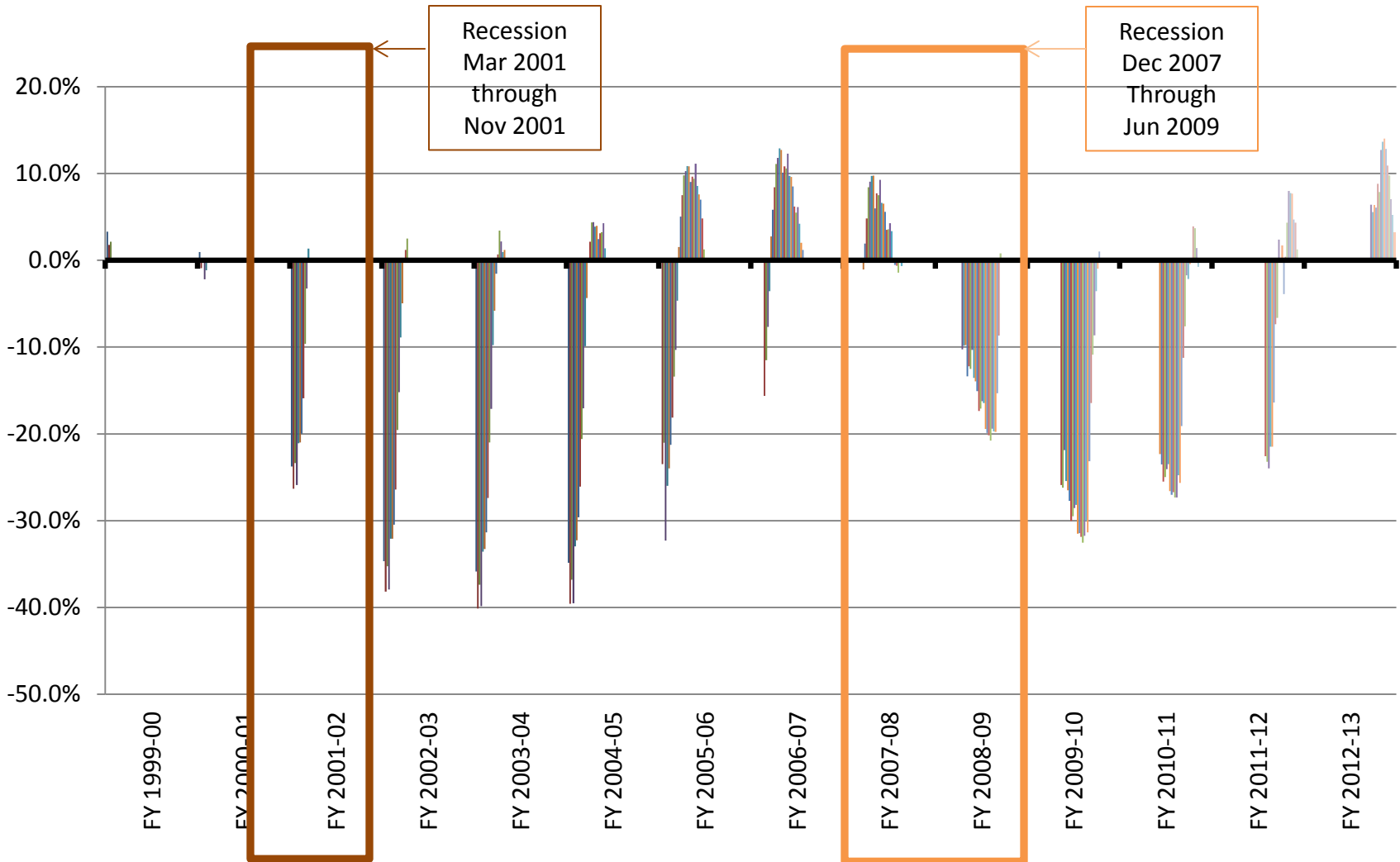
Comparison of Mean Percentage Error (MPE)

All LCS General Fund Revenue Forecasts – 2000 through 2012



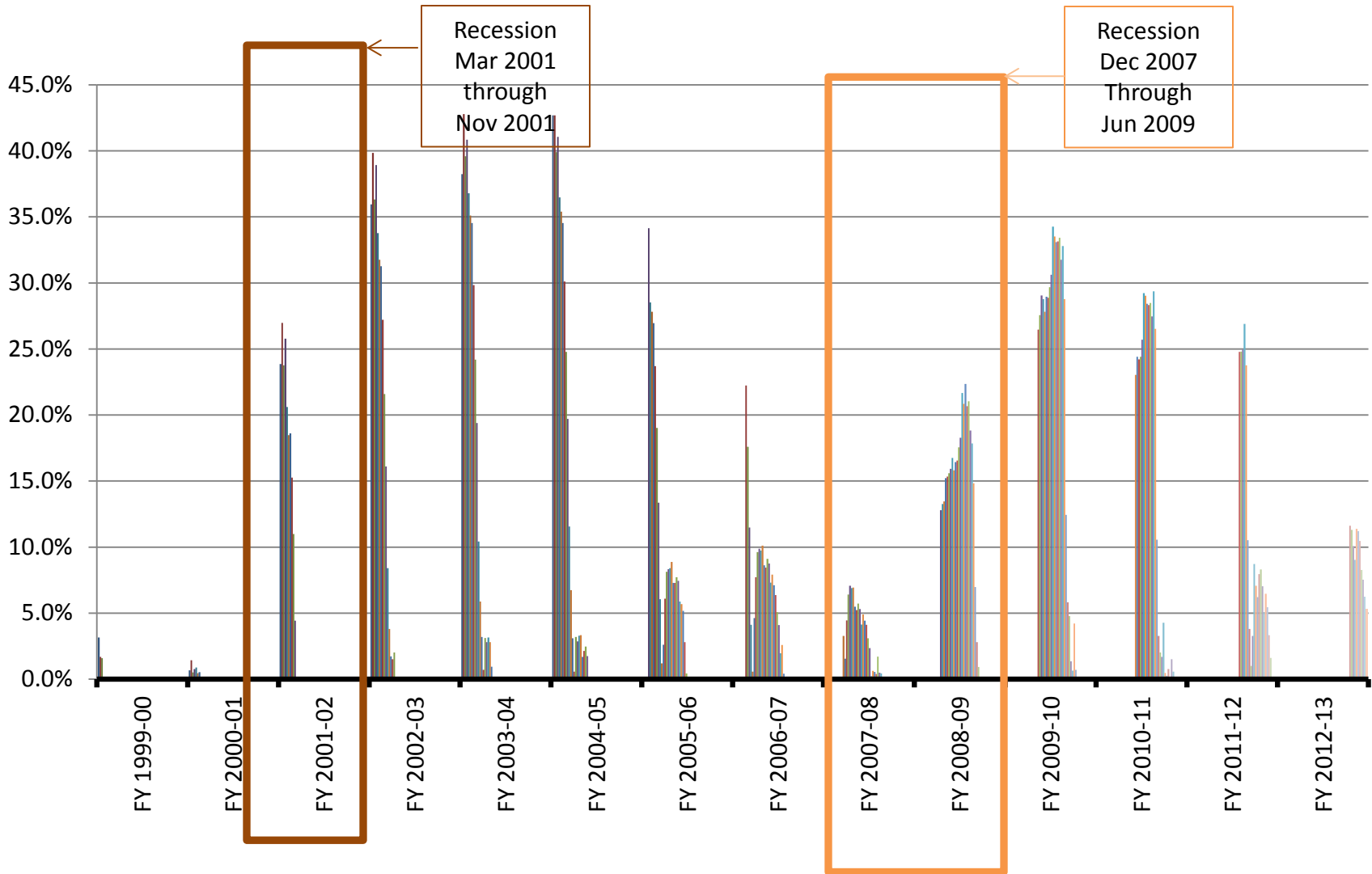
Comparison of Mean Percentage Error (MPE)

All OSPB General Fund Revenue Forecasts – 2000 through 2012



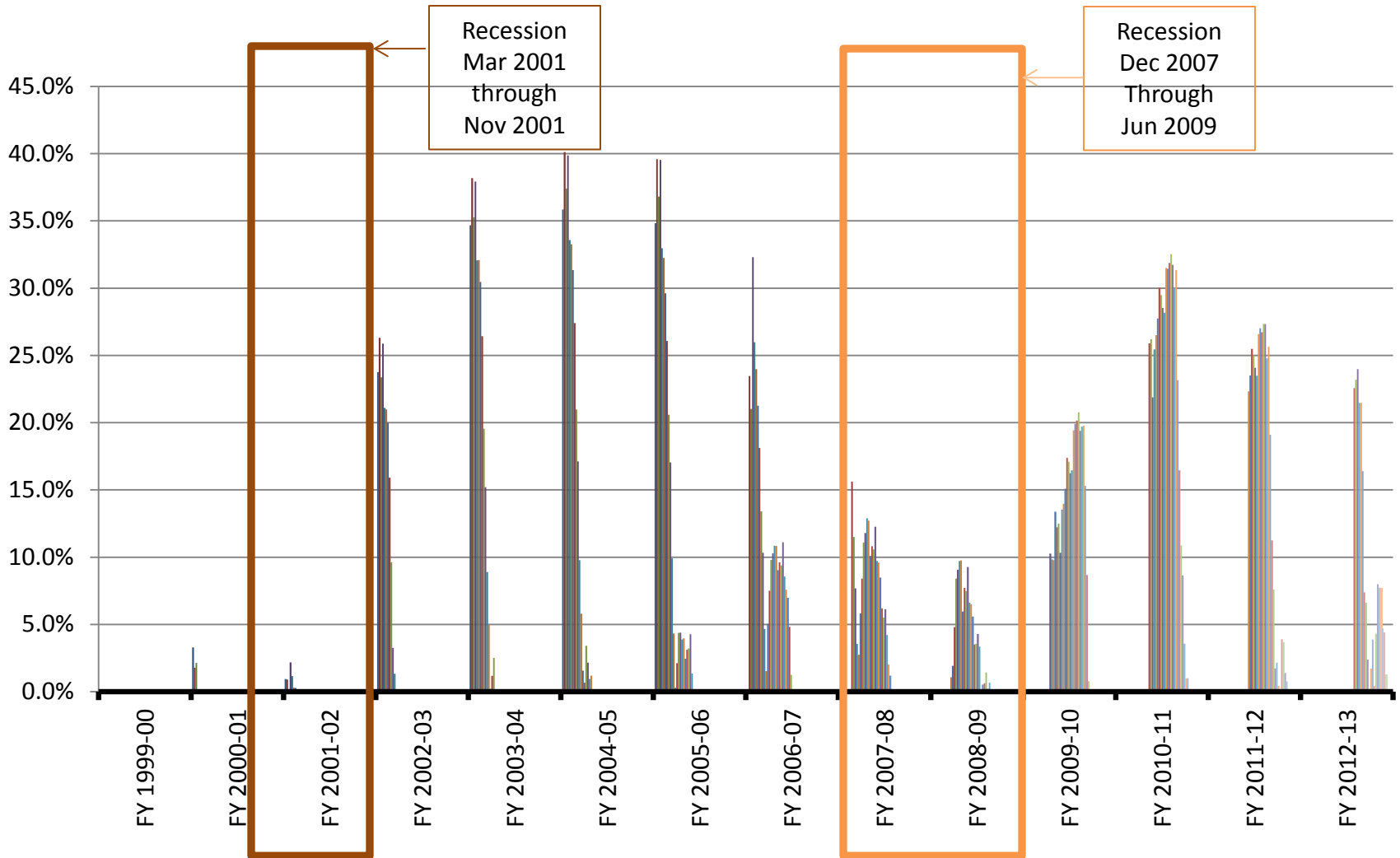
Comparison of Mean ABSOLUTE Percentage Error (MAPE)

All LCS General Fund Revenue Forecasts – 2000 through 2012



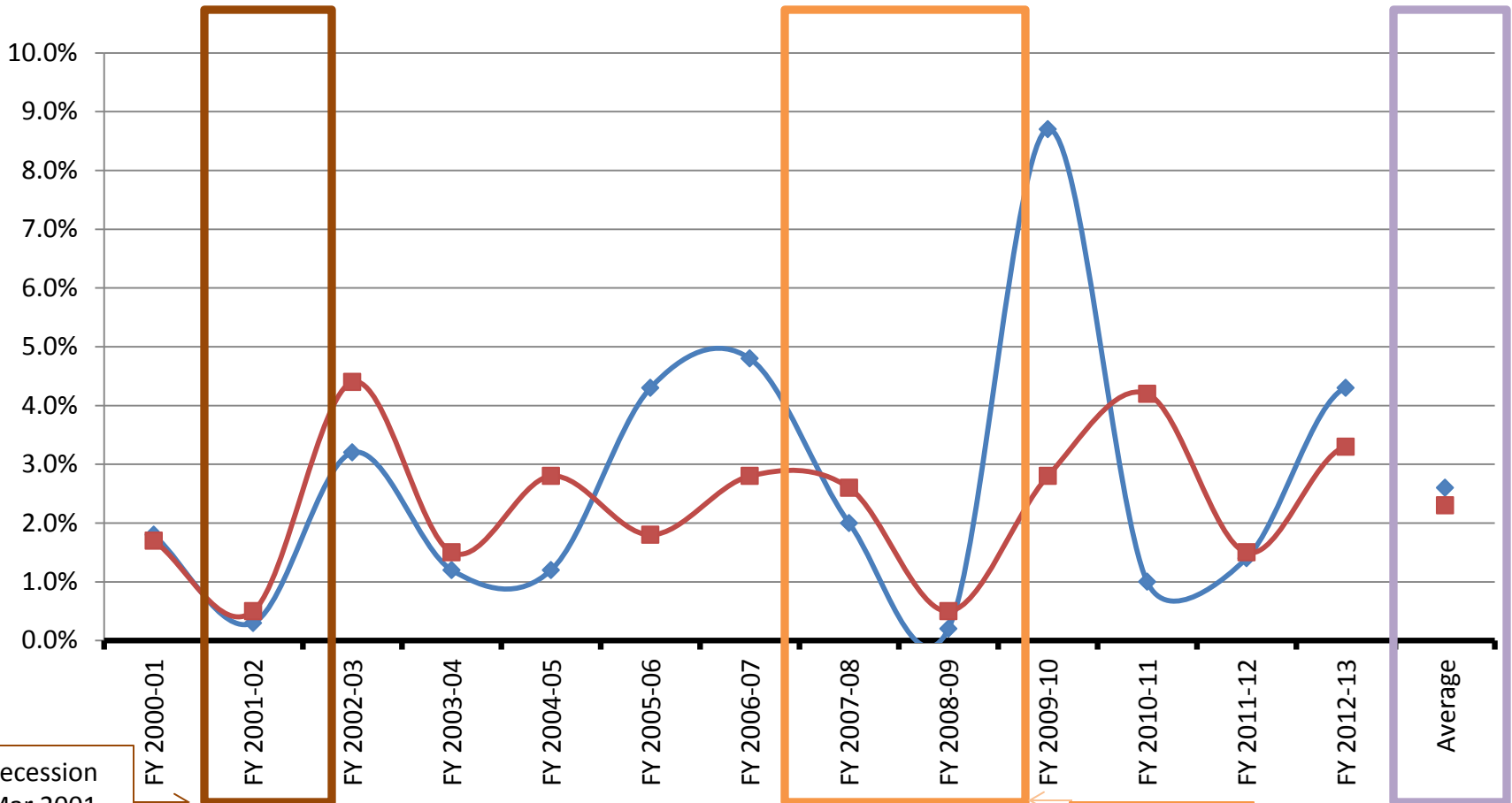
Comparison of Mean ABSOLUTE Percentage Error (MAPE)

All OSPB General Fund Revenue Forecasts – 2000 through 2012



Comparison of Mean ABSOLUTE Percentage Error (MAPE)

March General Fund Revenue Forecasts Supplemental Fiscal Year – 2000 through 2012

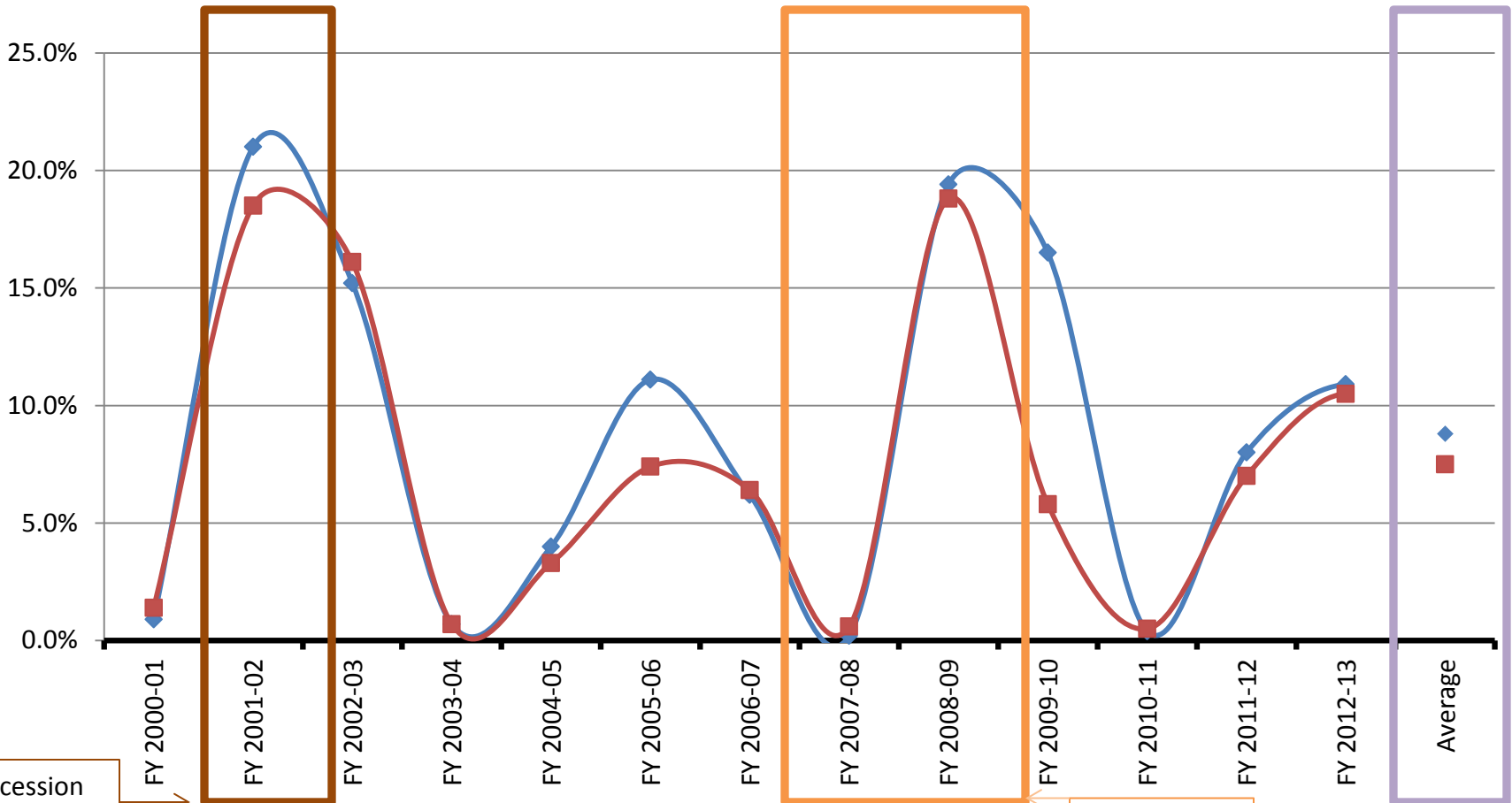


Recession
Mar 2001
through
Nov 2001

Recession
Dec 2007
Through
Jun 2009

Comparison of Mean ABSOLUTE Percentage Error (MAPE)

March Revenue General Fund Forecasts Figure Setting Fiscal Year – 2000 through 2012

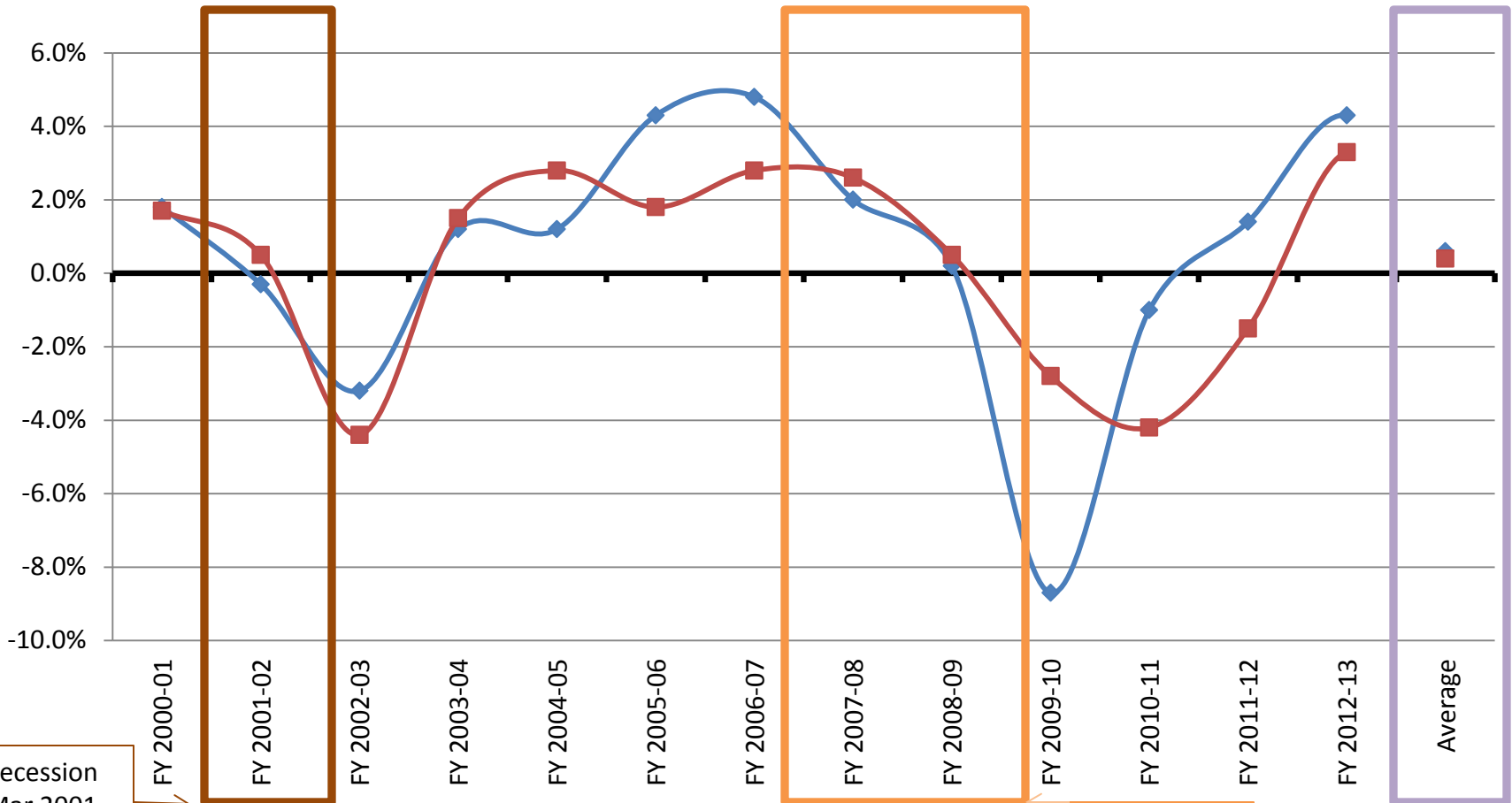


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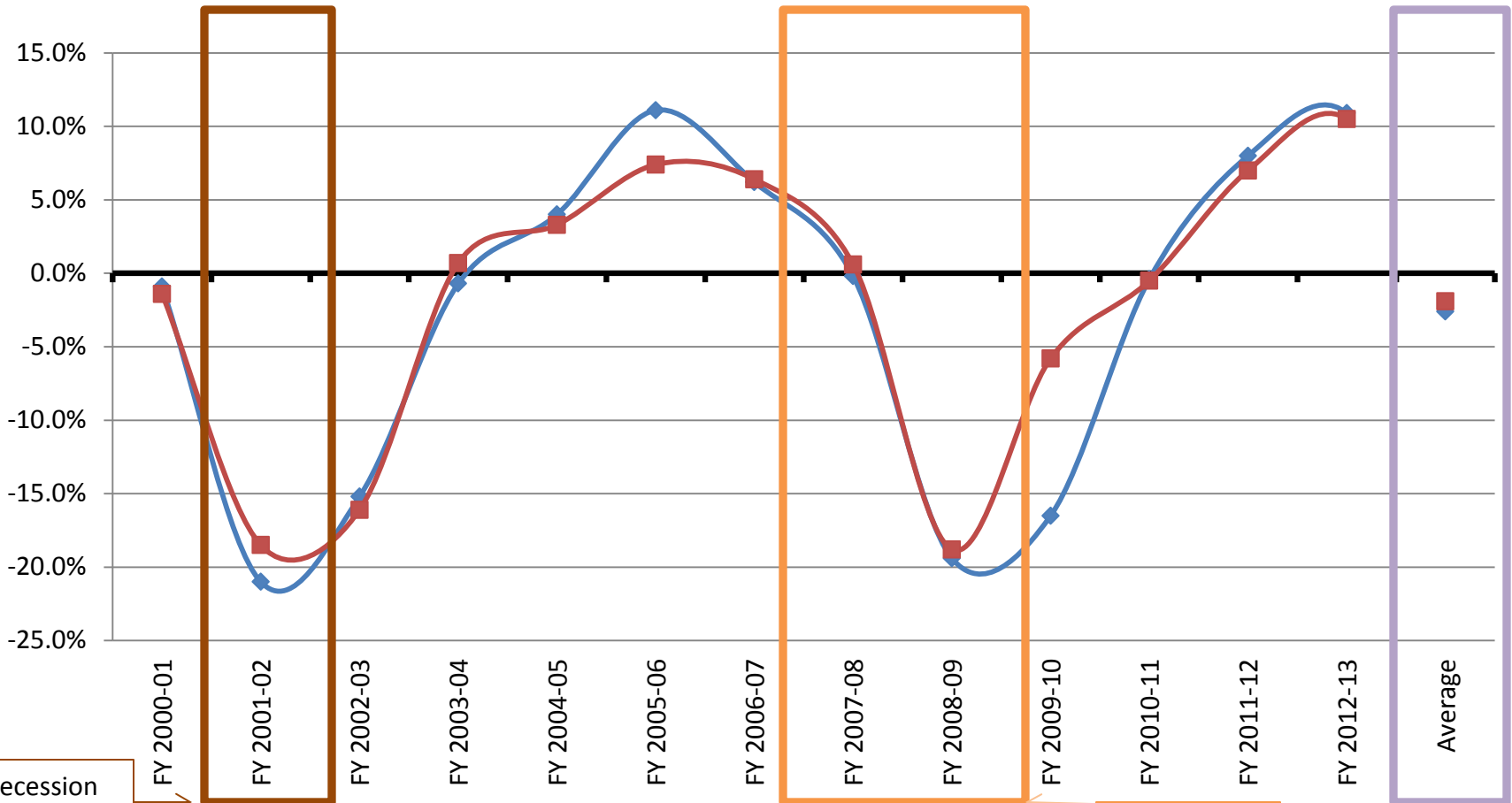


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