# MANAGEMENT AND BUDGET

March 16, 2017

Representative Jim Knoblach, Chair
House Ways and Means Committee
453 State Office Building
St. Paul, MN 55155

Senator Julie Rosen, Chair
Senate Finance Committee
3235 M1nnesota Senate Building
St. Paul, MN 55155

Representative Lyndon Carlson
283 State Office Building
St. Paul, MN 55155

Senator Richard Cohen
2301 Minnesota Senate Building
St. Paul, MN 55155

RE: Revenue Forecast Uncertainty Report

Dear Representatives and Senators:

In accordance with M.S. 16A.103 Sub. 1h, please find attached a report on the Budget and Economic Forecast for the state of Minnesota that was released on January 9, 2017.

Questions regarding this report may be directed to John Pollard at (651) 201-8039.

Sincerely,

Myron Frans, Commissioner

cc: Eric Nauman, State Counsel, Research and Fiscal Analysis
    Bill Marx, House Fiscal Analysis

# Revenue Forecast Uncertainty Report
# March 2017

**Summary of Revenue Forecast Uncertainty for the Current and Next Biennia**

In Minnesota's February 2017 *Budget and Economic Forecast*, total revenues for FY 2016-17 are forecast to be $42.435 billion. This forecast was constructed five months before the current biennium closes. If this forecast turns out to have the same degree of accuracy as the average of our five-months-ahead forecasts, we can expect FY 2016-17 closing revenues to be between $42.135 and $42.735 billion (+/- $300 million).

Total revenues for FY 2018-19 are now forecast to be $45.663 billion. This forecast was constructed 29 months before the biennium closes. Average accuracy for a 29-months-ahead forecast would mean that FY 2018-19 revenues will end up between $43.219 and $48.107 billion (+/- $2.444 billion).

**Estimating Revenue Forecast Uncertainty**

The difference between the level of revenues forecast and the amount actually collected at the end of a biennium—the forecast error—is a gauge of forecast accuracy. The mean absolute error (MAE) is the average of the errors' absolute values (that is, treating negative and positive errors the same). Since accuracy in forecasting a single biennium's revenues improves the closer we get to the end of the two-year period, we calculate separate errors for each time a biennium is part of the forecast: 32, 29, 20, 17, 8 and 5 months from actual. We then average those errors over FY 1990-91 to the most recent closed period, FY 2014-15.

We measure our forecast error as the difference between forecast and actual non-dedicated revenues, while the focus in the *Budget and Economic Forecast* is on total revenues. The items making up the difference between these two measures are dedicated revenues, transfers, and prior year adjustments. We base our forecast error on non-dedicated revenues, because it includes all general fund tax and non-tax revenues—the sources that are the most challenging to accurately forecast. For FY 2016-17, non-dedicated revenues are forecast to be $41.944 billion, and the forecast for total revenues is $42.435 billion, with a difference of $491 million.

The current forecast for FY 2016-17 is the third February forecast, five months ahead of closing. The MAE for five-months-ahead forecasts is 0.7 percent of non-dedicated revenues, or about $300 million for the current biennium. Consequently, the range of closing values for FY 2016-17 total revenues is $42.435 billion +/- $300 million, or $41.135 to $42.735 billion.

The current forecast for FY 2018-19 is the first February forecast, 29 months ahead of closing. The MAE for 29-months-ahead forecasts is 5.4 percent of non-dedicated revenues, or about $2.444 billion for the next biennium. Consequently, the range of closing values for FY 2018-19 total revenues is $45.663 billion +/- $2.444 billion, or $43.219 and $48.107 billion.

Another way to measure the degree of forecast uncertainty is to calculate a confidence range (CR) for our estimates. A 90 percent CR for our revenue forecast is the range of values that will contain the actual value for total revenues 90 out of 100 times. As with the MAE, we calculate the CR as a percentage of non-dedicated revenues. Both the percentage and the CR get smaller the closer we are

to the end of a biennium. The range calculated with the MAE is approximately a 72 percent CR for FY 2016-17 (five-months-ahead forecasts) and a 60 percent CR for FY 2018-19 (29-months-ahead forecasts).

For FY 2016-17, the 90 percent confidence range for total revenue is $42.435 +/- $452 million (1.1 percent), or $41.983 to $42.887 billion. For FY 2018-19, the 90 percent confidence range is $45.663 +/-$4.785 billion (10.6 percent), or $40.878 to $50.448.

Note that all of the error measures reported here relate to the state's revenue forecasts. They do not include estimates of errors in forecasting state expenditures.
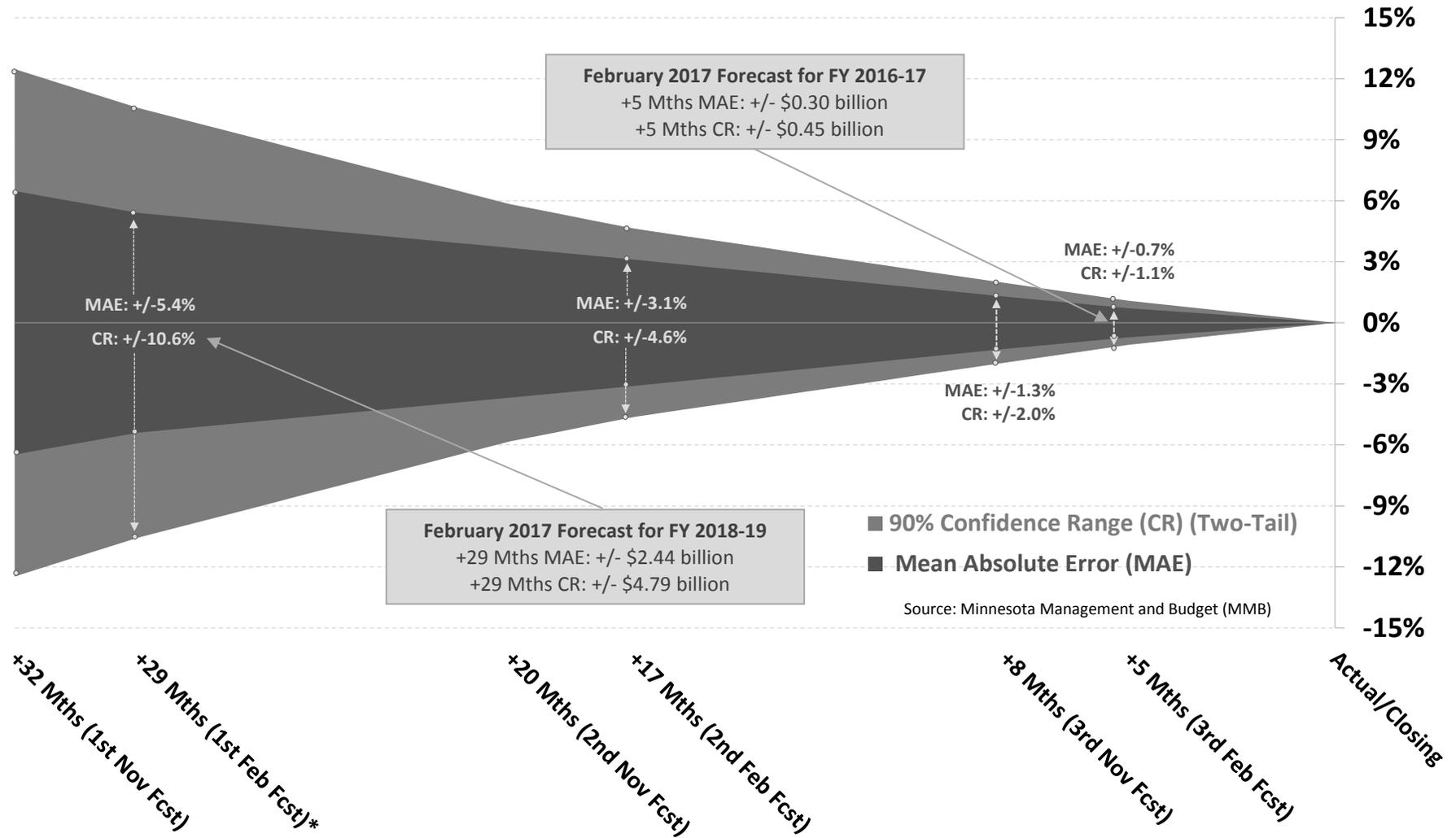
**Sources of Revenue Forecast Uncertainty**

Actual revenue collections never *precisely* match the forecast for a wide range of reasons. First, economic data from time periods preceding a forecast (such as employment or consumer spending data) are not perfectly measured and are frequently revised after we have used them to construct a forecast. Second, even if past U.S. economic data *were* perfectly measured, modelling errors and the inability to foresee all future impacts on the economy would prevent our macroeconomic consultant from perfectly forecasting the U.S. economy. Third, errors in the U.S. forecast and in Minnesota's data history and our own imperfect modelling introduce inaccuracies into our forecast of the state's economy. Fourth, even if the Minnesota economy *were* forecast with perfect accuracy, our forecasts of Minnesota tax revenues would still contain some error. This is because of imperfections in our revenue forecasting models, mis-matches between the economic and tax definitions of income and spending items, inconsistencies in the timing of receipts from a given year's tax liability, and uncertainty about the revenue impacts of changes in state tax laws.

Minnesota's February 2017 economic and revenue forecasts carry a large degree of uncertainty related to U.S. economic policy. The February 2017 U.S. outlook incorporated available information related to some possible U.S. policy changes. However, considerable uncertainty remains about which policy changes will be enacted in the near term and their impact on the economy. Until those changes become clearer, their impact on key economic sectors remain a sources of forecast risk.

# Average Revenue Forecast Uncertainty over Minnesota's Budget Cycle

% of Net Non-Dedicated Revenue , Sample Period: FY1990-91 to FY2014-15

**February 2017 Forecast for FY 2016-17**
+5 Mths MAE: +/- $0.30 billion
+5 Mths CR: +/- $0.45 billion

MAE: +/-5.4%
CR: +/-10.6%

MAE: +/-3.1%
CR: +/-4.6%

MAE: +/-0.7%
CR: +/-1.1%

MAE: +/-1.3%
CR: +/-2.0%

**February 2017 Forecast for FY 2018-19**
+29 Mths MAE: +/- $2.44 billion
+29 Mths CR: +/- $4.79 billion

■ 90% Confidence Range (CR) (Two-Tail)
■ Mean Absolute Error (MAE)

Source: Minnesota Management and Budget (MMB)

15%
12%
9%
6%
3%
0%
-3%
-6%
-9%
-12%
-15%

+32 Mths (1st Nov Fcst)
+29 Mths (1st Feb Fcst)*
+20 Mths (2nd Nov Fcst)
+17 Mths (2nd Feb Fcst)
+8 Mths (3rd Nov Fcst)
+5 Mths (3rd Feb Fcst)
Actual/Closing

* +29 Mths (1st Feb) represents the MMB forecast on which the original budget for the biennium was based.
Notes: Adjusted for the effects of legislation. MMB uses the mean-absolute error (MAE) as a measures of accuracy in its evaluation of forecast uncertainty. MAE is calculated by averaging forecast deviations from actual without regard to arithmetic sign.Under the assumption that tax policies do not significantly change, a 90% confidence range (CR) is a measure based on our sample budget data, reporting that 90% of the times the lightest range will contain the actual value for total revenues. The range calculated with the MAE (darkest area) is approximately a 72% CR for FY 2016-17 and a 60% CR for FY 2018-19.