MANAGEMENT AND BUDGET

Revenue Forecast Uncertainty Report

December 2020

Summary of Revenue Forecast Uncertainty for the Current Biennium

In Minnesota's November 2020 *Budget and Economic Forecast*, total revenues for FY 2020-21 are forecast to be $47.100 billion. This forecast was constructed eight months before the current biennium closes. If this forecast turns out to have the same degree of accuracy as the average of our eight-months-ahead forecasts, we can expect FY 2020-21 closing revenues to be between $46.540 and $47.660 billion (+/- $0.56 billion).

Total revenues for FY 2022-23 are forecast to be $49.494 billion. This forecast was constructed 32 months before the close of the biennium. If this forecast is consistent with average accuracy of our 32-months-ahead forecasts, we can expect FY 2022-23 closing revenues to be between $46.644 and $52.344 billion (+/-2.85 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 2018-19.

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 2020-21, non-dedicated revenues are forecast to be $46.378 billion, and the forecast for total revenues is $47.100 billion, with a difference of $722 million. For FY 2022-23, non-dedicated revenues are forecast to be $49.121 billion, and the forecast for total revenues is $49.494 billion, with a difference of $373 million.

The current forecast for FY 2020-21 is the third November forecast, eight months ahead of closing. The MAE for eight-months-ahead forecasts is 1.2 percent of non-dedicated revenues, or about $0.56 billion for the current biennium. Consequently, the range of closing values for FY 2020-21 total revenues is $47.100 billion +/- $0.56 billion, or $46.540 to $47.660 billion.

The current forecast for FY 2022-23 is the first November forecast, 32 months ahead of closing. The MAE for 32-months-ahead forecasts is 5.8 percent of non-dedicated revenues, or about $2.85 billion for the next biennium. Consequently, the range of closing values for FY 2022-23 total revenues is $49.494 billion +/- $2.85 billion, or $46.644 to $52.344 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.

For FY 2020-21, the 90 percent confidence range is $47.100 +/-$0.93 billion (2.0 percent), or $46.170 to $48.030. For FY 2022-23, the 90 percent confidence range is $49.494 billion +/- $5.89 billion (12.0 percent), or $43.604 to $55.384 billion.
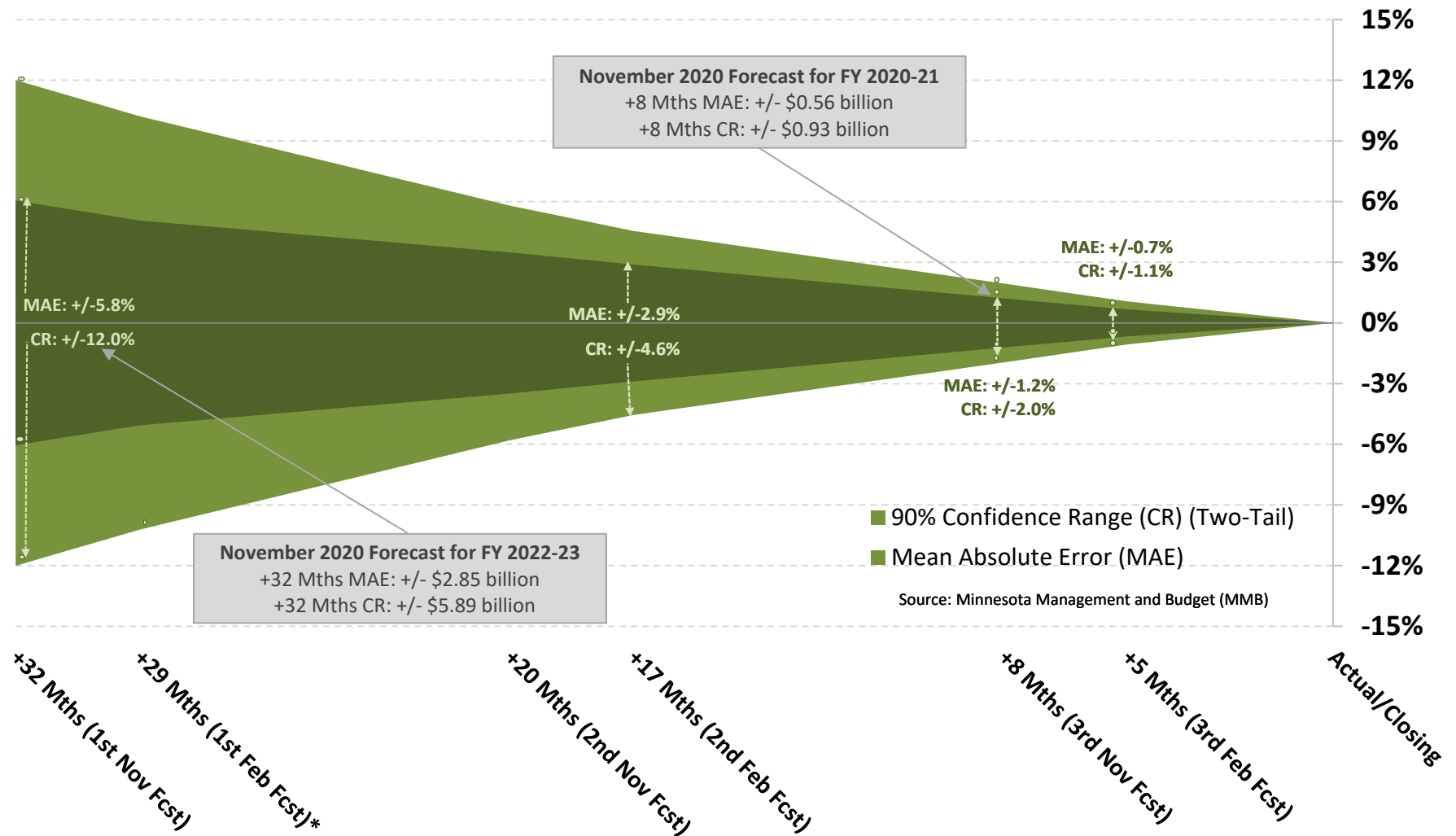
Note that all the error measures reported here relate to the state's revenue forecasts. They do not include estimates of errors in forecasting state expenditures.

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, modeling 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 modeling 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, mismatches 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.

Average Revenue Forecast Uncertainty over Minnesota's Budget Cycle

% of Net Non-Dedicated Revenue, Sample Period: FY1990-91 to FY2018-19

November 2020 Forecast for FY 2020-21
+8 Mths MAE: +/- $0.56 billion
+8 Mths CR: +/- $0.93 billion

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

MAE: +/-5.8%
CR: +/-12.0%

MAE: +/-2.9%
CR: +/-4.6%

MAE: +/-1.2%
CR: +/-2.0%

November 2020 Forecast for FY 2022-23
+32 Mths MAE: +/- $2.85 billion
+32 Mths CR: +/- $5.89 billion

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

Source: Minnesota Management and Budget (MMB)

X-axis labels: +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 evalulation 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..