Minnesota's Revenue Volatility
Presented by Laura Kalambokidis
To the Minnesota Senate Finance Committee
January 24, 2019

MMB recommends the size of the state's budget reserve

As you know, Minnesota statute requires Minnesota Management and Budget to "develop and annually review a methodology for evaluating the adequacy of the budget reserve based on the volatility of Minnesota's general fund revenue structure." To get us all on the same page: volatility is the amount that a data series varies from its trend growth path. That analysis results in a recommended size of the budget reserve as a percentage of general fund net non-dedicated revenues. At the end of each September, we report that percentage along with any changes in our methodology.

Our September 2018 report recommended a reserve level equal to 5.0 percent of FY 2018-19 revenues, or $2.222 billion. With the November 2018 forecast, FY 2018-19 revenues have been updated, and the 5 percent recommendation implies a reserve level of $2.250 billion. The current reserve is $2.075 billion, or $175 million short of the target.

We annually analyze revenue volatility

This slide walks through the basic steps we take in conducting our annual revenue volatility analysis.

1. Using U.S. historical data, we estimate **the volatility of major components within each tax**, e.g., the volatility of income sources included in the income tax base.

2. Combining components, we estimate **the volatility of each major tax type:** individual income, sales, corporate, statewide property, other.

3. To understand how the tax types interact with one another in the state's revenue system, we estimate **the volatility <u>between</u> the tax types**, e.g., sales tax correlated with the individual income tax, sales tax correlated with corporate income tax. In other words, we determine whether the tax bases tend to deviate from their trends in the same or opposite direction.

4. Looking at the tax system like a financial portfolio, we combine the volatilities of the tax types and their interactions—or correlations—with one another to measure **the volatility of the tax base system**.

5. Using the current share of revenues that each tax type contributes to Minnesota's total revenues, we **convert estimated tax base volatility to revenue volatility**. So, changing the revenue shares will change the system volatility, even if the volatility of the tax types stays the same. I will show you a chart that illustrates how this has changed over time.

6. Given this level of volatility and the size of current net non-dedicated revenues, we **compute the size of the budget reserve**—as a share of revenues—that would ensure that a biennial deficit generated by revenue volatility will not exceed the reserve 95 times out of 100 (19 out of 20 biennial deficits). This is the 95 percent confidence interval that we describe in our report.

A couple more notes about the methodology: We examine the tax base (not revenues), because it is difficult to obtain a state revenue data series that controls for tax law changes. Data on tax bases, as opposed to actual collections, is a reasonable substitute.

We examine national tax base and income data, because detailed state-level economic data is limited. National data serve as an appropriate proxy for Minnesota activity, and the most recent national data are from 2016. So, when I show you results for our 2018 study, note that it is based on analysis of 2016 U.S. data on tax base volatility and the 2018 composition of Minnesota taxes.

Finally, the values in our study are in nominal dollars (i.e., not adjusted for inflation), because budget policy is concerned with current dollars.

The composition of Minnesota's revenues varies over time

This chart shows the contribution of each major tax type to Minnesota's total revenues over time. I've also included the range of shares for each tax type between 1970 and 2015. Between 1990 and 2010, revenues from sales tax averaged 31.5 percent as a share of total revenues. Since 2010, sales tax as a share of total revenues has been falling. Sales tax represented 27 percent of revenues in 2015.

Since 1970, income tax has grown as a share of MN Revenues (+8% since 1970) and now represents roughly half of MN Revenues.

You will see in the next slide that the corporate tax is the most volatile source of revenues, but it represents a fairly small share of the total (7.3 percent).

Revenue volatility varies by source

This chart shows our estimates of volatility—or variability—of each of the major general fund revenue sources tax types over time. To estimate revenue volatility, we first measure the underlying trend growth rate in the revenue source and then observe the standard deviation from that trend. The chart shows those standard deviations.

Minnesota's corporate tax is measured as most volatile of the major sources, with an estimated volatility of 7.7 percent, 2 ½ times more volatile than general sales tax, which is one of the most stable revenue sources. The two taxes generate very different shares of total revenue, however, with the corporate tax making up only 7.0 percent of revenues (in FY 2016), compared to more than ¼ of revenues for the sales tax. The corporate tax is nearly 2 times more volatile than the individual income tax, but it generates a much smaller share of general fund revenues. So,

on a weighted basis, the corporate income tax contributes less to general fund volatility than the income tax.

While still relatively low compared to the corporate income tax, the individual income tax—making up roughly half of general fund revenues—is the second most volatile of the major sources.

We combine volatility estimates with revenue shares to estimate overall volatility

This chart shows MMB's estimates of overall volatility of the general fund over time, along with the current estimated standard deviation—the 4.3 percent you see in last data point. The volatility measure depends on (1) the volatility of individual sources of revenue, (2) the share of total revenue each tax contributes to the general fund, and (3) whether the revenue sources tend to deviate from their trends in the same or opposite directions (that is, whether their changes are negatively or positively correlated).

This last condition is tied to the idea of a diversified investment portfolio: the riskiness of your return is dampened to the extent you have assets in your portfolio whose deviations will offset one another over time.

The estimates in the chart are based on current law and on analysis of the volatility of the bases of Minnesota's major taxes through 2016.

The vertical gray bars indicate the U.S. recessions.

Minnesota's revenue volatility increased in the 1990s, declined since the Great Recession

The chart shows that revenue volatility increased significantly during the 1990s and during the 08-09 recession. The primary drivers of this increased volatility are economic, rather than policy, factors. For example, during this period, financial

markets became more volatile and performance-based compensation, such as stock options and bonuses, grew as a share of total compensation. In addition, the negative shock from the Great Recession increased the volatility of the general sales tax and the corporate tax base.

In contrast, as we move further from the Great Recession, volatility has decreased. This is likely due to the steady economic recovery and prolonged expansion period.

Revenue volatility and forecast inform budget reserve recommendations

Every state revenue system has some inherent volatility, and most states manage the associated risk with some kind of budget reserve. MMB's recommendation is that the budget reserve should be a percentage of forecast general fund revenues for each biennium, where the percentage is based on the volatility analysis of the current law revenue system that I have just presented.

This table shows the most recent history of our budget reserve recommendation. In the columns to the right, I report the estimated tax base volatility of the major revenue sources for the last five budget reserve reports. Again, the corporate tax has the highest volatility, the statewide property tax the lowest.

The column to the left, labeled total volatility, shows the system volatility that we construct when we combine the tax base data with their revenue shares. The 4.3 percent from the last chart is the final number in that column.

Applying our confidence interval to the volatility measure, we estimate the recommended percentage of revenues for the budget reserve. Based the assumption that the budget is structurally balanced at the start of the biennium, and the objective of limiting to 5 percent the probability that a biennial deficit will exceed reserves, we recommend a budget reserve equal to 5.0 percent of non-dedicated general fund revenues. Note that both the system volatility and the recommended percentage have remained quite stable in recent years.

The next column to the left is the size of the current biennium's general fund net non-dedicated revenues, and two columns to the right of that shows the recommended budget reserve level—these are the amounts in our September 2018 report. Note that even when the recommended percentage stays the same, the target budget reserve level will grow (shrink) as revenues grow (shrink).

Returning to the total volatility measure, **this** number could change if (1) the volatility of any tax base changes, (2) a correlation between tax bases changes, or (3) the composition of revenues changes. It will take a pretty large change in the composition of revenues to have a material impact on the overall volatility measure. And of course, a large system change will also have other effects, such as changing revenue growth and the distribution of the tax burden.

The confidence level determines the recommended budget reserve percentage. We apply a 95 percent confidence level. A lower confidence level (e.g., 90 percent) would imply a smaller reserve and greater risk that a deficit will exceed the reserve. A higher confidence level (e.g., 99 percent), would imply a larger reserve and lower risk that a deficit will exceed the reserve.

Staying on this table: Note the change from our 2017 to 2018 studies. The most recent change in the recommended percentage was primarily due to the Bureau of Economic Analysis historical data revision, done every five years. The revision reflects "methodological improvements, changes in definitions, and the availability of more complete data over time". Unlike the usual annual revisions that typically go back three years the comprehensive revisions can go back to 1929 and are only released every five years. Some of the NIPA data in this study were revised back to 1997. The revised consumer spending data were more variable than the historical data we used for prior studies, and increased the measured volatility of the sales tax.

There are limitations to our analysis

Minnesota's budget reserve analysis and policy has gotten positive attention nationally. Nevertheless, I should caution you that there are limits to our approach. Our methodology only measures revenue volatility.

First, any budget forecast risk introduced by **expenditure volatility** is not accounted for here.

Our analysis does not include revenue forecast risk from factors other than tax base volatility, listed on this slide. The full range of those revenue forecast risks is measured in our twice-yearly revenue forecast uncertainty reports.

- **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.
- Even if past U.S. economic data *were* perfectly measured, modeling imperfections and the inability to foresee all future impacts on the economy would prevent our macroeconomic consultant from perfectly **forecasting the U.S. economy**.
- Uncertainty 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**.
- Even if the Minnesota economy *were* forecast with perfect accuracy, our **forecasts of Minnesota tax revenues** would still contain some uncertainty. 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.

I am happy to take questions.