

Special Project – Revenue Forecasting Process

Project Scope:

During deliberation of the FY15 budget, City Council members asked several questions regarding the revenue forecasting process. The Office of the City Auditor undertook this project to obtain an understanding and provide information on the forecasting process used to estimate General Fund resources for the last five complete fiscal years, which includes FY2010 – FY2014.

We did not conduct an audit and are not expressing an audit opinion on the revenue forecasting process. Like all economic forecasting, revenue forecasting requires highly specialized expertise. An audit would include assistance from a forecasting/modeling expert.

Questions we asked:

- What methods does the Finance Department staff use for revenue forecasting? (See Exhibits A and B)
- What judgmental changes are made to the forecasts? (See Exhibit A)
- What are the bases for any judgmental changes? (See Exhibit A)
- How accurate have estimated revenues been? (See Exhibit C)
- How is revenue forecasting done by other governments? (See Exhibit D)
- How much change occurs between revenue estimates and what is approved for the budget? (See below)

Comparison of revenue estimate to approved budget

Fiscal year 09-10 was the only year in our five-year scope in which the revenue estimate was significantly different from the approved budget. Because the economy was beginning a decline when the FY09-10 budget was prepared, the history-based models had to be adjusted based on judgment. Even with large downward judgment-based adjustments, actual revenue in the General Fund was \$19.7 million below the estimates.

Projection models based on historical data are vulnerable to this risk. When historical revenue is trending upward, the models tend to make projections of increasing revenue. Once again, the economy is showing signs of a decline during FY16 due to negative trends in the oil industry. This is an indicator of potential for this risk.

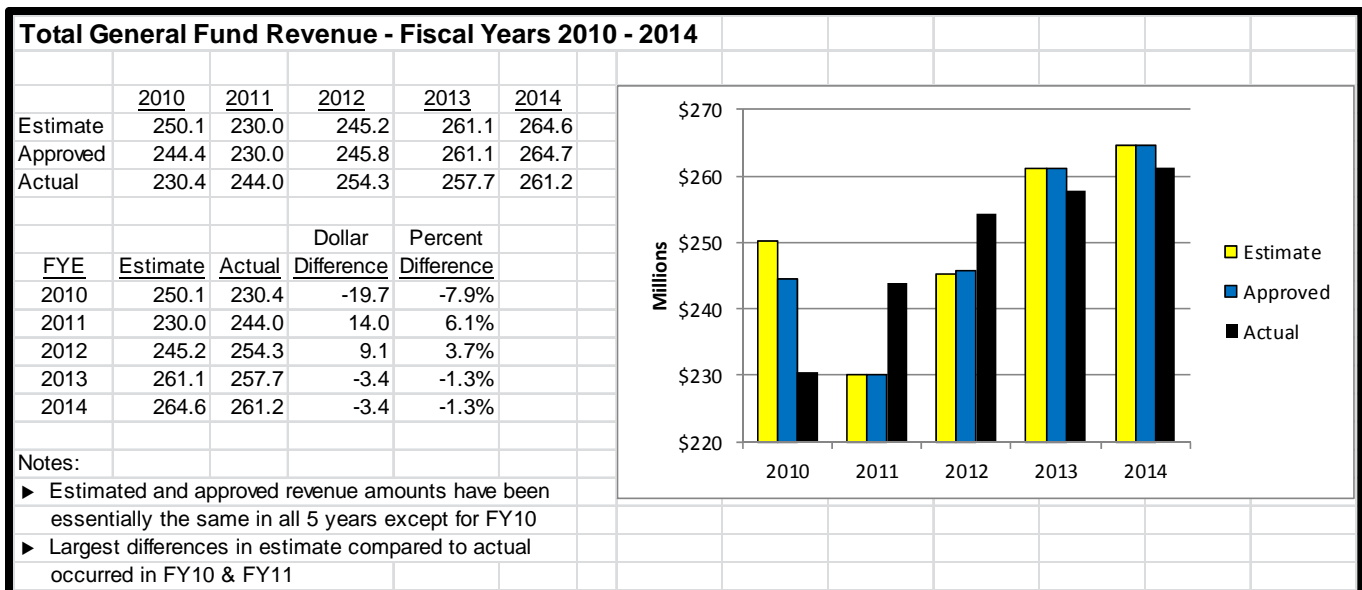


Exhibit A

Revenue Forecasting Process Used by Finance Department – Budget Division

Step 1 – Modeling

Finance Department budget staff uses technical tools to develop forecasts using various methods depending on the type of revenue. Most of the forecasting models create projections based on historical revenue collections.

Step 2 – Budget staff identification and application of factors

Budget staff analyzes available information from different sources to identify factors that will affect revenue calculations. Staff members discuss these factors and their impact. Budget staff then adjusts the results from the forecasting models to reflect expected changes. Documentation of the details of each adjustment is not maintained; however, the *Annual Budget and Capital Plan* in the Executive Summary section includes a description of significant factors considered each year. Budget staff also discusses forecasting each year with Oklahoma City's budget director, comparing results and assumptions.

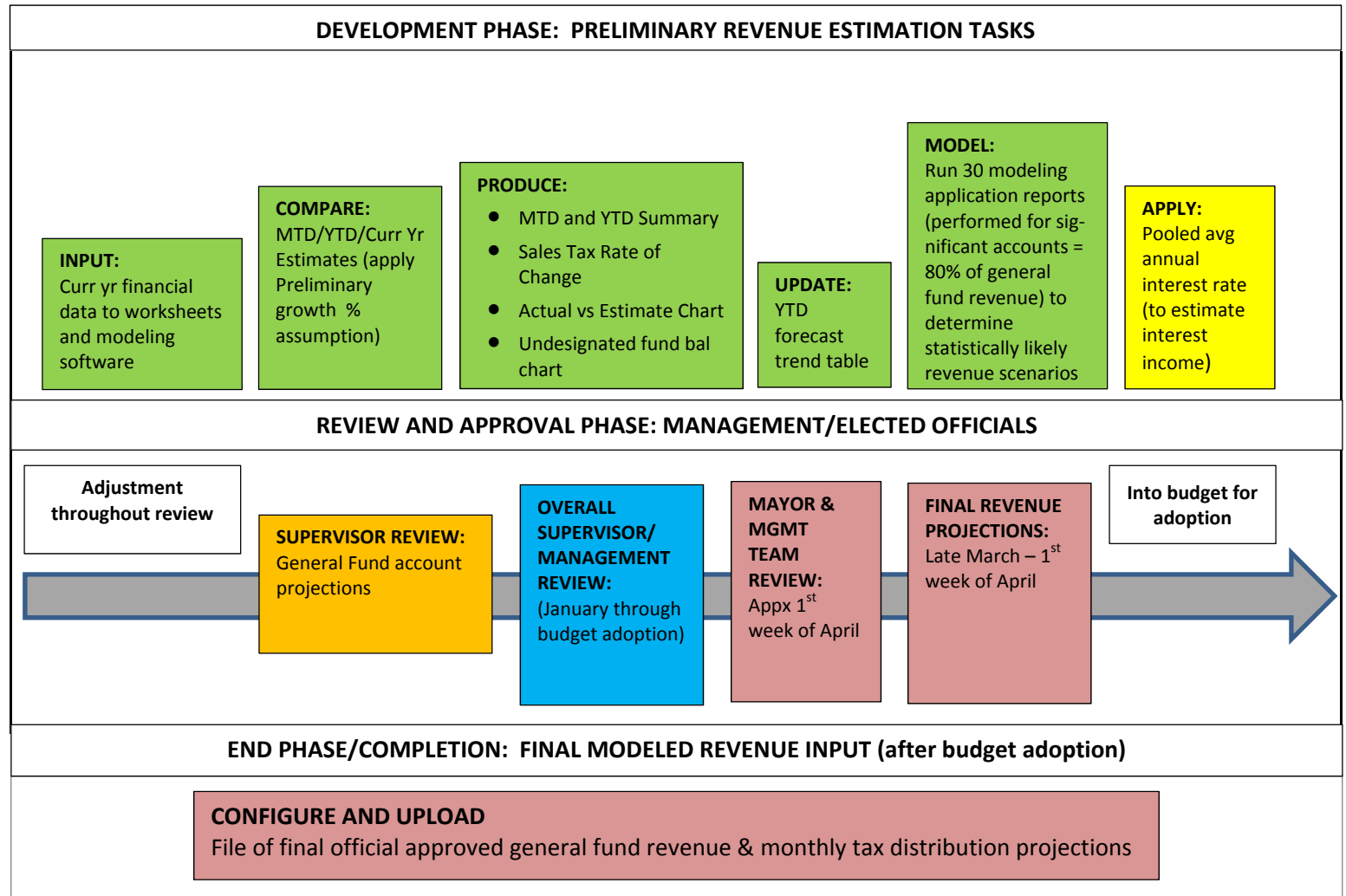
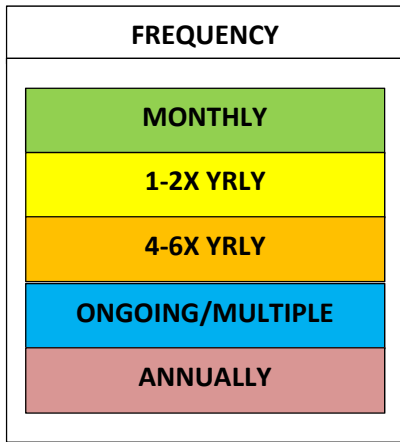
Step 3 – Executive level management discussion

The Finance Director, Budget Division Manager and budget staff discuss the draft budget, including revenue forecasts, with the Mayor and executive-level managers. The Mayor or managers may ask staff to take a second look at a revenue assumption, but they have not directed budget staff to change forecasts. Usually revenue projections are discussed several times with the Mayor during the budgeting process.

Step 4 – Council discussion

The City of Tulsa complies with the provisions of the Oklahoma Municipal Budget Act. The Mayor is responsible, through the Department of Finance, to ensure compliance and the timely preparation of the City of Tulsa's annual budget. Usually, the Mayor provides a proposed budget at the Council meeting held the last week of April. The Council has approximately six weeks to review the budget and make any changes since the charter requires adoption by Council ordinance at least seven days before the beginning of the fiscal year. Historically, Council has not requested changes to revenue forecasts. Council members may propose budget changes that will affect revenue. In this case, budget staff analyzes the effect of the proposed changes on revenue forecasts and provides updated information to the Council.

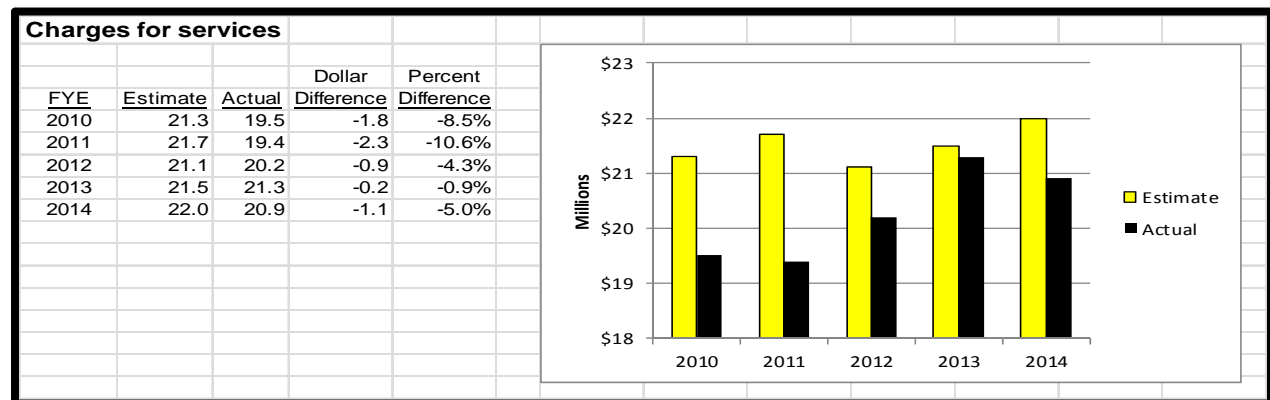
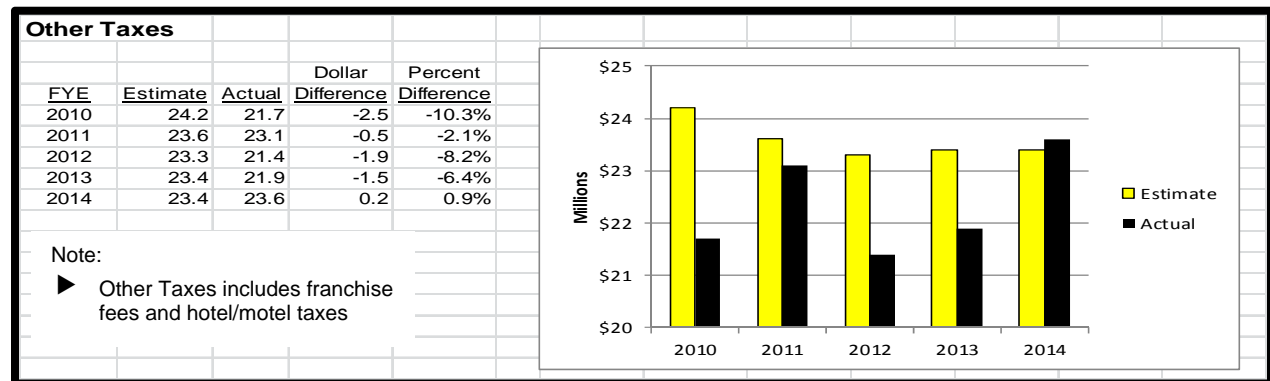
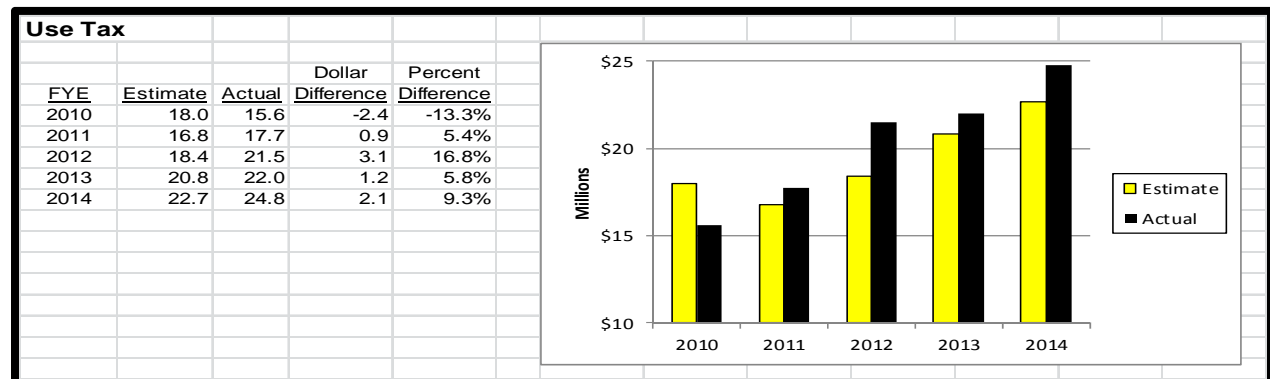
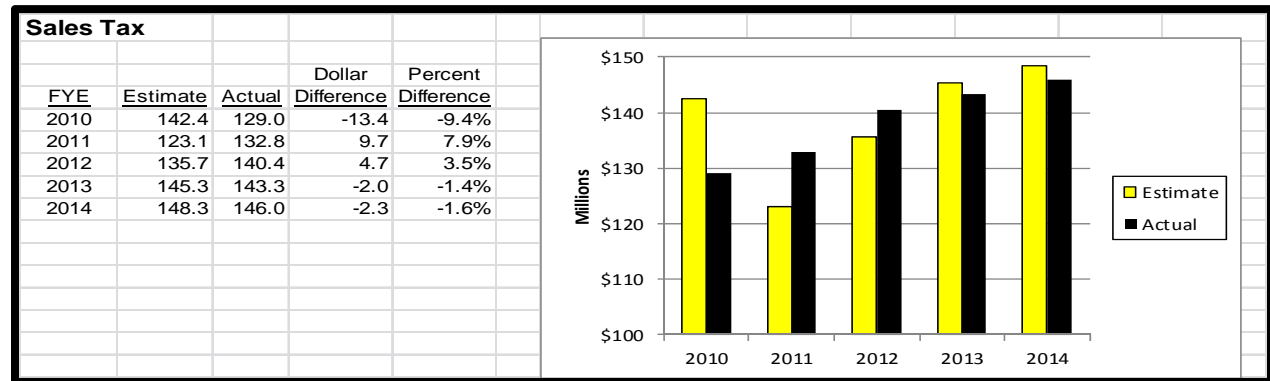
Exhibit B GENERAL FUND REVENUE PROJECTION PROCESS OVERVIEW



DATA/INPUTS/ASSUMPTIONS												
Monthly calculated forecasts - adjusted with YTD actual data	Sales & Use Tax Distribution Data	Sales Tax – Yr/Yr \$ and % difference	Monthly modeled revenue data and trends	Undesignated fund balance (over /under fully funded operating reserve)	Actual to Estimate rate of change	Moody's Tulsa econ report	COT Mayor's Mthly Sales & Use Tax Notification Letter	FY Budgetary Control Data and upcoming year est data	2 yr budget annualized and fund data	MIT Living wage calculator – Tulsa Cty	Wells Fargo Global outlook	SEIX Advisors outlook

Exhibit C

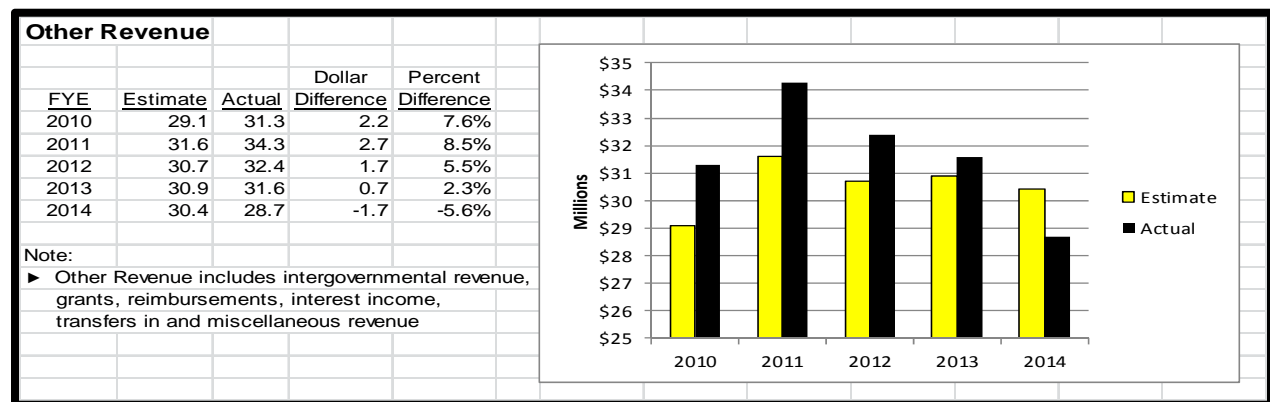
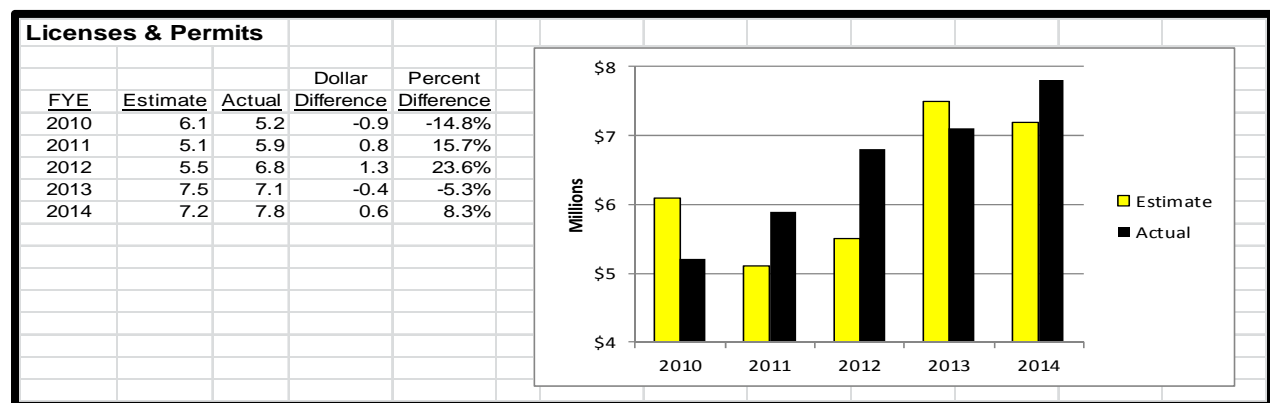
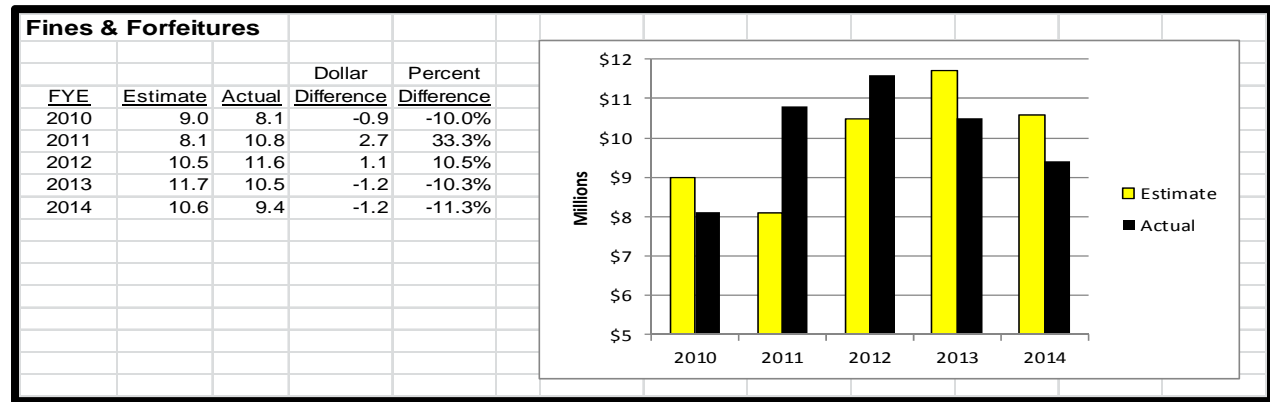
Budget Estimates Compared to Actual Revenues, Fiscal Years 2010-2014



Sources: Estimate was obtained from the Mayor's proposed budget (copy in the City Council library). Actual revenue for FY10-13 was obtained from the City of Tulsa's published budget, entitled *Annual Budget and Capital Plan*. FY14 actual revenue was obtained from fund summaries in the FY16 proposed budget.

Exhibit C

Budget Estimates Compared to Actual Revenues, Fiscal Years 2010-2014



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Exhibit D

Summary of Guidance on Governmental Revenue Forecasting

Scenario evaluation

An evaluation of available data should be conducted. Some considerations include:

- Number of years' history available and its relevance to current conditions,
- Data quality,
- Data patterns, including seasonality and business cycles,
- Any data outliers, which should be removed/normalized,
- Any predictable patterns indicated by the data.

Environmental changes affecting forecasting assumptions should be identified, for example:

- Population increases or decreases,
- Community growth rate,
- Citizen priorities and demands,
- Government policy changes.

Economic change is the most significant and difficult factor to evaluate. Leading and lagging indicators most relevant to the community should be identified and used in revenue forecasting. Information from economic experts is useful but a key risk with outside information is whether it is relevant to the organization's unique economic circumstances. Perspectives from the organization's Finance Department staff and from other departments are helpful in evaluating indicators and expert information.

A basic decision to be made by the organization is whether an objective or conservative forecasting approach will be used. An objective approach relies on the accuracy of the revenue forecasts with minimal judgmental adjustments. The conservative approach systematically underestimates revenue forecasts to reduce the risk of overspending. The decision of which method to use is based on the degree of certainty indicated by the scenario evaluation.

Prepare forecast

Determination should be made for each revenue source whether a qualitative or quantitative forecasting method will provide the most accurate results. Qualitative methods are used for revenue sources with high uncertainty. Quantitative methods are used for revenue sources with sufficient, reliable historical data and little change.

Qualitative forecasting methods use judgment. Two examples include:

- Judgmental forecasting – An experienced person or group with knowledge of a revenue source provides information about what is likely to occur in the forecast period. An example is asking staff in the Planning and Development Division to provide information on what they expect with regard to licenses and permits revenue.

Exhibit D

Summary of Guidance on Governmental Revenue Forecasting

- Consensus forecasting – A group meets to discuss factors that will likely affect a revenue source and reach agreement on what is likely to happen. An example of this could be assembling individuals from real estate, financial institutions, and the local chamber of commerce to discuss and reach a consensus on what trends will likely affect local revenue sources.

Quantitative forecasting methods rely on data relevant to the revenue source. Two examples of quantitative forecasting include:

- Time series approach – Uses past trends in the revenue source to predict future revenues.
- Causal models – Use variable trends assumed to affect revenue. For example, if population is decreasing, it is assumed sales tax revenue will decrease.

Evaluate results

Once a forecasting method is selected and a forecast prepared, the final step is to evaluate and, if necessary, adjust the results. Evaluation focuses on the reliability and validity of the forecasted results. Budget staff should review forecast results compared to the assumptions used. If the results appear to be inaccurate, additional evaluation may be needed.

One way to evaluate reliability and validity is comparing results from different forecasting methods. For example, when a revenue source is forecast with a time series approach, different types of time series computations can be used and compared, such as a moving average compared to a regression analysis.

Another method to evaluate forecast reliability is sensitivity analysis. Sensitivity analysis, also called “what if”, changes an assumption to assess effects on the revenue projection. For example, evaluating what the revenue forecast would be if the expected increase in sales tax was lowered by 1/2%.

Sources:

Kavanagh, Shayne C. (October 2012). *Structuring the Revenue Forecasting Process*. Retrieved from <http://www.gfoa.org/structuring-revenue-forecasting-process>.

Garrett, Thomas A. and Leatherman, John C. (2000). *An Introduction to State and Local Public Finance*. Retrieved from <http://rri.wvu.edu/WebBook/Garrett/contents.htm>