MONTANA LEGISLATIVE BRANCH

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Director
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DATE: November 19, 2018

TO: Revenue & Transportation Interim Committee

FROM: Sam Schaefer and Stephanie Morrison

RE: Error Attribution for Individual and Corporation Income Taxes, and Oil & Natural Gas Production Taxes

This memo is in response to the Committee's request at the September 2018 meeting for an analysis of the three revenue sources with the historically largest contributions to overall revenue estimating error—individual and corporate income taxes, and oil and natural gas production tax.

Error Definition

As used in this memo, the term "error" does not refer to a mistake, an oversight, or a miscalculation. Rather, it is a technical term that can be described mathematically as follows:

$$Error = \frac{Estimate - Actual}{Actual}$$

Using the above definition, if actual revenue comes in above the estimate—i.e., actual revenue was *underestimated*—the error is negative. Conversely, if actual revenue comes in below the estimate—i.e., actual revenue was *overestimated*—the error is positive.

Findings

- Individual income tax – error in the first year of the estimate can be attributed to a variety of components; the IHS Markit econometric forecast is typically not a key contributor to the overall error
- Corporation income tax – error is primarily attributed to three components, with IHS Markit forecasts likely not a large factor in the overall error
- Oil & natural gas production taxes – about 75% on the error in the revenue estimate appears to be due to error in the price forecast from IHS Markit

Individual Income

Detailed error analysis of individual income tax estimates has been reported on for the past three biennia, but only for the first year of the three-year estimate. The analysis uses the most recent completed fiscal year revenue and calendar year tax return data, along with newly released IHS Markit economic forecasts, to attribute estimating error to the six components summarized in the following table:

Individual Income Tax Error Attribution
($ Millions)

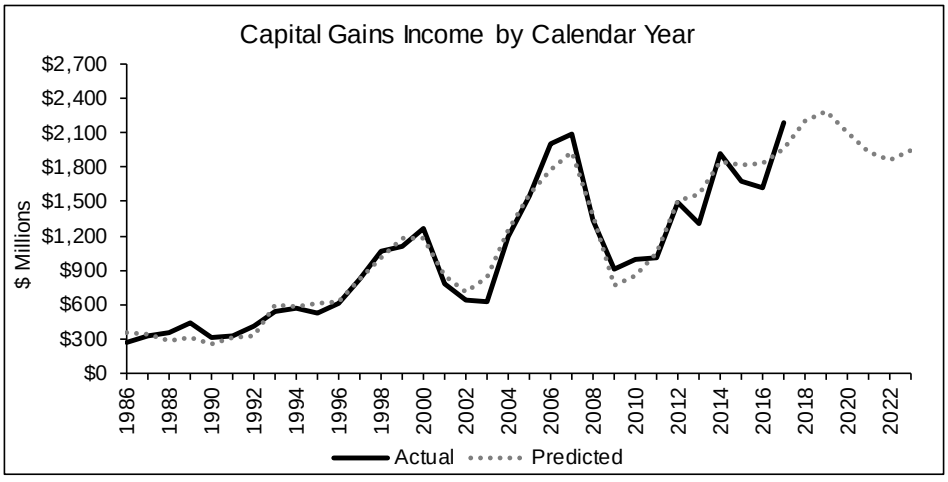
Error Attribution	FY 2013/CY 2012	FY 2015/CY 2014	FY 2017/CY 2016
FY Error	($63.8)	($33.3)	$70.3
	Underestimated	Underestimated	Overestimated
IHS Forecast	(7.0)	-	10.4
Income Growth Rates	(16.0)	(12.0)	64.2
Simulation Model	(12.0)	(12.0)	(12.0)
Audit, P&I, and Amended	4.4	(1.7)	5.2
Conversion		(20.0)	2.5
Unexplained/Other	(33.2)	12.5	(0.0)

IHS Markit Forecast

IHS Markit data is used to model each of the income types, and several of the additions, reductions and itemized deductions. Changes in the data—whether historical revisions or updated estimates—automatically result in changes to the forecast income. The amount of error due to the IHS forecast depends on how recent of a forecast release is used in the legislative estimate, and the accuracy of their forecast.

Income Growth Rates

Growth rates for each type of income, addition, reduction and itemized deduction are developed using the historical return data and various economic indicators. Estimate error can result from unusual historical data, inaccurate forecast growth of economic indicators, historical economic data that is subject to revision, and fluctuations in taxpayer choices of when to declare profits. The growth rate estimates can produce the largest source of error, with wages, capital gains, and partnership income growth rates typically being the largest contributors to overall error. The chart below illustrates the volatility of capital gains income, including the inconsistency with the modeled historical amounts.



Tax Simulation Model

The tax simulation model forecasts calendar year full-year resident tax liability by applying the growth rates discussed above to each resident taxpayer's income and deduction items. The model makes various determinations on income type, income level and filing status. These assumptions are used to assign tax rates and applicable deductions, and ultimately the amount of tax liability. The model aggregates all the individual taxpayer information for each income line to produce an estimate of full-year resident calendar year tax liability. The simulation model appears to underestimate full-year resident liability by about $12 million in the first year of the estimate.

Audit, Penalty & Interest, and Amended Income

Audit, penalty and interest, and amended collections are forecast explicitly in the legislative revenue estimate. The combined collections are typically not significant contributors to the overall revenue estimating error.

Conversion and Other

The fiscal year conversion takes the calendar year full-year resident liability output of the tax simulation model and adjusts for non-full-year resident liability to produce a total calendar year liability. Fiscal year total collections, excluding audit and penalty and interest collections, were modeled in HJ 2 on total prior calendar year tax liability to produce estimated fiscal year collections before audits and other adjustments. Finally, estimated audit, penalty, and interest collections, as well as any other adjustments are added to produce the final estimate.

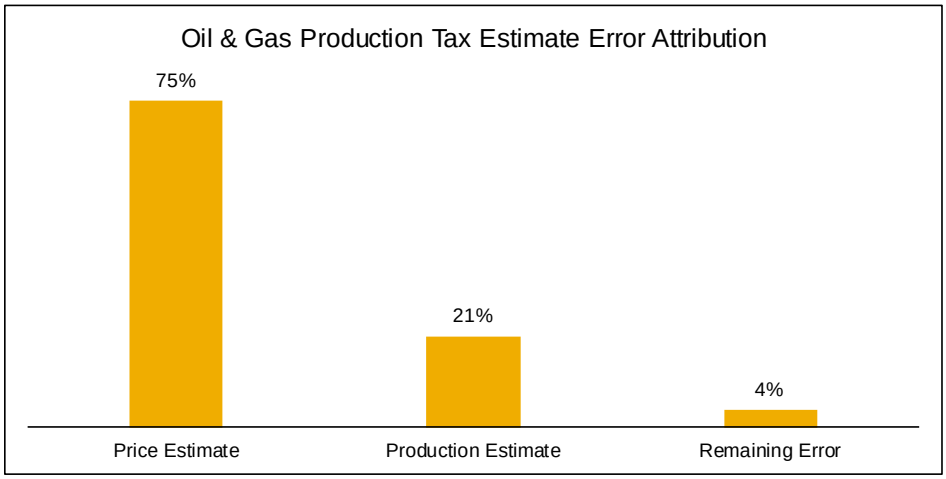
The conversion process and taxpayer timing of payments can be significant sources of the overall fiscal year error in the individual income tax estimate. The revenue volatility associated with taxpayer timing is an issue for most states with an individual income tax. Taxpayer timing can influence the following items:

- Timing and size of bonus payments
- Realization of capital gains income
- Business profits
- Timing of quarterly estimated tax payments

Recent conversations with revenue forecasters from around the country indicated that quantifying taxpayer choices to optimize their federal tax strategy will be an ongoing challenge, with projections of future taxpayer behavior a bedeviling puzzle.

Oil and Natural Gas Production Tax

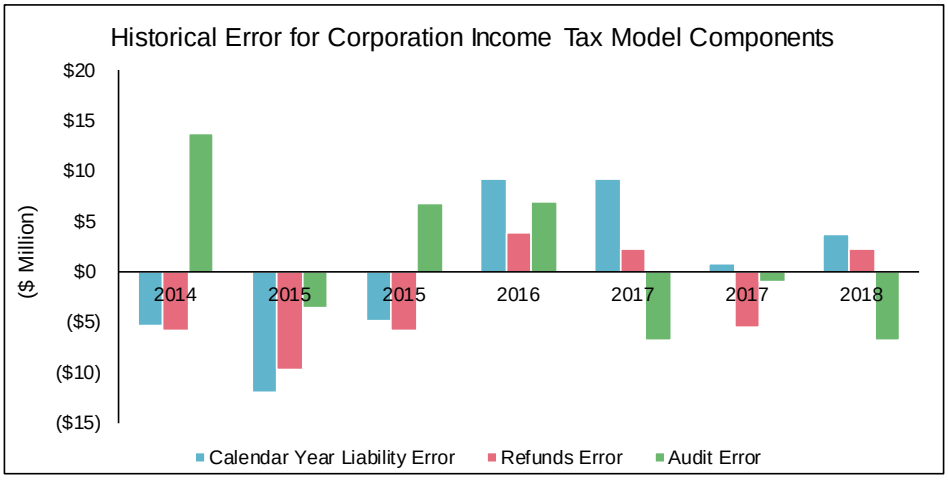
The oil and natural gas production tax estimate has two main components: a price estimate based on the IHS Markit forecast, and a production estimate based on current production combined with assumptions regarding production decline and new drilling activity. If the estimates of these components are incorrect, then the revenue estimate for this source will also be incorrect. However, if the price and production estimates are close to the actual values, then the model does a good job of predicting total collections. The historical drivers of the total estimate error are shown in the following chart.



Historically, any error associated with the price estimate has accounted for 75% with the total estimated error, while production estimate error contributes another 21%. Finally, the remaining error is small and likely due to the conversion of calendar year estimates to a fiscal year estimate.

Corporation Income Tax

The corporation income tax model has three main components. FY audits and refunds are estimated independently, along with a calendar year tax liability for each economic sector. The tax liability is estimated using economic variables from IHS. The historical errors from these three components are shown below.



As the chart above shows, all pieces contribute to the error, in both directions. This allows for some offsetting, which helps decrease the total error. The three components above do not model this source perfectly, as there is still some unexplained error that averages $6.6 million per year. This error likely occurs because the calendar liability model does not perfectly predict the true liability. In addition, the conversion from calendar year tax liability to fiscal year liability is not perfect, and likely contributes to the unexplained error as well.