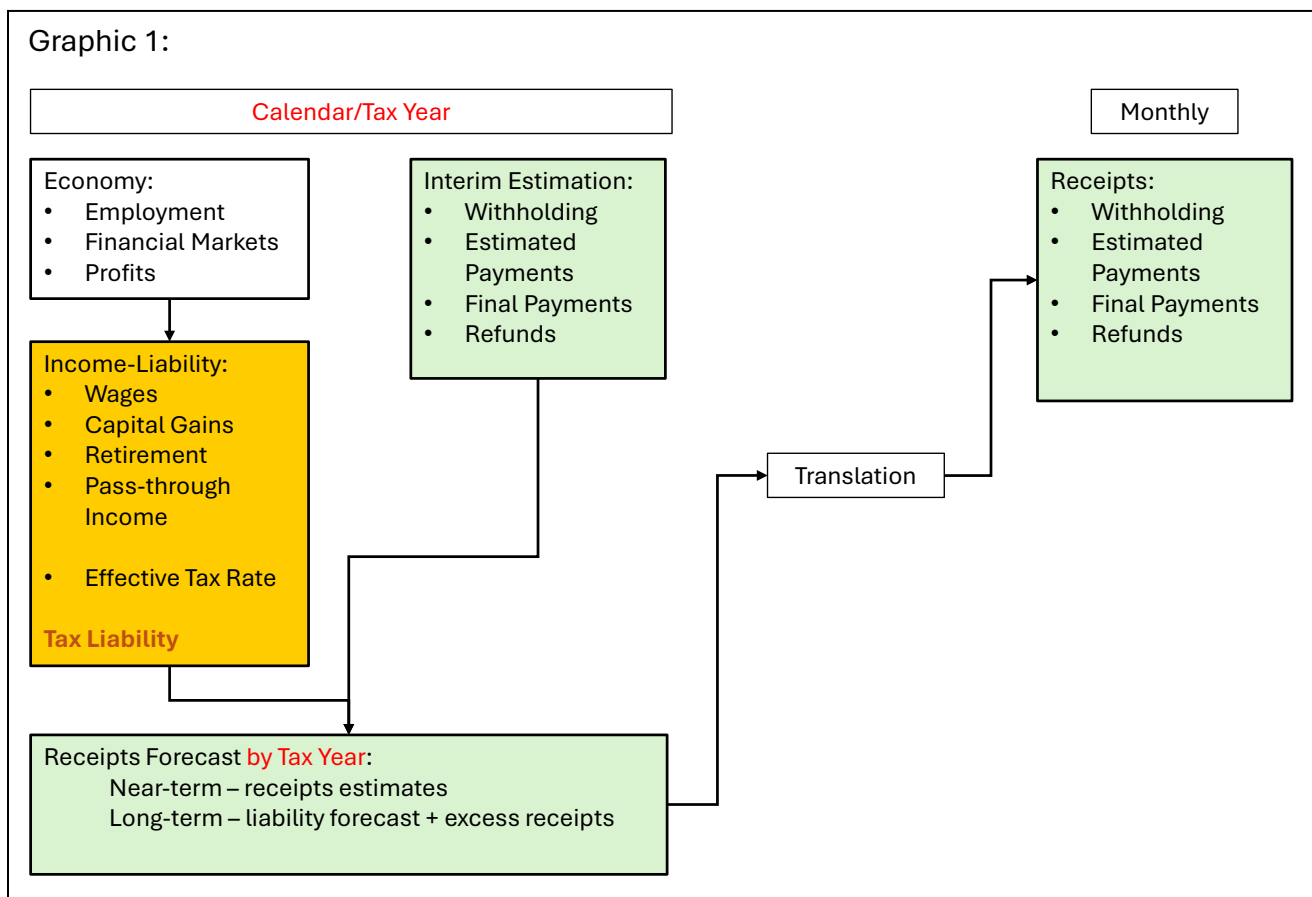


Personal Income Tax - Methodology

Overview

As directed by Oregon Revised Statute 192.342 through 192.349, the Office of Economic Analysis tracks and forecasts General Fund revenues for state budgetary and planning purposes. Personal Income Taxes (PIT) are the largest source of General Fund revenues, currently comprising approximately 80 percent of total revenues. This document presents the methodology for the Personal Income Tax forecast. Appendix A presents an overview of the PIT forecast methodology. For a prerequisite overview of the office's revenue forecasts, see *An Overview of State Revenue Forecasting*¹.

Graphic 1:



The PIT model can be broken down into three main components: (1) the Gross Income-Liability Model (GILM), (2) Interim Estimation of Tax Years in Progress, and (3) the Translation to Monthly Net Receipts.

¹ For those unfamiliar with state revenues or forecasting in general, the reader is advised to review this document as context for understanding the methodology papers. Paper is forthcoming.

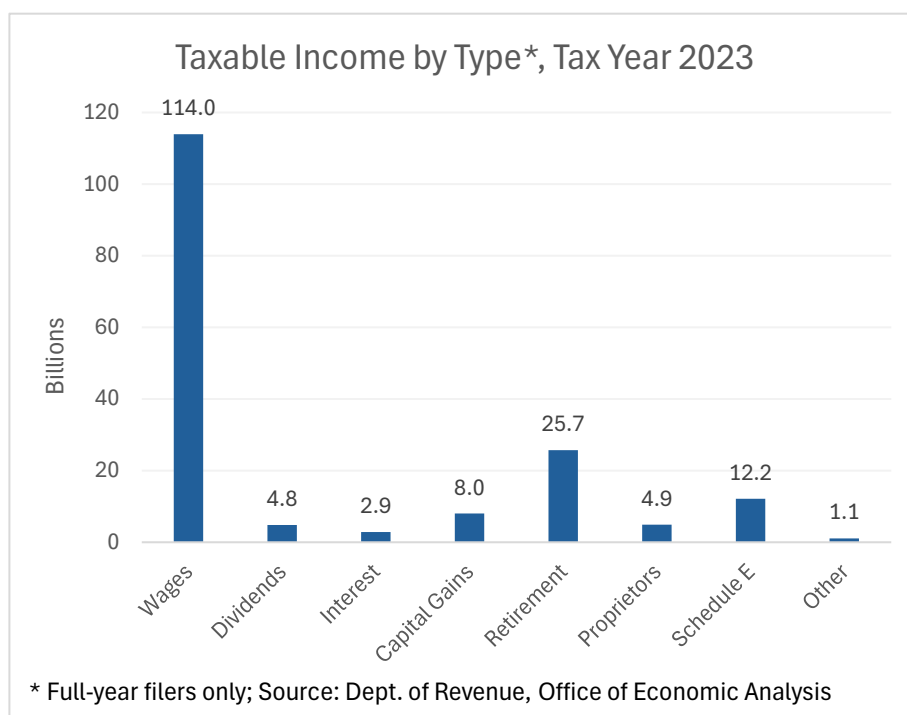
Gross-Income Liability Model

The purpose of the Gross Income-Liability Model is to provide a direct link between net receipts and economic activity. This link is invaluable for explaining changes in the forecast to general audiences. It also helps to understand nuances in the data as they emerge.

The system can be conceptualized as taxpayers earning income of various types (wages, capital gains, etc.) and consequently incurring tax liability in the process. These earnings can further be seen as direct results of economic activity such as employment, drawing down savings in retirement, realizing gains from market earnings, and so on.

Chart 1 presents the breakdown of taxable income for tax year 2023². Wages from employment constitute roughly 65 percent of the total. Retirement income (pensions, IRAs and taxable social security) account for another 15 percent. Capital Gains and Schedule E³, at five percent and seven percent, respectively, are of particular importance due to their

Chart 1:



² Note that income in the GILM pertains to full-year residents only to isolate income earned solely in Oregon. Income data are derived from the federal income tax form. Thus, part-year and non-resident filers incomes will be attributable to activity in all states where they participated.

³ The Schedule E form is where Rents, Royalties and pass-through income from S-Corporations are recorded. S-Corporations are an alternative to standard C-Corporations that are not taxed at the entity level but rather allow income to be passed through to members to be taxed on an individual basis.

historical volatility. When taxable income exhibits abnormal growth or decline, it is typically due to large swings in these two components. The remaining sources of income (dividends, interest, proprietorships and all other sources) are small, and more importantly do not historically contribute to unanticipated shifts in income and liability.

For forecasting purposes, the eight components of taxable income are specified individually as functions of variables in the Oregon Economic Model. For example, taxable wage income is projected based on the forecast for the wage component of personal income. Likewise, expected growth in capital gains is based on forecasts of market performance. Appendix B presents detailed specifications for each income component.

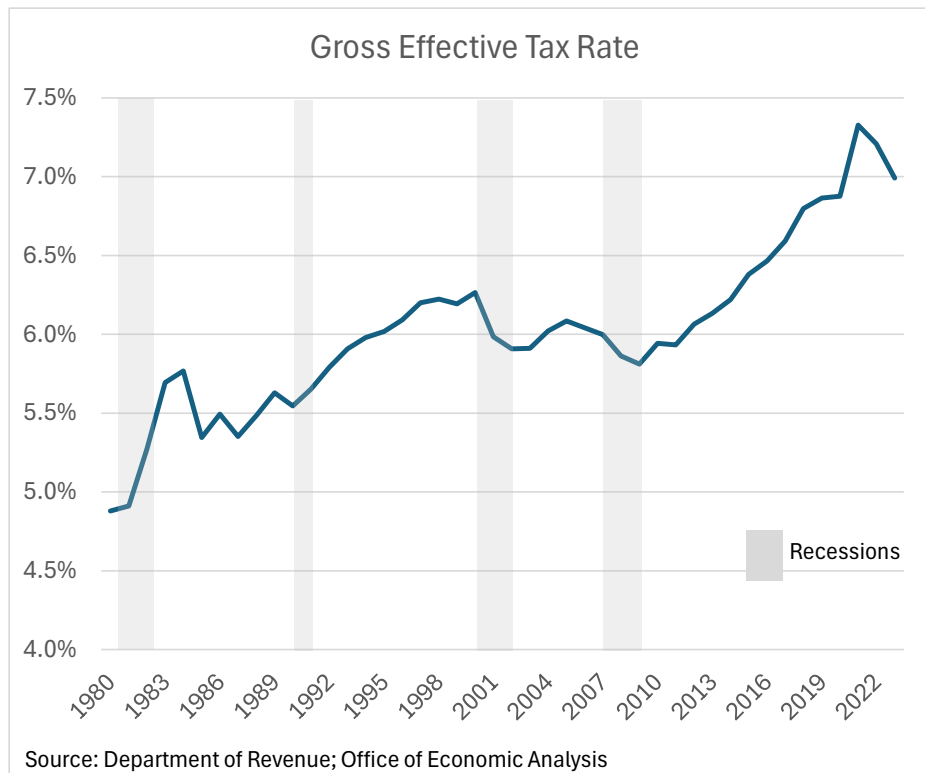
In the GILM, taxable income is translated into tax liability through an effective rate variable. Specifically:

$$\text{Effective Tax Rate} = \frac{\text{Liability}}{\text{Gross Income}}$$

Note that to model total tax payments, however, tax liability is specified as that attributable to all Oregon filers. This assumption subsumes the relationship between full-year and all filers in the effective rate equation. An analysis of this relationship is presented in Appendix C.

Chart 2 presents the history of the Gross Effective Tax Rate. The first observation is how variable the rate has been over time. These periods of growth and occasional decline are attributable to the progressive nature of Oregon's personal income tax structure. As income increases, a greater percentage of that income is taxable in the higher brackets, thus causing the effective rate to increase. Conversely, in recessions when incomes fall, the effective rate declines. This is particularly true of capital gains and pass-through income, which are earned almost exclusively by high income taxpayers. When these sources fall significantly during recessions, the loss of this income that is being otherwise taxed at the top rates produces a significant drag on the overall effective rate.

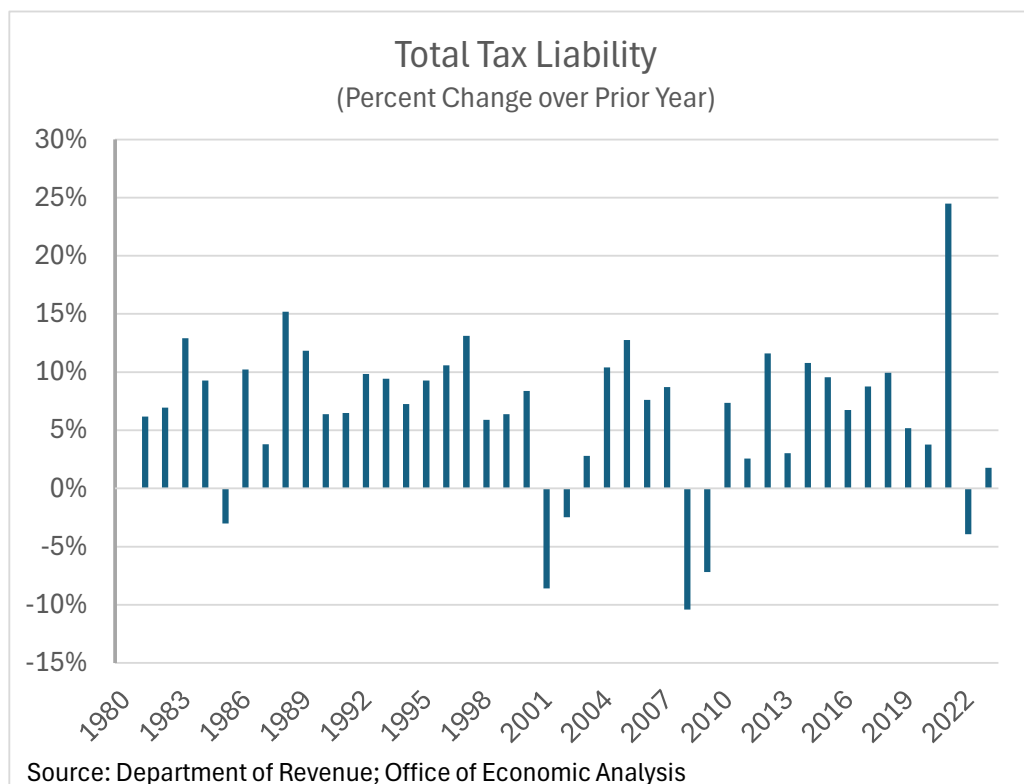
Chart 2:



The effective rate is forecast based on two primary variables: (a) a projection of per capita income that captures overall bracket creep, and (b) the share of income attributable to non-wage and non-retirement sources like capital gains and pass-through income from S-Corporations, which captures the tendency for these sources to cause abnormal variation in the effective rate.

Finally, the total tax liability forecast is derived as the product of total gross income multiplied by the effective rate. Chart 3 illustrates the change in gross tax liability (absent kicker credits) dating back to the 1980 tax year and including the most recent forecast. Of note is how variable liability growth has been over the years. While average growth from 1980 through 2023 was 6.4 percent, growth has ranged from 3.0 percent to 15.0 percent⁴ excluding recessions.

Chart 3:



Kicker Credit

In biennia where General Fund revenues (excluding Corporate Income taxes) exceed the Close-of-Session forecast by two percent or more, the surplus revenues⁵ are credited back to taxpayers in the tax year corresponding to the last year of the biennium. For example, the 2023-25 surplus will be returned as a credit on the 2025 tax return⁶.

⁴ Tax year 2021 was an aberration defined by a doubling of capital gains realizations and overall rapid inflation.

⁵ The kicker surplus is calculated as the difference between total gross General Fund revenues for the biennium and the Close-of-Session forecast.

⁶ The credit for tax year 2025 will be calculated as a percentage of taxpayers' 2024 liability.

The 2011 legislature changed the kicker rebate from checks distributed to taxpayers in the winter following the biennium to a credit on tax returns. At the time, this change was modeled outside of the GILM: the effects of the kicker were applied after the forecast was run. In other words, liability in the GILM did not equal true final tax liability. This produced a disconnect between the model output and receipts data for years in which a kicker occurred.

Methodology Enhancement

For the December 2024 forecast, the kicker credit was factored into the GILM as an add factor reducing tax liability. This modeling change produces a receipts forecast commensurate with actual receipts. It is anticipated that this methodological adjustment will reduce statistical error in future revenue projections.

Other Payments

A complicating factor in the forecast is that more payments are received for a given tax year than are represented by tax liability on tax returns. Numerous factors contribute to this phenomenon: unclaimed withholding, penalties and interest, audit activity and late filing after the 24-month dataset snapshot date, etc. Historically, this excess has amounted to approximately 7-8 percent of tax liability⁷. For future years where the GILM is the basis for the forecast, an adjustment is made to account for payments above liability based on past averages.

Interim Estimation of Tax Years in Progress

While the GILM is invaluable for informing the forecast based on economic expectations, it has one drawback: a complete tax return snapshot only becomes available two years following the start of the tax year. For example, tax year 2023 data became available in January 2025.

Graphic 2 presents the flow of information regarding individuals' income, liability and receipts as time progresses. Note that as of the March 2025 forecast, the primary focus for budgeting had shifted to the 2025-27 biennium (beginning July 1, 2025). Thus, the lag between the latest actual (tax year 2023) in the GILM and the biennium of interest is 15 months. This introduces considerable error in the forecast, thus necessitating reliance on alternative data to inform the forecast.

Tax receipts are received continuously in real time. While prospective payments (withholding and estimated payments) come in during the tax year, reconciliation (return

⁷ Since tax year 2022, the [Pass-Through Entity-Elective Tax program](#) has caused a temporary increase in other payments.

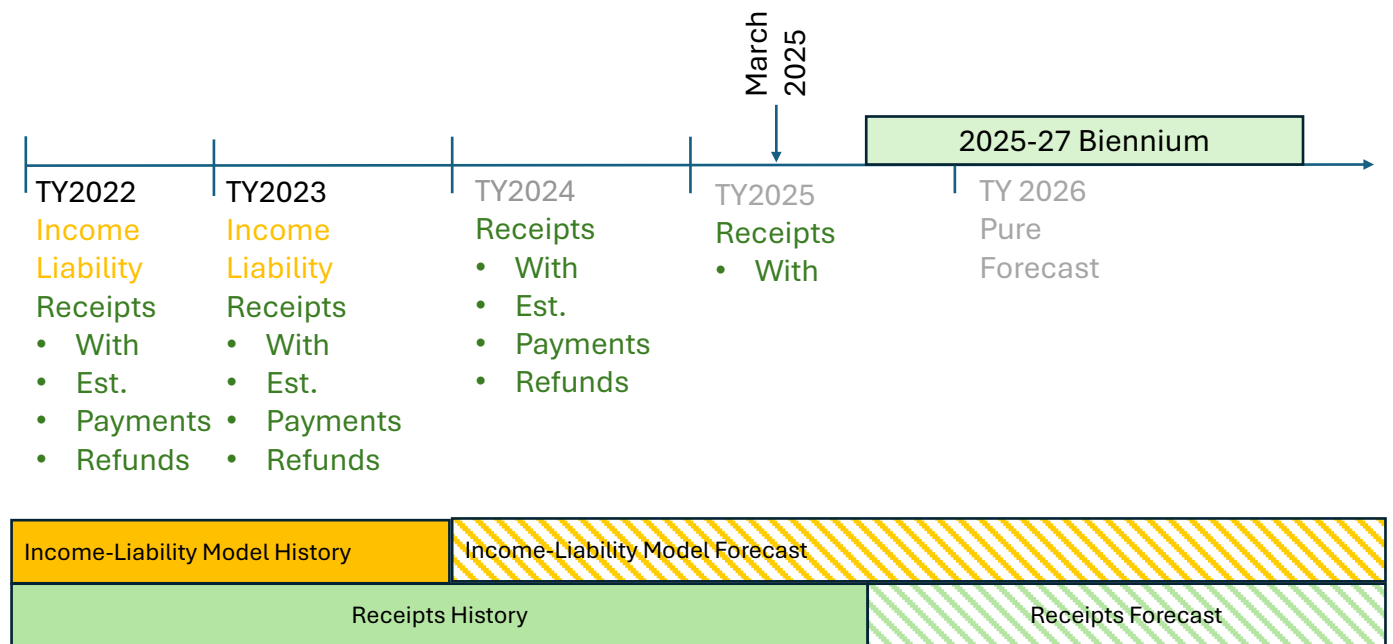
payments and refund activity) occurs in the year following and beyond. However, historically speaking approximately 99 percent of net tax receipts for a given tax year are known as of the end of the year following the tax year.

For the tax year in progress, withholding and estimated payments provide reasonable indication for how a tax year will turn out when all is said and done. This is done by looking at payment patterns for past tax years and extrapolating each of the payment types (Withholding, Estimated Payments, Final Payments and Refunds) to arrive at a total receipts projection.

Chart 4 illustrates how each of these payment types arrives during the first two years following the start of the tax year. Withholding is uniform throughout the tax year, while estimated payments arrive quarterly. The following year as taxpayers file their returns, final

Graphic 2:

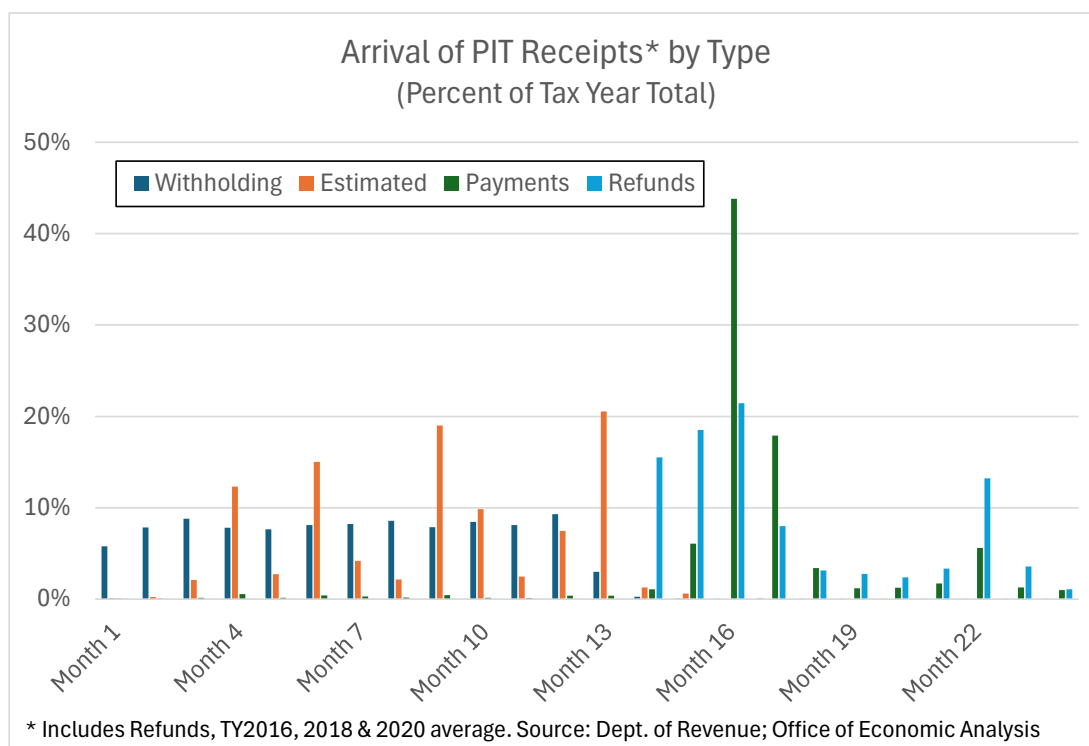
Timing of Available Data: Personal Income Tax Forecast



payments and refunds occur coincident with the April 15 filing deadline⁸. Note that refunds

⁸ Taxpayers are required to either file their return by April 15 or submit an extension request to file their return by October 15.

Chart 4:



are more evenly distributed from February through May, while final payments come primarily in April. Estimating total receipts for interim tax years based on average historical patterns provides a bridge between the latest actual data in the GILM and the first pure forecast year for which no receipts data are available.

For future years where no receipts information is available, the GILM takes precedence generating forecast values. The interplay between these companion models is in constant flux as data become available.

Translation to Monthly Receipts

The final component of the forecast model is converting liability by tax year to a monthly-receipts forecast. This is essential to tabulating the amount of revenues that will arrive during each biennium but is also critical for assessing how the forecast is tracking in real time. This translation is straightforward: historical arrival patterns like those exhibited in Chart 4 are used to translate each payment type total to its monthly counterpart.

It should be noted that the occurrence of kicker crediting for a given tax year will distort the payment patterns relative to a normal year, particularly when the credit percentage is significantly large. Taxpayers have not historically anticipated lower tax liability by altering

their withholding and estimated payments⁹. Consequently, the impact of kicker crediting is seen in smaller final payments and larger refunds than would have otherwise occurred. These patterns are anticipated in the translation.

Tax Law Changes

The Office of Economic Analysis produces forecasts consistent with current state law. The forecast assumes that current law will remain static regardless of the likelihood of impending actions. This includes sunsets to existing state law where specific policies are scheduled to end. Additionally, modeling is based on historical relationships where specific legal regimes occur during specific time periods. As noted elsewhere, these regime changes can be handled econometrically using control factors.

For forecasting purposes, adhering to federal law would pose extreme challenges. First, the office relies on national forecast information from vendors such as Standard and Poors. The forecasts from these vendors are not strictly current federal law but rather assume the most likely outcomes possible. Second, federal law often entails imminent sunsets that are regularly extended. Assuming these sunsets in the forecast and then eliminating them would induce unnecessary oscillations in the forecast. As such, the OEA forecast assumes the most likely outcome for federal policy and adheres strictly to current state policy.

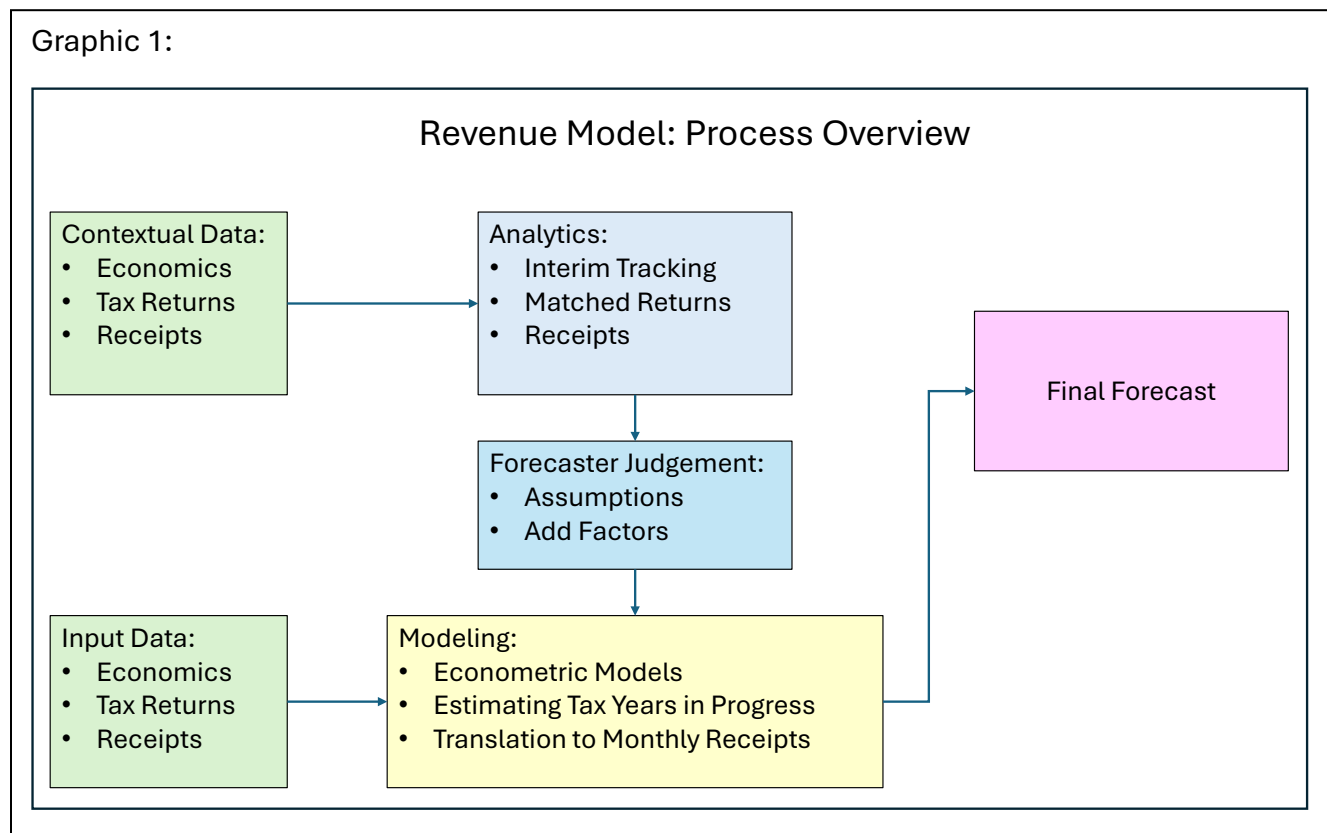
Periodically, the state legislature or congress will enact law changes that affect the tax system. The Legislative Revenue Office is responsible for producing impact estimates for all prospective law changes. When a law is passed, these impact estimates are incorporated into the baseline forecast to make it once again consistent with existing law. As the effects of a law change are realized in the payments data, the impacts must be phased out to avoid double counting the effects.

⁹ Tax year 2023 was an exception where the 44 percent credit did appear to cause a drop in estimated payments for the fourth quarter.

Appendix A: Process Overview of Revenue Forecast

The process for producing the revenue forecast for Personal and Corporate Income Tax, as well as the Corporate Activity Tax, has been standardized so that once one forecast has been assimilated, the other two are very straightforward. Graphic 1 exhibits the flow of information and activities involved in producing any of the revenue forecasts.

Graphic 1:



At the root of any forecasting process are the historical data that are being modeled and projected, as well as the ancillary data that inform the forecast. See the methodology document proper for more information about the modeling.

As critical to producing the forecast as the formal modeling are the ancillary analytics that inform the manual adjustments necessary to any forecast. Statistical models generally rely on historical regularities and patterns to predict future outcomes. Where systematic shifts have occurred or are occurring, these outside-the-model analytics help to produce forecasts that are reasonable and consistent with new norms. For a prerequisite overview of the office's revenue forecasts, see *An Overview of State Revenue Forecasting*¹⁰.

¹⁰ For those unfamiliar with state revenues or forecasting in general, the reader is advised to review this document as context for understanding the methodology papers. Paper is forthcoming.

Appendix B: GILM Specifications

The following identities indicate how each component in the Gross Income-Liability Model is modeled and projected as a function of economic variables.

Income

$$WagesGI = f(wagesPI)$$

$$InterestGI = f(Interest\ Rates, Income(DIR)_{PI})$$

$$DividendsGI = f(Income(DIR)_{PI})$$

$$RetirementGI = f(Population(65 +), Equities)$$

$$Capital\ Gains = f(equities)$$

$$Proprietorships = f(Income(Proprietor)_{PI})$$

$$Schedule\ E = f(Corporate\ Profits)$$

$$Other = f(Historical\ Averages)$$

Effective Tax Rate

$$\begin{aligned} Effective\ Tax\ Rate \\ = f\left(Per\ Capita\ Income_{PI}, Share_{GI}, DMY(Kicker, M66, HB\ 3427)\right) \end{aligned}$$

Where:

GI = Gross Taxable Income (Federal form 10 – 40)

PI = Personal Income (Bureau of Economic Analysis)

DIR = Dividends, Interest and Rent

Share = Gross Income excluding Wages/Retirement

DMY = Variables capturing the kicker, the addition of the Measure 66 top rate, and the change in the rate structure due to House bill 3427

Appendix C: Relationship of Full-Year to All-Filer Liability

Constructing the effective rate variable in the Gross Income-Liability Model using total tax liability divided by full-year gross income subsumes the relationship between full-year and all-filer income and liability in this variable. Doing so depends on the historical regularity in this relationship. Chart 5 exhibits the ratio between all filer liability and full-year filer liability. Except for a few outliers, notably 1998 on the high side and 2014 on the low side, this ratio has followed a steady trend with only a small variance (0.3 percentage points) from year to year. The Pass-through Entity Elective Tax program may explain the bump in tax years 2021 and 2022, as well.

For modeling purposes, this tendency for part-year and non-resident filers to exhibit slightly higher growth in income and liability will be captured in the relationship between the effective rate and its predictor variables (see Appendix A). It will be of utmost importance for OEA to keep an eye on this ratio to ensure that this modeling choice remains valid.

Chart 5:

