State of Indiana

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APRIL 2023 REVENUE FORECAST

Methodology and Technical Documentation

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Introduction
This document provides an overview of the April 2023 state revenue forecast. The calculation instructions, model specifications, summary statistics, and forecasts are included.

For further information and assistance in the calculation of models, please contact the State Budget Agency's Office of the Chief Economist and Tax Analysis at 317-232-5610.

Revenue Forecast Committee
The revenue forecast technical committee is comprised of members from both the executive and legislative branches. Staff from both the State Budget Agency and Legislative Services Agency have a vital role in the process by assisting with data analysis and modeling. Each forecast model and revenue estimate are agreed to by the technical committee on a consensus basis.

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Economic Forecast
The forecast committee uses economic forecasts from S&P Global Market Intelligence (formerly IHS Markit). Forecasts cited in this document are provided by S&P Global Market Intelligence, a leading economic consulting firm. S&P Global Market Intelligence is routinely ranked among the leading economic forecasters in studies by The Wall Street Journal and Bloomberg Markets.

Section I: Commentary on the Economic Forecast

S&P Global Market Intelligence (formerly IHS Markit) projects U.S. real gross domestic product growth of 1.6% in FY 2023, 1.1% in FY 2024 and 1.8% in FY 2025. During the same period, Indiana's real gross state product is projected to grow 0.5% in FY 2023, 0.6% in FY 2024 and 1.5% in FY 2025. Additionally, Indiana nominal wages and salaries are projected to grow by 7.8% in FY 2023, 4.2% in FY 2024 and 3.6% in FY 2025.

Economic and State General Fund revenue trends should be interpreted within historical perspective and in the context of macroeconomic dynamics and evolving policy actions at the federal and state level. Following temporary federal stimulus and other idiosyncratic dynamics (pandemic related etc.) that pushed revenues from $18.5B in FY 2021 (excl. deferred payments from FY 2020 to FY 2021 due to deferral of the tax year 2020 federal tax deadline) to $21.2B in FY 2022 (14.4% growth), the FY 2023-2025 period is projected to see an economic deceleration in FY 2023 and positive, but below-trend growth across key economic indicators. Income measures and spending behavior will be impacted by various factors including employment, average annual wages, financial markets, interest rates, and more.

Overall, (1) FY 2023 State General Fund revenues are projected to be 0.7% below FY 2022 but 13.6% above FY 2021 levels (adjusted for deferred payments from FY 2020 to FY 2021 due to deferral of the tax year 2020 federal tax deadline); (2) FY 2024 and FY 2025 are projected to grow at an annual rate of approximately 3.9% and 2.6% respectively.

Recent and scheduled legislative changes (individual income tax rate reduction, repeal of taxes on utility receipts and utility services use, and more), also impact revenue trends. On the back of continued nominal growth in Indiana wages and salaries, personal income, and gross state product, core tax revenues (sales and income taxes) are projected to grow by 4.1% in FY 2024 and 3.2% in FY 2025. Revenues from other sources will be driven by strength in General Fund interest revenues.

Below are some of the main assumptions in the April 2023 economic forecast from S&P Global Market Intelligence:

Consumer spending, payroll gains contribute to recent US economic growth

- Stronger than expected economic performance at the end of 2022 into early 2023 prompted S&P Global Market Intelligence to moderately revise up our forecast of most major US economic indicators for 2023.
  – Higher growth rates from 2022Q3 through 2023Q2 raise level of real GDP by a cumulative 1.5%.
  – Robust payroll gains have a similar impact on overall payrolls, now 1.6% higher by 2023Q2.
- Resilient consumer spending has been the overriding feature of recent strength of the economy. Inflation did not curb demand by as much as expected in late 2022 and early 2023.
- Payroll gains have been supported by gains in the labor force participation rate; in fact, the participation rate for the 16-to-64 year age group is now higher than in early 2020. Overall participation remains lower due to losses from the 65+ age group.
  – Several factors at work here, including rising immigration, improving access to day care, the expiration of pandemic-era support, economic need due to inflation, or improvements in job matching.
- Home sales also recovered, especially in February, as homebuyers come off the sidelines.
  – Some areas are experiencing significant home price declines, but those are mostly in portions the West and South that saw extreme price gains in 2020 and 2021.
  – The Midwest is faring better, although price gains have subsided.

Stronger-for-longer in the short run adds risk of lower growth in 2024 and 2025

- The main narrative underlying our base forecast remains unchanged. Inflation is intolerably high and unemployment unsustainably low. It will require a period of below-trend growth and an increase in the unemployment rate (to 4.6% in 2025) to reduce inflation to the Fed's 2% objective by then. The tightening of bank lending standards (due to the collapse of Silicon Valley Bank) will partially substitute for future hikes in the Fed's policy rate, which we now see peaking at 5¼% in May, rather than at 5½% in June.

- An economy that remains stronger for longer than previously anticipated risks leaving inflation uncomfortably and persistently above the Fed's 2% objective. Now, with the full extent of fallout from SVB as of yet unknown, and given some concern that commercial real estate will suffer, we see risk to our base forecast for near-term GDP growth shifting more heavily towards the downside.

- Our forecast for national GDP growth for fiscal 2024 and 2025 is now modestly lower than in our December 2022 forecast, but not by enough to offset the higher starting point.

Bottom line for Indiana

- The state economy remains on solid footing, despite broader macro concerns
  - Inflation has raised costs on households and businesses, reducing gains from higher wages and revenues.
  - Labor force participation has mostly recovered, reducing potential for further gains.
  - The state's research and development resources are generating and attracting cutting-edge industry opportunities.
- The outlook for manufacturing output and employment remains solid, even with a potential recession.
  - Recreational vehicle shipments have slowed from the torrid pace of 2021 and 2022 (especially in trailers).
- The pace of homebuilding will slow in 2023, but persistent high home prices will provide support.
  - Supply of homes still generally well below potential demand, especially from younger age groups.
  - Indiana should avoid a sharp decline in home prices, partly because price gains over the past few years were below the levels seen in the hottest markets (some of which now face the sharpest declines).
- Risks to the state's economy mirror issues at the national level.
  - On the downside, persistent inflation, banking issues, global turmoil could pull down growth by more than expected.
  - On the upside, consumer spending could remain robust, boosting manufactured goods, travel and tourism, etc.
- Longer-term issues remain the same – labor force must continue to grow in size and skill level to allow existing business to expand and to attract new business.

Section II: Economic Indicators for Indiana

Fiscal Year Amounts

Indiana Economic Indicators	FY 2022 Actual	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast
Personal Income (Millions $)	385,037.76	403,434.02	417,086.93	434,361.94
Adjusted Personal Income (Less transfer payments) per Household (Thousands $)	110.99	116.48	119.65	123.05
Household net worth per household (Thousands $)	971.37	961.95	981.71	977.43
Estimated PCE based Indiana Sales Tax Base as Ratio of PCE Total	0.5377	0.5364	0.5318	0.5283
Personal Savings (Millions $)	20,273.12	14,723.98	19,729.31	24,838.45
Nominal Wages and Salaries (Millions $)	186,799.07	201,450.61	209,963.82	217,517.82
Real GSP, Retail Trade (Millions 2012 $)	18,867.30	19,342.46	19,739.93	19,500.37
Gross State Product (Millions $)	435,771.70	468,464.90	486,411.57	504,489.33

US Economy				
Household Financial obligations ratio	14.08	15.88	16.51	16.38
Retail Price on All Grades of Gasoline (cents $)	386.54	380.02	360.51	357.96
GSP / GDP, Two-Year Moving Average	0.0178	0.0178	0.0178	0.0177
Dividend Payments to individuals and Personal Interest Income (Billions $)	3,268.57	3,436.40	3,679.17	3,958.32
S&P 500 Index	4,399.83	3,979.21	4,195.26	4,194.20
Change in Prior CY S&P 500 Index	1,048.29	(166.09)	9.30	99.17

Year-Over-Year Percentage Change

Indiana Economic Indicators	FY 2022 Actual	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast
Personal Income (Millions $)	3.33%	4.78%	3.38%	4.14%
Adjusted Personal Income (Less transfer payments) per Household (Thousands $)	6.16%	4.94%	2.73%	2.84%
Household net worth per household (Thousands $)	10.28%	-0.97%	2.05%	-0.44%
Estimated PCE based Indiana Sales Tax Base as Ratio of PCE	0.73%	-0.23%	-0.87%	-0.66%
Personal Savings (Millions $)	-60.83%	-27.37%	33.99%	25.90%
Nominal Wages and Salaries (Millions $)	10.24%	7.84%	4.23%	3.60%
Real GSP, Retail Trade (Millions 2012 $)	-4.24%	2.52%	2.05%	-1.21%
Gross State Product (Millions $)	10.75%	7.50%	3.83%	3.72%

US Economy				
Household Financial obligations ratio	3.43%	12.80%	3.99%	-0.78%
Retail Price on All Grades of Gasoline (cents $)	52.74%	-1.69%	-5.13%	-0.71%
GSP / GDP, Two-Year Moving Average	0.25%	0.10%	-0.18%	-0.52%
Dividend Payments to individuals and Personal Interest Income (Billions $)	4.68%	5.13%	7.06%	7.59%
S&P 500 Index	17.95%	-9.56%	5.43%	-0.03%
Change in Prior CY S&P 500 Index	242.58%	-115.84%	105.60%	966.31%

Section III: Models Used in the Forecast

Sales & Use Taxes

The forecast for sales and use tax is composed of (1) a sales net of gasoline use tax model ("sales net of GUT"), and (2) a gasoline use tax model ("GUT"). The reason for developing the two models was to better account for the impact that volatile gasoline prices have on total sales and use tax. The sales net of GUT and GUT models has been adjusted, as part of the April 2023 Forecast, to better address evolving dynamics that are affecting sales and use tax revenues.

The implied tax base for sales tax net of GUT is calculated by (1) subtracting gasoline use tax revenues; (2) subtracting remote sales revenues attributable to recent Wayfair decision and marketplace facilitator legislative changes ("remote sales"), (3) dividing the result by the prevailing sales tax rate for that fiscal year. This methodology allows for specific methodologies that capture distinctive dynamics impacting overall sales and use tax collections. Gasoline use tax collections and sales tax collections attributable to remote sales are forecasted separately.

Data used for each model is also adjusted to account for legislative changes, payment timing and other specific aspects that have altered tax collections trends over time.

Notably, the sales net of GUT model uses (1) Indiana adjusted personal income (less transfers payments) per household to potentially capture a measure of income that would better reflect the ability to spend, (2) U.S household obligations ratio as a percent of disposable income to potentially capture the impact of credit on the ability and willingness to spend, (3) Prior fiscal year savings to capture the potential impact on current year spending from recent changes in savings (4) Estimated PCE based Indiana Sales Tax Base as Ratio of PCE Total to capture the taxable share of consumer spending in Indiana (5) Household Net Worth per Household to capture the impact of wealth effects and household balance sheets on the willingness and ability to spend on taxable purchases.

The GUT model, which seeks to forecast taxable gallons of gasoline consumed in Indiana, uses (1) Indiana real gross state product, retail trade, as most gasoline consumption is from passenger vehicles and, in a State like Indiana, the purchase or delivery of goods to the end consumer is done using gasoline as a fuel to drive, (2) demand for petroleum as a percentage of total demand for all fuels to potentially capture the shift away from gasoline driven cars, and (3) the product of summer retail gas prices and fuel efficiency to potentially capture the impact of the cost of driving on gasoline consumption.

The forecast of gallons is (1) multiplied by an estimate of the average gasoline use tax rate (based on gasoline retail prices) to arrive at the forecast for total gasoline use tax revenue collections, then (2) the forecast for total gasoline use tax revenue collections is multiplied by the share of revenues to be distributed to the General Fund, based on the Indiana Code. The General Fund share of total gasoline use tax collections has been decreasing every Fiscal Year and is set to decrease from 21.445% in FY 2023 to 10.735% in FY 2024 and 0.0% in FY 2025.

> Total State Sales Tax Forecast = Sales Net of Gasoline Use Tax (Sales net of GUT) + Gasoline Use Tax (GUT)

Sales & Use Taxes: Sales Net of Gasoline Use Tax

Log (Sales Net of GUT Tax Base) = β_0 + (β_1 * Log (Indiana Adjusted Personal Income (Less Transfer Payments) Per Household)) + (β_2 * U.S. Household financial obligations ratio) + (β_3 * Log (Prior Fiscal Year Savings)) + (β_4 * Estimated PCE based Indiana Sales Tax Base as Ratio of PCE Total) + (β_5*Log (Household Net Worth per Household))

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	5.493***
β_1	0.738***
β_2	0.030***
β_3	0.045**
B_4	1.025***
B_5	0.203***

Model Statistics:

Adjusted R^2	0.997
Predicted R^2	0.997
F –Statistic	1829.990***
DW Statistic	2.226
Sample Size (n)	26

Significance: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Historical Revenue Data				
Fiscal Year	Adjusted General Fund Revenue (Millions $)	Growth Rate	Commuter Rail Service Fund	Industrial Rail Service Fund
2018	7,359.86	2.8%	9.66	2.29
2019	7,626.14	3.6%	10.01	2.37
2020	7,835.81	2.7%	10.28	2.43
2021	8,925.60	13.9%	11.69	2.77
2022	9,809.99	9.9%	12.89	3.05

Forecast Revenue Data				
Fiscal Year	Adjusted General Fund Revenue (Millions $)	Growth Rate	Commuter Rail Service Fund	Industrial Rail Service Fund
2023	10,393.40	5.9%	13.64	3.23
2024	10,749.95	3.4%	14.11	3.34
2025	11,100.60	3.3%	14.57	3.45

Forecasted revenue shown above also include adjustments related to legislative acts and remote sales as a result of the Wayfair ruling in 2018 and other changes related to marketplace facilitators.

Sales & Use Taxes: Gasoline Use Tax (GUT)

Log (GUT Base) = β_0 + (β_1 * Log (Real GSP, Retail Trade)) + (β_2 * Demand for petroleum as % of Total demand for all fuels) + (β_3 * Summer Gas Price x Fuel Efficiency) + (β_4 * Dummy Variable for FY 2020 and FY 2021)

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	19.048***
β_1	0.262***
β_2	0.766***
β_3	-8.680E-6***
β_4	-0.057***

Model Statistics:

Adjusted R2	0.903
Predicted R2	0.830
F –Statistic	57.163***
DW Statistic	1.545
Sample Size (n)	25

*Significance: *p < 0.1, **p < 0.05, ***p < 0.01*

Note that revenue data below reflects revenues and therefore is influenced by factors such as changes in the distribution formula of the gross revenue collections across different funds for each fiscal year.

Historical Revenue Data						
Fiscal Year	Adjusted General Fund Revenue (Millions $)	Growth Rate	Local Road & Bridge	MVHA	STFF	State Highway
2018	302.72	-8.60%	60.55	60.55	-	-
2019	288.87	-4.60%	96.29	64.2	-	-
2020	206.2	-28.60%	82.47	54.98	32.98	8.24
2021	146.96	-28.70%	73.47	48.98	44.06	29.38
2022	181.05	23.20%	120.66	80.44	72.36	108.55

Forecast Revenue Data						
Fiscal Year	Adjusted General Fund Revenue (Millions $)	Growth Rate	Local Road & Bridge	MVHA	STFF	State Highway
2023	137.16	-24.2%	137.06	91.37	54.80	219.20
2024	65.26	-52.4%	130.28	86.85	0.00	325.56
2025	0.00	-100.0%	128.45	85.63	0.00	385.33

Individual Income Tax

The individual income tax forecast is based on (1) a model of state and local withholding payment activity, (2) a model of state and local estimated payments and other non-withholding payment activity combined with a separate estimate of individual income tax refunds, and (3) a separate estimate of local income tax revenues. The selected equations use fiscal year data rather than quarterly data. A fiscal year methodology reduces the risk of factors involving atypical timing delays affecting the model output.

The withholding payments model seeks to capture payments received for both state and local withholding on income tax, excluding non-resident partnership withholdings. The non-resident partnership withholdings attributable to individual income taxpayers are estimated separately, based on historical data.

The estimated payments & other non-withholding model seeks to capture non-withholding individual income tax payment activity. Refunds are estimated separately to arrive to the net forecast.

Lastly, an estimate for local income tax revenues is generated and subtracted from the sum of state and local individual income tax collections to arrive at the net state individual income tax revenue forecast. The local income tax forecast is based on a calculation of the statewide weighted average local income tax rate relative to the state rate. In essence, it seeks to capture the share of payments that is attributable to local income taxes.

In FY19 and thereafter, a notable adjustment to the forecast is the estimated impact of Indiana's tax changes relative to the state's conformity to the 2017 Federal Tax Cuts & Jobs Act.

> Total State Income Tax Forecast = Total State and Local Withholding Payments + Total State and Local Estimated Payments & Other Non-Withholding Payments Net of Refunds – Local Income Tax Payments

Individual Income Tax: Withholdings

The withholding forecast is based on a methodology that seeks to capture the overall state and local withholding tax payment liability. This methodology reflects the actual cash flow process as both state and local withholding income tax payments initially come in together at the Department of Revenue level as withholding tax collections. The model is therefore able to use actual data of withholding tax payments for its forecast.

While Indiana's salary and wage disbursements is the major driver of withholding, adjustments relative to personal contribution to social insurance and residence adjustment add value by accounting for factors that impact the taxable income based on which the Indiana withholding tax is applied. On the same note, a variable for Indiana prior year births is added to address significant events (newborn children etc.) that would affect a taxpayer's withholding. The 'prior year' nature of the Indiana births variable also seeks to address the timing of when taxpayers would change their withholding details.

The forecast generated by the model is adjusted to account for (1) the combined state income tax rate and statewide average local income tax rate applicable to tax payments due during that period; (2) payment delays; and (3) corporate tax payments transferred to individual income taxes (nonresident shareholders' withholdings).

> Log (Withholdings Payment Liability) = β_0 + (β_1 * Log (Indiana Wage Disbursements Less Personal Contribution to Social Insurance + Residence Adjustment)) + (β_2 * AR (1)) + (β_3 * Log (Indiana Prior Year Births))

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	0.104
β_1	0.868***
β_2	0.163***
β_3	-0.119*

Model Statistics:

Adjusted R^2	0.999
Predicted R^2	0.999
F -Statistic	9457.060***
DW Statistic	1.923
Sample Size (n)	25

Significance: $*p < 0.1, **p < 0.05, ***p < 0.01$

Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	7,497.55	8.40%
2019	7,786.06	3.85%
2020	7,827.57	0.53%
2021	8,555.06	9.29%
2022	9,468.10	10.67%

Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	10,213.31	7.87%
2024	10,654.68	4.32%
2025	10,989.98	3.15%

Individual Income Tax: Estimated Payments and Other Non-Withholding

Similarly to the withholding forecast, the estimated payments & other non-withholding payment forecast is based on a methodology that seeks to capture the overall state and local non-withholding tax payment liability.

In terms of variables, the model uses (1) the combination of U.S personal interest income, U.S dividend payments to individuals; (2) the change in Prior CY S&P 500 index of common stocks, and (3) the prior year level of estimated payments & other non-withholding payments. These variables seek to capture income from investments, businesses, reconciliations, and other sources that are not captured in withholdings but affect the estimated payment and final payment liability.

The forecast generated by the model is adjusted to account for (1) payment delays; (2) impacts of legislative changes; and (3) refunds (based on average proportion of refunds relative to total individual income tax payments).

Log (Estimated Payments & Other Non-Withholding Payment Liability) = β_0 + (β_1 * Dividend payments to Individuals + Personal Interest Income) + (β_2 *Change in Prior CY S&P 500 index of common stocks) + (β_3 * AR (1))

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	6.523***
β_1	0.000***
β_2	0.000***
B_3	0.336***

Model Statistics:

Adjusted R^2	0.985
Predicted R^2	0.981
F –Statistic	535.474***
DW Statistic	2.243
Sample Size (n)	25

Significance: $*p < 0.1, **p < 0.05, ***p < 0.01$

Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	977.37	6.65%
2019	1,114.15	13.99%
2020	475.71	-57.30%
2021	2,023.87	325.44%
2022	2,280.93	12.70%

Forecast Data		
Fiscal Year	Adjusted Revenue	Growth
2023	1,473.65	-35.39%
2024	1,379.41	-6.40%
2025	1,585.06	-14.91%

Individual Income Tax: Local Income Tax

The estimate for local income tax revenues is based on a calculation of the statewide weighted average local income tax rate relative to the state rate. In essence, it seeks to capture the share of payments that is attributable to local income taxes.

Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	2,658.85	10.89%
2019	2,843.25	6.94%
2020	3,031.46	6.62%
2021	3,047.40	0.53%
2022	3,567.88	17.08%

Forecast Data		
Fiscal Year	Adjusted Revenue	Growth
2023	4,125.85	15.64%
2024	4,126.68	0.02%
2025	4,334.79	5.04%

Corporate Taxes: Corporate AGI

The corporate adjusted gross income ("AGI") model is based on a methodology that seeks to capture the corporate AGI tax payment liability. Notably, the model looks to address (1) overall trend in corporate profitability and size of the corporate sector but also (2) the specific dynamics that Indiana's corporate tax base is exposed to relative to its industry composition, (3) recognition of income attributable to Indiana.

The model uses variables such as the Indiana gross state product, Indiana GSP/US GDP, and the S&P 500 index of common stocks.

The forecast generated by the model is combined with specific adjustments to account for (1) the blended corporate tax rate potentially applicable to tax payments due during that period; (2) payment delays; (3) material changes in corporate tax credits and impacts of legislative changes; (4) refunds; (5) corporate payments transferred to individual income taxes (nonresident shareholders' withholdings).

> Log (Corporate Payments Liability) = β_0 + (β_1 * Log (Indiana Gross State Product)) + (β_2 * (Indiana GSP/US GDP) + (β_3 * S&P 500 Index of Common Stocks)

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	-6.917
β_1	0.855**
β_2	267.075**
β_3	0.000***

Model Statistics:

Adjusted R^2	0.973
Predicted R^2	0.962
F -Statistic	192.694***
DW Statistic	2.433
Sample Size (n)	17

*Significance: *p < 0.1, **p < 0.05, ***p < 0.01*

Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	390.63	-46.56%
2019	603.02	54.37%
2020	437.55	-27.44%
2021	994.94	127.39%
2022	1235.65	24.19%

Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	1,120.99	-9.28%
2024	1,260.98	12.49%
2025	1,270.49	0.75%

Corporate Taxes: Other Corporate Taxes

In addition to the corporate AGI forecast, revenues from the utility receipts tax, the utility services use tax, and the financial institutions tax are estimated separately using historical compounded annual growth rates.

HEA-1002 (2022) repealed the Utility Receipts Tax (URT) and Utility Services Use Tax (USUT) starting July 1, 2022. These forecasts are then added together to get the total corporate tax forecast.

Financial Institutions Tax

Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	68.67	-19.4%
2024	97.44	41.9%
2025	108.35	11.2%

Cigarette & Other Tobacco Products Tax

The committee estimates cigarette tax and tobacco products tax separately. Cigarette sales, measured in packs of 20, depend upon fiscal year nominal Indiana personal income, an estimate of the sum of the four surrounding states' nominal prices, the nominal Indiana price, a trend variable, and the smoking age population. Other tobacco product sales are estimated based on an annual fiscal year trend.

$$\text{Log (Packets Sold)} = \beta_0 + (\beta_1 * \text{Log (Nominal Indiana Personal Income)}) + (\beta_2 * \text{Log (Nominal Indiana Cigarette Price)}) + (\beta_3 * \text{Log (All Neighbors' Nominal Price)}) + (\beta_4 * \text{Trend}) + (\beta_5 * \text{Log (Smoking Age Population)})$$

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	-19.822**
β_1	1.819***
β_2	-0.705***
β_3	0.608**
β_4	-0.103***
β_5	0.919*

Model Statistics:

Adjusted R^2	0.978
F -Statistic	236.053***
Sample Size (n)	28

Significance: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	383.44	-4.1%
2019	368.67	-3.9%
2020	373.65	1.4%
2021	368.70	-1.3%
2022	346.55	-6.0%

Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	345.11	-0.4%
2024	331.52	-3.9%
2025	322.06	-2.9%

Note: The state General Fund receives 56.24% of the cigarette and tobacco products taxes. The historical and forecasted revenues reflect cigarette tax (net of collection allowance) to state funds.

Alcoholic Beverage Taxes

The alcoholic beverage tax model includes three equations: one for beer, one for liquor, and one for wine. The beer and liquor include fiscal year real Indiana personal income and the real beverage price. The beer equation includes dummy variables for 1979 and after, 1993 and after, and 2012 and after. In the beer equation, the price and income variables are expressed in terms of natural logarithms, and in the liquor equation the income variable is expressed in terms of a natural logarithm.

Alcoholic Beverage Taxes: Beer

Log (Thousands of Gallons of Beer Sold in Indiana) = $\beta_0 + \beta_1$ * Log (FY Real Indiana Personal Income)) + (β_2 * Log (Real Price of Beer)) + (β_3 * Slope Dummy (pre 1979=0, 1979 and after=Log (real IPI)) + (β_4 * Slope Dummy (pre 1993=0, 1993 and after=Log (real IPI)) + (β_5 * Dummy Variable for FY 1979 and after) + (β_6 * Dummy Variable for FY 1993 and after) + (β_7 * Dummy Variable for FY 2012 and after)

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	3.046***
β_1	0.749***
β_2	-0.105
β_3	-0.749***
β_4	0.211***
β_5	8.887***
β_6	-2.561***
β_7	-0.089***

Model Statistics:

Adjusted R^2	0.982
F -Statistic	432.4***
Sample Size (n)	58

Significance: $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

BEER	Actual* FY 2021	Actual* FY 2022	Forecast FY 2023	Forecast FY 2024	Forecast FY 2025
GENERAL FUND	4.8	4.7	4.8	4.8	4.8
STATE CONSTRUCTION FUND	4.5	4.4	4.5	4.5	4.5
ENFORCEMENT & ADMIN	2.1	2.1	2.1	2.1	2.1
ADDICTION SERVICES	2.4	2.4	2.4	2.4	2.4
TOTAL	13.9	13.5	13.7	13.7	13.8

*Actuals are calculated based on reported gallons sold, not actual revenue.

Alcoholic Beverage Taxes: Liquor

Log (Thousands of Gallons of Liquor Sold in Indiana) = β_0 + (β_1 * Log (Real Indiana Personal Income)) + (β_2 * Real Price of Liquor)

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	-5.879**
β_1	1.279***
β_2	-0.078**

Model Statistics:

Adjusted R^2	0.982
F -Statistic	639.0***
Sample Size (n)	24

Significance: $*p < 0.1, **p < 0.05, ***p < 0.01$

LIQUOR	Actual* FY 2021	Actual* FY 2022	Forecast FY 2023	Forecast FY 2024	Forecast FY 2025
GENERAL FUND	14.3	13.8	13.1	13.3	13.7
STATE CONSTRUCTION FUND	16.7	16.2	15.4	15.5	16.0
ENFORCEMENT & ADMIN	1.6	1.5	1.4	1.5	1.5
ADDICTION SERVICES	0.9	0.8	0.8	0.8	0.8
PENSION RELIEF FUND	4.9	4.7	4.5	4.5	4.7
TOTAL	38.3	37.0	35.2	35.6	36.7

*Actuals are calculated based on reported gallons sold, not actual revenue.

Alcoholic Beverage Taxes: Wine

Compound Annual Growth Rate from 2011-2022 to trend wine consumption.

WINE	Actual* FY 2021	Actual* FY 2022	Forecast FY 2023	Forecast FY 2024	Forecast FY 2025
GENERAL FUND	2.8	3.5	3.5	3.6	3.7
STATE CONSTRUCTION FUND	2.3	2.2	2.3	2.3	2.4
ENFORCEMENT & ADMIN	0.6	0.6	0.6	0.6	0.6
ADDICTION SERVICES	0.3	0.3	0.3	0.3	0.3
WINE GRAPE	0.7	0.0	0.0	0.0	0.0
TOTAL	6.7	6.5	6.7	6.8	7.0

*Actuals are calculated based on reported gallons sold, not actual revenue.

Riverboat and Racino Wagering

The committee uses an equation to estimate the total adjusted gross wagering receipts of the state's eleven riverboat casinos and two racinos. Adjusted gross wagering receipts serve as the tax base for both wagering taxes. These estimates are then adjusted to compute the estimated fiscal year riverboat wagering tax collections and racino slot machine wagering tax collections. The equation estimates the quarterly total adjusted gross wagering receipts with nominal Indiana personal income, a set of dummy variables for market and seasonal changes, and an interaction variable that accounts for other economic and market circumstances.

The baseline adjusted gross wagering receipts forecast is then adjusted to account for: (1) potential competitive impacts from new casino operations in neighboring states, (2) changes in Indiana laws, (3) court decisions impacting taxation of gaming revenues, and (4) the competitive effects of a new casino in South Bend, Indiana.

Total Adjusted Gross Wagering Receipts = β_0 + (β_1 * Indiana Personal Income) + (β_2 * CY Q4 Dummy) + (β_3 * Four Winds Dummy) + (β_4 * Racinos Dummy) + (β_5 * Ohio Dummy) + (β_6 * Indiana Personal Income * Four Winds Dummy)

Coefficient Statistics:

Coefficient	Estimated Coefficient
β_0	-43,563,378
β_1	3,323***
β_2	-30,453,166 ***
β_3	618,567,985***
β_4	58,450,066***
β_5	-0.58***
β_6	-3,028***

Model Statistics:

Adjusted R^2	0.942
F -Statistic	188.647***
Sample Size (n)	70

Significance: $*p < 0.1, **p < 0.05, ***p < 0.01$

Riverboat and Racino Wagering

Riverboat Wagering Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	317.32	-0.1%
2019	311.60	-1.8%
2020	200.28	-35.7%
2021	282.55	41.1%
2022	311.25	10.2%

Riverboat Wagering Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	342.57	10.1%
2024	296.95	-13.3%
2025	294.77	-0.7%

Racino Wagering Historical Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2018	114.84	0.7%
2019	119.38	3.9%
2020	90.42	-24.3%
2021	126.22	39.6%
2022	141.12	11.8%

Racino Wagering Forecast Data		
Fiscal Year	Adjusted Revenue (Millions $)	Growth
2023	143.92	2.0%
2024	142.00	-1.3%
2025	143.15	0.8%

Section IV: Technical Explanations

General Note on the Statistical Forecast Methodology

Models from this forecast are estimated using ordinary least squares regression ("OLS"). The OLS equation estimates the relationship between the explanatory variables (x) and the response variable (y). The multiple regression function is described by the equation below:

$$y = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \ldots + \hat{\beta}_n x_n$$

In this equation $\hat{\beta}_1$ represents the relationship between the explanatory variable x_1 and the response variable $y,$ while $\hat{\beta}_0$ equals the point at which the regression line intercepts with the y axis. The models used to estimate the state revenue forecast use this functional form. Certain models use the natural logarithmic form of the explanatory and response variables.

In order to calculate the forecast values of state revenue (y in the equation above) the committee uses forecast values of the explanatory variables (x) from S&P Global Market Intelligence (formerly IHS Markit). By substituting the forecast values of x in the equation, a future value of y can be estimated.

Explanations of summary statistics

Standard summary statistics for each model are included with the model specifications.

The Adjusted R^2 listed in the model summaries describes the total variation in the response variable (y) explained by the explanatory variables (x). An Adjusted R^2 equal to 0.90 means that 90% of the change in the dependent variable was explained by the change in the explanatory variables.

Predicted R^2 is calculated by systematically removing each observation from the data set, estimating the regression equation, and determining how well the model predicts the removed observation. It describes the total variation found in this way and determines how well the model explains new data.

The number of observations, or sample size, used to estimate the model is also listed as "n". Most of the forecast models are based on annual data, meaning that a model with an "n" equal to thirty is using thirty years of data. Certain models are based on quarterly data and in this case the statistic refers to the number of quarters used to estimate the model.

The F-statistic measures the overall statistical significance of the model and allows for an assessment of the probability that the coefficients estimated by the model do not equal zero. The relationship observed in the model is likely representative of reality if the F-statistic is significant.

The Durbin Watson Statistic (DW Statistic) is a statistic that tests for first order autocorrelation in the residuals of a model. The presence of first order autocorrelation violates assumptions in regression theory thus harming model integrity.

The p-value measures the significance of the relationship between a particular explanatory variable and the response variable in the model. While the F-statistic and the associated p-value evaluate the entire model simultaneously, the p-values associated with the coefficients examine each relationship independently.