



STATE OF INDIANA

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REVENUE FORECASTING METHODOLOGY

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Discussion of the Forecast

The December 2012 revenue forecast was prepared against the backdrop of on-going negotiations between the White House and Congress as significant tax increases and spending cuts were set to automatically take effect on January 1. The economic forecasts provided by IHS Global Insight at that time assumed the negotiations would result in the tax increases being limited to high-income households with some of the increases being pushed into CY 2014. It was assumed that the White House and Congress would agree to replace the mandated spending cuts under sequester with more modest cuts in discretionary and entitlement spending.

On January 1, federal legislation was enacted that limited the tax increases to high-income individuals. The sequester, however, was allowed to take effect. The IHS Global Insight forecasts used in this revenue forecast assume that the sequester will remain in place until the beginning of the next federal fiscal year, at which time it will be replaced by more targeted spending reductions spread over many years.

In its April 2013 forecasts, IHS Global Insight projected that real U.S. Gross Domestic Product will increase by 2.1% in FY 2013, 2.2% in FY 2014, and 3.2% in FY 2015. U.S. corporate profits, which increased by 6.8% in CY 2012, are forecasted to increase by 1.0% in CY 2013 and 2.8% in CY 2014. The S&P 500 stock index is forecasted to increase 14.7% in FY 2013, 8.8% in FY 2014, and 3.7% in FY 2015.

Indiana personal income is projected to increase by 3.6% in FY 2013, 3.9% in FY 2014 and 4.7% in FY 2015. Federal transfer payments to Indiana residents are forecasted to remain at historically high levels throughout the forecast period. Indiana personal income net of those payments is forecasted to increase by 3.7% in both FY 2013 and FY 2014 before accelerating to a 4.7% increase in FY 2015. The State's unemployment rate is forecasted to average 8.4% in FY 2013, 8.0% in FY 2014, and 7.5% in FY 2015.¹

The Revenue Forecast Technical Committee concluded that while the federal Affordable Care Act will most likely affect insurance premiums tax revenues in a positive way, the scale and complexities of the changes that will occur under the Act are such that those effects cannot be accurately determined at this time. Therefore, this forecast does not contain estimates of those revenue impacts.

Discussion of the Equations Used in the Forecast

Sales Tax

Labor and investment income drive sales tax revenues differently than government transfer payment income. Specifically, transfer payments are largely spent on items which are not subject to sales taxes such as food and shelter. Furthermore, government transfer payments contain a large counter-cyclical component in the form of income support payments such as unemployment benefits. Beginning in the first quarter of 2009, government transfer payments have accounted for, on average, nearly 20% of Indiana personal income. This is more than 1.6 times the historical average that prevailed between the first quarter of 1969 and the fourth quarter of 2008, and that elevated level is expected to continue throughout the forecast period. The committee incorporated personal income net of transfer payments into the sales tax equation to capture this dynamic.

Consumer spending does not change in a linear fashion with income, but depends on both the nature of that income and consumers' spending versus savings decisions. Those decisions are influenced by consumers' current economic conditions and what they believe those economic conditions will be in the future. The Committee incorporated the Indiana unemployment rate into the sales tax equation as a proxy for those conditions.

The model used by the Committee is replicated as Equation (1) below.

$$\text{Equation (1): Sales Tax Base} = 1.00191 * (\text{EXP}(0.10121 + (0.929 * \text{LN}(\text{FY_Adjusted IPI}) + (-0.0224 * \text{LN}(\text{FY_IN Unemployment Rate})))) + \text{Adjustments}$$

Individual Income Tax

The committee retained its individual income tax equation from December 2012 with two refinements. The equation was converted to a double-log form and the S&P 500 variable was

¹ To view the Fiscal Year Forecasted data please see the *General Fund Revenue Forecast* presentation from April 16, 2013.

changed from a calendar year basis to a fiscal year basis. That variable serves to capture income taxes from investment activity which personal income does not adequately account for. A calendar year basis better captures the current relationship between investment income and income tax payments that uses fiscal year Indiana personal income and calendar year S&P 500 common stock index values. The equation forecasts total state and local income taxes. The amounts of income taxes distributed back to counties and estimated local income tax distributions in excess of current year collections are then removed from the forecasted amounts.

<p>Equation (2): State & Local Individual Income Tax = $0.99796 * (\text{EXP} (-3.621 + (0.915 * \text{LN} (\text{FY_IPI})) + (0.153 * \text{LN} (\text{FY_S\&P 500})))) + \text{Adjustments} - \text{Local Option Income Tax Transfers}$</p>
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Corporate Income Tax

The forecast equation employed by the Committee in December 2012 and retained for this forecast is driven by Calendar Year National Income and Product Accounts (NIPA) corporate profits and a binary variable to account for the impact from the 2008 recession. The binary variable was introduced to capture the impact from net operating loss carry backs caused by the 6.1% and 17.4% decline in corporate profits in CY 2007 and CY 2008 respectively. The binary variable has been set to 0 throughout this forecast period to reflect the diminished pool of net operating losses and the elimination of the carry-back option for the purposes of Indiana taxation. The equation employed by the Committee is replicated as Equation (3). Revenues from the Utility Receipts Tax, the Utility Services Use Tax, and the Financial Institutions Tax were forecast separately and the results of the Equation (3) were adjusted accordingly.

<p>Equation (3): Corporate Income Tax Base = $1.007002 * (\text{EXP} (5.943 + (0.425 * \text{LN} (\text{CY Corporate Profits})) - (0.282 * \text{Dummy 2010, Dummy 2011}))) + \text{Adjustments}$</p>
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Cigarette & Tobacco Products Tax

The Committee adopted two equations to estimate the Cigarette Tax and Tobacco Products Tax. Cigarette Sales, measured in packs of 20, depend upon fiscal year real Indiana Personal Income (RFY_IPI), an estimate of the sum of the four surrounding states’ real prices (RALLPRICE), the real Indiana price (RINPRICE), the real Indiana cigarette excise tax rate (RCIG_RATE), and a trend variable equal to the fiscal year forecast minus 1965 (TREND65). Tobacco Product sales are estimated based on fiscal year real Indiana Personal Income (RFY_IPI), a real price index for tobacco products (RPPITOB), real excise tax on tobacco products (RTOBRATE), a product of real price index and federal tobacco products excise tax (RPPITOBFED), and a trend variable (TREND65). The sales, income, cigarette tax rate and price variables are expressed in natural logarithms. The tobacco tax rate and the trend variable are not in logarithmic form.

$$\begin{aligned} \text{Equation (4):} \quad & \text{Cigarette Sales} = \text{EXP} (-10.30 + 1.536 * \text{LN} (\text{RFY_IPI}) \\ & - 0.711 * \text{LN} (\text{RINPRICE}) + 0.165 * \text{LN} (\text{RALLPRICE}) \\ & - 0.099 * \text{LN} (\text{R CIG_RATE}) - 0.046 * (\text{TREND65})) \end{aligned}$$

$$\text{Equation 4(a):} \quad \text{Gross Cigarette Tax} = 0.995 * (\text{Cigarette Sales})$$

$$\begin{aligned} \text{Equation (5):} \quad & \text{Tobacco Product Sales} = \text{EXP} (-11.64 + 1.29 * \text{LN} (\text{RFY_IPI}) \\ & - 0.234 * \text{LN} (\text{RPPITOB}) - 0.027 * (\text{TOBRATE}) + 0.0093 * (\text{RPPITOBFED}) \\ & + 0.027 * (\text{TREND65})) \end{aligned}$$

$$\text{Equation (5a):} \quad \text{Tobacco Products Tax} = 0.24 * (\text{Tobacco Products Sales})$$

Alcoholic Beverage Taxes

The alcoholic beverage tax model includes three equations: one for beer, one for liquor, and one for wine. All three equations include fiscal year real Indiana Personal Income (RFY_IPI), the real beverage price (BEER_PRICE, LIQ_PRICE, and WINE_PRICE). The beer equation includes dummy variables for 1979 and after (D79), 1993 and after (D93) and 2012 and after (D12). Two other dummy variables are included where D79 and D12 are multiplied by the log of real Indiana Personal Income. The liquor equation includes a dummy variable for 1999 and after (D99). It also includes a variable where D99 is multiplied by the log of real Indiana Personal Income. The wine equation includes dummy variables for 1987 and after, and 2012 and after. For all equations, the income and price variables were adjusted by the Gross Domestic Product price deflator. The sales and income variables are expressed in terms of natural logarithms. The price and dummy variables are not in natural logarithms.

Equation (6): Beer Sales = EXP (3.72 + .7033 * LN (RFY_IPI) - 0.724 * LN (RFYIPI79) + 0.275 * LN (RFYIPI93) - 0.054* (RBEER_PRICE) + 8.58* (D79) -3.29 * (D93) - 0.056 * (D12))

Where RFY_IPI79 = Real FY_IPI when FY > 1978

Where RFY_IPI93 = Real FY_IPI when FY > 1992

Where D79 = 1 when FY > 1978

Where D93 = 1 when FY > 1992

Where D12 = 1 when FY > 2011

Equation (6a): Beer Tax = 0.115 * (Beer Sales)

Equation (7): Liquor Sales = EXP (15.76- 0.54 * LN (RFY_IPI) – 0.0571 (RLIQ_PRICE) + 2.37* LN (RFYIPI99) -28.492 (D99))

Where RFY_IPI99 = Real FY_IPI when FY > 1998

Where D99 = 1 when FY > 1998

Equation (7a): Liquor Tax = 2.68 * (Liquor Sales)

Equation (8): Wine Sales = EXP (1.43 + 0.848 * LN (RFY_IPI) – 0.569 (RWINE_PRICE) - .280 * (D87) -0.0633 * (D12))

Where D87 = 1 when FY > 1986

Where D12 = 1 when FY > 2011

Equation (8a): Wine Tax = 0.47 * (Wine Sales)

Gaming Taxes

The Committee adopted an equation to estimate the total adjusted gross wagering receipts of the state's 11 riverboat casinos and 2 racinos. Adjusted gross wagering receipts serves as the tax base for the riverboat wagering tax and the racino slot machine wagering tax. These estimates are then used to compute estimated fiscal year riverboat wagering tax collections and racino slot machine wagering tax collections.

The equation estimates quarterly total adjusted gross wagering receipts (Q_AGR) generated at the state's 11 riverboat casinos and 2 racinos based on its relationship to quarterly nominal Indiana personal income in millions of dollars (Q_NIPI), a set of dummy variables, and an interaction variable that account for other economic and market circumstances. The equation contains a dummy variable (D_FRLICK) to account for the addition of the French Lick Casino and its impact on total adjusted gross wagering receipts levels since 2006. The equation includes a dummy variable (D_FRWINDS) to account for the competitive impact of the Four Winds Casino on total adjusted gross wagering receipts levels since 2007. The Four Winds Casino is a tribal casino located in New Buffalo, Michigan, about 20 miles from the Blue Chip Casino in Michigan City, Indiana. The equation also includes a dummy variable (D_RACINO) to account for the addition of the racinos at Hoosier Park and Indiana Downs and their impact on total adjusted gross wagering receipts levels since 2008. The equation includes a variable comprising the interaction of Q_NIPI and D_FRLICK to account for the secular leveling and decline in total adjusted gross wagering receipts levels due to market and capacity factors. The equation also includes quarterly dummy variables (D_Q2 and D_Q4) to account for seasonal variation in adjusted gross wagering receipts levels. The baseline AGR forecast is then adjusted to account for: (1) potential competitive impacts from new casino operations in neighboring states, (2) changes in Indiana laws, and (3) court decisions impacting taxation of gaming revenues. The equation chosen is replicated as Equation (9) below.

$$\begin{aligned} \text{Equation (9): } \quad Q_AGR = & -33,576,457 + 3,323.2(Q_NIPI) \\ & + 972,054,943.7 (D_FRLICK) - 28,860,970.6 (D_FRWINDS) \\ & + 62,763,996.8 (D_RACINO) - 4,516.3 (Q_NIPI * D_FRLICK) \\ & - 9,588,146.1 (D_Q2) - 41,862,542.1 (D_Q4) \end{aligned}$$

Where D_FRLICK = 0.67 in 4th Quarter 2006 and 1 in calendar quarters thereafter.

Where D_FRWINDS = 0.67 in 3rd Quarter 2007 and 1 in calendar quarters thereafter.

Where D_RACINO = 0.33 in 2nd Quarter 2008 and 1 in calendar quarters thereafter.

Where Q_NIPI * D_FRLICK = Q_NIPI * 0.67 in 4th Quarter 2006 and Q_NIPI * 1 in calendar quarters thereafter.

Where D_Q2 = 1 during the 2nd calendar quarter of a year.

Where D_Q4 = 1 during the 4th calendar quarter of a year.

SPECIFIC METHODOLOGY
(April 16, 2013)

Sales Tax

For Each Fiscal Year to be Forecast:

1. Multiply 0.929 by the natural logarithm of the Fiscal Year Indiana Personal Income Net of Transfer Payments.
2. Multiply -0.0224 by the natural logarithm of the Fiscal Year Indiana Unemployment Rate.
3. Add the results of Steps 1 and 2.
4. Add 0.10121 to the result of Step 3.
5. Compute the exponential of the result of Step 4. Multiply the result by 1.00191 to obtain the total fiscal year sales tax base.
6. Multiply the results of Step 5 by the sales tax rate (7%).
7. Add 30.7 in FY 2013, 53.3 in FY 2014, and 88.6 in FY 2015 from the result of Step 6 to account for the impact of tax measures enacted by the General Assembly.
8. Multiply the results of Step 7 by 0.99848 to account for the percentage of sales taxes deposited in the General Fund under HEA 1001- 2011.

Individual Income Tax

For Each Fiscal Year to be Forecast:

1. Multiply 0.915 times the natural logarithm of the Fiscal Year Indiana Personal Income.
2. Multiply 0.153 times the natural logarithm of the Fiscal Year S&P 500 Common Stock Index.
3. Add the results of Step 1 and Step 2.
4. Subtract 3.621 from the result of Step 3.
5. Compute the exponential of the result of Step 4. Multiply the result by 0.99796 to obtain the total fiscal year income tax base.
6. Subtract 307.2 for FY 2013, 308.0 for FY 2014, and for 309.2 for FY 2015 from the result of Step 5 to account for tax measures enacted by the General Assembly.
7. Subtract 1,562.8 for FY 2013, 1,654.8 for FY 2014, and 1,769.5 for FY 2015 from the result of Step 6 to account for the local option income tax transfers.

8. Subtract 208.0 for FY 2013, 209.7 for FY 2014, and 196.7 for FY 2015 from the result of Step 7 to account for transfers to the local option income tax reserve fund.

Corporate Income Tax

For Each Fiscal Year to be Forecast:

1. Multiply 0.425 by the natural logarithm of the prior Calendar Year Corporate Profit.
2. Multiply -0.282 by the dummy for FY 2010 and for FY 2011.
3. Add the results of Step 1 to Step 2.
4. Add 5.943 to the results of Step 3.
5. Compute the exponential of the result of Step 4. Multiply the result by 1.007002 to obtain the total Fiscal Year corporate tax base.
6. Subtract 782.1 for FY 2013, 785.3 for FY 2014, and 795.3 for FY 2015 from the result of Step 5 to account for tax measures enacted by the General Assembly.
7. Multiply the result of Step 6 by the tax rate (7.94% in FY 2013, 7.44% for FY 2014, and 6.95% for FY 2015).
8. Subtract 1.5 for FY 2013 from the result of Step 7 to account for Financial Institutions Tax receipts/transfers.
9. Add 5.7 for FY 2013, 11.9 for FY 2014, and 17.5 for FY 2015 to the result of Step 8 to account for the adjustment for the tax on state/local bonds.
10. Add 201 for FY 2013, FY 2014, and FY 2015 to the result of Step 9 to account for the revenues from the Utility Receipts Tax.
11. Add 6.8 for FY 2013, FY 2014, and FY 2015 to the result of Step 10 to account for the revenues from the Utility Service Use Tax.
12. Add 21.7 in FY 2013, FY 2014, and FY 2015 to the result of Step 11 to account for the revenues from the Financial Institutions Tax.

Cigarette Tax

For Each Fiscal Year to be Forecast:

1. Multiply 1.536 by the logarithm of fiscal year real Indiana Personal Income.
2. Subtract 10.3 from the result of Step 1.
3. Multiply 0.165 by the logarithm of the sum of the real cigarette prices in the four surrounding states.

4. Add the result of Step 3 to the result of Step 2.
5. Multiply -0.711 by the logarithm of the real cigarette price in Indiana.
6. Add the result of Step 5 to the result of Step 4.
7. Multiply -0.099 by the logarithm of the real cigarette excise tax rate.
8. Add the result of Step 7 to the result of Step 6.
9. Subtract 1,965 from the fiscal year of the forecast.
10. Multiply the result of Step 9 by -0.046.
11. Add the result of Step 10 to the result of Step 8.
12. Take the exponential of Step 11 to calculate sales.
13. Multiply the result of Step 12 by 0.995 to calculate total revenue.
14. Add the results of Step 15 from the Tobacco Product Tax methodology to the results of Step 13.
15. Multiply the result of Step 14 by 0.6024 for FY 2013 and 0.545 for FY 2014 and FY 2015 to calculate General Fund revenue.

Tobacco Products Tax

For Each Fiscal Year to be Forecast:

1. Multiply 1.292 by the logarithm of fiscal year real Indiana Personal Income.
2. Subtract 11.64 from the result of Step 1.
3. Multiply -0.234 by the logarithm of the of the real tobacco product price.
4. Add the result of Step 3 to the result of Step 2.
5. Multiply 100 by the tobacco products excise tax rate.
6. Multiply -0.027 by the result of Step 5.
7. Add the result of Step 6 to the result of Step 4.
8. Subtract 1965 from the fiscal year of the forecast.
9. Multiply the result of Step 8 by 0.027.

10. Add the result of Step 9 to the result of Step 7
11. Multiply 0.009 by the product of real tobacco product price and federal tobacco product tax rate.
12. Add the result of Step 11 to the result of Step 10.
13. Take the exponential of Step 12 to calculate sales.
14. Multiply the result of Step 13 by 0.24 to calculate total revenue.
15. Multiply the result of Step 14 by 0.75 and distribute the amount along with the Cigarette Tax revenue.
16. Multiply the results of Step 14 by 0.25. Deposit the amount in the Affordable Housing Fund.

Alcoholic Beverage Tax - Beer

For Each Fiscal Year to be Forecast:

1. Multiply 0.703 by the logarithm of fiscal year real Indiana Personal Income.
2. Add 3.72 to the result of Step 1.
3. Multiply -0.0543 by the real beer price
4. Add the result of Step 3 to the result of Step 2.
5. For 1979 and thereafter, multiply -0.724 to the logarithm of fiscal year real Indiana Personal Income.
6. For 1993 and thereafter, multiply 0.275 to the logarithm of fiscal year real Indiana Personal Income.
7. Add Step 4, Step 5 and Step 6.
8. For 1979 and thereafter, add 8.58.
9. For 1993 and thereafter, subtract 3.29.
10. For 2012 and thereafter, subtract 0.056.
11. Take the exponential of the result of Step 10 to calculate sales.
12. Multiply the result of Step 11 by 0.115 to calculate total revenue; multiply the result of Step 11 by 0.04 to calculate General Fund revenue.

Alcoholic Beverage Tax - Liquor

For Each Fiscal Year to be Forecast:

1. Multiply -0.540 by the logarithm of fiscal year real Indiana Personal Income
2. Add 15.756 to the result of Step 1.
3. Multiply -0.057 by the real liquor price.
4. Add the result of Step 3 to the result of Step 2.
5. For 1999 and thereafter, multiply 2.37 to the logarithm of fiscal year real Indiana Personal Income.
6. For 1999 and thereafter, subtract 28.49.
7. Take the exponential of the result of Step 6 to calculate sales.
8. Multiply the result of Step 7 by 2.68 to calculate total revenue; multiply the result of Step 7 by 1.00 to calculate General Fund revenue.

Alcoholic Beverage Tax – Wine

For Each Fiscal Year to be Forecast:

1. Multiply 0.848 by the logarithm of fiscal year real Indiana Personal Income.
2. Subtract 1.43 from the result of Step 1
3. Multiply -0.569 by the real wine price.
4. Add the result of Step 2 to the result of Step 3
5. For 1987 and thereafter, subtract 0.28.
6. For 2012 and thereafter, subtract 0.0633.
7. Take the exponential of the result of Step 6 to get sales.
8. Multiply the result of Step 7 by 0.47 to get total revenue; multiply the result of Step 7 by 0.20 to get General Fund revenue.

Gaming Taxes

For Each Fiscal Year to be Forecast:

1. Multiply 3,323.2 by quarterly nominal Indiana Personal Income in millions of dollars.
2. Subtract 33,576,457 from the result of Step 1.

3. Add 651,276,812 to the result of Step 2 for the 4th Quarter of 2006, and add 972,054,944 to the result of Step 2 for each calendar quarter thereafter.
4. Subtract 19,336,850 from the result of Step 3 for the 3rd Quarter of 2007, and subtract 28,860,971 from the result of Step 3 for each calendar quarter thereafter.
5. Add 20,712,119 to the result of Step 4 for the 2nd Quarter of 2008, and add 62,763,997 to the result of Step 4 for each calendar quarter thereafter.
6. Multiply 3,025.9 by quarterly nominal Indiana Personal Income in millions of dollars and subtract the result from the result of Step 5 for the 4th Quarter of 2006, or multiply 4,516 by quarterly nominal Indiana Personal Income in millions of dollars and subtract the result from the result of Step 5 for each calendar quarter thereafter.
7. Subtract 9,588,146 from the result of Step 6 if the calendar quarter is the 2nd Quarter or subtract 41,862,542 from the result of Step 6 if the calendar quarter is the 4th Quarter.
8. Sum the quarterly totals from Step 7 for the fiscal year to obtain the total fiscal year adjusted gross wagering receipts of the 11 riverboat casinos and 2 racinos.
9. Divide the total fiscal year adjusted gross receipts from Step 8 between the 11 riverboat casinos and 2 racinos based on the historical percentage distribution of adjusted gross wagering receipts by riverboat casino and racino.
10. Reduce the estimated adjusted gross wagering receipts for Belterra Casino, Grand Victoria Casino, and Hollywood Casino by 26.6% in the last quarter of FY 2013, and 33.3% in FY 2014 and FY 2015 to account for potential competitive impacts from new casino operations in Cincinnati, Ohio, and Columbus, Ohio, beginning in Fall 2012 and Spring 2013.
11. Reduce the estimated adjusted gross wagering receipts for the Hoosier Park racino by 21.7% in FY 2013, 22.9% in FY 2014, and 24.1% in FY 2015 to account for: (1) potential competitive impacts from new gaming facilities in neighboring states, (2) statutory reduction in taxable AGR from 100% to 99% starting July 1, 2012, and (3) the U. S. Bankruptcy Court's ruling reducing the slot machine wagering tax base.
12. Reduce the estimated adjusted gross wagering receipts for the Indiana Downs racino by 15.9% in FY 2013, 17.0% in FY 2014, and 18.2% in FY 2015 to account for: (1) potential competitive impacts from new gaming facilities in neighboring states, (2) statutory reduction in taxable AGR from 100% to 99% starting July 1, 2012, and (3) the U. S. Bankruptcy Court's ruling reducing the slot machine wagering tax base.
13. Use the fiscal year adjusted gross wagering receipts totals for the 11 riverboat casinos resulting from Step 10 to compute the fiscal year riverboat wagering tax for each riverboat casino.
14. Sum the fiscal year wagering tax totals for each riverboat casino from Step 13 to obtain the fiscal year total riverboat wagering tax collections.
15. Subtract from the Step 14 result: (1) \$1,105,160 each year to account for reimbursement to the Indiana Gaming Commission for administrative expenses, (2) \$33,000,000 each year to

account for local revenue sharing, and (3) \$97,853,930 in FY 2013, \$96,303,944 in FY 2014, and \$95,018,518 in FY 2015 to account for riverboat wagering tax distributions to riverboat communities and other purposes.

16. Use the fiscal year adjusted gross wagering receipts totals for the 2 racinos resulting from Step 11 and 12 to compute the fiscal year racino slot machine wagering tax for each racino.
17. Sum the fiscal year wagering tax totals for each racino from Step 16 to obtain fiscal year total racino slot machine wagering tax collections.