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# REVENUE FORECASTING METHODOLOGY

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## Discussion of the Forecast

The economic forecast underlying this update to the April 2011 revenue forecast was released by IHS Global Insight on December 8, 2011. In April 2011, Indiana personal income was forecasted to increase by 3.9% in FY 2012 and FY 2013. IHS Global Insight currently forecasts Indiana personal income to increase by 3.2% in FY 2012, and 3.3% in FY 2013. The forecast assumes that the temporary federal payroll tax reduction enacted for CY 2011 will be extended through CY 2012. Government transfer payments to individuals are forecasted to equal 20.1% of personal income in FY 2012 and FY 2013.

In April 2011, IHS Global Insight forecasted Indiana's unemployment rate would decrease from 9.2% in FY 2011 to 8.5% in FY 2012 and 8.2% in FY 2013. Currently, IHS Global Insight is forecasting Indiana's unemployment rate to decline to 8.6% in FY 2012 and FY 2013.

In April 2011, IHS Global Insight forecasted nominal GDP to increase by 4.8% in FY 2012 and 4.3% in FY 2013. IHS Global Insight is currently forecasting nominal GDP to increase by 3.6% in FY 2012 and 3.0% in FY 2013. In real terms, GDP was forecasted to increase by 3.1% in FY 2012 and 2.7% in FY 2013. Real GDP is currently forecasted to increase by 1.7% in FY 2012 and by 1.9% in FY 2013.

The U.S. personal savings rate averaged 5.2% of disposable personal income over the period FY 2009 through FY 2011. It is forecasted to decline to 3.8% in FY 2012 and 3.3% in FY 2013.

In April 2011, corporate profits were forecasted to grow by 3.6% in CY 2011 and 2.2% in CY 2012. IHS Global Insight is currently forecasting corporate profits to increase by 8.8% in CY 2011 and 0.6% in CY 2012.

## Discussion of the Equations Used in the Forecast

### Sales Tax

As of November 2011, sales tax revenues have been above prior year amounts for twenty-one consecutive months. This was preceded by year-over-year declines for sixteen straight months from November 2008 to February 2010. On a year-to-date basis through November 2011, sales tax revenues were up 8.2%. The committee employed a model forecasting the sales tax base using fiscal year Indiana personal income, fiscal year US personal savings rate and fiscal year government transfer payments as a share of Indiana personal income.

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 second quarter of 2009, government transfer payments have accounted for more than 20% of Indiana personal income. This is more than 1.5 times the historical average that prevailed between the first quarter of 1969 and the first quarter of 2009, and that elevated level is expected to continue throughout the forecast period. The committee incorporated transfer payments as a share of personal income into the sales tax equation to capture the information about spending patterns over the business cycle embodied in that variable.

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. The US personal savings rate increased during the recent recession, but has recently begun to decline back towards pre-recession levels. To capture the relationship between spending and saving, the US personal savings rate has been included in the sales tax equation.

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

Equation (1): Fiscal Year Sales Tax Base = 22,321 + (0.4056 * (FY_IPI)) - (63,203 * (FY_US Savings Rate) – (103,168 * FY_Indiana Transfer Payments as a % of total IPI) + Adjustments

## Individual Income Tax

The committee adopted a fiscal year model that uses fiscal year Indiana personal income and calendar year S&P 500 common stock index values. The S&P 500 variable is lagged by six months in recognition that realized capital gains impact final and estimated tax payments. The equation forecasts total state and local income taxes. The amounts of income taxes distributed back to counties are then removed from the forecasted amounts.

Equation (2):    State & Local Individual Income Tax = -258.9 + 0.0258 * (FY_IPI) + .578 * (CY_S&P500) + Adjs. – Local Option Income Tax Transfer

## Corporate Income Tax

The forecast equation employed by the Committee in April 2011 and again for this update 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 sharp 17.4% decline in profits in 2008. 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.

Equation (3):    Corporate Income Tax Base = 1.0052 * (EXP (5.87 + (0.4377 * LN (CY Corporate Profits)) - (0.355 if FY = 2010, 2011, 2012, and 2013))) + Adjustments

## 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 cigarette excise tax rate (CIGRATE), and a trend variable equal to the fiscal year forecast minus 1965 (TREND). Tobacco Product sales are estimated based on fiscal year real Indiana Personal Income (RFY_IPI), a price index for tobacco products (PRICE), excise tax on tobacco products (TOBRATE), a dummy variable for 2010 (DUM 10) and years after and the trend variable (TREND). The sales, income, cigarette tax rate and price variables are expressed in natural logarithms. The tobacco tax rate is not in logarithmic form.

Equation (4):  Cigarette Sales = -8.00 + 1.323 (RFY_IPI) + 0.188 (RALLPRICE)
                - 0.767 (RINPRICE) - 0.090 (CIGRATE) – 0.044 (TREND)

Equation 4(a):  Gross Cigarette Tax = 0.995 (Cigarette Sales)

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Equation (5):  Tobacco Product Sales = -14.691 +1.554 (RFY_IPI) - 0.233 (PRICE)
                - 0.020 (TOBRATE) + 0.023 (TREND) + 0.079 (DUM10)

Equation (5a):  Tobacco Products Tax = 0.24 (Tobacco Products Sales)

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## 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 (BPRICE, LPRICE, and WPRICE). The liquor equation includes a trend variable (TREND) and the square of the TREND variable (TREND2). The beer equation includes a dummy variable for 1993 (DUM 93) and years after, and that dummy variable multiplied by the log of real Indiana Personal Income (D93_RFY_IPI). The wine equation includes dummy variables for 1987 and after, 1993 and after and 1999 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, trend, and dummy variables are not in natural logarithms.

Equation (6):  Beer Sales = 6.374 -0.283 (D93_RFY_IPI)) + 0.530 (RFY_IPI)
                - 0.173 (BPRICE) +3.232 (DUM93)

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

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Equation (7):  Liquor Sales = 6.266 + 0.453 (RFY_IPI) - 0.139 (LPRICE) - 0.082(TREND)
                + 0.001(TREND2) + 0.133 (DUM99)

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

Equation (8):    Wine Sales = -13.378 + 2.015 (RFY_IPI) - 0.289 (WPRICE) -0.288 (DUM87)
                  - 0.383 (DUM93) - 0.292 (DUM99)

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) and to 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 equation chosen is replicated as Equation (9), below.

Equation (9): $Q\_AGR = -35{,}542{,}665.82 + 3{,}331.32(Q\_NIPI) + 875{,}225{,}096.70(D\_FRLICK) - 33{,}513{,}014.91(D\_FRWINDS) + 64{,}098{,}179.84(D\_RACINO) - 4{,}059.80(Q\_NIPI*D\_FRLICK) - 10{,}191{,}025.10(D\_Q2) - 39{,}589{,}453.84(D\_Q4)$

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
### (December 14, 2011)

**Sales Tax**

For Each Fiscal Year to be Forecast:

1. Multiply 0.4056 by the Fiscal Year Indiana Personal Income.

2. Add 22,321 to the results of Step 1.

3. Multiply 63,203 by the Fiscal Year US Personal Savings Rate.

4. Subtract the results of Step 3 from the results of Step 2.

5. Multiply 103,168 by the Fiscal Year Indiana Transfer Payments as a % of total Indiana Personal Income.

6. Subtract the results of Step 5 from the results of Step 4.

7. Multiply the results of Step 6 by the sales tax rate (7%).

8. Add 29.1 in FY 2012, and 30.2 in FY 2013 to the result of Step 8 to account for the impact of tax measures enacted in 2007, 2008, 2009, 2010 and, 2011.

9. Multiply the results of Step 10 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 0.02587 times the Fiscal Year Indiana Personal Income.

2. Multiply .5779 times the Calendar Year S&P 500 Common Stock Index.

3. Add the results of Steps 1, Step 2.

4. Subtract 259 from the results of Step 3.

5. Subtract 295 for FY 2012, and 308.7 for FY 2013 from the results of Step 4 to account for tax measures enacted by the General Assembly.

6. Subtract 1,354.6 for FY 2012, and 1,342.6 in FY 2013 from the results of Step 5 to account for the local option income tax transfers.

**Corporate Income Tax**

For Each Fiscal Year to be Forecast:

1. For each Fiscal Year multiply 0.4377 by the natural logarithm of the prior Calendar Year Corporate Profit.

2. Subtract 0.355 from Step 1 for FY 2012, and FY 2013.

3. Add the results of Step 1 and Step 2.

4. Add 5.87 to the results of Step 3.

5. Compute the exponential of the result of Step 4. Multiply the result by 1.005248 to obtain the total Fiscal Year corporate tax base.

6. Multiply the results of Step 5 by the tax rate (8.34% in FY 2012 and 7.94% for FY 2013).

7. Add 208 for FY 2012 and 213.3 for FY 2013 to the result of Step 6 to account for the revenues from the Utility Receipts Tax.

8. Add 10.5 for FY 2012 and 11.5 for FY 2013 to the result of Step 7 to account for the revenues from the Utility Service Use Tax.

9. Add 5.0 in FY 2012 and FY 2013 to the results of Step 8 to account for General Fund impact from the Financial Institutions Tax.

10. Subtract 3.3 for FY 2012 and add 6.0 for FY 2013 to the results of Step 9 to account for tax measures enacted in 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011.


**Cigarette Tax**

For Each Fiscal Year to be Forecast:

1. Multiply 1.323 by the logarithm of fiscal year real Indiana Personal Income.

2. Subtract 8.00 from the result of Step 1.

3. Multiply 0.188 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 -0.767 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 -0.090 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 -0.044.

11. Add the result of Step 10 to the result of Step 8.

12. Take the exponential of Step 11 to get sales.

13. Multiply the result of Step 12 by 0.995 to get total revenue.

14. Multiply the result of Step 13 by 0.6024 to get General Fund revenue.


**Tobacco Products Tax**

For Each Fiscal Year to be Forecast:

1. Multiply 1.554 by the logarithm of fiscal year real Indiana Personal Income.

2. Subtract 14.691 from the result of Step 1.

3. Multiply -0.233 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 -0.020 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 0.023.

10. Add the result of Step 9 to the result of Step 7

11. Multiply 0.079 by the dummy for 2010 and after.

12. Add the result of Step 11 to the result of Step10.

13. Take the exponential of Step 12 to get sales.

14. Multiply the result of Step 13 by 0.24 to get total revenue.

15. Multiply the result of Step 14 by 0.75 to get General Fund revenue.

**Alcoholic Beverage Tax - Beer**

For Each Fiscal Year to be Forecast:

1. Multiply 0.530 by the logarithm of fiscal year real Indiana Personal Income.

2. Add 6.374 to the result of Step 1.

3. Multiply -0.173 by the real beer price

4. Add the result of Step 3 to the result of Step 2.

5. Multiply -0.283 by the product of the dummy for 1993 and after and the logarithm of fiscal year real Indiana Personal Income.

6. Add the result of Step 5 to the result of Step 4.

7. Multiply 3.232 by the dummy for 1993 and after.

8. Add the result of Step 7 to the result of Step 6.

9. Take the exponential of the result of Step 8 to get sales.

10. Multiply the result of Step 9 by 0.115 to get total revenue; multiply the result of Step 9 by 0.04 to get General Fund revenue.

## Alcoholic Beverage Tax - Liquor

For Each Fiscal Year to be Forecast:

1. Multiply 0.453 by the logarithm of fiscal year real Indiana Personal Income

2. Add 6.266 to the result of Step 1.

3. Multiply -0.139 by the real liquor price.

4. Add the result of Step 3 to the result of Step 2.

5. Multiply -0.082 by the trend term.

6. Add the result of Step 5 to the result of Step 4.

7. Multiply 0.001 by the trend term squared.

8. Add the result of Step 7 to the result of Step 6.

9. Multiply 0.133 by the dummy for 1999 and after.

10. Add the results of Step 9 to the results of Step 8.

11. Take the exponential of the result of Step 10 to get sales.

12. Multiply the result of Step 11 by 2.68 to get total revenue; multiply the result of Step 11 by 1.00 to get General Fund revenue.

## Alcoholic Beverage Tax - Wine

For Each Fiscal Year to be Forecast:

1. Multiply 2.015 by the logarithm of fiscal year real Indiana Personal Income.

2. Subtract 13.378 from the result of Step 1

3. Multiply -0.289 by the real wine price.

4. Add the result of Step 2 to the result of Step 3

5. Multiply -0.288 by the dummy for 1987 and after.

6. Add the result of Step 5 to the result of Step 4

7. Multiply -0.383 by the dummy for 1993 and after.

8. Add the result of Step 7 to the result of Step 6

9. Multiply -0.292 by the dummy for 1999 and after.

10. Add the result of Step 9 to the result of Step 8

11. Take the exponential of the result of Step 10 to get sales.

12. Multiply the result of Step 11 by 0.47 to get total revenue; multiply the result of Step 11 by 0.20 to get General Fund revenue.


**Gaming Taxes**
For Each Fiscal Year to be Forecast:

1. Multiply 3,331.32 by quarterly nominal Indiana Personal Income in millions of dollars.

2. Subtract 35,542,665.82 from the result of Step 1.

3. Add 586,400,814.80 to the result of Step 2 for the 4th Quarter of 2006, and add 875,225,096.70 to the result of Step 2 for each calendar quarter thereafter.

4. Subtract 22,453,719.99 from the result of Step 3 for the 3rd Quarter of 2007, and subtract 33,513,014.91 from the result of Step 3 for each calendar quarter thereafter.

5. Add 21,152,399.35 to the result of Step 4 for the 2nd Quarter of 2008, and add 64,098,179.84 to the result of Step 4 for each calendar quarter thereafter.

6. Multiply 2,720.07 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 4,059.80 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 10,191,025.10 from the result of Step 6 if the calendar quarter is the 2nd Quarter or subtract 39,589,453.84 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 actual FY 2011 percentage distribution of adjusted gross wagering receipts by riverboat casino and racino.

10. Reduce the FY 2012 estimated adjusted gross wagering receipts for the Horseshoe Southern Indiana riverboat casino by 6% to account for the impact on business due to the closure of the Sherman Minton (I-64) bridge.

11. Reduce the estimated adjusted gross wagering receipts for Belterra Casino, Grand Victoria Casino, and Hollywood Casino by 19% in FY 2013 to account for potential competitive impacts from new casino operations in Cincinnati, Ohio, and Columbus, Ohio, beginning in Fall 2012 and Spring 2013.

12. Reduce the estimated adjusted gross wagering receipts for the Hoosier Park racino by 3.5% in FY 2012 and 14% in FY 2013 to account for potential competitive impacts from a new casino operation in Toledo, Ohio, beginning in Spring 2012.

13. Reduce the estimated racino adjusted gross wagering receipts subject to tax by 1% beginning in FY 2013 to reflect a statutory change in the tax base from 100% of adjusted gross receipts instead to 99% of adjusted gross receipts.

14. Use the fiscal year adjusted gross wagering receipts totals for the 11 riverboat casinos resulting from Step 11 to compute the fiscal year riverboat wagering tax for each riverboat casino.

15. Sum the fiscal year wagering tax totals for each riverboat casino from Step 14 to obtain the fiscal year total riverboat wagering tax collections.

16. Subtract from the Step 15 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) $99,986,087 in FY 2012 and $98,606,419 in FY 2013 to account for riverboat wagering tax distributions to riverboat communities and other purposes; and add to the Step 15 result $3,244,801 in FY 2012 and $3,230,918 in FY 2013 to account for riverboat wagering tax revenue from the French Lick Casino that is distributed to the state General Fund instead of the West Baden Springs Historic Hotel Preservation and Maintenance Fund.

17. Use the fiscal year adjusted gross wagering receipts totals for the 2 racinos resulting from Step 13 to compute the fiscal year racino slot machine wagering tax for each racino.

18. Sum the fiscal year wagering tax totals for each racino from Step 17 to obtain fiscal year total racino slot machine wagering tax collections.

19. Subtract from the Step 18 result, $16,038,469 in FY 2012 and $20,443,759 in FY 2013 to account for continued reductions in slot machine wagering tax remitted by each racino pursuant to the U. S. Bankruptcy Court's ruling as to the slot machine wagering tax base.