REVENUE FORECASTING METHODOLOGY

Technical Committee:

Bob Lain
Prof. John Mikesell
Dan Novreske
Jeff Spalding
Brian Tabor
Shah Towfighi

November 14, 2001

Discussion of the forecast

The terrorist attacks on September 11, 2001 clearly exacerbated already soft economic conditions. Against this backdrop, the Committee determined that the equations adopted in April 2001 for sales tax, individual income tax, and corporate income tax needed to be reconsidered. The challenge for the Committee was to find equations that capture the effects of recessionary periods on tax collections.

Discussion of the equations used in the forecast

The Committee adopted a sales tax equation that uses calendar year nominal Indiana Nonfarm Personal Income (CY_NFIPI) and the percent change in fiscal year real U.S. Gross Domestic Product (% Change FY_RGDP). The equation chosen is replicated as Equation (1) below.

$$\text{Equation (1)} \quad \text{Sales Tax} = 97.358858 + 0.022101(\text{CY\_NFIPI}) + 1565.465136(\%\text{ Change FY\_RGDP})$$

The Committee adopted an equation for individual income tax collections that uses the natural log of fiscal year nominal Indiana Nonfarm Personal Income (FY_NFIPI). The model chosen by the Committee is replicated as Equation (2) below.

$$\text{Equation (2)} \quad \text{Ln(Individual Income Tax)} = -4.619587 + (1.070932 * \text{Ln(FY\_NFIPI)}) + \text{Adjs.}$$

$$\text{Individual Income Tax} = e^{\wedge}\text{Ln(Individual Income Tax)}$$

The Committee adopted a corporate income tax equation that uses as independent variables calendar year nominal U.S. Gross Domestic Product (CY_GDP) and the percent change in fiscal year real U.S. Gross Domestic Product (% Change FY_RGDP). The equation also contains a dummy variable (D93) to account for unexplained changes in corporate Adjusted Gross Income Tax receipts that occurred in 1993 and a dummy variable (D01) to account for unexplained changes in corporate Adjusted Gross Income Tax receipts that occurred in 2001. The equation chosen is replicated as Equation (3) below.

Equation (3)　　　　　Corporate Gross + Adjusted Gross = 255.34043 + 0.035399(CY_GDP) + D93 + D01 + 1852.886439(% Change FY_RGDP) + Adjs.

Where D93 = 1 if Year = 1993

Where D01 = 1 if Year = 2001

Cigarette sales, measured in packs of 20, depend upon fiscal year real Indiana Nonfarm Personal Income (RFY_NFIP), an estimate of the sum of the four surrounding states real prices (RALLPRICE), the real Indiana cigarette price (RINPRICE), and real Indiana cigarette price lagged (RINPIRCE-1). The sales, income, and price variables are expressed in natural logarithms.

Equation (4)　　　　　Cig. Sales = 3.398 + 0.325(RFY_NFIP) + 0.113(RALLPRICE) - 0.562(RINPRICE)

Equation (4a)　　　　 Cigarette tax = 0.155(Cig. Sales)

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 Nonfarm Personal Income (RFY_NFIP) and the real beverage price (BPRICE, LPRICE, WPRICE). The beer and liquor equations also include the lagged sales of the beverage in gallons (BLAGSALE, LLAGSALE) and a trend variable (TREND). For all equations, the income and price variables were adjusted by the Gross Domestic Product price deflator. The sales, income and price variables are expressed in terms of natural logarithms.

Equation (5)　　　　　Beer sales = -2.836 + 0.945(LAGSALE) + 0.342(RFY_NFIP) - 0.169(BPRICE) - 0.010(TREND)

Equation (5a)　　　　 Beer tax = 0.115(Beer sales)

Equation (6)　　　　　Liquor sales = - 2.269 + 0.704(RFY_NFIP) – 0.564(LPRICE) - 0.015(TREND) + 0.507(LAGSALE)

Equation (6a)　　　　 Liquor tax = 2.68(Liquor sales)

Equation (7)　　　　　Wine sales = 8.947 + 0.092(RFY_NFIP) - 0.940(WPRICE)

Equation (7a)　　　　 Wine tax = 0.47(Wine sales)

2

GENERAL FUND

Sales Tax:

For each fiscal year to be forecast:

1. Multiply 0.022101 by calendar year Indiana Nonfarm Personal Income.

2. Add 97.358858 to the result of Step One.

3. Multiply 1565.465136 by the annual percentage change in fiscal year real U.S. Gross Domestic Product.

4. Add Step Three to the result of Step Two.

5. Multiply the result of Step Four by .5903 to account for the percentage of sales taxes deposited in the General Fund.

Individual Income Tax:

For each fiscal year to be forecast:

1. Multiply 1.070932 by the natural log of fiscal year Indiana Nonfarm Personal Income.

2. Subtract 4.619587 from the result of Step One.

3. Take the exponential of step 2.

4. Subtract 43.5 for FY 2002 and 47.2 for FY 2003 to account for tax reductions signed into law in 1997.

5. Subtract 163.8 for FY 2002 and 165.2 for FY 2003 to account for tax reductions signed into law in 1999.

Corporate Income Tax:

For each fiscal year to be forecast:

1. Multiply 0.035399 by calendar year U.S. Gross Domestic Product.

2. Add 255.34043 to the result of Step One.

3. Multiply 1852.886439 by the annual percentage change in fiscal year real U.S. Gross Domestic Product.

4. Add step three to the result of step two.

5. For the Supplemental Net Income Tax, multiply 4.0 times 55.325 for FY 2002 and 4.0 times 50.825 for FY 2003 and add to the results of Step Four.

6. Subtract 25.4 in FY 2002 and 26.6 in FY 2003 to account for tax reductions enacted in 1999.

7. Subtract 94.0 in FY 2002 and 95.4 in FY 2003 to account for the transfer of Corporate Adjusted Gross Income tax receipts to the Property Tax Replacement Fund.

8. Add 20.0 in each year for the General Fund collections from the Financial Institutions Tax.

Cigarette Tax:

For each fiscal year in the forecast:

1. Multiply 0.325 by the logarithm of fiscal year real non-farm Indiana personal income.

2. Add 3.398 to the result of step one.

3. Multiply 0.113 by the logarithm of the sum of real cigarette prices in the four surrounding states.

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

5. Multiply –0.562 by the logarithm of the real cigarette price in Indiana.

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

7. Take the exponential of step 6, to get sales.

8. Multiply the result of step 7 by 0.155, to get total revenue.

9. Multiply the result of step 8 by 0.4516 to get general fund revenue.

Alcoholic Beverage Tax – Beer:

1. Multiply 0.342 by the logarithm of fiscal year real non-farm Indiana personal income.

2. Add –2.836 to the result of step 1.

3. Multiply –0.169 by the logarithm of the real beer price.

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

5. Multiply –0.010 by a trend term.

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

7. Multiply 0.945 by the logarithm of beer sales, lagged one year.

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 .04 to get general fund revenue.

Alcoholic Beverage Tax – Liquor:

1. Multiply 0.704 by the logarithm of fiscal year real non-farm Indiana personal income.

2. Add –2.269 to the result of step 1.

3. Multiply –0.564 by the logarithm of the real liquor price.

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

5. Multiply –0.015 by a trend term.

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

7. Multiply 0.507 by the logarithm of liquor sales, lagged one year.

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 2.68, to get total revenue; multiply the result of step 9 by 1.00 to get general fund revenue.

Alcoholic Beverage Tax – Wine:

1. Multiply 0.092 by the logarithm of fiscal year real non-farm Indiana personal income.

2. Add 8.947 to the result of step 1.

3. Multiply –0.940 by the logarithm of the real wine price.

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

5. Take the exponential of the result of step 4 to get sales.

6. Multiply the result of step 5 by 0.47, to get total revenue; multiply the result of step 5 by 0.20 to get general fund revenue.

PROPERTY TAX REPLACEMENT FUND

Sales Tax:

For each fiscal year to be forecast:

1. Multiply the result from Step Four of the General Fund sales tax calculation by 0.4.

Corporate Adjusted Gross Income:

For each fiscal year to be forecast:

1. Add 94.0 for FY 2002 and 95.4 for FY 2003 for corporate adjusted gross income taxes.