



California Cigarette Excise Tax Revenue Loss Estimates

Joe Fitz
Chief Economist
California Board of Equalization

Federation of Tax Administrators
Revenue Estimating and Tax Research Conference
September 17, 2007



Outline

- Summary of results
- Literature review
- BOE econometric model
- Survey estimation method
- Accounting estimation method

Summary of Results of Four Estimation Methods (Excise Tax Revenues, Millions of Dollars)

BOE Econometric Model	\$182
Survey Method	\$173
Washington State Department of Revenue Econometric Model	\$186
Accounting Methods:	
14.3% Prevalence Rate	\$139
15.2% Prevalence Rate	\$210
Average	\$178

Summary of Results (Millions of Packs in FY 2005-06)

Tax Paid Distributions	1,190
<u>Tax Exempt Distributions</u>	<u>19</u>
Total Distributions	1,209
<u>Evasion Estimate</u>	<u>209</u>
Estimated Cigarette Market	1,418
Evasion Percentage of Total	14.7%

Literature Review: Price Elasticity Estimates

- The 2000 U.S. Surgeon General report on smoking, Reducing Tobacco Use
- Range of -0.3 to -0.5 for approximately 40 cigarette price of elasticity of demand studies they reviewed
- Our econometric model results show a price elasticity of about -0.4

Literature Review: United Kingdom Article

- Retail price of cigarettes in 2003 in the UK was the equivalent of about \$6.00 U.S. dollars per pack
- About 22% of the UK domestic cigarette market now consists of smuggled cigarettes
- Smuggled cigarette prices are a third to half of the official price

Literature Review: Canadian Article

- Canadian cigarette excise taxes rose from \$1.90 per pack (\$ Canadian) in 1989 to \$3.50 per pack in 1993
- Smuggled cigarettes represented about one-third of all domestic cigarette consumption at their peak

Literature Review: Canadian Article (Continued)

- Price elasticity of demand averaged -0.72 in Canada from 1981 through 1999
- Price elasticity of demand averaged -0.47 excluding smuggling
- Implication (Difference): About 35 percent of the sales response was from smuggling

Literature Review: U.S. Cigarette Tax Avoidance Elasticities Article (Mark Stehr)

- Two separate econometric equations, 43 states:
 - Time period: 1984 through 2001, many cigarette tax increases during these years
 - Estimated cigarette consumption from survey data
 - Estimated cigarette sales from the state's tax administrative records

Literature Review: U.S. Cigarette Tax Avoidance Elasticities Article (Mark Stehr, continued)

- Results:
 - "Implied tax avoidance elasticity" of -0.6 for cigarettes
 - Sales price elasticity of -0.7
 - "... up to 85% of the tax paid sales response is from tax avoidance"
 - Average tax avoidance for all 43 states studied increased from 7.2 percent of sales in 1985 to 12.7 percent by 2001

Literature Review: 2007 Washington State Department of Revenue Study

- Four separate econometric models estimated, similar results
- Estimates of taxed cigarette sales, total sales cigarette sales and differences in these two numbers for all 50 states
- As noted earlier, we found the results similar to those from our own econometric model, even though the models are very different structurally

BOE Econometric Model

- Functional form: Multiplicative, annual percentage change
- Time period: fiscal years 1961-62 through 2005-06, 45 observations

BOE Econometric Model: Specification

- Expressed in packs per capita, real 2005 prices
- Dependent variable: (apparent consumption per capita, year t) / (apparent consumption per capita, year t-1)
- Independent variables: All expressed in same mathematical form as dependent variable (i.e. annual percent changes)

Mathematical Specification

$$Y = a + b*x_1 + c*x_2 + d*x_3 + e*x_4 + \text{error term}$$

where:

“Y” is the percent change in tax paid cigarette distributions per capita,

“a” is an intercept,

“x₁” is the percent change in tax paid cigarette distributions per capita in the prior fiscal year,

Mathematical Specification (continued)

Tax and Price Variables x_2 , x_3 , and x_4

$$Y = a + b*x_1 + c*x_2 + d*x_3 + e*x_4 + \text{error term}$$

where:

" x_2 " is the percent change in the real California cigarette excise tax per pack,

" x_3 " is the percent change in the real federal cigarette excise tax per pack,

" x_4 " is the percent change in the real average retail cigarette price (excluding California and federal cigarette excise taxes)

Model Results

- F-Statistic: 25.81
- R-Squared: 0.72
- Adjusted R-Squared: 0.69
- Durbin-Watson Statistic: 2.20
- Mean Absolute Percent Difference From Actual Annual Tax Paid Distributions: 1.5%

Model Results (continued)

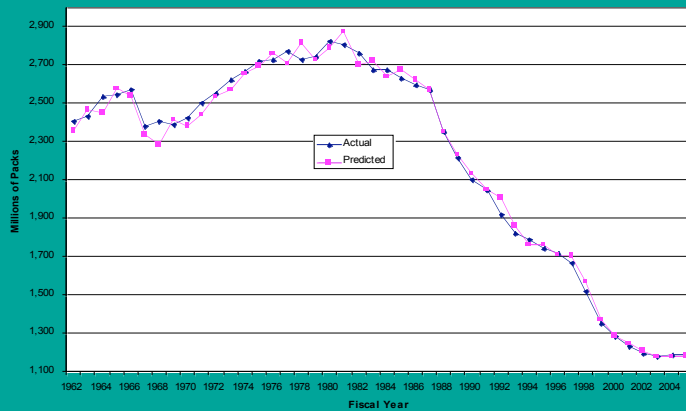
	Intercept	Tax Paid Distributions of Prior Fiscal Year
Coefficients	0.6569	0.4541
Standard Errors	0.09	0.09
t-Statistics	7.0	5.3

Model Results (continued)

	Real CA Excise Tax	Real Federal Excise Tax	Real Product Price
Coefficients	-0.0385	-0.0408	-0.0447
Std Errors	0.01	0.02	0.02
t-Statistics	-6.9	-2.1	-2.4

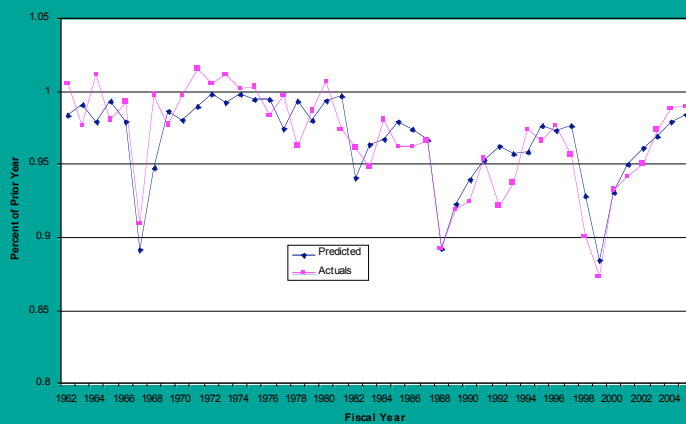
Model Results (continued)

Chart 1
Actual and Predicted Tax Paid Distributions



Model Results (continued)

Chart 2
Actual and Predicted Percentages of Per Capita Tax Paid Cigarette Distributions of Prior Fiscal Year



How Model Results Are Used to Predict Evasion

Predicting evasion involves four steps:

1. Use model to predict tax paid distributions with actual excise tax rate of \$0.87/pack.
2. Use model to predict tax paid distributions with an excise tax rate of \$0.10/pack, the rate prior to 1989 (little incentive for evasion at this rate)

How Model Results Are Used to Predict Evasion (continued)

Predicting evasion involves four steps:

3. Calculate difference in two predictions
4. Assume 25% of difference results from evasion (conservative assumption in light of literature review)



Survey Based Cigarette Evasion Estimates

- Casual Cigarette Tax Evasion by Consumers
 - Assume casual evasion by consumers is 5.0 percent of total consumption
 - Based on sources of purchases reported in the 1999 and 2002 surveys contracted by the CA Department of Health Services (DHS) and trends in Internet sales since 2002



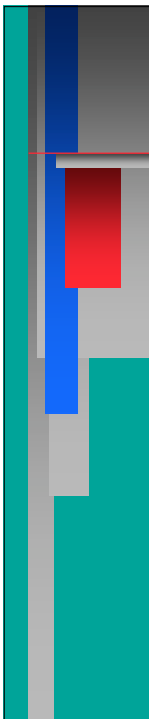
Survey Based Cigarette Evasion Estimates (continued)

- Cigarette Tax Evasion by Retailers
 - Data from over 5,000 retail inspections
 - About 10 percent of retailers had untaxed cigarettes in their inventories
 - Extrapolated the results of this retail inspections data to all retailers
 - Assumed 100% of inventories untaxed for these 10% of retailers



Accounting Model Cigarette Evasion Estimates

- Estimate cigarette consumption:
 - Multiply the number of smokers in California by the average number of cigarettes they smoke
- Subtract tax paid distributions plus exempt sales



Accounting Model Cigarette Evasion Estimates (continued)

- Small changes in either prevalence rates or cigarette consumption per day result in large differences in evasion estimates
- Underage smokers
- Travelers from outside the state



Accounting Model Cigarette Evasion Estimates (continued)

- Results very sensitive to assumptions:
 - 14.3% Prevalence Rate:
 - evasion estimate: \$139 million
 - 15.2% Prevalence Rate
 - evasion estimate: \$210 million



Questions???
