

# SOME PRELIMINARY ESTIMATES OF THE BORDER PRICE EFFECT ON CIGARETTE SALES

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September 23, 2003



## Issues To Be Addressed

- Standard Demand Analysis
- Measurement Questions
- Border Effect Results

## Standard Cigarette Demand Analysis

- Price
- Income
- Demographics
- Internet Sales
- Trends and State Effects

## Data and Sources

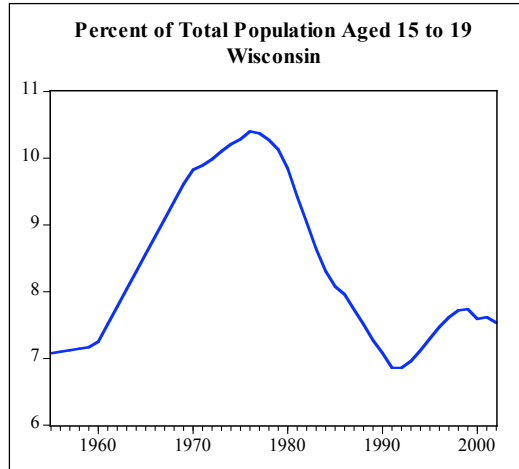
- The Tax Burden on Tobacco, 2002
- Bureau of Economic Analysis - PI, Price Index
- Census Bureau - Population
- Pooled Cross-sectional time series
- 48 years and 51 states
- Potential observations (2,448) and usable unbalanced observations (2,333)

## Cigarette Demand Model

- $Q_{st} = b_0 + b_1P_{st} + b_2Y_{st} + b_3Z_{st} + e_{st}$
- $Q_{st}$  is tax-paid sales of cigarette per capita
- $P_{st}$  is the average retail price per pack in constant dollars
- $Y_{st}$  is real per capita income
- $Z_{st}$  is vector of other demand factors

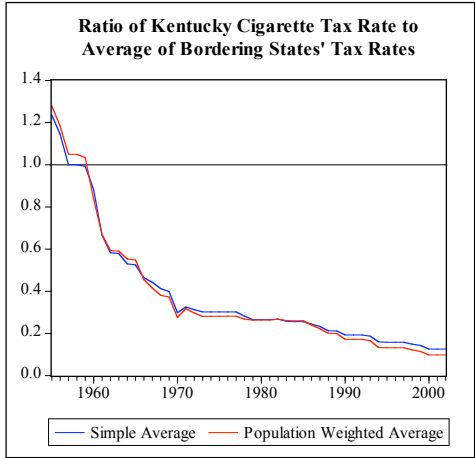
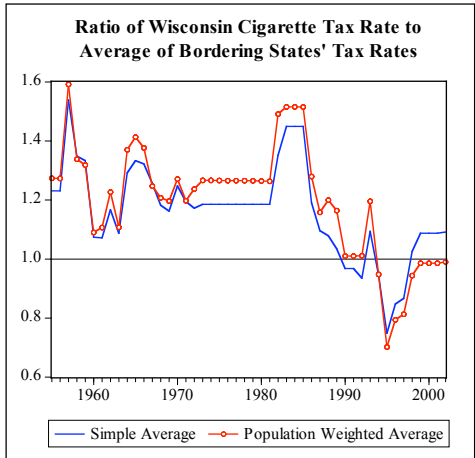
## Model Results Log Transformation

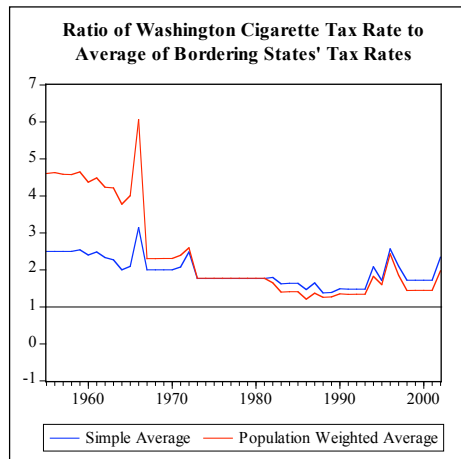
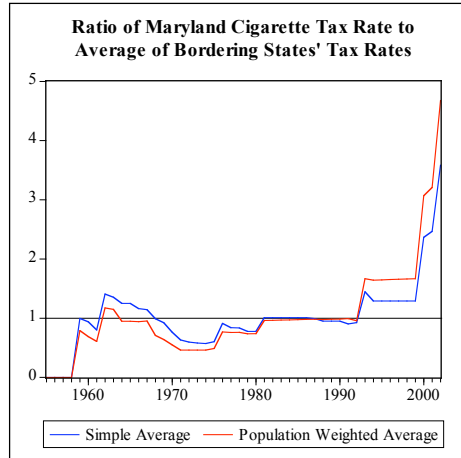
Variable      fficientStd. Error-t-statprice-0.6110070



## Measuring the Border Effect

- Use state cigarette tax rate as metric
- Assume that tax rate differences capture most of the price differences
- Example:
  - $BORDER_{WI} = RTXCIG_{WI} / ((RTXCIG_{IL} + RTXCIG_{IA} + RTXCIG_{MN} + RTXCIG_{MI}) / 4)$





## Model Results with Border Effect

Variable      Coefficient      Std. Error      t-stat      price-0.4068780

## Modifications

- Residuals of cross-section units revealed strong time trends in the error terms
- Re-estimation with GLS, each state has two fixed effects, a constant and a time trend.
- Forty-one states had statistically significant negative time trends
- Six states had statistically significant positive time trends
- Four states had statistically insignificant time trends

## Compare to Standard Model

- Price elasticity is lower, dropping from -0.611 to -0.407
- Income elasticity rises from 0.162 to 0.302
- Coefficient on teenage share increases from 0.207 to 0.246
- Trend coefficient (proxy for Internet) stronger, going from -0.003 to -0.013

## Interpretation of Border Effect

- Log ratio
- For every 10 percentage points that a state is above the average of its bordering states, there will be an additional 0.8% reduction in taxable sales of cigarettes
- In Wisconsin, for example, the border effect evaluated at 1.1 (10% higher than surrounding states) translates into \$23 million of lost revenue, compared to \$293.7 million total in FY2002.



## Future Research

- Add Municipalities that tax cigarettes
- Analyze effect of sales tax on cigarette retail price
- Refine geography on border effect to isolate large metro areas that border on two or more states
- Include the border effect, if any, of Canada and Mexico
- Consider how the model can be modified to include smuggling

