Research on Tobacco Taxation

Frank J. Chaloupka, University of Illinois at Chicago
South Eastern Europe Tobacco Tax Workshop
Warsaw, Poland, 10 May 2018
"Sugar, rum, and tobacco, are commodities which are nowhere necessaries of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation."
Taxes, Prices & Tobacco Use

• Aggregate demand studies
  – Variety of studies:
    • Pooled cross-sectional time-series studies
      – State, provincial, other subnational data
    • Time-series studies
    • Many countries, states
  – Alternative modeling of addiction
    • No accounting for addiction
    • Myopic addiction
    • Rational addiction
Taxes, Prices & Tobacco Use

• **Aggregate demand studies**
  – Modeling issues
    • Account for opportunities for tax avoidance and evasion
      – Use of tax paid sales data will overstate elasticity when significant opportunities exist
    • Control for other policies
    • Potential endogeneity of prices, policies
    • Functional form
    • Fixed/random effects models for CSTS data
Cigarette Prices and Cigarette Sales
United States, 1970-2014

Source: Tax Burden on Tobacco, 2015, and author’s calculations
Prețurile țigărilor ajustate la inflație și consumul de țigări pe cap de locuitor, România, 2001 – 2015

Elasticitatea de preț: - 0.58 în 2016
Taxes, Prices & Tobacco Use

- **Individual/household demand studies**
  - Variety of data:
    - Cross-sectional data on prevalence, frequency, consumption
    - Repeat cross-sectional data
    - Retrospective data
    - Cohort/longitudinal data
    - Expenditure data
  - Alternative modeling of addiction
    - No accounting for addiction
    - Myopic addiction
    - Rational addiction
Compensatory Model of Price Effects

Tax Increase

No effect

Quitting

Switch to discount brands

Switch to cheaper sources (e.g., Internet, Indian reservations, “Freddy’s van”)

More efficient purchases (cartons vs. packs; greater use of promotions)

Cutting back

More efficient smoking (e.g., smoking more of the cig, deeper breaths, less time out of mouth)

Dissonance-reducing activities (e.g., self-exempting beliefs)

Reduction in prevalence

Reduction in consumption

Cutting back

No effect
Taxes, Prices & Tobacco Use

• Individual/household demand studies
  – Modeling issues
    • Price data
      – Matched from external sources; less concern about endogeneity
      – From self-report - endogeneity of price a problem
    • Treatment of opportunities for tax avoidance and evasion
      – Use of external price data will understate elasticity when significant opportunities exist
    • Consider impact on multiple behaviors
      – Prevalence, frequency, intensity, initiation, cessation, substitution, brand choice, purchase behavior, tax avoidance…….
  • Examine impact in different populations
    – By age, gender, race/ethnicity, SES…….
Cigarette Prices and Adult Smoking Prevalence
United States, 1970-2014

Source: NHIS, Tax Burden on Tobacco, 2015, and author’s calculations
Note: green data points for prevalence are interpolated assuming linear trend
Monthly Quit Line Calls, United States
11/04-11/09

4/1/09 Federal Tax Increase

1/1/08 WI Tax Increase
Cigarette Prices and Cessation
US States & DC, 2009

Source: BRFSS, *Tax Burden on Tobacco*, 2010, and author’s calculations

\[ y = 0.0283x + 43.083 \]

\[ R^2 = 0.371 \]
Cigarette Price and Youth Smoking Prevalence
Seniors, United States, 1991-2014

Source: MTF, *Tax Burden on Tobacco*, 2015, and author’s calculations
Taxes, Prices and Health: US, 1980-2005

Source: Nat Rev Cancer © 2009 Nature Publishing Group
Prices and Tobacco Use

– Similar evidence for variety of other tobacco products
  • Generally see evidence of greater elasticity for non-cigarette tobacco products
  • Substitution among similar products, particularly combustible products
  • Some complementarity among combustible and non-combustible products
Reusable ENDS

Sales Volume (Thousands of Pieces)
Sales Price (Real 2014 Q4 Dollars)

Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4

Real Price
Volume
E-Cigarette Prices & Sales

- Stoklosa, Drope & Chaloupka (2016)
  - 2011-2014 monthly Nielsen data on e-cigarette sales in six EU countries (Estonia, Ireland, Latvia, Lithuania, Sweden, and UK)
  - Own price elasticities range from -0.83 to -0.87
  - E-cigarette sales generally positively associated with cigarette prices, but mostly not statistically significant
Cigarette Affordability
European Region, 2008-2016

Notes: Relative income price is the percentage of annual per capita GDP required to buy 100 packs of most popular brand of cigarettes.

Source: WHO 2017

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Affordability & Tobacco Use
Adult Smoking Prevalence, Indonesia, 2001-2014

Sources: Euromonitor, EIU, World Bank, and Authors’ Calculations

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Increasing Elasticity with Increasing Price

State tax-paid sales  TUS-CPS Prevalence & Consumption
Tobacco Taxes and Revenues

South Africa, 1961-2012

Excise tax revenue (Billions of 2012 Rands)

Excise tax per pack (constant 2012 Rands)

Tobacco Taxes and Revenues

www.tobacconomics.org
State Tobacco Control Program Funding and Youth Smoking Prevalence, United States, 1991-2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Total State Program Funding (in Millions)</th>
<th>Percent Current Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>$200</td>
<td>37%</td>
</tr>
<tr>
<td>1994</td>
<td>$600</td>
<td>35%</td>
</tr>
<tr>
<td>1997</td>
<td>$1,000</td>
<td>33%</td>
</tr>
<tr>
<td>2000</td>
<td>$800</td>
<td>32%</td>
</tr>
<tr>
<td>2003</td>
<td>$600</td>
<td>31%</td>
</tr>
<tr>
<td>2006</td>
<td>$500</td>
<td>30%</td>
</tr>
<tr>
<td>2009</td>
<td>$300</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: ImpacTeen Project, UIC; YRBS

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Potential Impact

• $1.50 Increase in cigarette excise tax in Oklahoma would:
  – Raise $183.9 million in *new* tax revenue
  – Prevent 28,200 kids from taking up smoking
  – Encourage 30,400 adult smokers to quit
  – Prevent 16,700 premature deaths from smoking
  – Reduce smoking-complicated pregnancies and births by 4,900 in first 5 years
  – Save $3.9 million in Medicaid spending in first 5 years

Source: CTFK, ACS-CAN & Tobacconomics, 2016
Estimated Future Cigarette Tax Revenues
Oklahoma

Without Increase  With $1.50 Increase

Source: CTFK, ACS-CAN & Tobacconomics, 2017
## Health Impact of Tax Increases: Philippines

<table>
<thead>
<tr>
<th></th>
<th>50% of price accounted for by uniform tax</th>
<th>Uniform specific tax of 28.3 pesos per pack (current maximum)</th>
<th>Uniform specific tax of 30 pesos per pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>New average cigarette tax</td>
<td>23.8</td>
<td>28.3</td>
<td>30.0</td>
</tr>
<tr>
<td>New average cigarette pack price</td>
<td>47.6</td>
<td>52.6</td>
<td>54.5</td>
</tr>
<tr>
<td>Cigarette excise tax as a percentage of price</td>
<td>50.0%</td>
<td>53.8%</td>
<td>55.0%</td>
</tr>
<tr>
<td>Reduction in number of current smokers (millions)</td>
<td>3.20</td>
<td>4.05</td>
<td>4.37</td>
</tr>
<tr>
<td>Reduction in number of future smokers (millions)</td>
<td>3.35</td>
<td>4.24</td>
<td>4.57</td>
</tr>
<tr>
<td>Total reduction in number of smokers (millions)</td>
<td>6.55</td>
<td>8.29</td>
<td>8.95</td>
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## Health Impact of Tax Increases: Philippines

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<tr>
<td>Reduction in Premature Deaths Caused by Smoking among Current Smokers (Millions)</td>
<td>1.12</td>
<td>1.42</td>
<td>1.53</td>
</tr>
<tr>
<td>Reduction in Premature Deaths Caused by Smoking among Future Smokers (Millions)</td>
<td>1.67</td>
<td>2.12</td>
<td>2.29</td>
</tr>
<tr>
<td>Total Reduction in Premature Deaths Caused by Smoking (millions)</td>
<td>2.79</td>
<td>3.54</td>
<td>3.82</td>
</tr>
<tr>
<td>Percentage of premature deaths in current and future smokers averted by higher taxes</td>
<td>19.3%</td>
<td>24.4%</td>
<td>26.4%</td>
</tr>
<tr>
<td>Additional Excise Tax Revenues (PhP billions)</td>
<td>52.6</td>
<td>53.8</td>
<td>53.3</td>
</tr>
</tbody>
</table>
Figure 5: Excise tax structure: Specific and mixed relying more on the specific component tend to lead to higher prices

Source: WHO 2017 GTCR data; unpublished figure.
Notes: Averages are weighted by WHO estimates of number of current cigarette smokers ages 15+ in each country in 2015; Prices are expressed in Purchasing Power Parity (PPP) adjusted dollars or international dollars to account for differences in the purchasing power across countries. Based on prices as of July 2016 for 53 high-income, 100 middle-income and 27 low-income countries with data on prices of most sold brand, excise and other taxes, and PPP conversion factors.
Excise Tax Structure and Price Variability

Source: Chaloupka, et al., 2014

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Oppositional Arguments
Figure 6 - State Cigarette Excise Tax Rates, United States, April 2015
Figure 7. State Cigarette Importing/Exporting Shares, 2010-2011

Note: “Importing states” are those where some consumers avoid or evade taxes by obtaining their tobacco products from states or federal tribal lands where taxes are lower. “Exporting states” are those where some tobacco products intended for consumption within that state are purchased by consumers from outside of the state to avoid or evade their “home” taxes.

Source: Created from data in National Research Council and Institute of Medicine, 2015.
Tax Avoidance & Evasion Do NOT Eliminate Health Impact of Higher Taxes

NYC Smoking Prevalence Declined as Price Increased

Source: Schroth, 2014

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Tax Avoidance & Evasion
Do NOT Eliminate Revenue Impact of Higher Taxes

Cook County Cigarette Tax and Tax Revenues - FY01-FY06

- Chicago tax rises from 16 to 48 cents
- Chicago tax up to 68 cents, 1/1/06
- Chicago smoking ban, 1/16/06

Chicago tax rises from 16 to 48 cents
Chicago tax up to 68 cents, 1/1/06
Chicago smoking ban, 1/16/06
Cigarette Tax Revenues, Illinois and Neighboring States
July 2011 - June 2012

- Illinois: $600,000,000
- Indiana: $200,000,000
- Iowa: $100,000,000
- Kentucky: $300,000,000
- Missouri: $100,000,000
- Wisconsin: $400,000,000

Percentage Changes:
- Illinois: 39.0%
- Indiana: 0.9%
- Iowa: 0.2%
- Kentucky: -6.6%
- Missouri: -2.6%
- Wisconsin: -1.2%
Illicit Cigarette Market Share & Cigarette Prices, 2012

Source: NCI/WHO, 2016

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Drivers of Illicit Tobacco

- Corruption
- Weak tax administration
- Poor enforcement
- Presence of informal distribution networks
- Presence of criminal networks
- Access to cheaper sources

Sources: NRC/IOM 2015; NCI/WHO 2016
Smuggling and Corruption, 2011

y = -0.0131x + 0.2028
R² = 0.0815

Source: NCI/WHO, 2016
Figure 12 – Estimated Volumes of Cigarettes Consumed in the U.K. – Duty paid, illicit, and cross-border shopping, 2000-01 – 2013-14

Source: HM Revenue & Customs, 2014

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California’s Encrypted Cigarette Tax Stamps

<table>
<thead>
<tr>
<th>Stamp Front View (ink appears green)</th>
<th>Stamp Angled View (ink appears blue)</th>
</tr>
</thead>
</table>

2005-2010

2011-present
Cigarette Tax Stamps Sold – projected and actual, California, 2000 - 2013

Source: CDC/Chaloupka et al., 2015
Who Pays & Who Benefits
Impact of Federal Tax Increase, U.S., 2009

- <poverty line:
  - Share of Tax Increase: 11.9%
  - Share of Reduced Deaths: 46.3%

- 1-2* poverty line:
  - Share of Tax Increase: 20.7%
  - Share of Reduced Deaths: 29.5%

- >2* poverty line:
  - Share of Tax Increase: 67.4%
  - Share of Reduced Deaths: 24.2%
Impact on the Poor

- Need to consider overall fiscal system
  - Key issue with tobacco taxes is what’s done with the revenues generated by the tax
  - Greater public support for tobacco tax increases when revenues are used for tobacco control and/or other health programs
  - Net financial impact on low income households can be positive when taxes are used to support programs targeting the poor
  - Concerns about regressivity offset by use of revenues for programs directed to poor
Tobacco Taxes and Small Businesses

• More recent argument that higher taxes will harm convenience stores

• Huang & Chaloupka (2012)
  • Number of convenience stores, by state, 1997-2009
  • State cigarette tax rates and smoke-free air policies
  • Economic conditions (income, unemployment, gas prices)
  • Multivariate, fixed effects econometric models
  • Find that higher taxes associated with \textit{increase} in convenience store business
    • Likely due to spending on other products, overshifting of taxes

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Summary and Potential Impact of Tax Increase
Bridging the Gap

University of Michigan
Lloyd Johnston, Project Director
Institute for Social Research

Monitoring the Future (MTF)

Youth, Education and Society
(YES!)

University of Illinois at Chicago
Frank Chaloupka, Project Director
Health Policy Center

ImpacTeen

A Policy Research Partnership
for Healthier Youth Behavior

www.bridgingthegapresearch.org
THE ITC PROJECT: EVALUATING THE IMPACT OF FCTC POLICIES IN...
25+ countries • >50% of the world’s population • >60% of the world’s smokers • >70% of the world’s tobacco users

Australia
Bangladesh
Bhutan
Brazil
Canada
China (Mainland)
France
Germany
Greece
Hungary
India
Ireland
Japan
Kenya
Malaysia
Mauritius
Mexico
Netherlands
New Zealand
Poland
Republic of Korea
Romania
Spain
Thailand
United Kingdom
United Arab Emirates (Abu Dhabi)
United States of America
Uruguay
Zambia

November 2017 V2
NEARLY 80%

of the world’s smokers live in low- and middle-income countries
US Surgeon General’s Reports

- Preventing Tobacco Use Among Youth and Young Adults
- Reducing Tobacco Use
- Youths & Tobacco: Preventing Tobacco Use Among Young People
- Reducing the Health Consequences of Smoking: 25 Years of Progress
WHO Framework Convention on Tobacco Control

Guidelines for implementation of Article 6
Price and tax measures to reduce the demand for tobacco

Adopted by the Conference of the Parties at its sixth session (decision FCTC/COP6(5))

Online version available at http://www.who.int/fctc/treaty_instruments/guidelines_article_6.pdf
Illicit Tobacco Trade

Preventing and Reducing Illicit Tobacco Trade in the United States
Bloomberg Initiative

• Ongoing effort to support implementation of evidence based tobacco control measures in highest tobacco using low- and middle-income countries

• Partnership among multiple organizations:
  • World Health Organization
  • US Centers for Disease Control and Prevention and CDC Foundation
  • Campaign for Tobacco-Free Kids
  • International Union Against Tuberculosis and Lung Disease
  • Johns Hopkins University Bloomberg School of Public Health
  • Vital Strategies
  • University of Illinois at Chicago

• Successful efforts on many policies, but little impact on tobacco taxes
SHARE OF THE WORLD POPULATION COVERED BY SELECTED TOBACCO CONTROL POLICIES, 2016

Source: WHO, 2017

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Bloomberg Initiative – UIC

• Engage with ‘think tanks’ in priority countries/regions to develop local evidence for tobacco tax reform and tax increases
  • Indonesia, Vietnam, Latin American, Bangladesh, Pakistan, South-Eastern Europe

• Engagement with high level decision makers to build technical capacity and political support for tobacco tax policy

• Develop/disseminate resources (policy briefs, white papers, etc.) on tobacco taxation to build knowledge and support for tobacco tax policy
Evidence Gaps

Regional/country specific evidence on economic impact of tobacco taxation

- Impact on demand for tobacco products
- Impact on tax revenues
- Impact on employment
- Impact on development

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Evidence Gaps

Regional/country specific evidence on impact of tobacco taxes on poverty

- Progressivity/regressivity of tobacco tax increases
- Impact of tobacco use on poverty
- Effectiveness of tobacco taxation in reducing disparities in tobacco use and its health/economic consequences
Evidence Gaps

Regional/country specific evidence on illicit trade

- Extent of illicit trade
- Changes in illicit trade in response to tobacco tax increases
- Determinants of illicit trade
- Impact of measures to control illicit trade
For more information:

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http://www.tobacconomics.org

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