The Impact of Different Tax Structures on Retail Price of Other Tobacco Products

Maryam Mirza, Jidong Huang, Frank J Chaloupka, Jamie F. Chriqui

Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago

Background

- While the effectiveness of raising tobacco product prices in reducing tobacco use has been well-documented, very little is known about how the structure of excise taxation on tobacco products may affect the effectiveness of price policies.
- Excise tax structure is defined by the tax base and whether different rates are imposed. A specific excise tax is a monetary tax levied on the quantity of tobacco products and an ad valorem excise tax is a tax levied as a percentage of the value of tobacco products.
- Limited evidence shows that, compared with a uniform specific excise tax system, other systems are associated with greater price variability and opportunities for tax avoidance.
- However, very little is known about the impact of the structure of excise taxation on other tobacco products on retail prices for other tobacco products.

Study Aim

- To assess the impact of tax structure changes for other tobacco products on retail prices of other tobacco products using the state level tax structure and prices data in the U.S.

Data

- OTP Tax Structure Data: OTP data structure data were compiled via original legal research for the years 2007 through 2013, which contain coded state laws (statutory and administrative/regulatory) that relate to tax base, type, and tax rates for all tobacco products.
- OTP Prices Data: OTP prices data were obtained from the Nielsen store scanner data, organized by 52 designated Nielsen markets. The data contain the quarterly market-level prices and sales data for tobacco products at the Universal Product Code (UPC) level for the time period 2007 to 2013.

Method

- OTP Tax Structure data were linked to the Nielsen Price Data based on state, year and quarter.
- Regression Analysis was used to estimate the association between prices and tax structure.
- Analytical Model:
  $Price_{jt} = NoTax_{jt} + AdValTax_{jt} + Efftax_{jt} + \delta_t + \gamma_j + \varepsilon_{jt}$
- Where $NoTax$ is a dummy variable with the value of 1 indicating states that don't have any tax, $AdValTax$ is a dummy variable with the value of 1 indicating states that have AdValorem Tax, $Efftax$ is total tax as a percent of price, and $\delta_t + \gamma_j$ represent year and quarter dummies respectively.

Method (cont'd)

- Next, Difference-in-Difference method was used to draw comparisons between average prices in states that changed tax structure to states that did not change tax structure for two OTPs: little cigars and moist snuff. The reason to focus on these two products is because the only significant changes in state level tobacco tax structures were for little cigars, moist snuff, and snus in our study period, and we did not have enough observations in price data for snus.
- Because many Nielsen designated markets cross state borders, in order to match with state level tax structure data, we limited our analyses to 19 Nielsen markets that completely fall within a state's boundary.
- Analytical Model:
  $Price_{jt} = ChangeState_{jt} + PostChange_{jt} + (State * Post)_{jt} + \delta_t + \varepsilon_{jt}$
- Where $ChangeState$ is a dummy variable with the value of 1 indicating states that changed tax structure in our study period, $PostChange$ is a dummy variable indicating the post change period. $(State * Post)$ is the interaction term, and δ_t are year dummies.

Results

Table 1: Regression Estimates for Price

	Cigar (1)	Cigar (2)	Cigarillo (1)	Cigarillo (2)	Little Cigar (1)	Little Cigar (2)
No Tax	-0.158** (0.0502)	-0.0272 (0.0532)	-0.0964* (0.0426)	-0.0207 (0.0429)	-0.0438*** (0.0072)	-0.0596*** (0.0081)
Advalorem Tax	0.0736* (0.0363)	0.128** (0.0404)	0.104*** (0.0304)	0.014 (0.0334)	-0.0201*** (0.0042)	-0.0210*** (0.0056)
Effective Tax Rate	0.00252*** (0.0003)		0.00507*** (0.0003)		-0.0000936*** (0.0000)	
Constant	0.342*** (0.0416)	0.227*** (0.0458)	0.288*** (0.0358)	0.237*** (0.0374)	0.0643*** (0.0057)	0.0807*** (0.0066)
N	1408	1408	1408	1408	1408	1408
adj. R-sq	0.08	0.159	0.08	0.25	0.041	0.062

Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Table 1: Regression Estimates for Price (contd)

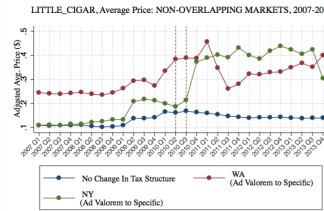|	Dry Snuff (1)	Dry Snuff (2)	Moist Snuff (1)	Moist Snuff (2)	Snus (1)	Snus (2)
No Tax	-2.099*** (0.1300)	-1.915*** (0.1350)	-1.534*** (0.0572)	-1.396*** (0.0779)	-1.936*** (0.0744)	-1.712*** (0.0952)
Advalorem Tax	-0.782*** (0.1360)	-0.774*** (0.1370)	-0.353*** (0.0679)	-0.313*** (0.0724)	-0.218* (0.0899)	-0.210* (0.0911)
Effective Tax Rate	0.00682*** (0.0021)		0.00286*** (0.0009)		0.00623*** (0.0014)	
Constant	2.441*** (0.1640)	2.272*** (0.1650)	2.072*** (0.1140)	1.957*** (0.1230)	2.839*** (0.1520)	2.665*** (0.1570)
N	1020	1020	1408	1408	1408	1408
adj. R-sq	0.093	0.105	0.044	0.05	0.03	0.044

Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Table 1: Regression Estimates for Price (contd)

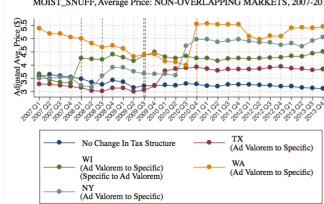|	Dissolvable (1)	Dissolvable (2)	Pipe (1)	Pipe (2)	Roll Your Own Tobacco (1)	Roll Your Own Tobacco (2)	Smokeless Tobacco (1)	Smokeless Tobacco (2)
No Tax	-0.0682*** (0.0199)	-0.185*** (0.0478)	-0.928*** (0.0976)	-0.731*** (0.1130)	0.0394 (0.3070)	0.651* (0.3240)	-0.701*** (0.0747)	-0.402*** (0.0946)
Advalorem Tax	0.0397 (0.0206)	-0.0699 (0.0459)	-0.0292 (0.0973)	0.0294 (0.0110)	-0.301* (0.1300)	-0.234 (0.1540)	0.0779 (0.0751)	0.15 (0.0979)
Effective Tax Rate	-0.000193** (0.0001)		0.00388*** (0.0008)		0.0165*** (0.0020)		0.00612*** (0.0007)	
Constant	0.361*** (0.0246)	0.476*** (0.0495)	1.092*** (0.1120)	0.932*** (0.1560)	1.397*** (0.1560)	0.870*** (0.1850)	0.704*** (0.0882)	0.467*** (0.1050)
N	1408	1408	1408	1408	1408	1408	1408	1408
adj. R-sq	0.134	0.134	0.052	0.057	0.081	0.197	0.249	0.058	0.138

Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001

Results

LITTLE_CIGAR, Average Price: NON-OVERLAPPING MARKETS, 2007-2013

Legend: No Change In Tax Structure; WA (Ad Valorem to Specific); NY (Ad Valorem to Specific)
Note: 1. Average Price Calculated Per Unit.

MOIST_SNUFF, Average Price: NON-OVERLAPPING MARKETS, 2007-2013

Legend: No Change In Tax Structure; TX (Ad Valorem to Specific); WI (Ad Valorem to Specific) (Specific to Ad Valorem); WA (Ad Valorem to Specific); NY (Ad Valorem to Specific)
Note: 1. Average Price Calculated Per Unit.

DID Estimates, Little Cigar, Non Overlapping Markets

	New York	Washington
Interaction	0.211*** (8.750)	0.0620** (2.590)
New York	0.0277 (1.620)	
NYC Pre/Post	-0.00767 (0.430)	
Washington		0.142*** (8.140)
WA Pre/Post		-0.00228 (0.110)

* p<0.05, ** p<0.01, *** p<0.001

DID Estimates, Moist Snuff, Non Overlapping Markets

	New York	Washington	Texas	Wisconsin1	Wisconsin2
Interaction	0.564 (1.850)	0.847** (2.910)	0.848** (2.810)	1.062 (1.940)	0.173 (0.490)
New York	0.692*** (3.480)				
NYC Pre/Post	-0.0399 (0.390)				
Washington		1.293*** (6.520)			
WA Pre/Post		0.0762 (0.280)			
Texas			-0.293 (-1.21)		
Texas Pre/Post			-0.106 (-0.46)		
Wisconsin				-0.145 (-0.34)	0.916** (3.00)
Wisconsin Pre/Post				-0.327 (-1.46)	-0.0249 (-0.11)

* p<0.05, ** p<0.01, *** p<0.001

Conclusion and Discussion

- Two general conclusion from cross-sectional analysis: Taxes increase prices for other tobacco products, and prices are higher under specific tax structure than ad valorem tax structure.
- For little cigars, average prices increased after states changed their tax structures from ad valorem tax to specific tax.
- For moist snuff, average prices increased in State of Washington and Texas after these two states changed their tax structures from ad valorem tax to specific tax.
- Although we observed price increases, at least for a few states in our study, after states changed their tax structures from ad valorem tax to specific tax for little cigars and moist snuff, the reason that drives the price increase is unclear. The price increase may be due to increase in effective tax rates associated with the tax structure change, it may also be due to the change in brands/product types mix within a specific product category. Further studies are needed to differentiate these factors.
- Our study has several limitations: first, for detailed analysis we only examined a few selected Nielsen markets that fall within a state's boundary and a few selected tobacco products, which limits the generalization of our results. Second, we did not consider the effective tax rate changes that may accompany the tax structure changes. Third, we only examined the average price for a specific tobacco product. Future studies can examine whether tax changes affect the price for premium brands and discount brands differently. Last, we did not examine the tax structure change on price variability. Further studies are needed to examine how tax structure changes may affect the price variability using measures such as the ratios of IQR to the median price.
- In summary, our results indicate that the OTP tax structure change is associated with retail prices changes, at least for some states and a few selected tobacco products. This suggests that tax structure changes may induce behavioral changes in tobacco use through its direct impact on prices. States may consider alter tax structure for tobacco products to influence the retail prices for tobacco products.