

## BACKGROUND

- A variety of tobacco tax structures are used globally.
- Types of excise tax system:
  - Specific (e.g. per pack or by weight, a minimum tax).
  - Ad valorem (e.g. % of retail prices).
  - Mixed (specific & ad valorem)
- Tax rates can be uniform or vary across price tiers.
- Economic theory predicts that tax structures other than specific uniform are associated with greater price variability and tax avoidance opportunities.
- Recent studies (Chaloupka et al. 2014; Shang et al. 2014) present descriptive evidence that supports this theory.
- Studies that use more rigorous analytical methods and that encompass all common tax structures are needed.

## OBJECTIVES

- To examine how cigarette tax structure is associated with price variability.

## DESIGN/METHODS

- Data are from the ITC Project surveys across 17 countries during 2004-2013.
- Tax Structure data are from WHO reports.
- Self-reported prices were used to construct the price variability measures.
- Generalized estimating equations (GEE) was used to assess the association.

## MEASURES

- Price variability
  - Prices were first ranked from the highest to the lowest.
  - Price variability was measured using the ratio of price gap between percentiles to the median price:  $\frac{99\%-1\%}{\text{median}}$ ,  $\frac{95\%-5\%}{\text{median}}$ ,  $\frac{90\%-10\%}{\text{median}}$ , and  $\frac{75\%-25\%}{\text{median}}$  or Interquartile(IQR)-to-median price ratio.

## RESULTS

- Tax structure measures:
  - Dichotomous indicators for **specific tiered** (India, Brazil prior to 2012), **ad valorem uniform** (Thailand, Mexico prior to 2009), **ad valorem tiered** (Bangladesh), **mixed uniform** (EU, Malaysia, Mexico 2009-), and **mixed tiered tax** structure (China, Brazil 2012-), with the **specific uniform** structure (US, Australia, Canada, Uruguay, Mauritius, and Republic of Korea) being the omitted category.
  - Percentage of specific component among total excise taxes and a dichotomous indicator for a tiered structure.
- Controlled for a EU dummy (tax structure is subject to same criteria), a dummy for sub-national taxes (Canada, US, India), with year as a fixed effect.
- On average, the share of specific component among total excise taxes is 63.48 (thus ad valorem share is 36.52) percentage points.
- 19.9% of the sample has a tiered tax structure.
- Results, dichotomous measure for each type of tax structure:

Price Variability	%75-25/	%90-10/	%95-5/	%99-1/
<b>Specific Uniform-Omitted, (N=78)</b>				
<b>Specific Tiered</b>	0.19*** (0.05) [0.85]	0.60** (0.30) [1.01]	1.03*** (0.38) [1.28]	1.37*** (0.45) [1.01]
<b>Ad Valorem Uniform</b>	0.03 (0.04) [0.12]	0.01 (0.15) [0.01]	0.28 (0.23) [0.35]	0.36 (0.41) [0.26]
<b>Ad Valorem Tiered</b>	0.65*** (0.03) [2.89]	0.67*** (0.11) [1.13]	1.49*** (0.15) [1.86]	1.45*** (0.18) [1.06]
<b>Mixed Uniform</b>	0.09*** (0.02) [0.40]	0.45** (0.20) [0.75]	0.36* (0.19) [0.45]	0.60** (0.29) [0.44]
<b>Mixed Tiered</b>	0.39* (0.21) [1.71]	0.38 (0.48) [0.64]	0.85 (0.66) [1.06]	3.43*** (1.00) [2.51]

\* p ≤ 0.1, \*\* p ≤ 0.05, \*\*\* p ≤ 0.01. Marginal effects or coefficients are reported. Standard errors clustered at the country level are reported in parentheses and corresponding elasticity estimates are reported in square brackets.

- Compared with a specific uniform structure, tiered (specific, mixed and ad valorem) and mixed uniform structures are positively associated with price variability.

## RESULTS (CONTINUED)

- A mixed uniform structure is associated with 40-75% greater price variability.
- A specific tiered structure is associated with 85- 128% greater price variability.
- An ad valorem tiered structure is associated with 106-289% greater price variability.
- A mixed tiered structure is associated with 171-250% greater price variability.
- Results, percentage of specific component among total excise taxes and a dichotomous measure for tiered structure (mixed/ad valorem/specific):

Price Variability	%75-25/	%90-10/	%95-5/	%99-1/
<b>% of specific</b>	-0.001** (0.001) [-0.43]	-0.002** (0.001) [-0.28]	-0.004** (0.002) [-0.36]	-0.006* (0.004) [-0.33]
<b>Tiered</b>	0.33*** (0.13) [1.47]	0.37** (0.18) [0.61]	0.83*** (0.24) [1.04]	1.88** (0.78) [1.39]

\* p ≤ 0.1, \*\* p ≤ 0.05, \*\*\* p ≤ 0.01. Marginal effects or coefficients are reported. Standard errors clustered at the country level are reported in parentheses and corresponding elasticity estimates are reported in square brackets.

- A 10% increase in the share of specific taxes among total excises is associated with a 4.3% decrease in the IQR-to-median ratio (p≤0.1).
- A 10% increase in the share of specific components in total excises is associated with a 2.8-4.3% lower price variability.
- A tiered tax structure is associated with a 147% increase in the IQR-to-median ratio (p≤0.01).
- A tiered structure is associated with a 61-147% higher price variability.

## CONCLUSIONS

- Complicated tax structures that depart from a specific uniform structure are associated with greater price variability of cigarettes.
- Countries that impose a specific uniform tax structure, that increase their reliance on specific excise taxes, and/or switch from tiered to uniform tax rates, will reduce price variability.
- These results support the proposition that specific uniform tax structure is the most effective tax structure for reducing tobacco consumption and prevalence.