Asymmetric Tobacco Regulations and the Disease Haven Hypothesis

By Aaron Olanie, Gregmar Galinato, and Jonathan Yoder

WASHINGTON STATE UNIVERSITY
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The Problem

- The World Health Organization (WHO) estimates tobacco use kills 5 million people annually worldwide
- The burden is heaviest in developing countries. More than 80% of the world's smokers live in low- and middle-income countries
- Developing countries tend to be less regulated

The "Disease Haven" Hypothesis

- Asymmetric tobacco regulations between trading partners may result in a skewed flow of tobacco trade towards countries with less stringent regulations.

Objective

- Investigates the impact of tobacco regulations on the flow of tobacco trade

Methods

- We employ a gravity equation to study the effect of asymmetric tobacco regulations between trading partners on the flow of tobacco trade
- We estimate the gravity equation using a PPML estimator

Regulations Considered

- Advertising/marketing regulations
- Counter-advertising mandates
- Age regulations
- Spatial regulations

Regulation Indices

$$index_j^t = \frac{\text{number of type } t \text{ regulations observed in country } j}{\text{total number of type } t \text{ regulations}}$$

r^t_{ij}= (exporter i's type t index – importer j's type t index)

$$R_{ij} = \left[r_{ij}^m \;\; r_{ij}^c \;\; r_{ij}^a \;\; r_{ij}^s \right]$$

Data

- Cross-sectional data from the year 2000
- The tobacco trade data was gathered from the World Bank's COMTRADE data set
- Per capita GDP is from the World Bank
- As an instrument for import tariffs, we use a trade freedom index constructed by the Heritage Foundation
- The tobacco regulation data was gathered from the World Health Organization's tobacco control country profiles
- The bilateral distances and characteristics are from the Centre d'Etudes Prospectives et d'Informations Internationales

The Gravity Equation

$$x_{ij} = \exp\left[\begin{array}{l} \ln\left(y_j\right) + \ln\left(y_i\right) + \left(1-\sigma\right)\left(R_{ij}\Phi\right) + \left(1-\sigma\right)\gamma CUL_{ij} + \\ \left(1-\sigma\right)\ln\left(1+tf_{ij}\right) + \left(1-\sigma\right)b\ln d_{ij} - \ln\Pi_i^{1-\sigma} - \ln P_j^{1-\sigma} \end{array}\right]$$

x_{ij} = tobacco exports from country i to country j
σ = constant elasticity of substitution
y_j = GDP of country j
y_i = GDP of country i
R_{ij} = vector of regulation difference terms
Φ = vector of regulation sensitivities
CUL_{ij} = vector of bilateral characteristics
γ = vector of bilateral characteristic sensitivities
d_{ij} = bilateral distance
b = distance sensitivity
tf_{ij} = import tariff imposed by country j on country i's goods
P_j = inward multilateral resistance term
Π_i = outward multilateral resistance term

Parameters of Interest

$$\left(1-\sigma\right)R_{ij}\Phi = r_{ij}^m\left(1-\sigma\right)marketing + r_{ij}^c\left(1-\sigma\right)counter + r_{ij}^a\left(1-\sigma\right)age + r_{ij}^s\left(1-\sigma\right)spatial$$

The coefficients our model estimate are given by,

$$\Phi = \left[\begin{array}{l} \left(1-\sigma\right)marketing \\ \left(1-\sigma\right)counter \\ \left(1-\sigma\right)age \\ \left(1-\sigma\right)spatial \end{array}\right]$$

Results using regulation differences (restricted model)

All coefficients "should" be positive

Variable	Coefficient
Marketing regulation difference	1.3011* (0.7687)
Counter-advertising difference	0.6787** (0.2743)
Age regulation difference	-0.8083** (0.3433)
Spatial regulation difference	-1.3555*** (0.3431)

*** Indicates significance at the 1% level
** Indicates significance at the 5% level
* Indicates significance at the 10% level

Results using individual country regulation indices (unrestricted model)

Coefficients for exporting countries "should" be positive
Coefficients for importing countries "should" be negative

Variable	Coefficient
Exporter Marketing regulation index	2.3774*** (0.4116)
Exporter Counter-advertising regulation index	3.6826*** (0.4315)
Exporter Age regulation index	-1.4753*** (0.3935)
Exporter Spatial regulation index	-1.8902*** (0.3917)
Importer Marketing regulation index	1.7371*** (0.2848)
Importer Counter-advertising regulation index	3.0206*** (0.3951)
Importer Age regulation index	-1.0661*** (0.3601)
Importer Spatial regulation index	-1.1405*** (0.4015)

*** Indicates significance at the 1% level
** Indicates significance at the 5% level
* Indicates significance at the 10% level

Discussion

- Mixed results for both restricted and unrestricted model.
- The restricted model suggests harmonizing counter-advertising and marketing regulations may reduce tobacco trade, while the negative age and spatial coefficients conflict with our hypothesis.
- The unrestricted results suggest counter-advertising and marketing regulations are effective in reducing exports but not imports, while age and spatial regulations reduce the flow of tobacco regardless of trade direction.
- The negative exporter age and spatial coefficients may be explained if elasticity of supply is such that a strict regulation reduces the equilibrium world price enough to reduce exports.

Future Research

- One of the weaknesses of our analysis is the lack of a weighting strategy. Each regulation is weighted equally, when in reality certain regulations have much larger effects than others.
- We could explore grouping regulations using comparative or factor analysis.

Conclusions

We have conflicting results. Both the restricted and unrestricted models partially support the disease haven hypothesis. Our results suggest two schemes for reducing tobacco imports. The first method involves harmonizing counter-advertising and marketing regulations to levels of their trading partners. The second method is simply a unilateral increase in age and spatial regulations, which can reduce both imports and exports regardless of their trading partners' regulations. Given majority of countries with low levels of age and spatial regulations are developing countries, they serve to benefit most from this policy. From a policy standpoint, if the goal is to reduce total tobacco trade, age and spatial regulations are the most significant.