

# **Tobacco, Tobacco Control, and Employment**

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# Why Evaluate Employment ?

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- # to assess the magnitude of the impact tobacco control measures can cause
- # to undermine false arguments by the tobacco industry
- # to provide arguments for policy makers
- # to develop an effective policy

# What Do We Know?

## # Tobacco industry studies

- count both direct and indirect jobs
- count part-time jobs as full-time
- estimate gross effects of tobacco controls

## # Academic and government studies

- count only direct full-time jobs
- estimate net effects of tobacco controls
- assume existence of free market and transferability of skills and investment

# Counting Tobacco Jobs

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- # Count only jobs in the production, distribution and retailing of tobacco leaf and tobacco products
- # Assess structure and organization of the tobacco industry to avoid double counting
- # Do not include expenditure induced employment

# Data

- # Government statistics
  - verify what is included in each job category
  - evaluate the reliability of statistics
- # International organizations – e.g. FAO
- # US Department of Agriculture
- # Survey of local experts

# Employment in Agriculture

## # Method 1

Number of labor hours required per pound of tobacco  $\times$  # pounds of tobacco produced = hours of labor

## # Method 2

Number of labor hours required per acre of tobacco  $\times$  acre of tobacco planted = hours of labor

## # Obtain full-time employment

Hours of labor  $\div$  hours of a full-time employee =  
# full-time employees

# Leaf Marketing and Processing

- # May not exist in all countries or may be counted in manufacturing employment
- # If official statistics not available, estimate employment indirectly:
  1. Total volume sold through auctioning = Total tobacco production – Tobacco marketed through private contract
  2. Survey a warehouse to estimate hours of labor per sale of 1 pound of tobacco.
  3. # hours in marketing&processing = total auctioning volume x hours per sale of 1 pound
  4. Convert hours into a full-time employment

# Tobacco Manufacturing

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- # Data usually available from government statistics or from international organizations (e.g. UNIDO)
- # Avoid double counting or miscounting by analyzing which economic activities are included (e.g. wholesale can be part of manufacturing)

# Employment in Wholesale

**If statistics by commodity group not available, estimate employment indirectly:**

- 1. Survey an expert on total turnover value and the value of tobacco products to calculate tobacco share in the wholesale**
- 2. Obtain total employment in wholesale industry from governmental statistics**
- 3. # of jobs in wholesale = full-time jobs in wholesale x tobacco share in wholesale**

# Employment in Retail

- 1. Define all types of retail outlets that may carry tobacco and find their total employment (gov. statistics)**
- 2. Find what share of these outlets carry tobacco and how much tobacco represent in total sales (or net earning) if carried – (gov. statistics or outlet survey)**
- 3. Tobacco related jobs = full-time jobs \* share of outlets carrying tobacco \* share of tobacco in total sales or net earnings**
- 4. Add jobs from all outlets (drug stores, tobacco stands, gas stations, etc)**
- 5. If data by outlets not available, apply the same method as for the wholesale.**

# Importance of Tobacco Employment for the Economy

Evaluate relative importance by:

- # % of agricultural jobs associated with tobacco farming
- # % of manufacturing jobs associated with tobacco
- # % of wholesaling and retailing jobs associated with tobacco
- # % of tobacco jobs in total employment

Assess trends in tobacco employment

# Effect of Tobacco Controls Depends on the Structure of Tobacco Economy

## Types of Tobacco Economy Structure

- # Full exporter
- # Net exporter
- # “Self-contained”
- # Net importer
- # Full importer

Positive effect expected for importers, most job losses will occur to exporters.

Domestic v. foreign tobacco controls – different effects for different types of countries

# Input-Output Analysis

## Economy Matrices

### Transaction matrix (XY)

- describes the flow of goods and services between sectors
- columns represent requirements from sectors
- rows represent distribution of sectors' output

### Direct requirement matrix (A)

- shows how much a sector requires from other sectors to produce \$1 of output (i.e. purchase coefficients)
- computed from Transaction matrix:  
requirements from sectors  $\div$  total output

### Total Requirement Matrix or Leontief Inverse $(I - A)^{-1}$

- shows supply from all sectors necessary for that sector to deliver \$1 of output for final demand

# Transaction Matrix

	<b>Agriculture</b>	<b>Manufacture</b>	<b>Service</b>	<b>Final Demand</b>	<b>Total Output</b>
<b>Agriculture</b>	4	8	2	16	30
<b>Manufacture</b>	7	15	6	22	50
<b>Service</b>	6	5	4	10	25
<b>Final Payment</b>	13	22	13	0	48
<b>Total Input</b>	30	50	25	48	153

# Direct Requirement Matrix

	<b>Agriculture</b>	<b>Manufacture</b>	<b>Service</b>
<b>Agriculture</b>	0.13	0.16	0.08
<b>Manufacture</b>	0.23	0.30	0.24
<b>Service</b>	0.20	0.10	0.16
<b>Final Demand</b>	0.44	0.44	0.52
<b>Total Input</b>	1.00	1.00	1.00

# Total Requirement Matrix (Leontief Inverse)

	Agriculture	Manufacture	Service
Agriculture	1.28	0.32	0.22
Manufacture	0.55	1.64	0.52
Service	0.37	0.27	1.30

# Calculating the Leontief Inverse Matrix

$X_{ij}$  = total amount of the product of industry  $i$  used by industry  $j$  (Transaction Matrix entry)

$X_i$  = total output of industry  $i$

$X$  = vector of industry outputs

$Y_i$  = total amount of  $X_i$  left over for final demand

$Y$  = vector of final demand (Transaction Matrix)

$$X_i = Y_i + \sum_j X_{ij}$$

$$a_{ij} = X_{ij} \div X_j \quad \text{A is matrix of } a_{ij}$$

$$Y_i = X_i - \sum_j a_{ij} \times X_j \quad \text{or} \quad Y = X - AX$$

$$X = (I - A)^{-1} \times Y$$

# Change in Final Demand

Change in total output:

$$\Delta X = (I - A)^{-1} \times \Delta Y$$

Change in employment:

$$\Delta \text{ employment} = \Delta X \times E$$

E = employment output matrix (= # of people needed to produce \$1 worth of output )

# Input-Output Analysis – Example

The fall and increase in output as a result of reduced tobacco spending and increased final demand for other goods.

$$\Delta X_f = (I - A)^{-1} \times \Delta Y_f = \begin{bmatrix} 1.28 & 0.32 & 0.22 \\ 0.55 & 1.64 & 0.52 \\ 0.37 & 0.27 & 1.30 \end{bmatrix} \begin{bmatrix} -1.0 \\ -1.5 \\ -0.5 \end{bmatrix} = \begin{bmatrix} -1.87 \\ -3.27 \\ -1.43 \end{bmatrix}$$

$$\Delta X_i = (I - A)^{-1} \times \Delta Y_i = \begin{bmatrix} 1.28 & 0.32 & 0.22 \\ 0.55 & 1.64 & 0.52 \\ 0.37 & 0.27 & 1.30 \end{bmatrix} \begin{bmatrix} 0.5 \\ 1.0 \\ 1.5 \end{bmatrix} = \begin{bmatrix} 1.29 \\ 2.70 \\ 2.41 \end{bmatrix}$$

# Input-Output Analysis – Example (continues)

The change in output by sectors:

$$\Delta X_n = \Delta X_f - \Delta X_i = \begin{bmatrix} -1.87 \\ -3.27 \\ -1.43 \end{bmatrix} - \begin{bmatrix} 1.29 \\ 2.70 \\ 2.41 \end{bmatrix} = \begin{bmatrix} -0.58 \\ -0.57 \\ +0.98 \end{bmatrix}$$

The change in employment by sectors:

$$E \times \Delta X_n = \begin{bmatrix} 500 \\ 300 \\ 600 \end{bmatrix} \begin{bmatrix} -0.58 \\ -0.57 \\ +0.98 \end{bmatrix} = \begin{bmatrix} -290 \\ -171 \\ +588 \end{bmatrix}$$

# Sensitivity analysis

Recalculate the employment effect under different spending pattern scenarios:

use  $\Delta Y_i = \begin{bmatrix} 0.5 \\ 0.5 \\ 2.0 \end{bmatrix}$  instead of  $\Delta Y_i = \begin{bmatrix} 0.5 \\ 1.0 \\ 1.5 \end{bmatrix}$

Use the most favorable, the least favorable and the most realistic values of the parameters.

# Report the Results

## Report

- # the aggregate employment change
- # changes in employment by sectors and regions
- # limitations of the input-output analysis (static, no economy adjusts over time, ignores substitution, no supply-demand interaction)
- # assumptions made due to a lack of data

# Other Methods of Quantitative Analysis

## # Regional Economic Models

- superior to input-output tables, because it lets prices to adjust in response to changes in demand
- may not be available for all countries

## # Computable General Equilibrium (CGE)

- see the economy as a complete system
- price and quantity of goods and services are calculated as endogenous parameters
- high demand on data quality

# Summary (1)

## # Jobs in tobacco agriculture

- most affected will be net exporters
- but, only few communities heavily dependent on tobacco farming
- gradual adaptation will occur due to gradual decrease in demand for tobacco
- government can help with the transition
- tobacco companies themselves reduce jobs in tobacco farming

# Summary (2)

## # Jobs in manufacturing, marketing and processing

- usually a small percentage of total employment
- automation in tobacco manufacturing will also lead to employment losses
- net importers can expect positive effect on total employment as part of the demand shift will aim at the domestic market

# Summary (3)

## # Jobs in related industries

(E.g. suppliers sector, distributors, advertising, whole sale and retail)

- usually not heavily depend on tobacco production
- the shift in demand for other products will prevent job losses