

Trading Tobacco for Health Initiative: Smoking and Poverty

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Why this Topic?

- Smoking takes up a large portion of household budget in low income household
 - deprive essential expenditures
- Smoking has long-term negative effect on health
 - high medical expenditures
- Smoking has negative effect on health
 - premature death/ low mortality

Outline

- I. Conceptual Framework
- II. Impact of Smoking on Household Expenditures
- III. Impact of Smoking on Medical Expenditures and Productivity
- IV. Tax Incidence Issues
- V. Research Recommendation and Challenges

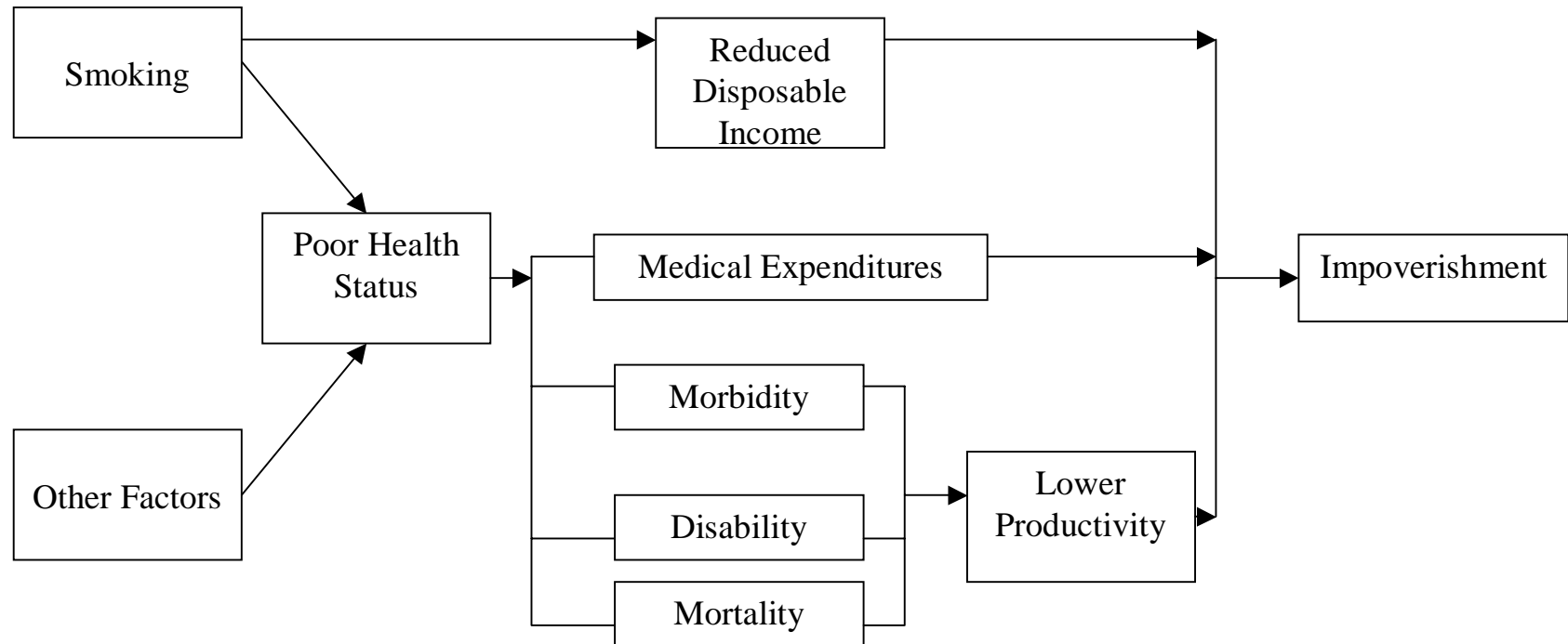
I. Conceptual Framework

- Relationship between smoking and poverty
- Measurement
- Data sources

Conceptual Framework

- Reduce disposable income – opportunity cost
- Causes of poverty – human capital theory
- Smoking leads to illnesses
- Illness leads to lower productivity (disability, morbidity, and mortality)
- Illness leads to higher medical expenditures

Conceptual Framework: Smoking and Poverty



Measurement

- Smoking status – past and current smoking status
- Poor health status – prevalence of smoking related illness
- Reduced disposable income – cigarette expenditures
- Medical expenditures – inpatient and outpatient
- Morbidity – sick days
- Disability – days in bed or inactive
- Mortality – year of death
- Productivity – days lost work, early retirement
- Poverty – wages, earned income

Data Sources

- National Household Expenditure Survey
- Standard Living Household Survey
- Health Interview Survey
- Tobacco Consumption Survey

II. Impact of Smoking on Household Expenditures

- Quantity and quality by income level
- Tobacco expenditures and income
- Price elasticities by income level
- Income elasticities

Smoking Prevalence Rate

(1996 China National Tobacco Survey)

Income Level (Yuan)	Regular Smoking Rate (%)	Heavy Smoking Rates (%)
< 50	30.69	3.90
> 50	31.89	4.20
> 200	30.90	4.00
> 500	30.86	4.37
> 1,000	30.68	7.07
> 5,000	19.46	6.93
Total	31.21	4.15

Regular smoker: at least 1 cigarette per day
Heavy smoker: smokes 20 or more cigarette per day

Intensity of Smoking Among Smoking Households by Income Group in Bulgaria

(unit in packs of 20 cigarettes)

Income Group	Average Packs per Smoking Household per Month	Average Packs per Adult in Smoking Households per Month
Low	32.3	12.3
Middle	33.1	13.7
High	37.5	15.7

Source: Sayginsuy, Yurikli, and de Beyer, 2000

Types of Tobacco Products Used by Income Level, 1996, China

Income Level (yuan)	Cigarette w/o filter	Cigarette with filter	Pipe	Chinese Pipe	Other	Total
< 50	32.43	47.46	3.11	13.37	3.63	100.0
> 50	21.89	63.68	2.09	10.36	1.98	100.0
> 200	9.60	83.19	1.40	4.45	1.36	100.0
> 500	5.55	90.63	0.49	2.19	1.14	100.0
> 1,000	3.95	92.37	0.42	2.68	0.58	100.0
Total	16.7	72.91	1.74	7.39	1.26	100.0

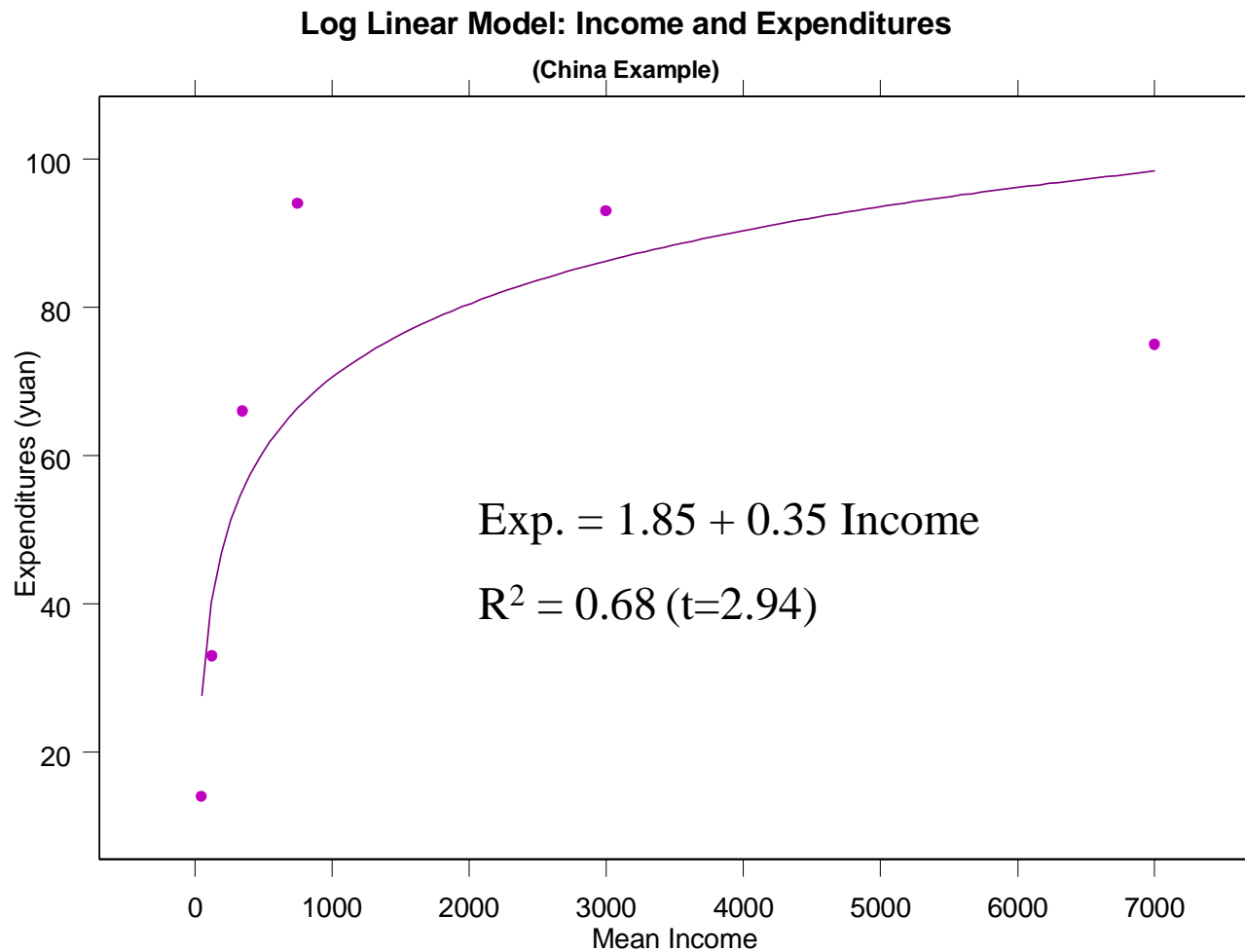
Source: China National Tobacco Survey, 1996

1998 China National Tobacco Survey

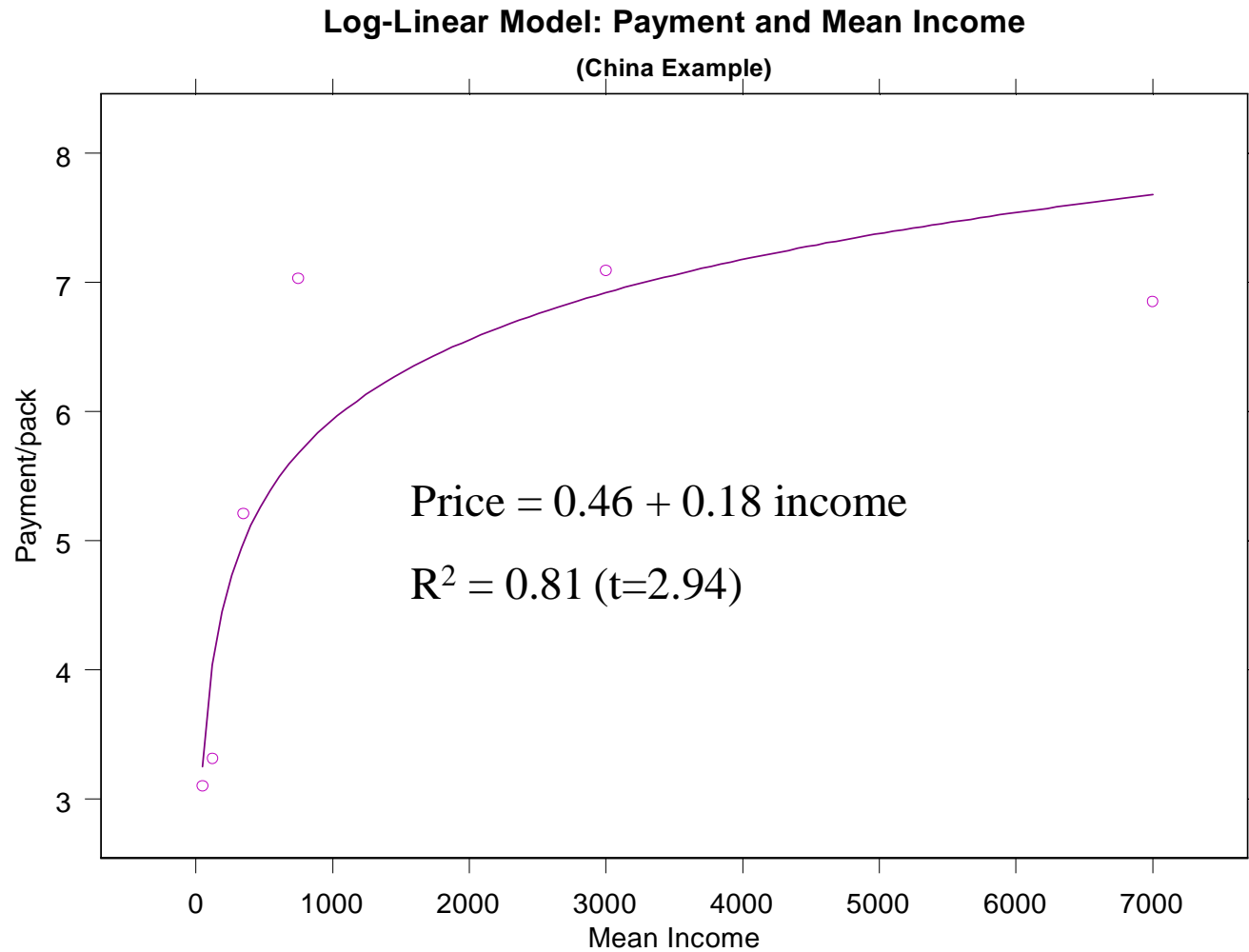
Monthly Income (per capita)	Mean Income	Expenditures (yuan/month)	Average Payment (per pack)	Expenditures/ Incomes
< 50 (yuan)	50	14	3.10	0.28
> 50	125	33	3.31	0.26
> 200	350	66	5.21	0.19
> 500	750	94	7.03	0.12
> 1,000	3,000	93	7.09	0.03
> 5,000	7,000	75	6.85	0.01

Note: Assuming cell means 50, 125, 350, 750, 3000, and 7000 yuan

Regression Result (1)

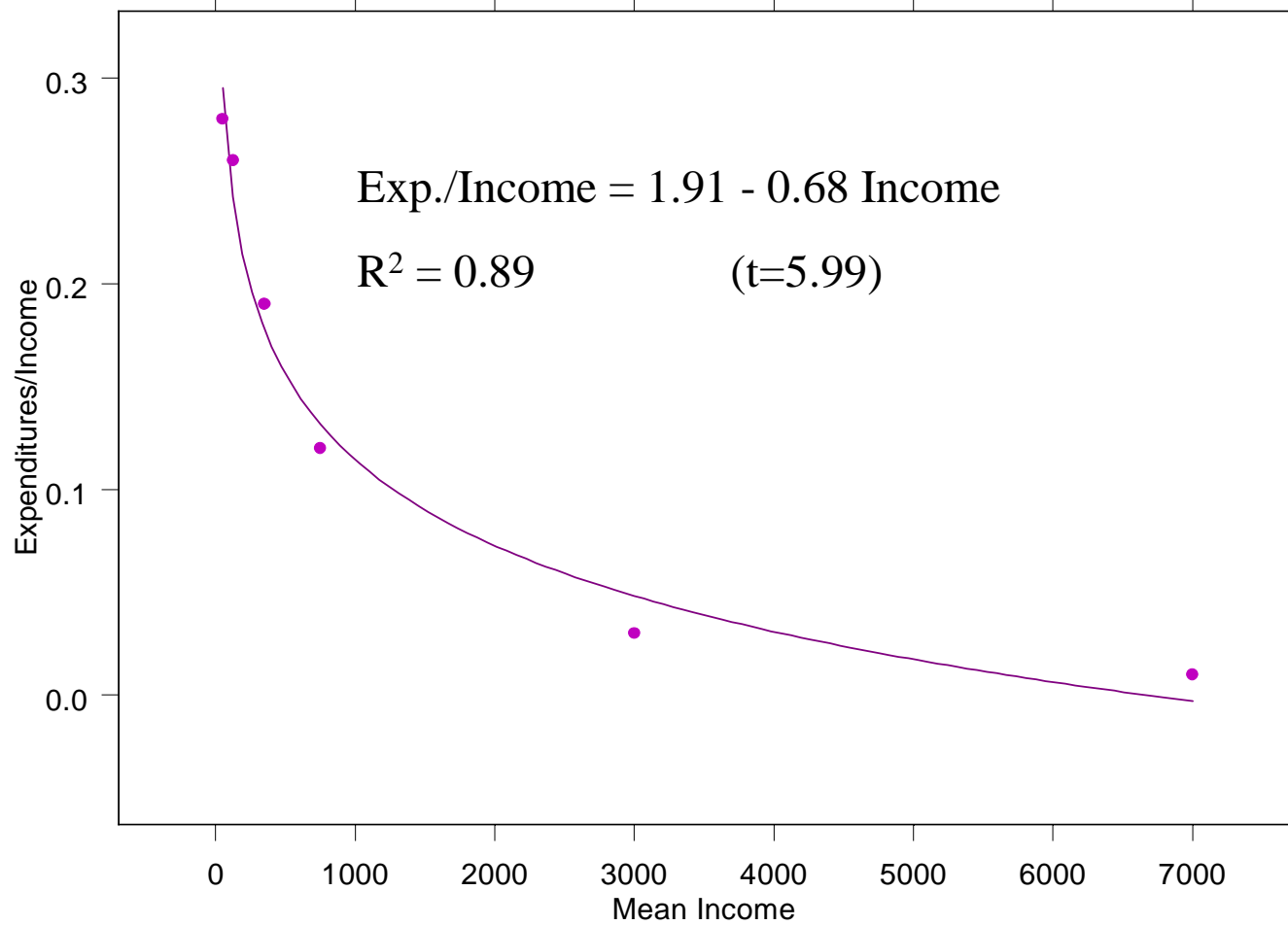


Regression Result (2)



Regression Result (3)

Regression Models: Ratio and Mean Income
(China Example)



Percentage of Tobacco Expenditures of Household Income

Country	Year	Income group	Tobacco Expenditures
Bangladesh	1996	Low income	1.5 %
		High income	4.5 %
		All	2.8 %
Egypt	1997	High income	2.8 %
		All	2.0 %
India	1986-1987	All	2.5-4.0 %
South Africa	1995	High income	0.6-1.3 %
		All	4.7 %
Tibet	1992	Urban Household	5.5 %
China	1992	All	17.0 %
Indonesia	1996	Low income	15.0 %

Source: Joy de Beyer, Chris Lovelance, Ayda Yurikli, "Poverty and Tobacco", Tobacco Control, 2001

Expenditures on Tobacco Versus Health and Education in Bangladesh, 1995/1996

Household Expenditure Group	Percentage of Total Income Spent on Tobacco	Ratio of Expenditures on Tobacco/Health	Ratio of Expenditures on Tobacco/Education
\$24-30	2.3	1.0	6.9
\$94-118	2.6	1.0	0.9
\$236-295	3.7	2.1	0.7
\$413-472	3.5	1.5	0.7

Source: Efroymson, Debra, et al., Tobacco Control, 2000

Average daily expenditure for tobacco and equivalent in calories of rice, by sex and type of tobacco in Bangladesh, 1997

Type of Tobacco	Average Expenditure on Tobacco (taka)		Equivalent in Calories of Rice	
	Male	Female	Male	Female
Average for All Types of Tobacco	5.1	2.8	1,402	770
Bidi	2.9	3.3	797	907
Cigarettes	10.7	6.8	2,942	1,869
Hukka/pipe etc.	2.6	1.9	715	522

Source: Efroymson, Debra, et al., Tobacco Control, 2000

Preliminary Estimates of Price Elasticities

	<u>China*</u>	<u>Bulgaria**</u>
High Income	- 0.52	- 0.52
Middle Income	- 0.77	- 1.01
Low Income	- 1.91	- 1.33

Source: * Mao, Simonich, and Yang, 2000

** Saygiasoy, Yurikli, and de Beyer, 2000

Odds Ratio of Smoking Status By Income, U.S. Study

<u>Income</u>	<u>Current Smokers</u>	<u>Successful Quitters</u>
\$10,000-19,000	1.50	0.73
\$20,000-49,000	1.18	0.87
\$50,000-74,999	0.99	1.02
over \$75,000	0.86	1.24

Source: Keeler, Marciniak, Hu, 1999

III. Impact of Smoking on Medical Expenditures and Productivity

- Epidemiological approach
- Econometric approach

Epidemiological Approach

- Smoking Attributable Fraction (SAF) for related disease (cancer, heart, and lung)
- Medical services use, mortality rate, morbidity
- Costs of services and wages
- Rice study (1986) \$53.7 billion (\$23.3 billion direct costs, \$30.4 billion indirect costs)

The Contribution of Smoking of the Risk of Premature Death Among Males at Age 35-69 by Income Group, Canada, 1991

	Attributed to Smoking	Attributed to Smoking, but would have died anyway	Other Causes	Total Risk
Richest	5	0	14	19
Richer	6	1	16	23
Average	7	1	17	25
Poorer	9	1	17	27
Poorest	13	2	20	35

Source: Jha, et al. BMJ

The Contribution of Smoking of the Risk of Premature Death Among Males at Age 35-69 by Social Class, England and Wales, 1991

	Attributed to Smoking	Attributed to Smoking, but would have died anyway	Other Causes	Total Risk
Highest Class	5	1	17	23
Non-Manual Class	8	1	22	31
Middle Manual	13	2	21	36
Lower Class	21	4	24	49

Source: Jha, et al. BMJ

Econometric Approach

- Use econometric model to estimate smoking attributable amount
- Two-part model/negative binomial model
- Manning (1990)/L. Miller (1998), V. Miller (1999), \$53.4 billion medical expenditures

Probability of Medical Expenses

	<u>Medication</u>	<u>Ambulatory</u>
Current light smokers	0.011	-0.069
Current heavy smokers	0.082***	0.013
Former light smokers, quit <15 yrs	0.086	0.106
Former heavy smokers, quit <15 yrs	0.373***	0.340**
Former light smokers, quit 15+ yrs	0.144	0.448**
Former heavy smokers, quit 15+ yrs	0.334***	0.417**

Source: V. Miller, 1999 ***p<.01; ** p<.05

General Model Specification

Dependent Variables:

medical expenditures, days lost work, day in bed, mortality, conditions of illness

Independent Variables:

smoking status, gender, age, education, income, insurance status

IV. Tax Incidence Issues

Regressivity: A tax that is disproportionately falls on the poor and raises income inequality

Progressivity: A tax takes a larger proportion of the income of the rich than it does of the poor and reduces inequality

Measurement of Tax Incidence

- Price paid
- Quantity consumed
- Price elasticity
- Income level

Additional Tax Burden

$$\begin{aligned}\rho R &= Q \rho t + t \rho Q \\ &= Q \rho t [1 + (t / P + t)]\end{aligned}$$

ρR = Changing in tax paid

Q = Quantity

P = Pre-tax price

ρt = Changes in tax

E = Price elasticity

Source: Peck

Examples

$$Q_P = 100$$

$$Q_R = 100$$

$$P = \$1.00$$

$$t = \$0.50 \text{ (} \rho t = \$0.10 \text{)}$$

$$E_P = -0.8$$

$$E_R = -0.40$$

$$\rho R_P = \$7.33$$

$$\rho R_R = \$8.67$$

So rich pays more by 18%, \$1.34

What if $Q_P = 60$ $Q_R = 100$?

What if $P_P = \$0.80$ $P_R = \$1.00$?

Impact of Higher Taxes on Household Expenditure

$$\rho B = a \times (1 + E) \rho T$$

ρB = fraction of income spent on non-tobacco

a = fraction of income spent on tobacco

E = Price elasticity (negative)

ρT = fractional change in the original tobacco price ($\rho t / P$)

Source: Peck

Example

$$a = 0.24$$

$$E = -0.8$$

$$\rho_T = \$0.3/\$3.0 = 0.1, \rho_t = \$0.3$$

$$\rho_B = 0.24(1-0.8) \times 0.1 = 0.0048 = .48\%$$

(non-tobacco expenditure will fall by .48% if $\rho_t = \$0.30$)

What if $a = 0.10$

if $E = -0.4$

Source: Peck

Do the poor really pay more taxes when tobacco tax is increased?

It depends on:

- Relative price elasticity
- Price paid
- Amount of smoking

In lower/middle income countries, the poor buys cheaper priced cigarettes, smokes less, and are more price responsive than the higher income group.

V. Research Recommendations and Challenges

Research Topics:

- Impact of smoking on household expenditures
- Impact of smoking on health status and health expenditures
- Impact of smoking on productivity (labor market performance) and poverty
- Impact of tobacco taxation incidence on different household income levels

Challenges

- Data need: tobacco consumption (quantity and price), household expenditures, income, health status, smoking status
- Economics training: microeconomics and public finance
- Econometric training: statistics and econometric methods