

A Cost-effectiveness Analysis of a Prescription and Over-the-counter Drug Take-back Program for New York State

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Outline

- Purpose
- Background Information
- Theoretical Model
- Questions and feedback

Purpose

- Introduce theoretical economic model
 - Cost-benefit design
- Human and environmental health implications
- Develop inclusive list of societal costs and benefits
- Refine model parameters

Background Information

- Purpose of economic evaluation:
 - Efficient resource allocation
 - Cost abatement
 - Prioritize public health concerns

Pharmaceuticals

- National Association of Chain Drug Stores
 - ~3.2 billion prescriptions filled in 2003
 - ~2.2 billion prescriptions filled in 1995
 - Not including OTC's
- Prescription and OTC products identified in NY (Wilson, 2006)
 - Atenolol
 - Estrone
 - Ibuprofen
 - Carbamazepine
 - Trimethoprim
 - Caffeine
- Source:
 - Wilson L, Palmer P, O'Keefe P, King T, Briggs R, Sheridan R. Pharmaceutical Project Report: A Survey of the New York City Watershed for the Presence of Pharmaceuticals. New York State Department of Health Final Report. 13 Jun 2006.

Background Information

- Medication take back programs include:
 - One day events
 - Extended producer responsibility
 - Deposit system

One Day Events

- Several variations have been done
- Limitations:
 - Short duration
 - Participation is voluntary
 - Medication container recycling
- Sources:
 - Report On In-Store Pilot CVS Mill Creek, South Portland, Maine. Northeast Recycling Council, Inc. February 5, 2005.
 - Rubenstein, Lynn. Operating Unwanted Medication Collections – A Legal & Safe Approach. Northeast Recycling Council, Inc. September 2006.
 - Rubenstein, Lynn. Holding an Unwanted Medication Collection as Part of a Household Hazardous Waste Event – A legal & Safe Approach. Northeast Recycling Council, Inc. September 2006.
 - Franklin County Pilot Unwanted Medications Collection: Senior Center, Turner Falls (Montague), Massachusetts. 9 December 2004.

Extended Producer Responsibility

- Definition:

The development of policies for the take-back , recycling, and final disposal of used products (Driedger, 2002)

An Example

- British Columbia Medications Return Program
 - Pharmaceutical manufacturers sponsor
 - Utilize community pharmacies
 - Collect unused/expired medications which are destroyed as hazardous waste
 - In 2005 collected 18,012 kg and cost \$225,000 (Partridge, 2006)

Extended Producer Responsibility

- Limitations:
 - Consumer participation is voluntary
 - Medication container recycling
- Sources:
 - Partridge, Eric. Post-Consumer Residual Stewardship Program: Medications Return Program Report: January 1, 2004 – December 31, 2004. Environmental Management Division British Columbia Ministry of Water, Land and Air Protection. 30 April 2005.
 - Partridge, Eric. Post-Consumer Residual Stewardship Program: Medications Return Program Report: January 1, 2005 – December 31, 2005. Environmental Management Division British Columbia Ministry of Water, Land and Air Protection. 30 April 2006.
 - Driedger R. From Cradle to Grave: Extended Producer Responsibility for Household Hazardous Wastes in British Columbia. *Journal of Industrial Ecology*. 2002; 5 (2): 89-102.

Deposit System

- Medication deposit system:
 - Consumers pay deposit on medication container
 - Receive deposit refund upon container's return
 - Returned medications collected for disposal as hazardous waste
 - Medication container recycled
- Venue:
 - Community Pharmacies

Deposit System

- Model based upon:
 - Recyclable goods
 - Consumer behavior patterns
- Deposit system maximizes participation
 - Financial incentive
 - Increases medication return
 - Initiates medication container recycling



Deposit System

- Limitations
 - Consumer resistance
 - Agricultural agents

Deposit System

- Basic Assumptions:
 - Consumers will return unused /expired medications with deposited container
 - Demand for medications is inelastic
 - Societal perspective
 - Producer
 - Consumer

Model

- Theoretical using mathematical equations consumer & producer costs
- Consumption Methods:
 - Method **X** – Consumer utilizes medication and returns the container with unused / expired portions
 - Method **Y** – Consumer disposes of containers with unused /expired medication portions

Model

- **R(X)** represents recycling costs pharmacies incur from deposit system
- Comprised of:
 - Processing costs
 - Storage costs
 - Disposal costs

Model

- **S** represents containers which are not returned

$$Q = Q(X+Y, S(X))$$

- Where:
 - **Q** = Quantity
 - **Q(X+Y)** = positive utility from consumption
 - **Q(S(X))** = the inconvenience of returning containers / medications
- Consumer utility

Model

Marginal externality of dumping =
Marginal cost of recycling –
Marginal inconvenience cost of
returning containers/medications

- Summarizes Consumer's side

Model

- Producers side:
 - Assume single processes for production and distribution
- Z represents costs which producer incurs based on amount of containers and/or medications returned
- $Z = X + Y$

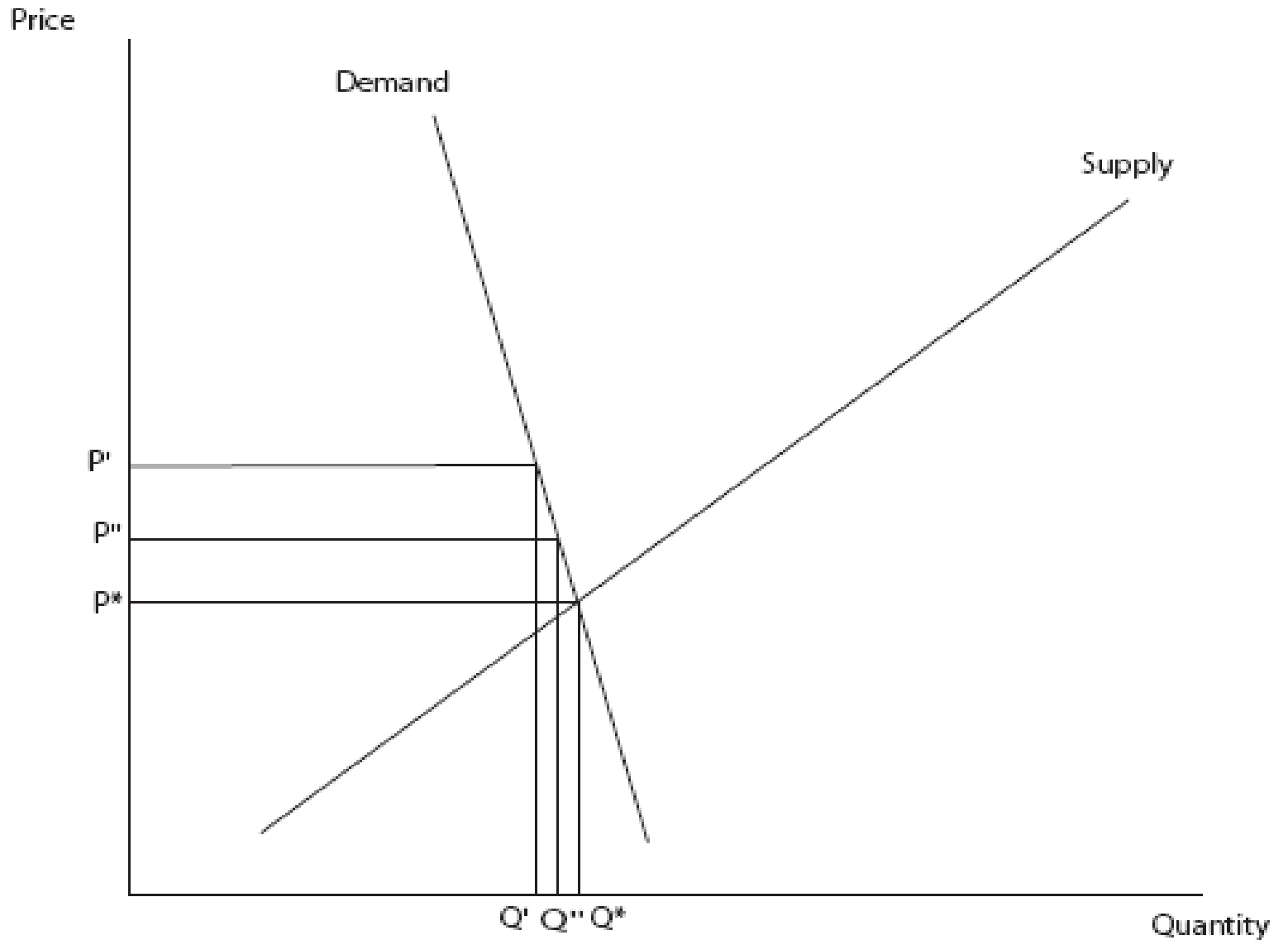
Model

- Producers want to maximize profits
 - Incur costs of:
 - Recycling
 - Storage
 - Processing
 - Gain revenue:
 - Unclaimed deposits
 - Consumer patronage

Model

- Consumers will **return** containers with unused / expired medications:
 - If inconvenience costs of returning $<$ deposit
- Consumers will **dump** containers with unused / expired medications:
 - If inconvenience costs of returning $>$ deposit

Inelastic Demand



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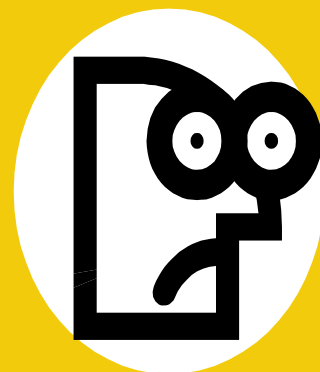
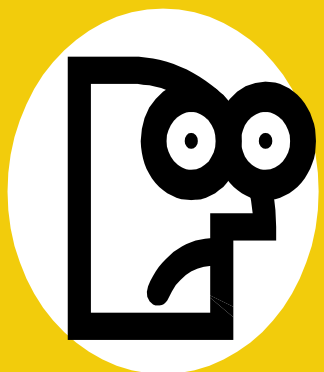
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Deposit System Analysis

- Consumers pay deposit
- Receive refund upon return
- Those who find it too inconvenient will not participate
- Uncollected deposits entice producers to participate
- Goal to maximize medication return to decrease PPCP pollution
- Limitation of consumer resistance

Societal Costs and Benefits

Costs	Benefits
Storage costs	Improved human health
Processing costs	Improved environment
Recycling costs	Higher drinking water quality
Disposal costs	Increased employment opportunities
Public education	Residual value of recyclable container
Cost of deposit	Increased revenue
Time costs	Decreased raw materials
Transportation costs	Reduced container production costs
Manufacturing costs	Consumer patronage
Enforcement costs	Societal beneficence
Health costs	
Insurance costs	



It's QUESTION TIME !!