

Vaccines Versus Drugs: Pharmaceutical Manufacturers' Incentives

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A rack of test tubes containing colored liquids. The rack is filled with many test tubes, some containing green liquid, some blue, and some purple. The rack is made of metal and has three rows of tubes. The top row has four tubes, the middle row has four tubes, and the bottom row has four tubes. The tubes are arranged in a grid pattern.

Summary of Collaborative Research on Vaccines

- Michael Kremer and Christopher Snyder (2004) “Why is There No AIDS Vaccine?”
- Michael Kremer, Christopher Snyder, and Heidi Williams (2004) “Vaccines: Integrated Economic and Epidemiological Models”

Popular Understanding of Firms' Bias Against Vaccines



•Chris Rock: “They ain’t curing AIDS because there ain’t no money in the cure. The money’s in the medicine. That’s how you get paid: in the “comeback”. ...Curing AIDS, that’s like Cadillac making a car that lasts for 50 years. You know they could do it but they ain’t doing anything that #%* @ & dumb.” (HBO special, 1999)

•Patricia Thomas, author of *Big Shot: Passion, Politics, and the Struggle for an AIDS Vaccine*: “Private companies find vaccines less financially rewarding than drugs. In 2001, the global marketplace for therapeutic drugs exceeded \$300 billion, whereas worldwide vaccine sales were only about \$5 billion It is not hard to understand why major pharmaceutical companies, capable of developing drugs and preventive vaccines, generally invest in drugs that patients must take every day rather than shots given only occasionally. Drug company executives have investors to answer to, after all.” (Thomas 2002)

Factors Affecting the Profitability of Vaccines Vs. Drugs



A. Policy Factors

- Liability concerns
 - Testing
 - Administering
- Government procurement

B. Inherent Factors

- + Vaccines prevent symptoms
- + Single/few doses
- ? Development costs, efficacy
- Tested on healthy people
- Administered to larger group than would have contracted disease

C. Wedge Factors

- Consumer myopia
- Free-rider problem
- Consumer heterogeneity
- “Durable good” problem

Wedge Factors

- Factors driving a wedge between social and the firms' benefits
- Firms' ability to extract consumer surplus
- **Consumer myopia** (also other behavioral factors)
- **Free-rider problem**
 - ❖ Geoffard and Phillipson (1997)
 - ❖ Boulier, Goldfarb, and Datta (2004)
 - ❖ Kremer, Snyder, and Williams (2004)
- **Consumer heterogeneity**
 - ❖ Kremer and Snyder (2004)
- **“Durable good” problem**
 - ❖ Kremer and Snyder (2004)



Simple Example of Consumer Heterogeneity



Total population: 100 consumers.

Low risk class:
90 consumers.
10% chance of
contracting disease.

High risk class:
10 consumers.
100% chance of
contracting disease.

Harm from disease: \$100

Simple Example of Consumer Heterogeneity

Vaccine revenue: \$1,000

- Charge \$100 (reservation price of high risk types) and sell to high risk only. Revenue \$1,000.
- Charge \$10 (reservation price of low risk types) and sell to all consumers. Revenue \$1,000.

Drug revenue: \$1,900

- Charge \$100 (reservation price of consumer contracting disease) to all consumers contracting disease. Expect 19 will contract disease on average (all 10 high risk types plus 10% of low risk types, 9).

Welfare: equivalent given above numbers, but firm would still develop drug even if efficacy were as low as 53%.



Consumer Heterogeneity

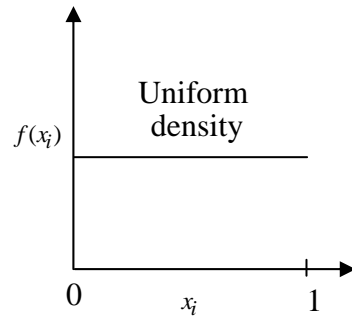
- Size-of-market effect, impacts vaccines differently from drugs because consumers have private information.
- Paper characterizes how large wedge can be in theory.
- Paper calibrates how large wedge can be in practice for HIV/AIDS.
- Paper empirically tests whether effect has influenced medicine development.



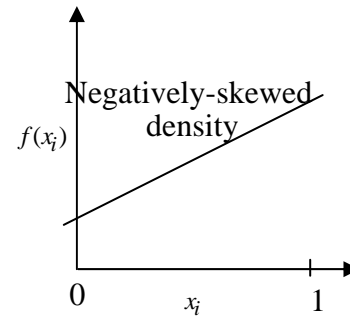
Theory



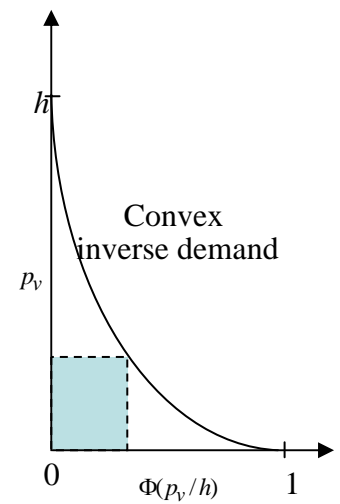
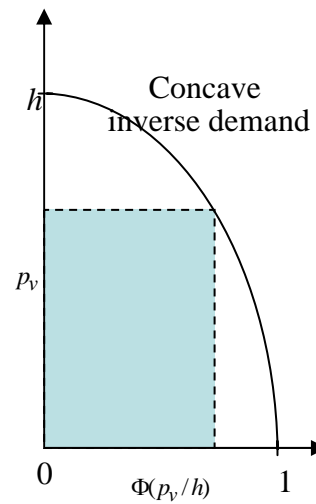
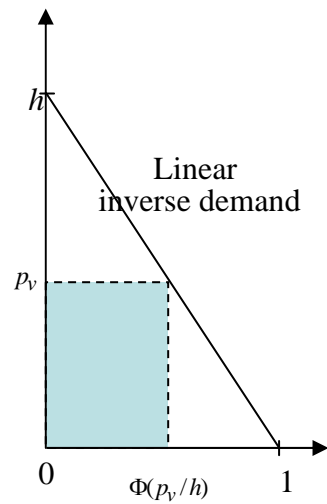
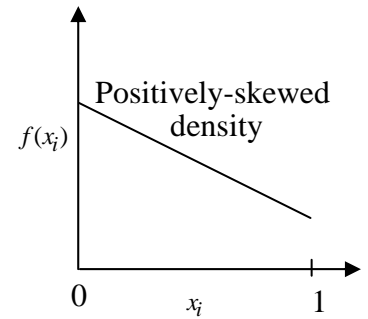
Panel I: $f'(x_i) = 0$



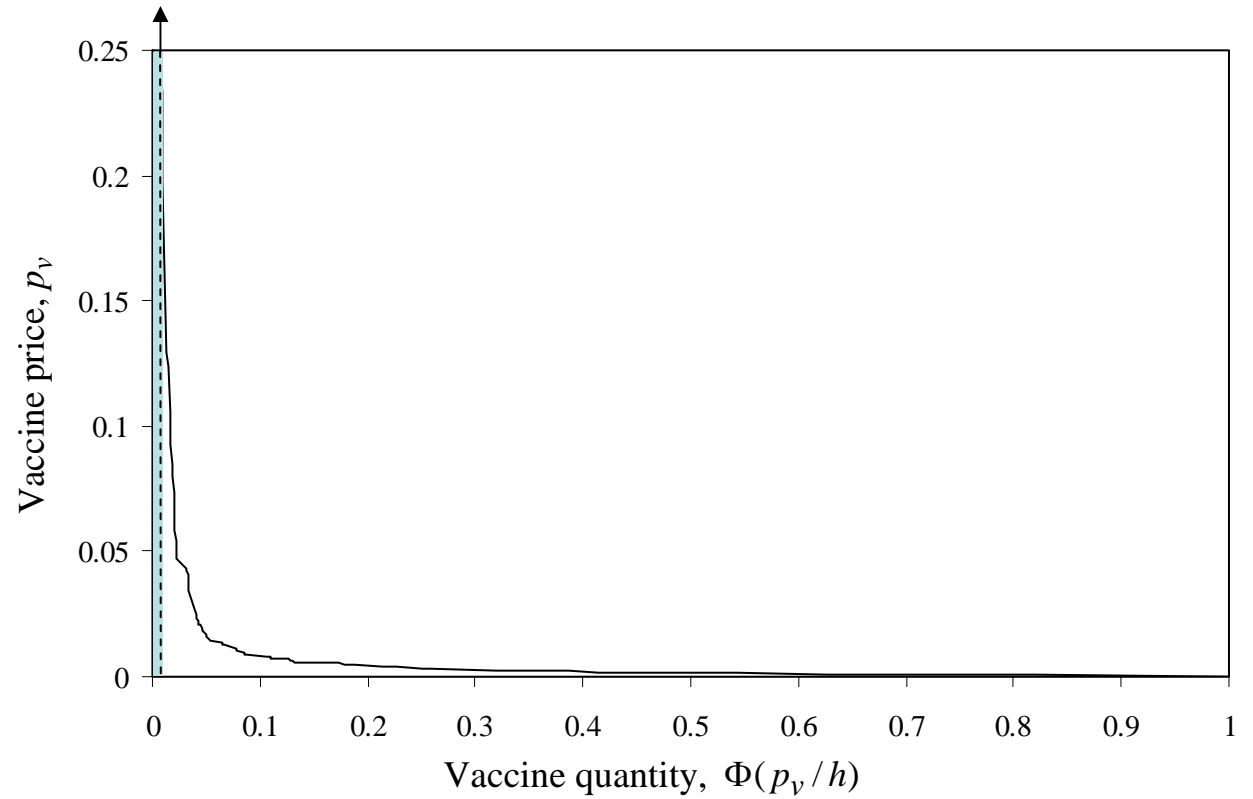
Panel II: $f'(x_i) > 0$



Panel III: $f'(x_i) < 0$



Calibration for HIV/AIDS in United States



Empirical Tests Based on Sexual Transmission



Transmission mode	Number of diseases in data set		
	Total	Vaccine Developed	Drug Developed
Sexually Transmitted	10	1	9
Non-sex. Transmitted	65	25	44
Total	75	26	53

Flu Vaccine

- **Consumer myopia** (also other behavioral factors)
- **Free-rider problem**
- **Consumer heterogeneity**
- **“Durable good” problem**

- One of the best-case scenarios for vaccines
- Problem with length of production process, forecasting demand

- If want assured supply, need to contract for (likely slack) capacity. Hold-up problem.

