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Inequality and Pharmaceutical Drug Prices:

A Theoretical Exercise

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Abstract:

Several studies report that in both developed and developing countries, the relatively poor individuals go without medical care, including pharmaceuticals. This situation is associated with both low income and inequality in the distribution of income. Additionally, data show that pharmaceutical prices in developing countries are sometimes higher than those in developed countries for identical products. In this paper, I explore the relationship between per capita income, inequality, and prices. Specifically, I develop a model of demand that shows the equilibrium price of a pharmaceutical drug produced by a monopolist will rise with (1) per capita income and (2) income inequality. In the context of multiple countries, the former result corroborates empirical findings on the statistically significant effect of per capita income on drug prices. The latter result has not been empirically tested. The results from this paper are, however, conducive to nonlinear regression techniques so that income inequality may be tested as a source of variation of drug prices across countries.

[1] a 84achem et al (1992), Mapelli (1993), Castro-Leal et al (2000), Makinen et al (2000).

theelevel of individual income and not onrgeg income.

elasticity of demand, these models thus do not produce the result that the markup and hence equilibrium price will depend in any way on per capita income. Put another way, there is no distinction for equilibrium pricing between having more consumers and having richer consumers.

There are, of course, many alternatives for modeling non-homothetic preferences. Ielpaper, ofutibr offun

$$X_i = \frac{\alpha}{\alpha + \beta}\left(\frac{\quad}{\quad}\right.$$

$$\frac{X_i}{Y_i} = \frac{\alpha(w_i}{\qquad}$$

[redacted]

Y_i

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

function of price, countries with different per capita incomes will also have different minimum requirements. Demand thus fluctuates with per capita income. These results do not hold when using total income. That is, there is no difference between having more consumers and having richer consumers.

IV. Income Distributions and Increasing Inequality

The role of income inequality is to show that the price elasticity of demand--at both the individual and aggregate levels--drives the results. Rising inequality lowers the price elasticity of market demand (in absolute value) because the rich are getting richer. As a result, the equilibrium price rises.

With increasing inequality, fewer people are able to meet the minimum requirement.

$$f(w) = \frac{1}{w^{u}}$$

$$g(w) = \frac{1}{w^u + \delta - w^l}, \qquad w^l$$

[4] IMS Health.

[5] Atkinson (1970).

[redacted]

[redacted]

$$h(w) = \frac{1}{w^{u} - w^{l} + 2\delta}$$

[6] IMS Health.

[redacted]

$f($

$$\int_{w} F(w,$$

[8] World Bank, 2001.
[9] Atkinson (1970).

however, deserves a different interpretation. The first two models show that the equilibrium price is concave in dispersion. The third model shows price to be convex in dispersion. Relative to model 3, models 1 and 2 protect the rich. Price increases are relatively smaller as the rich get richer.

In the context of multiple countries, the price of a pharmaceutical as developed in this

References:

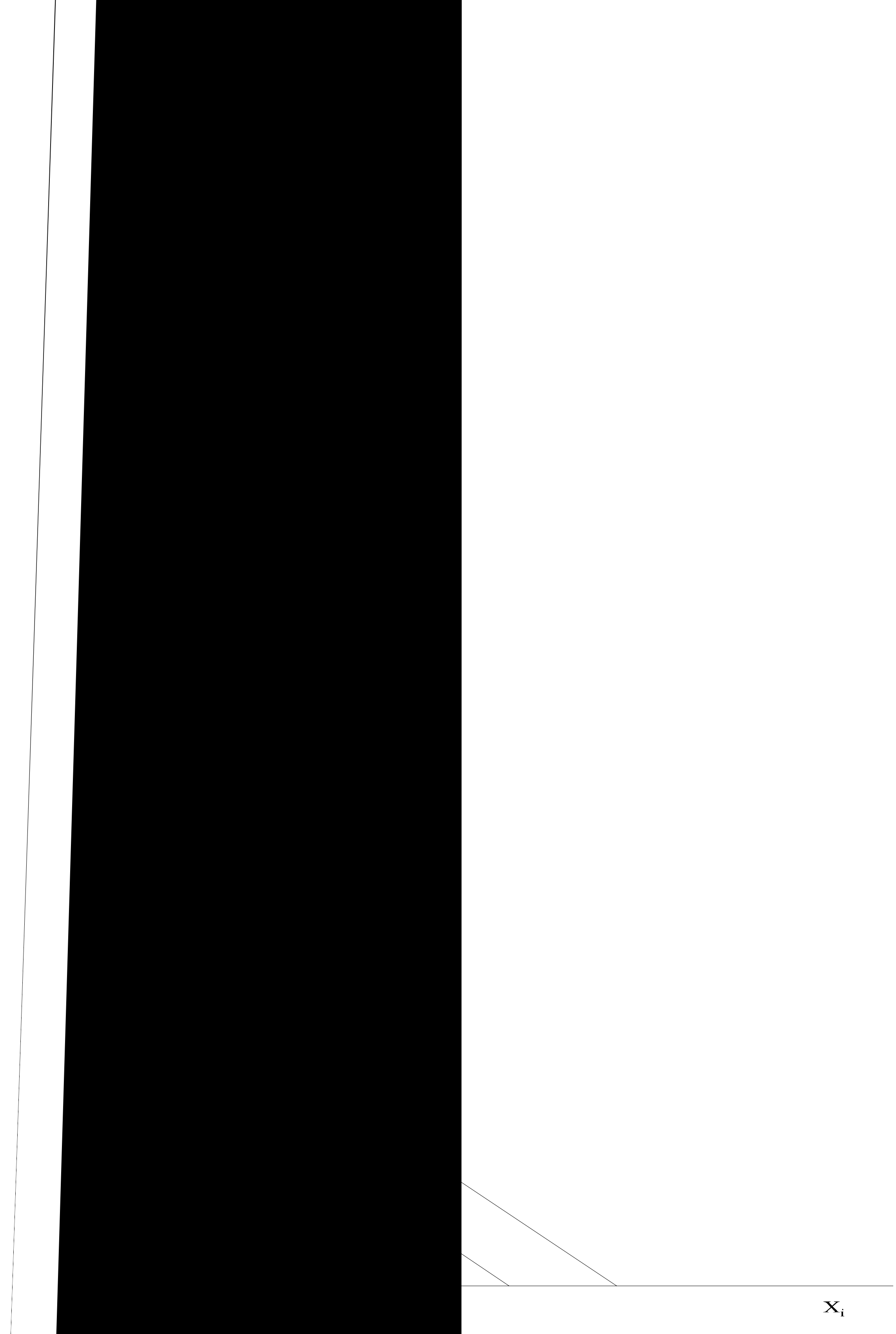
Atkinson, A.B. 1970. "On the measurement of inequality," *Journal of Economic Theory* 2 (3): 244-63.

Castro-Leal, F., J. Dayton, L. Demery, & K. Mehra. 2000. "Public spending on health care in Africa: do the poor benefit?" *Bulletin of the World Health Organization* 78 (1):66-74.

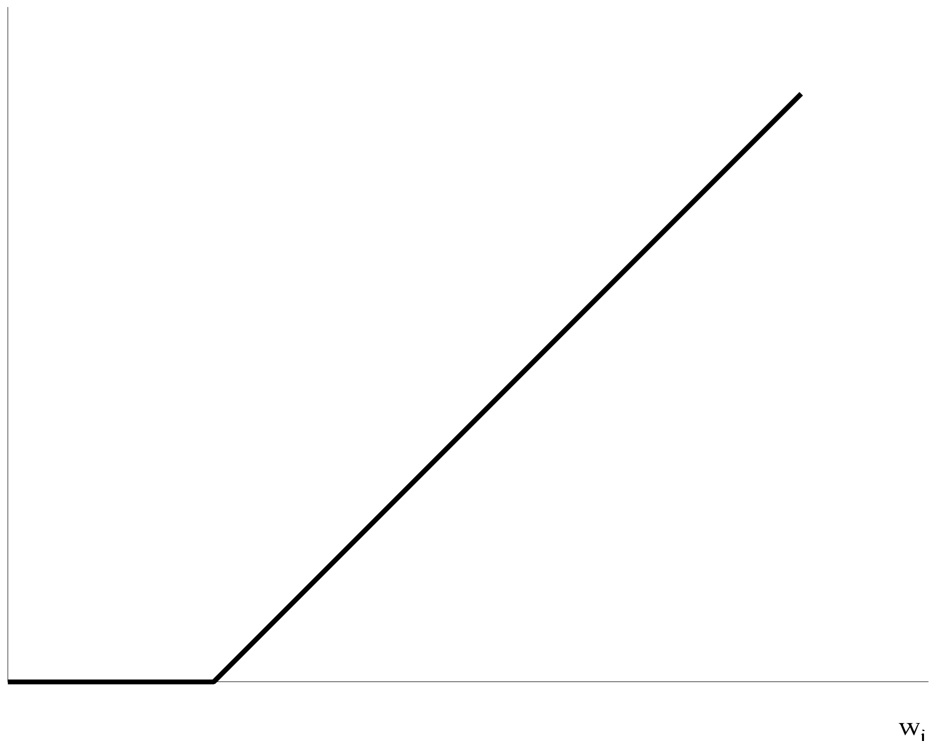
Appendix

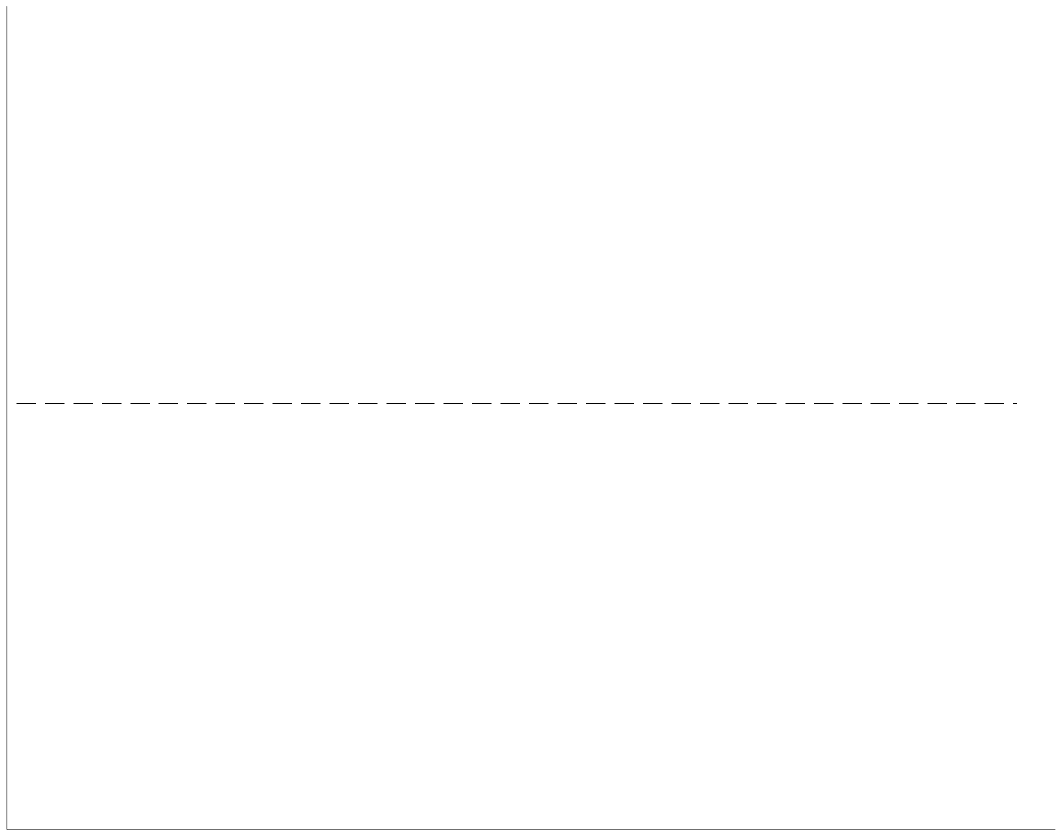
Effects of increasing dispersion on: (relative to benchmark distribution)

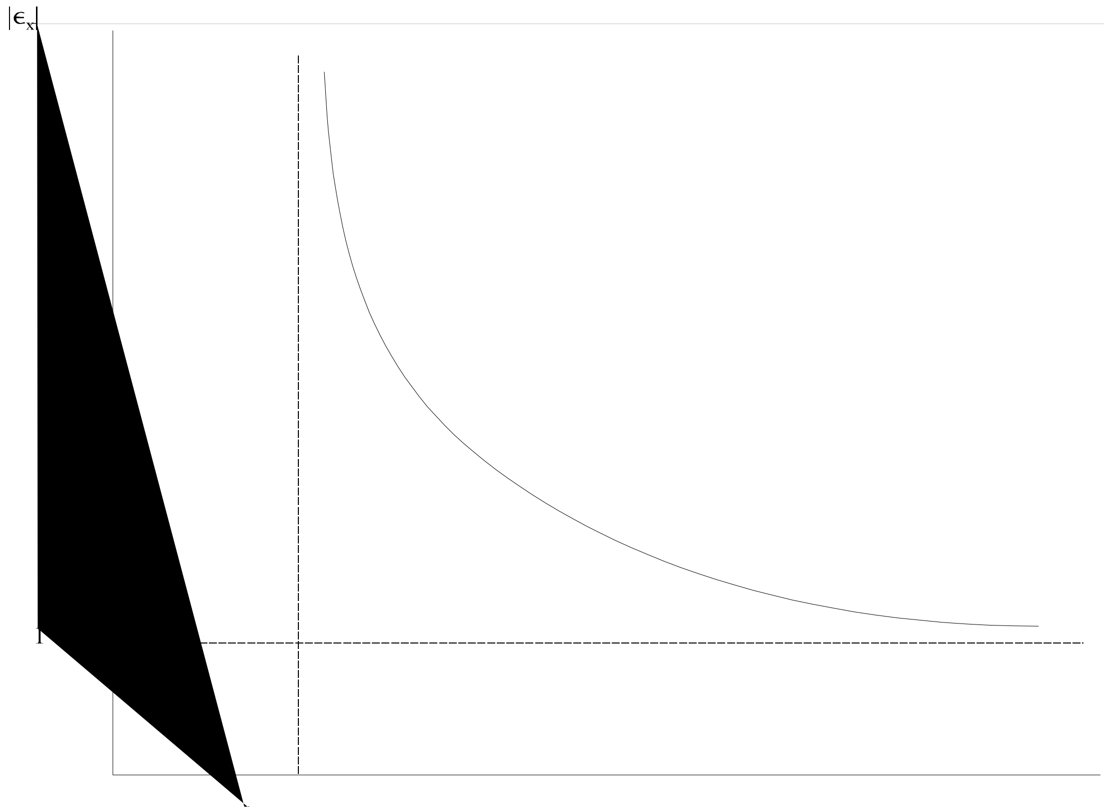
	Model 1 (*)	Model 2 (*)	Model 3 (2)
Mean income	increasing	constant	constant
Total wealth	increasing	constant	constant
Upper income limit	increasing	increasing	constant
Lower income limit	constant	decreasing	constant
p_x^*	increasing, concave	increasing, concave	increasing, convex
X(p,w,*,2)	decreasing	decreasing	decreasing
Y(p,w,*,2)	increasing	increasing	increasing
X(p,w,*,2)/Y(p,w,*,2)	decreasing	decreasing	decreasing
Type of dispersion:	first-order stochastic dominance	mean-preserving spread	mean-preserving spread



x_i


w_i





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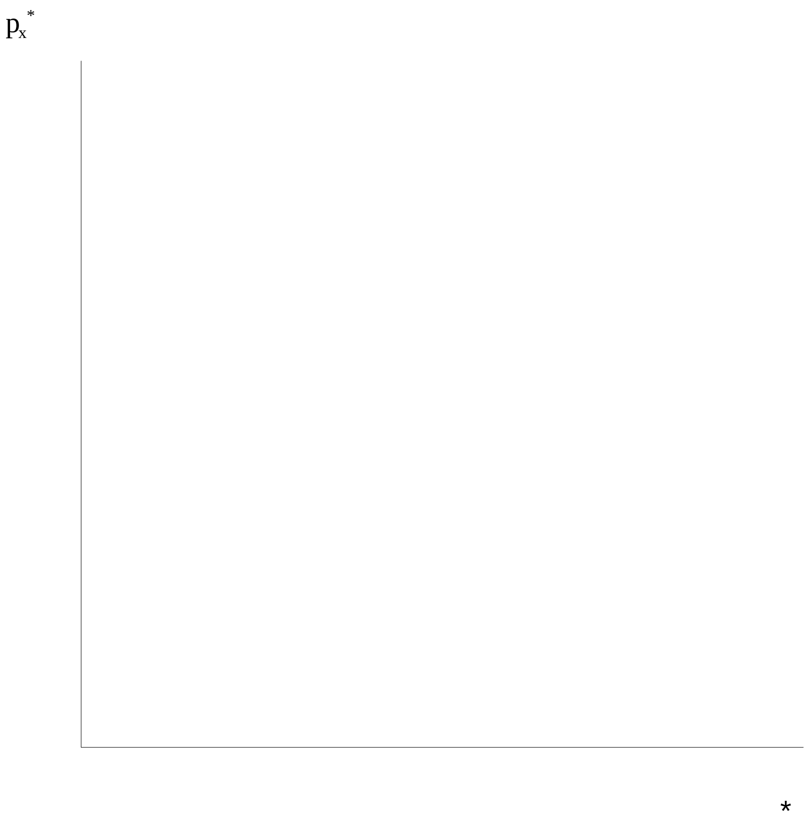
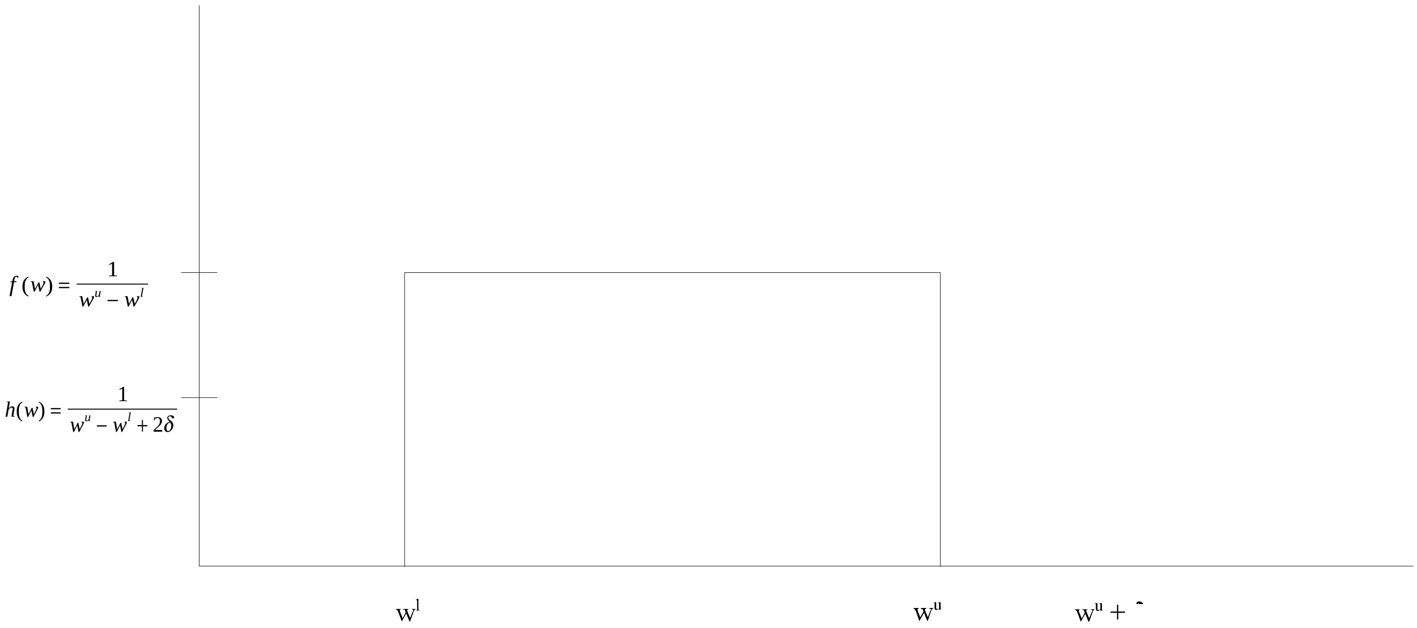
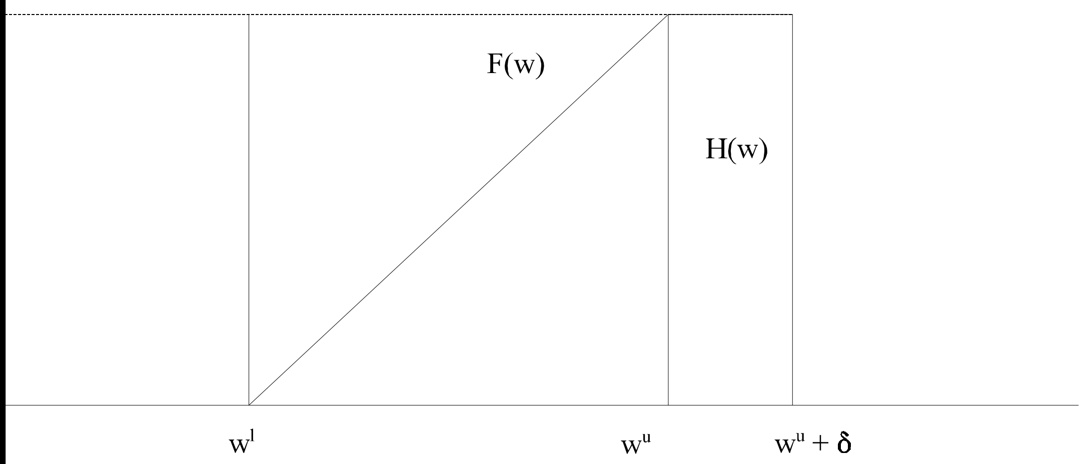
1


p_x^*
*



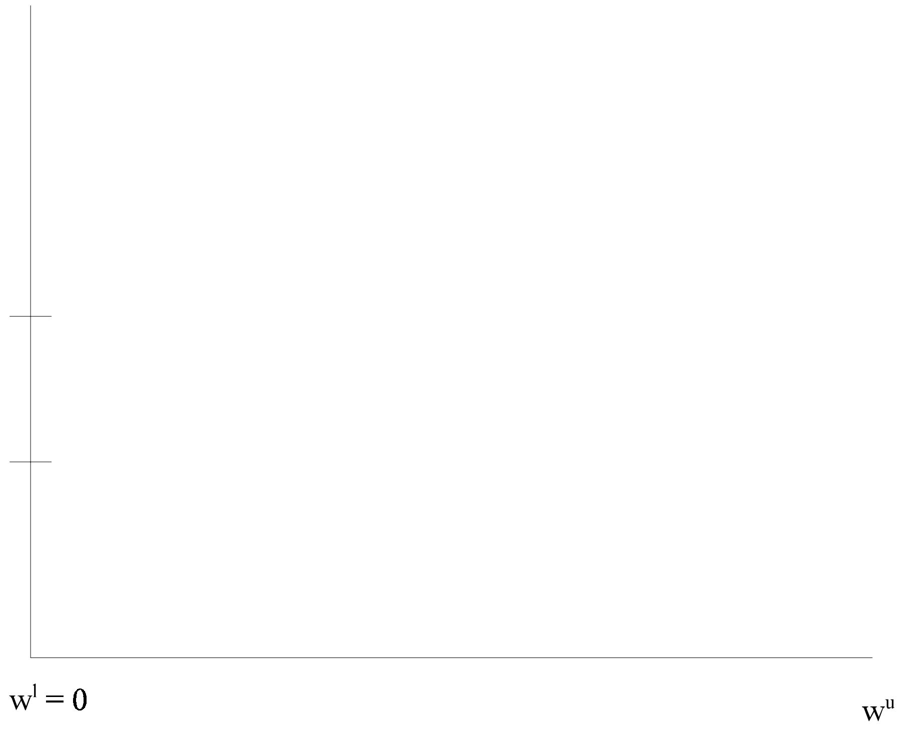
$f(w) = \frac{1}{w^u - w^l}$
$h(w) = \frac{1}{w^u - w^l + 2\delta}$
w^l
w^u
$w^u +$


F(w)
H(w)
w^l
w^u
w^u + δ

[redacted]

w^u

[redacted]



Figure

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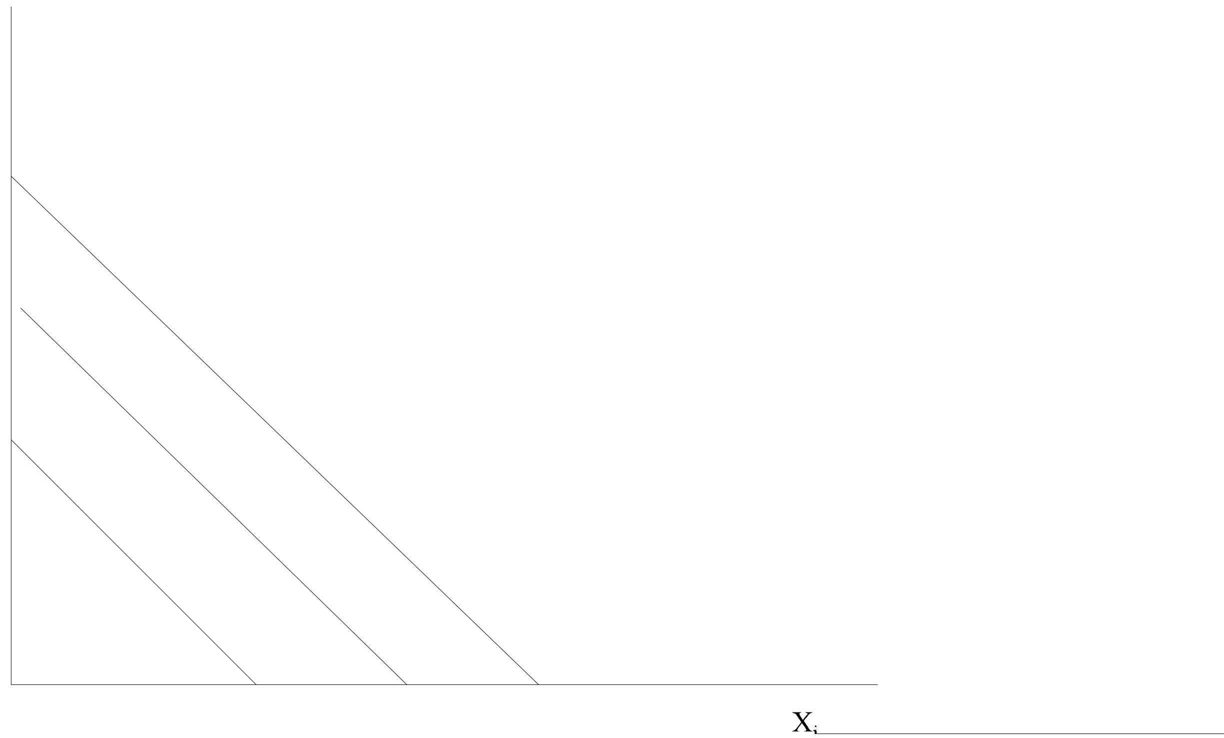
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