

# Pass-Through as an Economic Tool

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# Introduction

- Elasticities very informative in competitive models
    - Will raising tax raise revenue?
    - Sufficient statistic for welfare (Chetty 2008)
  - But monopolist takes this into account...
    - So now *pass-through* governs comparative statics
- ⇒ Crucial parameter when market power

# What is pass-through and why is it so useful?

Pass-through  $\rho \equiv \frac{dp^*}{dc}$

- Driven by log-curvature
- Clearly determines cost-price comparative statics
- Unitless measure of sharpness of monopoly problem

$$\rho = \frac{1}{-\frac{d^2 \pi}{dm^2} \frac{m^2}{\pi}}$$

⇒ Determines quantity analog as well

- Consumer surplus is what makes monopolist indecisive

⇒ Size of tails given by pass-through as well

$$\frac{V(p^*)}{\pi(p^*)} = \frac{\int_{p^*}^{\infty} \mu(p) \rho(p) dp}{\int_{p^*}^{\infty} \mu(p) dp}$$

- Makes simple assumptions identifying in many problems
  - I.E. pass-through on same side of 1 over some range

# Examples of applications

- 1 Double marginalization and Cournot competition
  - Which side of 1+sign of slope  $\implies$ 
    - Ranking of firm and industry markups/quantities and profits
- 2 Symmetric markets with many products
  - Horizontal demand or most discrete choice  $\implies$ 
    - Strategic complements v. substitutes: PT v. 1
    - Short- and long-run own same side as industry PT
    - Effect of mergers, entry on prices
- 3 Two-sided markets (Rochet and Tirole 2003)
  - All major positive and normative properties: PT v. 1
- 4 Mergers (Froeb et. al. 2006, Farrell and Shapiro 2008)
  - Efficiencies +cannibalization determine sign
  - Pass-through, strategic effects determine scale

Ergo, important to measure not assume

# But most functional forms restrict!

	$\rho < 1$	$\rho > 1$	Price-dependent
$\rho' \wedge 0$			AIDS
$\rho' \vee 0$	Normal (Gaussian) Logistic Type I Extreme Value (Gumbel) Double Exponential Type III Extreme Value (Reverse Weibull) Weibull with shape $\alpha > 1$ Gamma with shape $\alpha > 1$		Type II Extreme Value (Fréchet) with shape $\alpha > 1$
Price-dependent			
Does not globally satisfy MUC		Type II Extreme Value (Fréchet) with shape $\alpha < 1$ Weibull with shape $\alpha < 1$ Gamma with shape $\alpha < 1$	

# Conclusion

To overcome, three approaches

- 1 Weak assumptions (sufficient statistics)
- 2 Non-parametric tests on different data
- 3 More flexible functional forms

- Monopoly: match level, elasticity,  $\rho$ ,  $\rho'$

- “Apt” demand

$$D(p) = \lambda \left( |\bar{p} - 1| \sqrt{|p - \bar{p}|} - 2\bar{p}\alpha \right)^{\frac{2\bar{p}}{1-\bar{p}}}$$

- Very flexible, but also extremely tractable

- For differentiated Bertrand/Cournot PT and X-PT

- Constant pass-through demand system

$$D_i(p_i, \mathbf{p}_{-i}) = f_i(\mathbf{p}_{-i}) \left( [1 - \rho_i] \left[ \tilde{p}_i - p_i + \sum_{j \neq i} \beta_{ji} p_j \right] \right)^{\frac{\rho_i}{\rho_i - 1}}$$

- Flexible symmetric demand system