

The Impact of Integration on Productivity and Welfare Distortions under Monopolistic Competition

Swati Dhingra and John Morrow

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- Does firm heterogeneity introduces a new dimension?
 - Does the market select the right distribution of firm productivity?
 - Are the relative quantities across firms optimal?
- If there are distortions, what are they?
- Can integration reduce distortions through increased competition?

Approach & Summary

- Generalize Spence-Dixit-Stiglitz to heterogeneous firms.
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- Scope for policy when markups vary.
- What are the distortions?
- Can integration be a policy tool to correct distortions? (Large Mkts)

Outline

1 Introduction

2 Welfare & Revenue

VES Demand

Firm Level Incentives

3 Integration with Large Markets

Integration and Market Size

Large Markets and Efficiency

4 Market Distortions

Distortions and Demand Characteristics

5 Conclusion

Variable Elasticity of Demand

- To arrive at VES demand, replace the CES integrand $[q(c)]^\rho$ with a general function $u(q(c))$ (regularity conditions in paper):

$$U(M_e, q) \equiv M_e \int_0^{c_a} u(q(c)) dG.$$

Firms

- Pay sunk entry cost f_e to draw unit cost c from absolutely continuous distribution G .
- Cutoff cost level of firms indifferent about exiting is c_a .
 - “When I say productivity increases, I mean $c_a \downarrow$.”
- Free entry: Ex ante expected profit $\int \Pi(c) dG = f_e$.
- Letting δ denote the consumer's budget multiplier (aka $1/\text{wage}$), firms maximize profits

$$\pi(c) \equiv \max_q \underbrace{L [u'(q) / \delta] q}_{\text{Revenue}} - \underbrace{Lcq}_{\text{Variable Costs}} - \underbrace{f}_{\text{Fixed Cost}}.$$

Revenue Maximization vs Welfare Maximization

Result. *Under VES demand, similar to PC, the market maximizes aggregate real revenue generated in the closed economy.*

$$\text{Total Real Revenue} = \underbrace{M_e}_{\text{Mass of Entrants}} \cdot \int_0^{c_a} \underbrace{Lu'(q(c)) q(c)}_{\text{Real Revenue}} dG.$$

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- For CES demand, $u(q) = q^\rho$ while $u'(q)q = \rho q^\rho$.
- Revenue maximization is perfectly aligned with welfare maximization.

Result. *Within the VES class, CES demand is necessary and sufficient for market efficiency.*

Incentives at the Firm Level Pt 2

- Define the inverse demand elasticity and elasticity of utility by

$$\mu(q) \equiv d \ln p(q) / d \ln q = |u''(q) q / u'(q)|$$

$$\varepsilon(q) \equiv d \ln u(q) / d \ln q = |u'(q) q / u(q)|$$

- In equilibrium, $\mu(q)$ summarizes markups:

$$\mu\left(q^{\text{mkt}}(c)\right) = (p(c) - c) / p(c)$$

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Utility	$u(q)$	$\mu(q) = -u''q/u'$	$1 - \varepsilon(q) \equiv 1 - u'q/u$
CES	q^ρ	$1 - \rho$	$1 - \rho$
Quadratic	$q - \alpha q^2/2$	$\alpha q / (1 - \alpha q)$	$\alpha q / (2 - \alpha q)$
CARA	$[1 - e^{-\alpha q}] / \alpha$	αq	$1 - \alpha q / [e^{\alpha q} - 1]$

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Integration and Market Size

In the absence of trade frictions, trade between countries of sizes L_1, \dots, L_n has the same outcome as a unified market of $L = L_1 + \dots + L_n$.

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- With heterogeneous markups, market allocations are not efficient.
- Can increased integration eventually reduce market distortions?
- To capture this idea: “What happens as total market size $L \rightarrow \infty$?”
- Large markets: per capita quantity q sold by each firm $\rightarrow 0$.
- Similar to competitive limit: Number of entrants grows large.
- Make assumptions to get monopolistically competitive limit.
- Pin down distribution of productivity, prices and quantity when firms are heterogeneous.

Large Markets and Efficiency

Result. Under the large market assumptions, as market size L grows large the market approaches the *monopolistically competitive limit*.

- 1 Prices, markups and expected profits converge to positive constants.
- 2 Per capita quantities $q(c)$ go to 0, total quantities $Lq(c)$ converge.
- 3 Relative qtys $Lq(c)/Lq(c_d)$ converge to $(c/c_d)^{-1/\alpha}$
where $\alpha = \lim_{q \rightarrow 0} \mu(q)$.
- 4 The entrant per worker ratio M_e/L converges.
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- Markups converge, corresponds to CES with $u(q) = q^{1-\alpha}$.
 - Integration (with large markets) eliminates distortions.

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Firm Markups and Misalignment of Incentives

- Pattern of “profits” across firms determined by μ' and $(1 - \varepsilon)'$:
 - $\mu'(q) > 0$: high qty (=low cost) firms receive higher markups.
 - $(1 - \varepsilon(q))' > 0$: high qty firms provide higher “social markups”.
- Vice versa for $\mu'(q) < 0$ and $(1 - \varepsilon(q))' < 0$.

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- Private and social incentives:
 - **Partially aligned** when μ' and $(1 - \varepsilon)'$ have the same sign.
 - **Misaligned** when μ' and $(1 - \varepsilon)'$ have different signs.
- Key distinction for understanding distortions.

Examples: Private and Social Incentives

	$(1 - \varepsilon)' < 0$	$(1 - \varepsilon)' > 0$
$\mu' > 0$	Generalized CES ($\alpha > 0$)	HARA ($\alpha > 0$), CARA, Quadratic Expo-power ($\alpha > 0$)
$\mu' < 0$	HARA ($\alpha < 0$) Expo-power ($\alpha < 0$)	Generalized CES ($\alpha < 0$)

- Expo-power: Post et al. (AER 2008) $[1 - \exp(-\alpha q^{1-\rho})]/\alpha$.
- HARA: $[(1 - \rho)/\rho] \{[q/(1 - \rho) + \alpha]^\rho - \alpha^\rho\}$.
- Generalized CES: Dixit-Stiglitz $(q + \alpha)^\rho$.

Summary: Imperfections by Demand Characteristics

$$(1 - \varepsilon)' < 0$$

$$\mu' > 0$$

$$(1 - \varepsilon)' > 0$$

Quantities Low-Cost Skewed:

$$q^{\text{mkt}}(c) > q^{\text{opt}}(c) \text{ for } c < c^*$$

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Integration->productivity: (similar relations w/ $(1 - \varepsilon)'$, μ').

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 - VES demand provides richer structure for estimation & interpretation.
- CES uniquely efficient, otherwise private and social markups not perfectly aligned.
- How does integration affect distortions?
 - Large Market: Converge to efficiency and CES is a reasonable approximation. Help small economies mitigate the distortions of imperfect competition
 - Small Market: Can use richer markups to pin down the distortions.
- How large is large is an open quantitative question.