Product Quality in Different Markets and Cost Structure

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Outline

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1. Introduction

- Two anecdotes on Japanese Firms
- What this paper tries to do
- Results

Two anecdotes on Japanese Firms

1. Struggling in the markets of emerging economies.
   - One reason: high prices with (unnecessarily) high quality/functions.
2. Japanese consumers are so demanding that they have to deal with it.
   - Japan is still one of the most important market for them.

What this paper tries to do

1. to analyze the behavior of monopoly firm serving its vertically differentiated products to two countries
   - Country 1: developed
   - Country 2: developing/emerging

   with different types of consumers:

   Country 1 consumers value quality more.

What this paper tries to do

2. to focus on costs of product quality:

Name	depends on	Example
production cost	quality and quantity	quality control, sales network
R&D cost	only quality	R&D, advertisement

Results

Two Strategies of quality assignment

- Different quality: low-q → country 2,
  high-q → country 1.
- Common quality: same-q to both.

Propositions

1. Only production costs → different q.
2. Only R&D costs → common q.
3. General case: cutoff value of the utility parameter of country 1 consumers.

Results

4. Application: how to enter country 2

location/quality choice:

Exports with common q

vs.

FDI with different q

- Result: threshold curve of the unit trade cost and the utility parameter.

2. Model

- Basic setup
- Utility and Pricing
- Costs of product quality

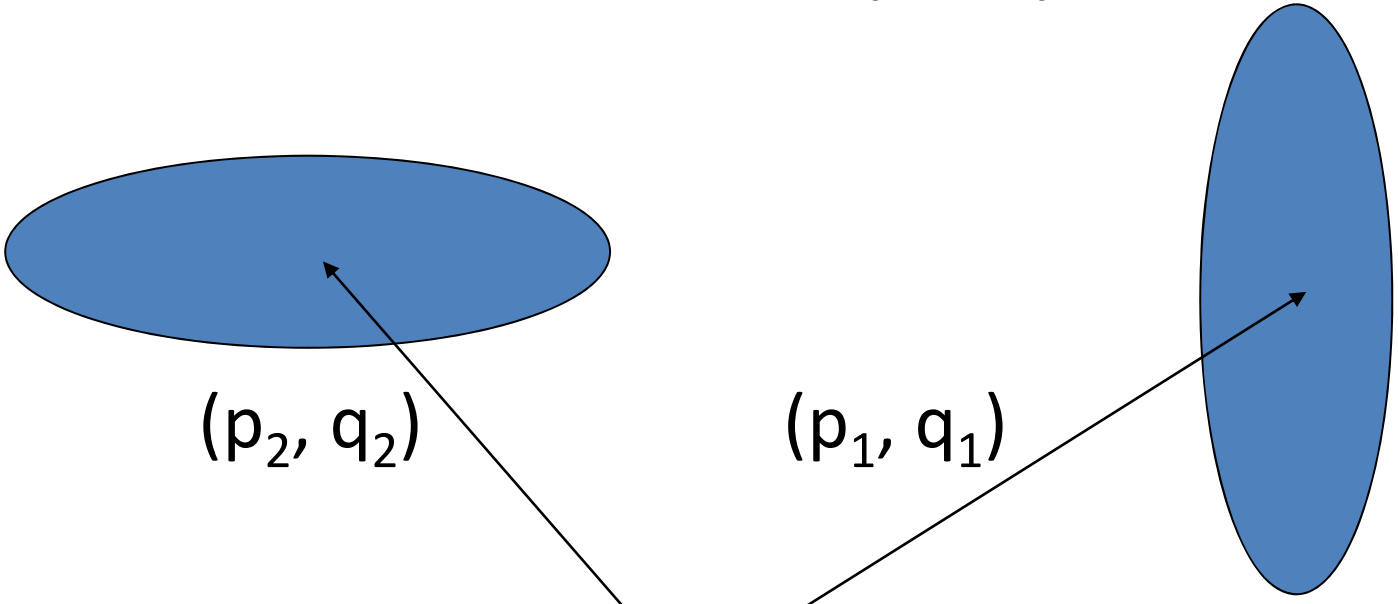
Basic Setup

Country 2

more consumers

Country 1

more quality valuation



Monopoly Firm in country 1

(vertical: quality valuation, horizontal: population)

Basic Setup

- Based on Mussa and Rosen (1978 JET).

- n_i = number of consumers in country *i*.

  $n_2 \geq n_1$

- two markets are segmented,

  i.e. no parallel imports.

Utility and Pricing

- Utility of consumer in country *i*

  $U = a_i q - p.$

  a_i = degree of quality valuation.

  $a = a_1 \geq a_2 = 1$

- For a given level of *q*, the firm sets the price at $a_i q$, i.e. zero consumer surplus.

Costs of Product Quality

$C(x, q) = c(x, q) + F(q)$.

x = quantity.

$c(x, q)$ = production costs:

costs depending on both quantity and quality.

$F(q)$ = R&D costs:

costs depending only on quality.

Assume

$C(x, y) = (c/2)\, q^2 x + (d/2)\, q^2$.

3. Results

- Proposition 1: only production costs
- Proposition 2: only R&D costs
- Proposition 3: both production and R&D costs

Prop. 1: only production costs

- *The optimal strategy for the monopoly firm is to assign the different levels of product quality to each of the two markets.*

- Intuition

  by charging for a higher level of quality in country 1, a>1, the firm enables to increase its profits.

Proposition 2 : Only R&D Costs

- Assumption: only one plant with common-q.
- *The optimal strategy for the monopoly firm is to assign the common level of product quality to each of the two markets.*
- Intuition

By providing the common quality, the firm enables to utilize the scale economy of the R&D costs.

Proposition 3 : General Case

- *A cutoff value of "a" exists.*

  If $a < a^*$ → common q is optimal.

  If $a > a^*$ → different q is optimal.

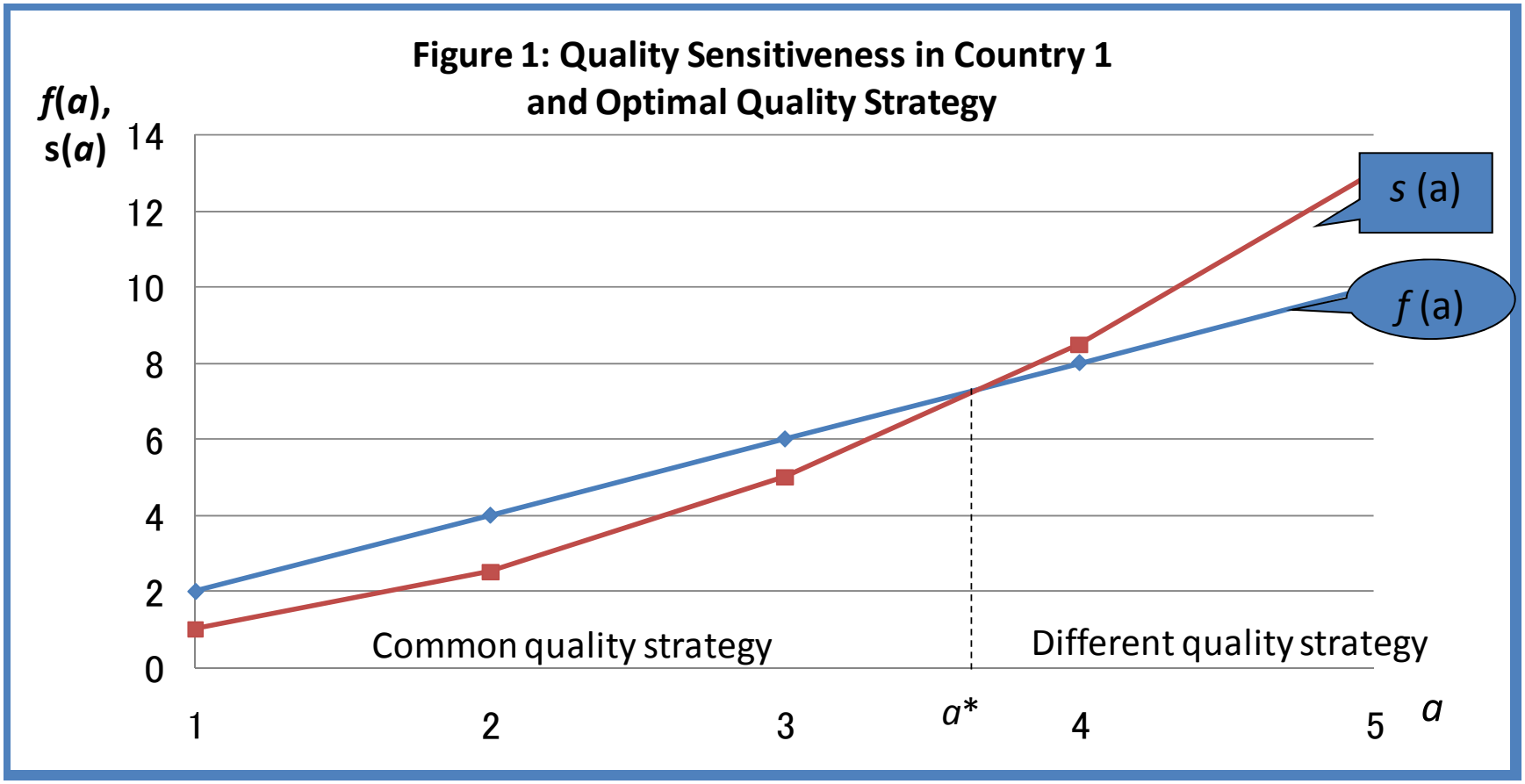
- Effects on a^*

  -c: (-) i.e. different q more likely.

  -d: (+) i.e. common q more likely.

  -n_1 and n_2: (-) respectively.

General Case



4. Application: FDI vs. Exports

- Motivation
- Assumption
- Result
  - proposition 4 and figure 2
  - comparative statics

Motivation

- How to enter the country 2 market?

  The unit trade cost, t, should be important.
- So far it is not, because trade costs are constant at $n_2 t$ with either strategies.

→ any relationship between the way of entry and product-quality strategy?

Assumption

Suppose:

- Exports: only common q is possible.
- FDI: only different q is possible.

  e.g. R&D centers in both countries.

→FDI can save trade costs but has to spend more on R&D.

Result: Proposition 4

- A threshold curve of *"t"*, a quadratic function of *"a"*, exists.

  If (a, t) is below the curve

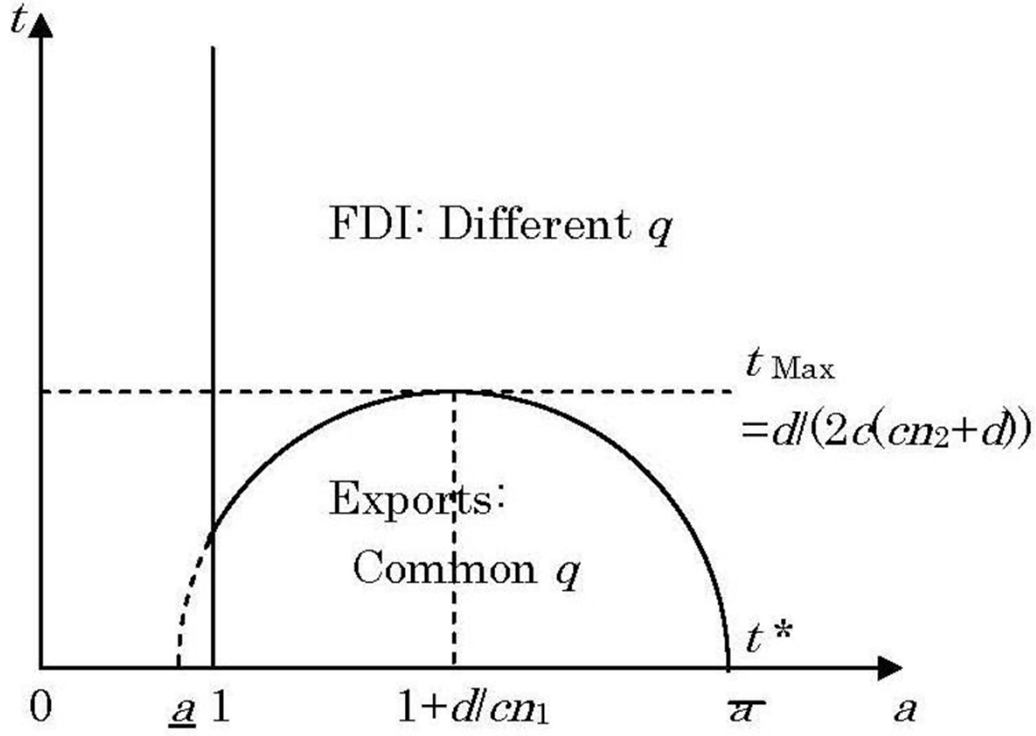
  → exports/common q is optimal.

  If (a, t) is above the curve

  → FDI/different q_s are optimal.

Proposition 4 by Figure

Figure 2: Quality Sensitivity in Country 1, Unit Trade Cost, and Optimal Plant Location/Quality



Comparative statics

- Effects on t^*

  (+) means exports with common q more likely.

  -c: (-) if $cn_1 > d$ and $a > 1+d/cn_1$.

  -d: (+) if $2c^2n_1n_2 > d^2$.

  -n_2: (-) if $a = 1+d/cn_1$.

  -$n_{1:}$ (-) if a > $1+d/cn_1$.

  (+) if <

5. Implication from the model

In the real world,

(1) a > 1 but decreasing in many developed economies.

(2) n_2 is large and increasing.

→Developed-country firms should take the different-quality strategy.

5. Implication from the model

- And some successful MNEs do.

  e.g. Nestle (food),

  Unilever (consumer products),

  and GE (medical equipment).

6. Extensions

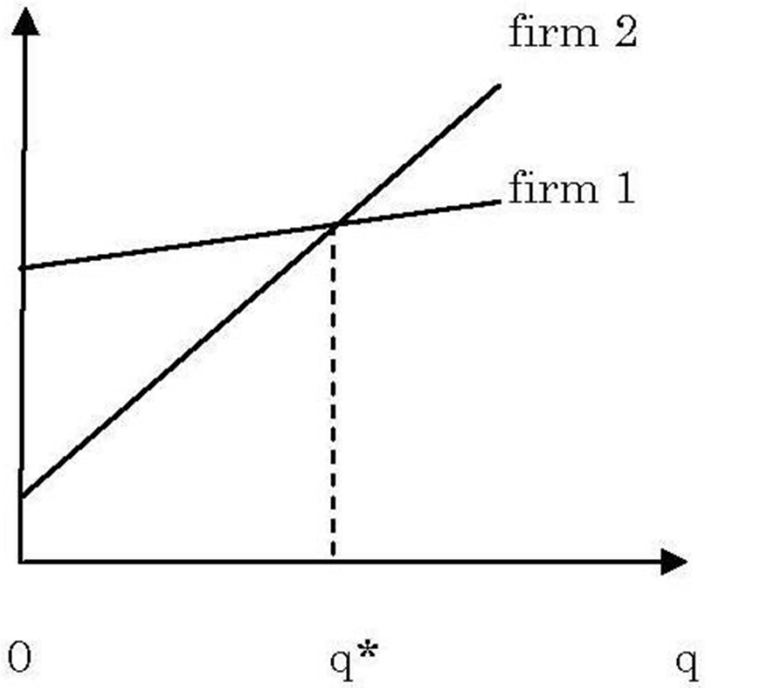
0. decreasing parameters

$n_1 = 1$. $n_2 = n$.

1. Duopoly in Country 2

- Local incumbent:
  - lower quality
  - but lower costs.

$$\frac{\partial C}{\partial q}(x = n_2) = (cn_2 + d)q + F_i, i = 1, 2.$$



6. Extensions

2. Assuming Income distribution of consumers
   → downward-sloping demand curve.

3. General symmetric model: one firm in each country may enter the other country.

Additional Reference

- Fajgelbaum, Pablo, Gene M. Grossman, and Elhanan Helpman, “Income Distribution, Product Quality, and International Trade.” presented at Hitotsubashi COE Conference 2010, December 2010 (also as NBER Working Paper 15329).

Thank you for your attention.