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Comparisons of Hospital Output in Canada: National and International Perspectives

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Background

Table 1: Health Care Expenditures in G7 Countries in 2004

Country	% of GDP	% Publicly Funded	Health as % of Government exp.	Expenditure per person (US$)
Canada	9.8	69.8	17.1	3,038
France	10.5	78.4	15.4	3,464
Germany	10.6	76.9	17.3	3,521
Italy	8.7	75.1	13.7	2,580
Japan	7.8	81.3	17.2	2,823
U.K.	8.1	86.3	15.9	2,900
U.S.A.	15.4	44.7	18.9	6,096

Source: WHO (2007)

Background (conti.)

- Expenditures are increasing over time in many OECD countries
- International comparisons are mostly done with expenditure, not output
- Better policy analysis and political debate need decomposition of expenditure change into price change and quantity change
- Complexity of the health care sector leads to measurement problems

Index Number Problem

- Product identity:

$$P(p^1, p^2, q^1, q^2)Q(p^1, p^2, q^1, q^2) = \frac{p^2 \cdot q^2}{p^1 \cdot q^1}$$

or

Price index $\times$ Quantity index = Expenditure ratio

where 1 = base period, 2 = comparison period

- We need to measure the price index or quantity index (but not both).

Health Care Sector

- Most consumers are covered by insurance, prices are not well-defined
- Definition of quantity is ambiguous
- New treatment methods over time, that is, q^1 and q^2 are of different dimension (new goods problem)
- Technological changes lead to quality changes

What to Measure?

1. Inputs — hospitals and clinics, doctors, nurses, drugs, etc.

2. Activities — hospital visits, surgeries performed, diagnostic tests, etc.

3. Outputs — courses of treatment adjusted for severity, length, and quality of care

4. Outcomes — health status of patients adjusted for environmental and socio-economic factors

Some International Practices

- U.S. — measuring prices: MPPI uses invoices from clinics and patients' bill according to ICD codes.

- U.K. — measuring activities as quantities using costs (expenditures) as weights.

- Canada — using expenditures as outputs except out-of-pocket expenses (see Sharpe, Bradley, and Messinger, 2007).

- Consequence: international comparison of real outputs in health care is somewhat meaningless.

Direct Output Measurement: A Proposal

- Use courses of treatment (episodes) as quantity according to ICD codes

- Need relative cost (expenditure) shares as weight for aggregation

- Need some outcome measures for quality change adjustment

Laspeyres Index

$$Q_L = \sum_{i=1}^{N} s_i^1 \frac{e_i^2}{e_i^1} \frac{q_i^2}{q_i^1}$$

where

$$\begin{aligned} s_i^1 &= \text{base period cost share of episode } i \\ e_i^t &= \text{outcome measure of episode } i \text{ in period } t \\ q_i^t &= \text{number of episode } i \text{ in period } t \end{aligned}$$

Paasche Index: Use comparison period cost shares s_i^2.

Fisher Index: Geometric means of the two.

Practical Matters—Hospital Output

- One of these two approaches can be used to measure q:

  1. Number of episodes for each Case Mix Group (CMG)

  2. Number of episodes for each category of diseases defined within the ICD-10-CA classification

- For the cost shares s:

  1. Use RIW values if CMGs are used

  2. Use average cost per episode if ICD-10-CA categories are used

- If there is a quality change for a CMG between the two periods, we need the outcome measure e_i^t

- These are currently not available for each CMG

Outcome Measures

- Overall measures: life expectancy, mortality rates, etc.

- Physiologic measures: blood pressure, blood sugar level, hormone level, etc.

- Utility approach: disability-adjusted life year (DALY), quality-adjusted life year (QALY), health-year equivalent (HYE), etc.

- Contingent evaluation: willingness-to-pay for a new treatment method

An Experimental Quantity Index

- CMGs from 1996–2000 and 2003–2005
- RIW from Discharge abstract database (DAD)
- Assume no quality change in consecutive years
- Chained Laspeyres, Paasche, and Fisher indices
- Quality adjustment can be incorporated once available in the future.

Figure 1: Output Indices for Hospitals in Canada, 1996–2000

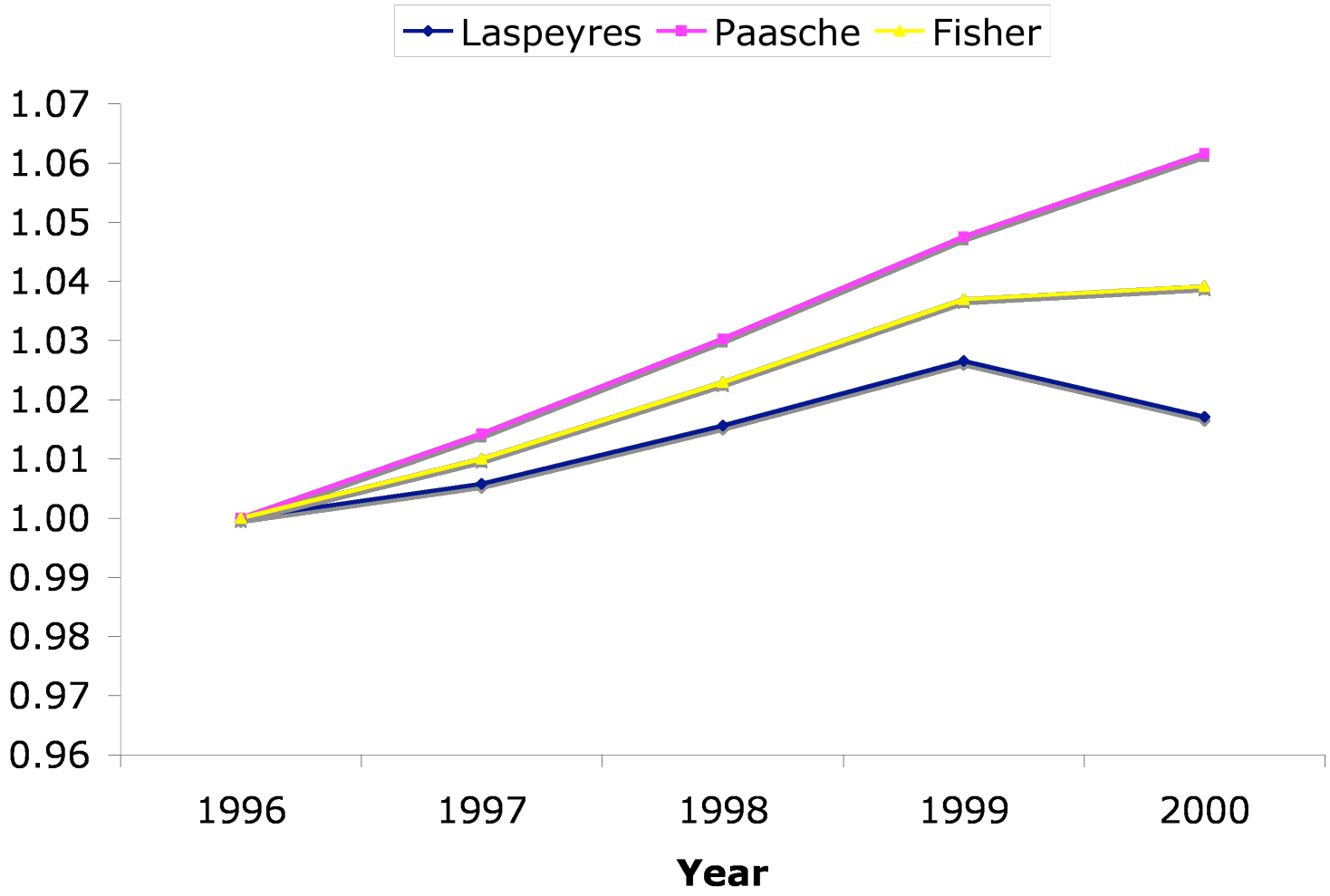
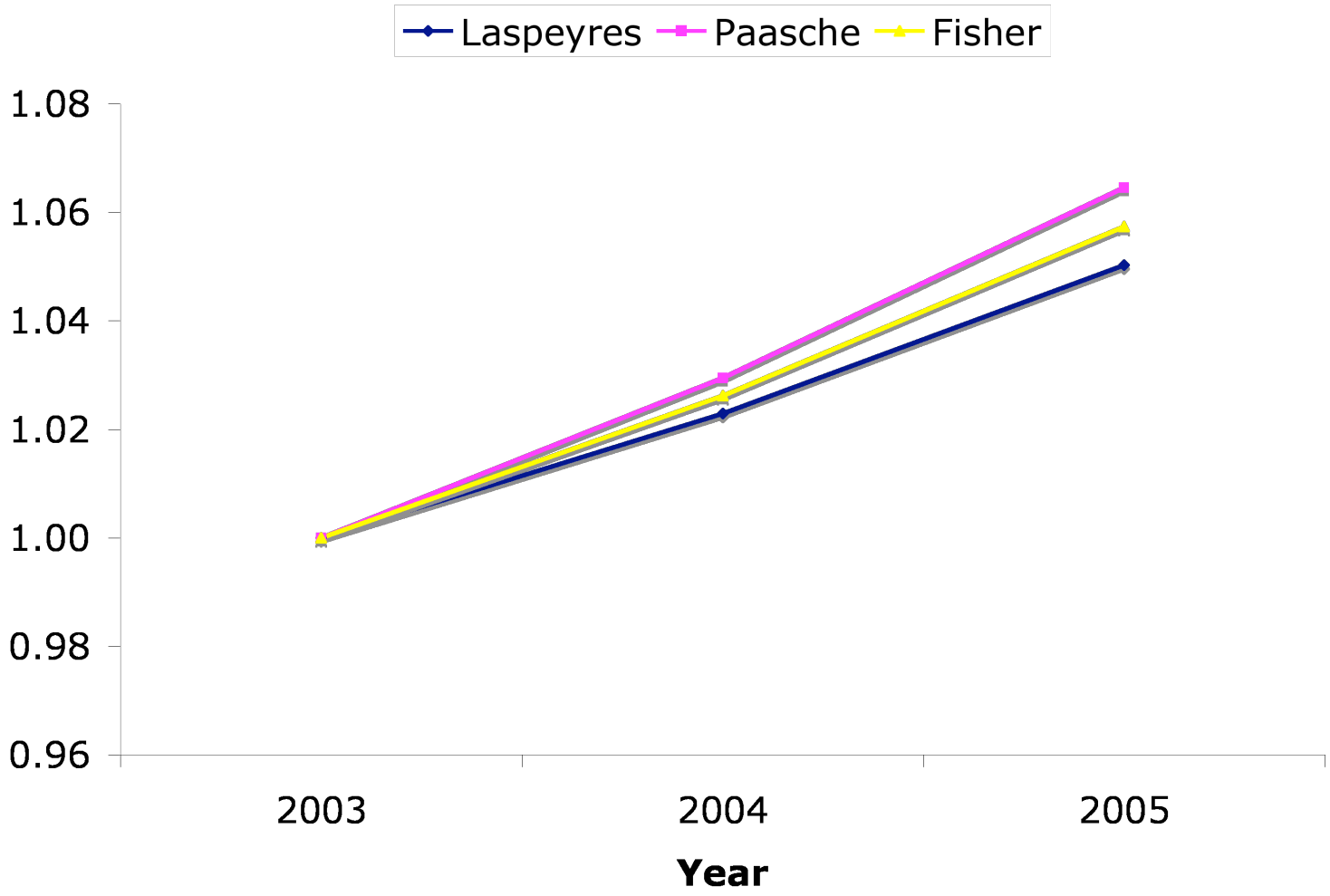


Figure 2: Output Indices for Hospitals in Canada, 2003–2005



Results

- $P_P > P_L$
- Average annual growth rate $= 1.6\%$
- With data on quality improvement the growth rate should be higher