Office for
National Statistics

Quality adjustment paper on:

# ISIC (Rev.4) H51 – Air Transport

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# Introduction – air transport

- Revisited sector paper in Oslo 2009

- Revisited for quality adjustment in Vienna last year

- Stimulated discussion in Vienna:

  – Production function v consumer utility

  – Measuring output in the national accounts

  – How do we identify and account for changes in quality

- Will attempt to tidy up these issues

# What this session covers

- Purpose of this presentation is to recommend a best practice in treating quality adjustment in air transport
- Clear up the confusion of production function v consumer utility
- Revisiting examples from 2010 based on the above
- Expanding the model
- Recommendations

# The quality adjustment problem

- System of National Accounts (SNA) treats differences in quality as differences in volume. A change in quality needs to be reflected in the accounts as a change in volume.

- Conceptually, the objective of a price index is to price to constant quality – price 'like-for-like' services.

- Mandate for Voorburg – **Internationally comparable measures of service sector GDP at constant prices**

- How can we apply these principles consistently to the air transport industry?

# Output for air transport industry

- Conceptually difficult to collect direct volumes

- Can use passenger km's as a proxy but….

- More likely to use deflated turnover

- Price index for air transport used to deflate gross current price turnover

- Need to reflect changes in price and quality accurately in this turnover

# Price measurement for air transport

- In basic terms the price reflects the service of providing a flight from A to B, BUT

- Ticket prices can change on a regular basis in the air transport industry:
  - Baggage restrictions/inclusions
  - In flight refreshments, meals etc.
  - Flexible ticket options
  - Seat pitch etc.....

- Typical pricing methods used by VG members include prices of repeated services, unit values, model and component pricing

# How do we proceed?

- Conceptually require a Fixed Input Output Price Index (FIOPI)

- This means the service provided with a fixed production process (i.e. fixed inputs)

- Therefore consumer utility is not a quality adjustment consideration for output prices

- Need to assess the change in price determining characteristic

- Changes to price determining characteristics should only be adjusted for when there is an impact on the production function

# Revisiting example 1

- 2009 price for London-Luxembourg = £200
    - Basic ticket price with no baggage allowance
- 2010 price for same route now £220
    - Inclusive baggage allowance now included at a premium of £20 – represents the full price change
- SPPI Used to deflate gross turnover to get air transport output
- This is a change in price mechanism only – inputs and service remain the same

# Example 1 revisited (cont.)

- This should be reflected in the accounts as a price change (no adjustment required).

# Example 1 continued

## Table 3 Price, volume and turnover data for the Example 1: Baggage

### Example 1 : Baggage

| | Observed price (£) | Quality Adjusted Price (£) | Price index | Observed Turnover (£) | Derived (constant period 2009 price) volume | Change in volume |
|---|---|---|---|---|---|---|
| 2009 | 200 | 200 | 100 | 8,000,000 | 8,000,000 | - |
| 2010 | 220 | 220 | 110 | 8,800,000 | 8,000,000 | 0.0% |

# Revisiting example 2

- 2009 price for Cardiff-Dublin = £140
  – Basic ticket price with 34 inch seat pitch

- 2010 price for same route now £126
  – Aircraft reconfigured – more seats on plane = smaller seat pitch

- Again, SPPI used to deflate gross turnover to get air transport output

- Reduction in seat pitch requires aircraft reconfiguration – thus a change in inputs/production function of airline

# Revisiting example 2 (cont).

- More passengers delivered for the for same amount of aircraft – increased output

- Change in quality, therefore this should be reflected in the accounts as a volume change – so need to quality adjust.

- However - In this example we assume the airline has confirmed the full change in price is attributable to the change in quality and can quantify the difference

# Example 2 continued

## Price, volume and turnover data for the Example 2: Legroom

### Example 2 : Legroom (consumer)

| | Observed price (£) | Quality Adjusted Price (£) | Price index | Observed Turnover (£) | Derived (constant period t price) volume | Change in volume |
|---|---|---|---|---|---|---|
| 2009 | 140 | 140 | 100 | 5,000,000 | 5,000,000 | - |
| 2010 | 126 | 140 | 100 | 5,250,000 | 5,250,000 | 5.0% |

If no quality adjustment carried out – volume increase is overstated:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2010 | 126 | 126 | 90 | 5,250,000 | 5,833,333 | 16.7% |

# Limitations and expanding the model

- Acknowledge examples are basic – included for ease of illustration.  In reality the industry is different:

- Ticket price is a function of a number of price determining characteristics (including):

- Airline, class of seat, flexibility of ticket, timing of booking, baggage options, in-flight extras etc.

- Our suggested model gets more difficult as more changes in these characteristics are observed

# Limitations and expanding the model

- Therefore potential for hedonic regression?

- Hedonic regression acknowledged as difficult and time consuming but can provide an explicit adjustment for any quality changes

- However:-

- Essential that Hedonic model is only based on those price characteristics that impact on production function/inputs

- Identifying and quantifying these will prove difficult

# What about the other changes?

- What if both a change in quality and a pure price change needs to be reflected (and hedonics not used)?

  – Important to use explicit method of price adjustment in this case to remove quality effect. Only USA and Australia reported that they use explicit methods in quality adjustment of air transport prices.

- Recommend explicit adjustment method for air transport – but acknowledge this is difficult

# Conclusion and recommendation

- Need a consistent model to follow for quality adjustment of air transport.

- Acknowledge this is difficult, however there is a consistent approach to recommend:

  – Firstly assess impact of change on production function (inputs) of those delivering the service. A change in the production function should be assessed as a quality change.

  – Secondly, how should the change be reflected in the output of the industry

# Conclusion and recommendations (cont.)

- If evaluated as a change in quality, will need to decide on the most suitable method of adjustment – <u>recommend</u> the use of explicit adjustment

- Consider the use of hedonic regression for air transport (the model based only on characteristics that impact on the production function).

# Questions & discussion

- Thank you

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