How to evaluate service output

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What is service?

- Service is not necessarily perishable.

  …People go to a dentist not because they enjoy the treatment but because it is hoped that their teeth will be in good shape for some time to come. So dental services are physically durable. (Hayashi, F., The Quarterly Journal of Economics 1985)

- Durable service is priced as the summation of discounted benefit flow.

$$P = \sum_{t=0}^{T} \rho^t B(t)$$

Interpretation of price change in durable goods (capital)

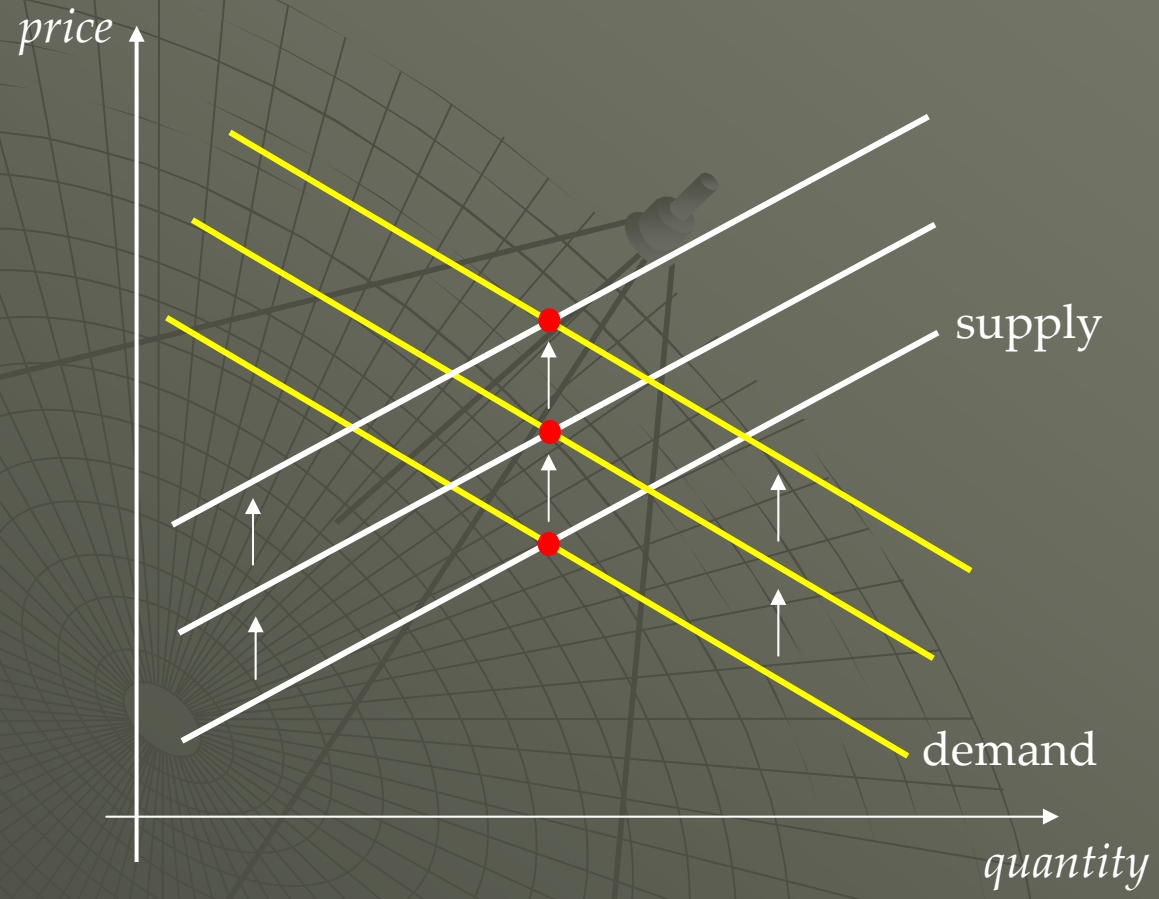
- Griliches definition of depreciation
  - Exhaustion: *fewer* work years left
  - Deterioration: *poorer* work years left
  - Obsolescence: remaining work years are *worthless*
    - Embodied (computers)
    - *Disembodied* (public baths)

      …obsolescence could arise not only from new inventions but also from shifts in demand. …the downward shift in final demand will lead to a downward shift in the price of these specialized capital services. … The case of a negative anticipated real capital services inflation rate can be interpreted as an obsolescence charge on income that is analogous to wear and tear depreciation or deterioration. (Diewert and Wykoff, 2007)
- Change in price = change in service flow

Example: medical & haircut service

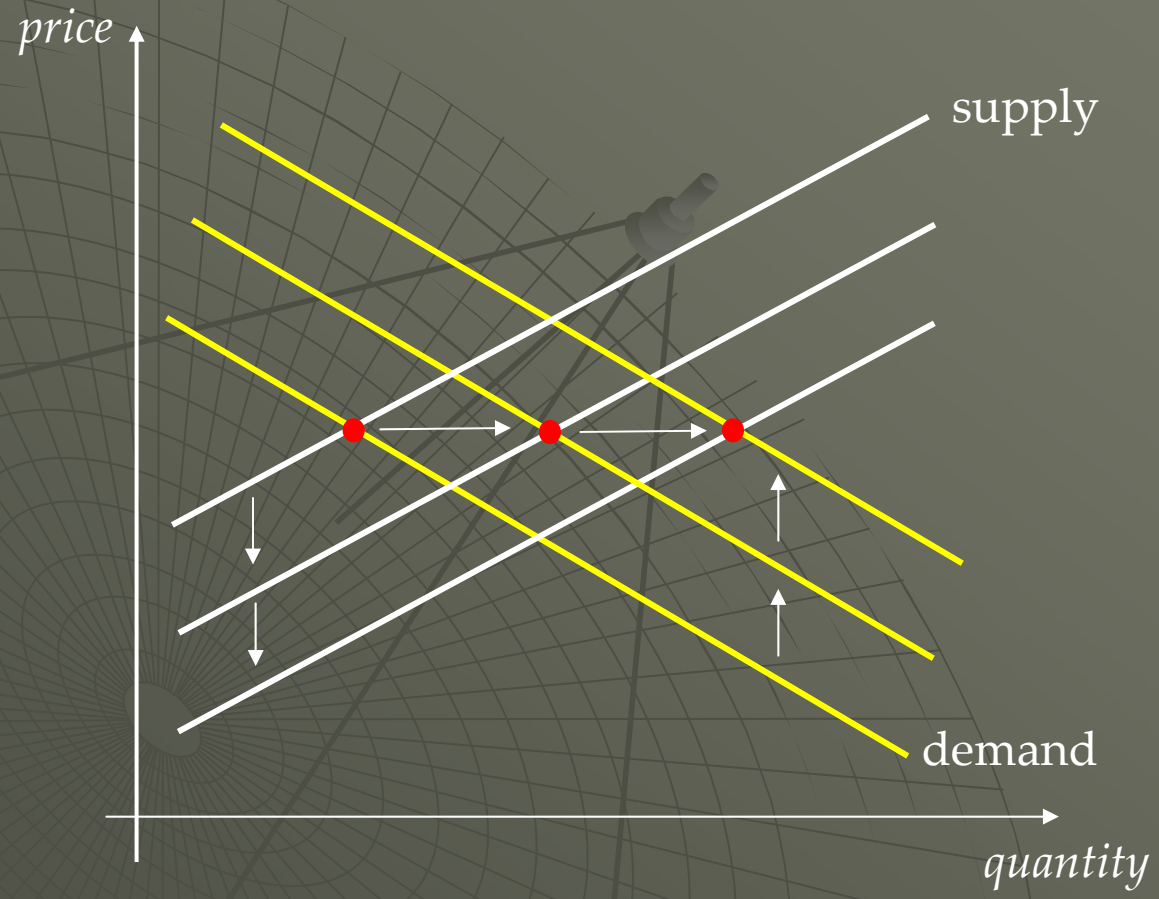
- Durability
  - Good conditions remain after treatment.
- Rise in price
  - rise in value of life (time) → upward demand shift → rise in price of treatment = rise in service flow
  - Barbershops survive in spite of rise in price
- Under the price regulations
  - long lines in the 1st class hospitals

Example: haircut service



Constant quantity (seemingly no growth and only rise in price)
Shift of demand curve ➔ *rise* in price ➔ service flow *growth*

Example: manufacturing product



Increasing quantity: upward shift of demand curve and downward shift of supply curve (technological progress)

Real service price change

- Rise in haircut service price in Tokyo
  - 6.6 times from 1970 to 2004
  - Is this price change?

    …An obsolescence effect will show up as an intertemporal real asset price change…(Diewert, 2005)
  - Simultaneous upward shifts of *demand* and supply curves
- *Real* service price
  - service price change – *general* inflation rate

(6.6) (3.2)

Problems in hedonic approach

- Model
  - Shepard(*JPE*, 1991) and Nakajima(*ESRI*, 2007)
  - Bertrand's price competition between high and low quality service providers
- Simulation
  - Decline in consumer's evaluation of high quality service (*disembodied* obsolescence) ➔ downward shift of demand curve

ex: consumer's satisfaction with traditional shopping arcades declines as the change in regional communities and cultural backgrounds

Simulation results

- Hedonic regression
  - Annual 2% fall or rise in consumer's satisfaction = downward/upward shift of demand curve
  - Logarithm of service price regressed on supply side information of service quality and time variable.
- Productivity index based on four ways to capture output
  - hedonic, constant price, utility level, nominal

Simulation results productivity index

6% rise in satisfaction with high quality service

hedonic	constant price	utility level	nominal
1.00	1.00	1.02	1.02

6% fall in satisfaction with high quality service

hedonic	constant price	utility level	nominal
1.00	1.00	0.99	0.98

Concluding remarks

- Labor-intensive service production
  - Low substitution effect between capital and labor
  - *Upward shift* of supply curve as a result of increasing labor cost caused by economic growth
- *Upward shift* of demand curve?
  - If no, service providers *disappear*.
  - If yes, rise in *real* price occurs and should be evaluated as output growth.
- Deflator is crucial to output measurement
  - Especially for service sectors where manufacturing-style productivity growth is not common.
  - *Mismeasurement* of service output causes policy failure

The End

Thank you for attention