Disease Based Price Indexes

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FESAC Meeting
June 17th 2011

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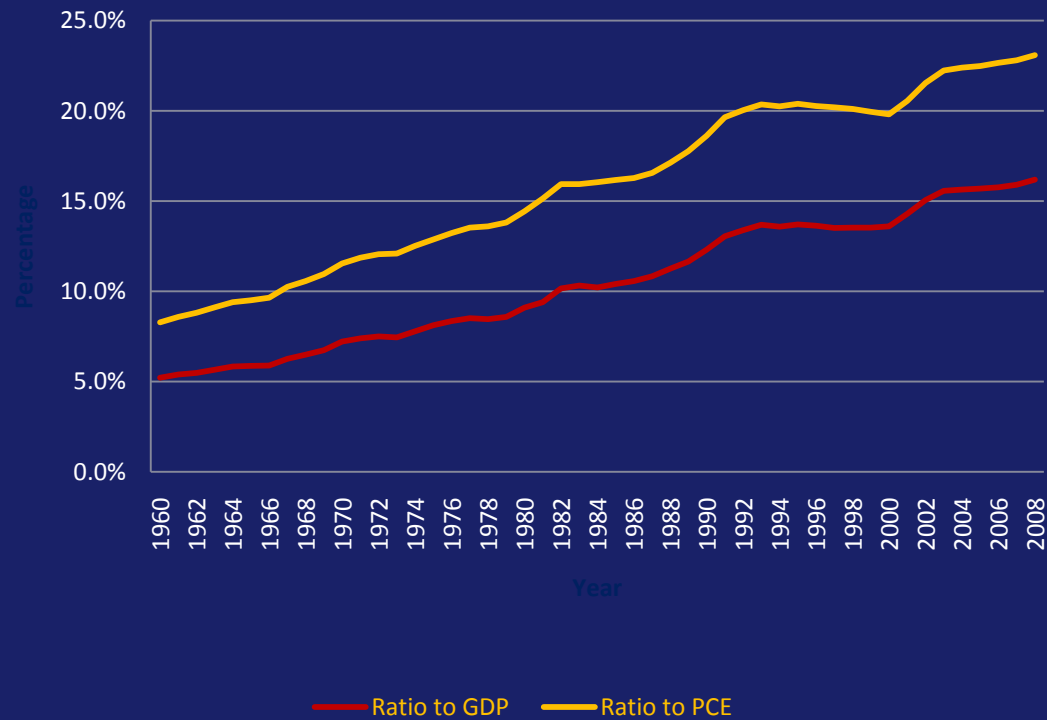U.S. DEPARTMENT OF LABOR

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Presentation Outline

- History
- CNSTAT 2002 Recommendation*
- BEA/BLS Research
- Conclusions

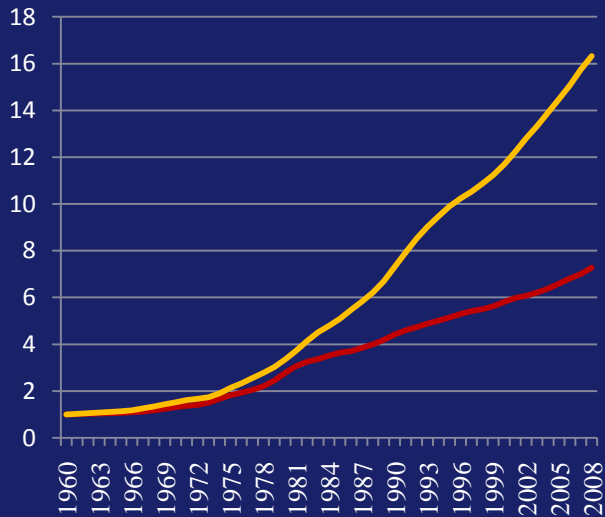* Shultze and Mackie, *At What Price?*, Recommendation 6-1.

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National Health Concern

**National Health Expenditures
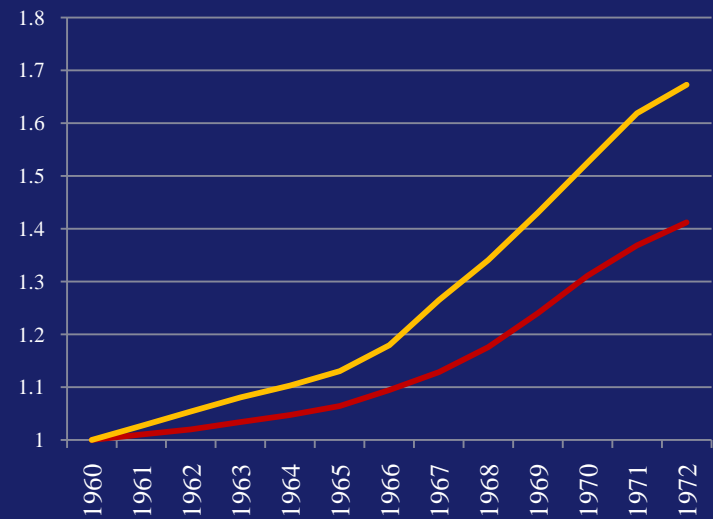As a Percent of GDP and PCE**

Legend: Ratio to GDP, Ratio to PCE

Health Inflation Compared to Overall Inflation

All Items CPI v. Medical CPI 1960-2008

All Items CPI v. Medical CPI 1960-1972

Is this price growth overstated?

- For over forty years, many claim that the CPI Indexes are upwardly biased.

- Many believe that bias occurs because we use the wrong concept.

- We price health care services and goods, and not the treatment of the disease.

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Concepts for Medical Expenditure

- (Triplett, 1999) Comparison between "human repair" and auto repair.
- For a car repair, the consumer pays one price for the entire repair. We do not treat human repair the same way.

- Newhouse (1992)
- CPI actually prices the inputs, and not the output.
- Should focus on the price/cost of treating a disease and not the service used to treat the disease.

The Disease Approach

- First disease based indexes computed by Scitovsky, 1967.
- Used medical records from a single medical practice group in Palo Alto.
- Results published in AER, 1967.

- She concludes that accounting for the changes in the quantity of goods and services used to treat a disease is important.
- Physician services, Rx, etc. are not final output. They are inputs.

Other Studies

- Shapiro and Wilcox (2001)
  - Substitution from inpatient hospital to outpatient for cataracts.
  - This has reduced the "price" of a cataract treatment.

- Berndt et. al (1996, 2002)
  - Substitution from office visits to medication for mental illness.
  - This has reduced the "price" of treating mental illness.

- Cutler et. al (1998)
  - Defined the concept of a Service Price Index.
  - Although service prices were increasing the total price of heart treatment was falling.

- From these studies, many infer that current medical price indexes from the CPI, PPI, and PCE are upwardly biased.

- Medical inflation is not as alarming as the published numbers would imply.

- When nominal health expenditure growth is decomposed into price and quantity growth, currently published indexes overstates the price growth and understates the quantity growth.

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Major Medical Innovations Affecting Input Use

Innovation	Service/Product	Disease Treated
MRI and CT	Diagnostic/Phys. Visits	various
ACE inhibitors	Rx/Hospitals	hypertension
Balloon angioplasty	Surgery/Hospitals	coronary artery disease
Statins	Rx/Hospitals	high blood cholesterol
Mammography	Diagnostic	breast cancer
Coronary Bypass	Surgery	coronary artery disease
H2 blockers	Rx	stomach
SSRI anti-depressants	Rx/Therapy Visits	depression
Cataract extraction	Inpatient/Outpatient	cataracts
Hip and knee replacement	Inpatient/Outpatient	orthopedic
Biopharmaceuticals	Rx/Hospitals/Phys.	mostly cancer
Da Vinci Surgical Robot	Operating Room	various

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CNSTAT 2002 Method for CPI

- Use "claims database to identify and *quantify* the inputs used in" the treatment of a disease.

- "On a monthly basis, the BLS should reprice" current medical inputs keeping the *quantities* fixed.

- "every year or two" update the *quantities* of inputs used to treat a disease.

- When updated, "the index will jump at the linkage points."

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Simplified CNSTAT Formulae

P_{dit} = Price of input service i used to treat disease d in period t.

Q_{dir} = Quantity of input i for a patient with d in period $r < t-1$.

When quantities are not updated:
(Lowe Index)

$$I_{dt} = \frac{\sum_i P_{dit} Q_{dir}}{\sum_i P_{dit-1} Q_{dir}}$$

When quantities are updated:

$$I_{dt} = \frac{\sum_i P_{dit} Q_{dir+1}}{\sum_i P_{dit-1} Q_{dir}}$$

$$= \frac{\sum_i P_{dit-1} Q_{dir+1}}{\sum_i P_{dit-1} Q_{dir}} \times \frac{\sum_i P_{dit} Q_{dir+1}}{\sum_i P_{dit-1} Q_{dir+1}}$$

$$= \text{Jump from Q change} \times \text{Price change only}$$

Example 1
A Mental Illness Patient

Price of Office Visit = $200 in period 1; = $220 in period 2.
Price of Rx   = $30 in period 1; = $33 in period 2.

The price of all inputs increase 10%.

Quantity of Office Visits = 4 in period 1 ; = 1 in period 2.
Quantity of Rx   = 0 in period 1 ; = 4 in period 2.

Disease Based Index drops 66%:

$$\frac{P_{doc,2}Q_{doc,2} + P_{RX,2}Q_{RX,2}}{P_{doc,1}Q_{doc,1} + P_{RX,1}Q_{RX,1}} = \frac{P_{doc,1}Q_{doc,2} + P_{RX,1}Q_{RX,2}}{P_{doc,1}Q_{doc,1} + P_{RX,1}Q_{RX,1}} \times \frac{P_{doc,2}Q_{doc,2} + P_{RX,2}Q_{RX,2}}{P_{doc,1}Q_{doc,2} + P_{RX,1}Q_{RX,2}}$$

$$\frac{220*1 + 33*4}{200*4 + 30*0} = \frac{200*1 + 30*4}{200*4 + 30*0} \times \frac{220*1 + 33*4}{200*1 + 30*4}$$

$$.44 \quad = \quad .4 \quad \times \quad 1.10$$

$$\text{Index} \quad = \quad \text{Input Effect} \times \text{Price Effect}$$

Recent Research by BEA/BLS

Study	Data Source	Episode Grouper	Time Period	Allocation of spending to diseases	Other
Song et. al (2009)	Thomson Claims Data	Yes	Jan 1999-December 2002	ETG	Only 3 cities, Only 40 randomly selected ICD-9.
Aizcorbe and Nestoriak (2010)	Pharmetric Claims Data	Yes	1st Qtr 2003-4th Qtr 2005	ETG	Quarterly indexes for all diseases, national representation.
Bradley et. al. (2010)	MEPS and CPI	No	Jan 1999-December 2004	Proration	Monthly indexes for all diseases, national representation
Dunn, Liebman, Pack, Shapiro (2010)	Marketscan (weighted)	Yes	1st Qtr 2003-4th Qtr 2007	ETG	Quarterly indexes for all diseases with robustness checks
Contract with Analysis Group (2010-2011)	Ingenix	Yes	1st Qtr 2001-4th Qtr 2004	ETG	Quarterly indexes with claims data from private health insurers
Aizcorbe et. al. (2011)	MEPS	Yes	2001-2005	MEG, Primary diagnosis, and proration	Annual indexes for all diseases, national representation

Conclusion from BLS/BEA Studies

- With *different data, different time periods, and different methods*, all find bias from current service based methods.

- A biased medical price indexes leads to a biased real GDP growth estimate.

- For a few diseases, the service base method produces a lower index.

- We have the capacity to generate timely disease based price indexes.

- This is a feasible program that can be easily integrated into existing programs.

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