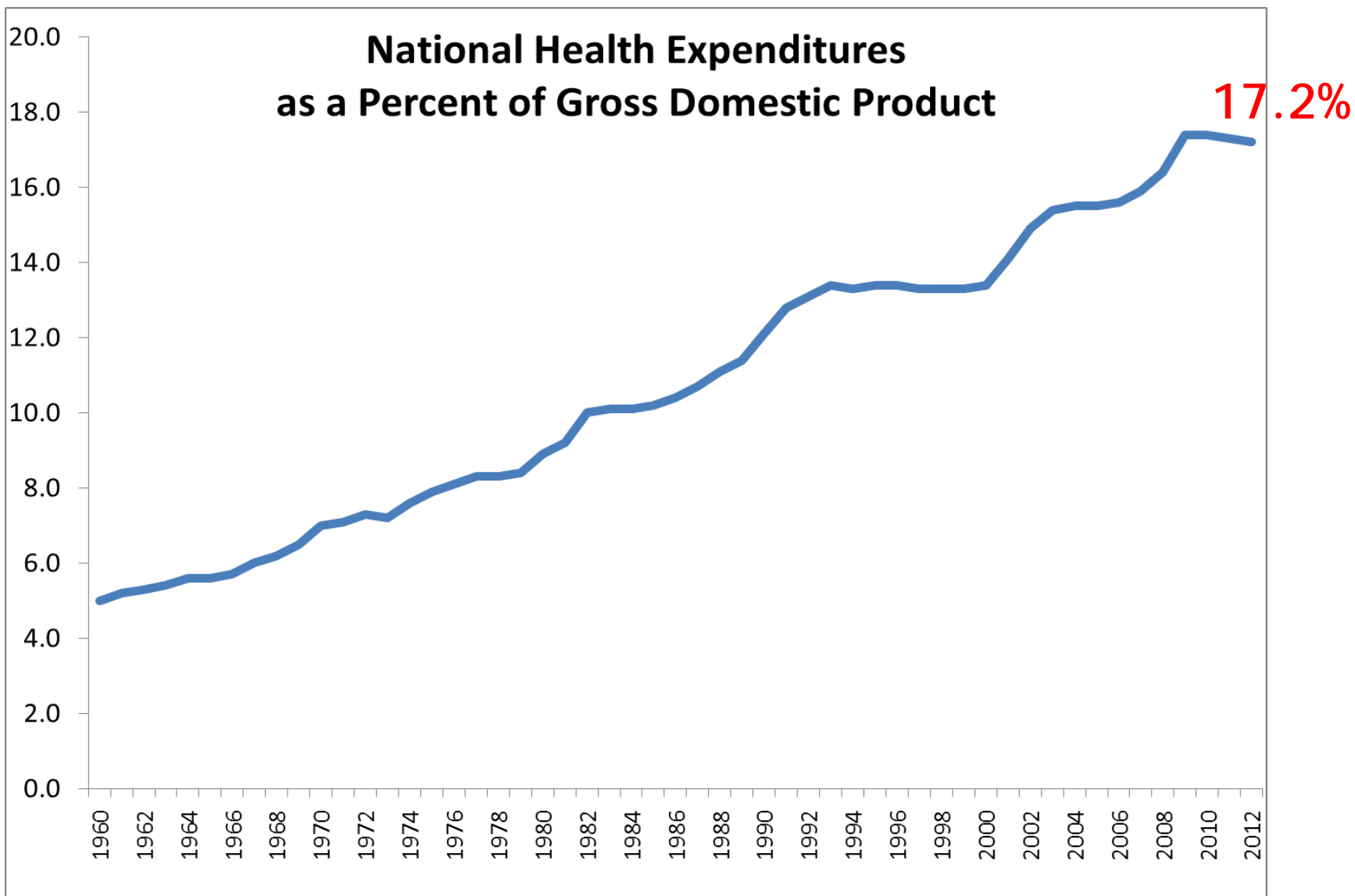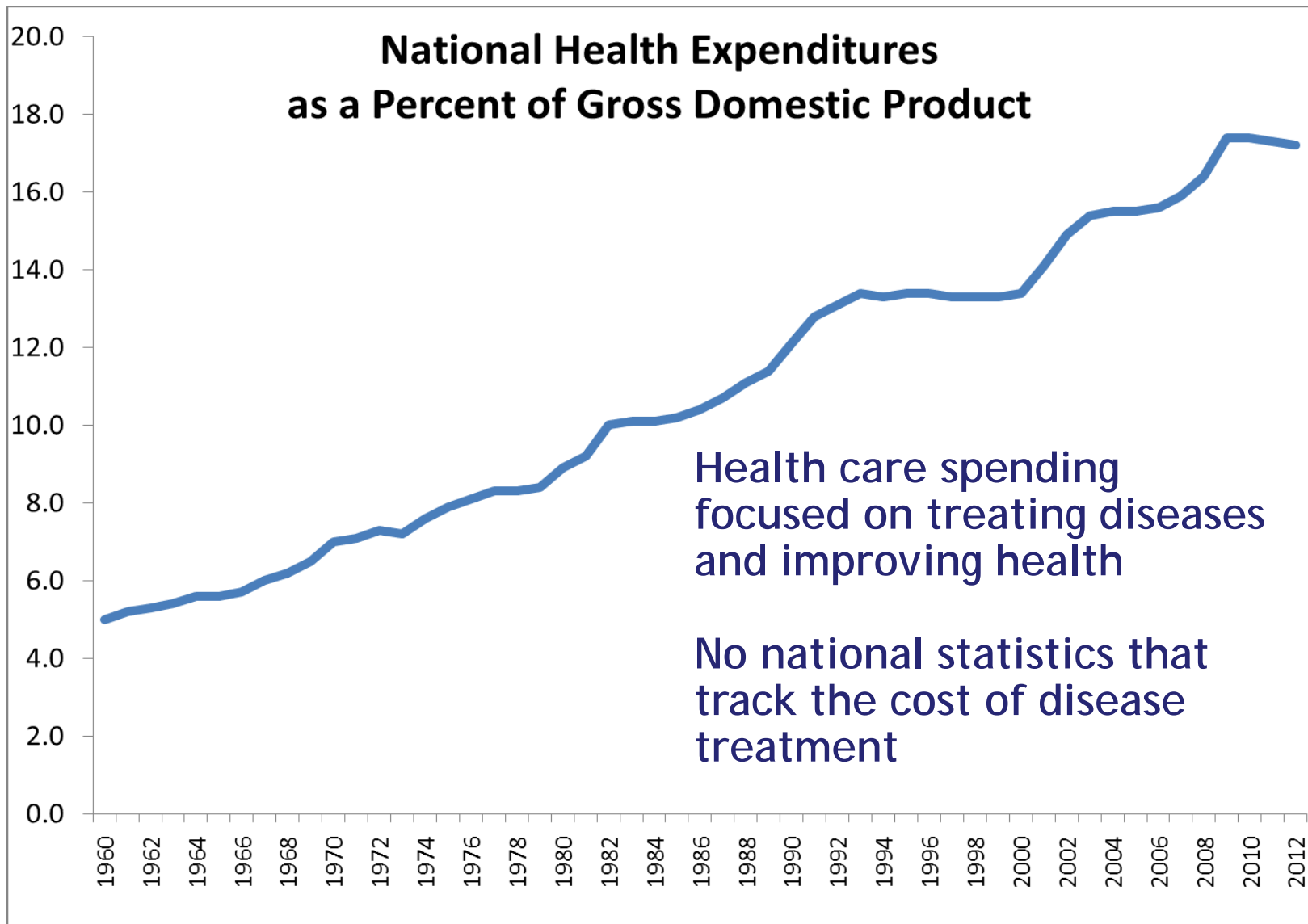# *Overview of BEA's new Health Care Satellite Account*

BEA Advisory Committee, Nov 14 2014

Office of the Chief Economist

David Johnson

Health care is a large and increasing share of GDP

National Health Expenditures as a Percent of Gross Domestic Product

17.2%

Health care is a large and increasing share of GDP

National Health Expenditures as a Percent of Gross Domestic Product

Health care spending focused on treating diseases and improving health

No national statistics that track the cost of disease treatment

Health Care Satellite Account

- Bureau of Economic Analysis (BEA) has years of extensive research, some joint with BLS, vetted by health experts, and these accounts were recommended in two CNSTAT reports

- The account will redefine the commodity provided by the health-care sector as "treatment of disease"

- Disease-based indexes better reflect the pricing of health care treatments and will allow for evaluation of quality change

- Useful for researchers, businesses, and policymakers assessing returns on medical care spending

- Original motivation suggested upward bias in health care price indexes

- **At What Price?**

    Recommendation 6-1: BLS should select about 15 to 40 diagnoses from the *ICD (International Classification of Diseases)*, chosen randomly in proportion to their direct medical treatment expenditures and use information from retrospective claims databases to identify and quantify the inputs used in their treatment and to estimate their cost.

- **Accounting for Health and Health Care**

    Recommendation 3.4: The Bureau of Economic Analysis, working with academic researchers (and perhaps other agencies, such as the Centers for Medicare & Medicaid Services and other parts of the Department of Health and Human Services), should collaborate on work to move incrementally toward the goal of creating disease-based expenditure accounts by attempting a "proof of concept" prototype. Using a subgroup of the population with good data coverage, the prototype would attempt to demonstrate that dollars spent in the economy on medical care can be allocated into disease categories in a fashion that yields meaningful information.

- Bureau of Economic Analysis (BEA) has years of extensive research, some joint with BLS, vetted by health experts, and these accounts were recommended in two CNSTAT reports

- The account will redefine the commodity provided by the health-care sector as "treatment of disease"

- Disease-based indexes better reflect the pricing of health care treatments

- Disease-based indexes will allow for evaluation of quality change

- Useful for researchers, businesses, and policymakers assessing returns on medical care spending

- Early research on selected conditions suggested upward bias in health care price indexes

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For example

- Output = number of patients treated for cancer

- Expenditures = spending on the treatment of cancer

- Price = spending per patient treated for cancer

This has three broad implications for the accounts

Implication 1: Health Care Spending will be reported by disease classes

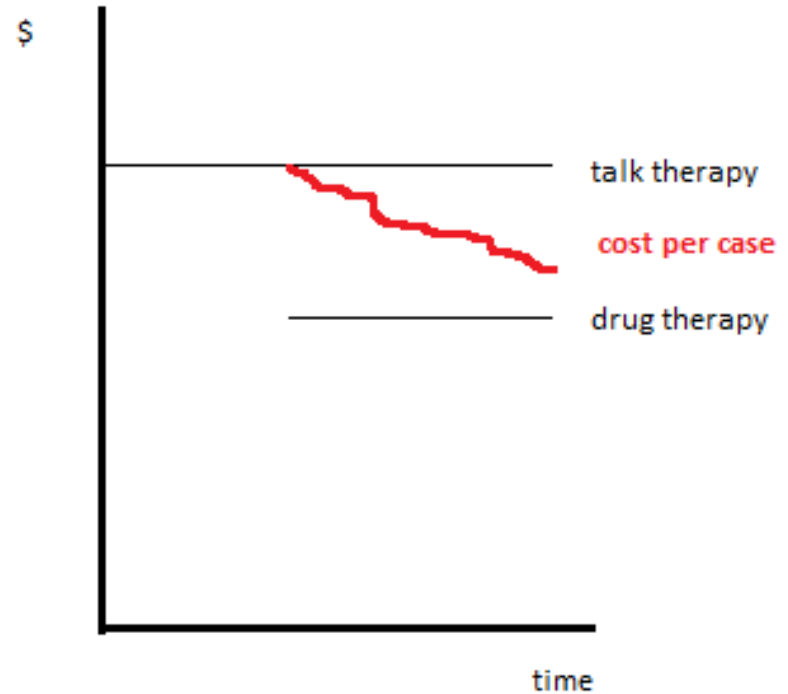| Current (billions of dollars)		2010
Goods		
Prescription drugs	$	288.5
Services	$	-
Physician services	$	402.8
Paramedical services	$	-
Home health care	$	77.0
Medical laboratories	$	32.6
Other professional medical services	$	151.0
Hospitals	$	770.5
Total*	$	1,722.4
Proposed by Disease (billions of dollars)		
Infectious and parasitic	$	35.9
Neoplasms	$	134.3
Endocrine	$	123.8
Mental illness	$	111.1
Nervous system	$	117.0
Circulatory system	$	266.0
Respiratory system	$	117.1
Digestive system	$	108.0
Genitourinary system	$	79.4
Complications of pregnancy	$	59.3
Skin	$	27.3
Musculoskeletal system	$	192.5
Injury and poisoning	$	135.2
Symptoms and ill-defined	$	157.0
Other (blood, perinatal, congenital, residual)	$	58.5
Total Disease	$	1,722.4

* not included - Dental services, Nonprescription drugs, Other medical products, Therapeutic medical equipment and Nursing homes

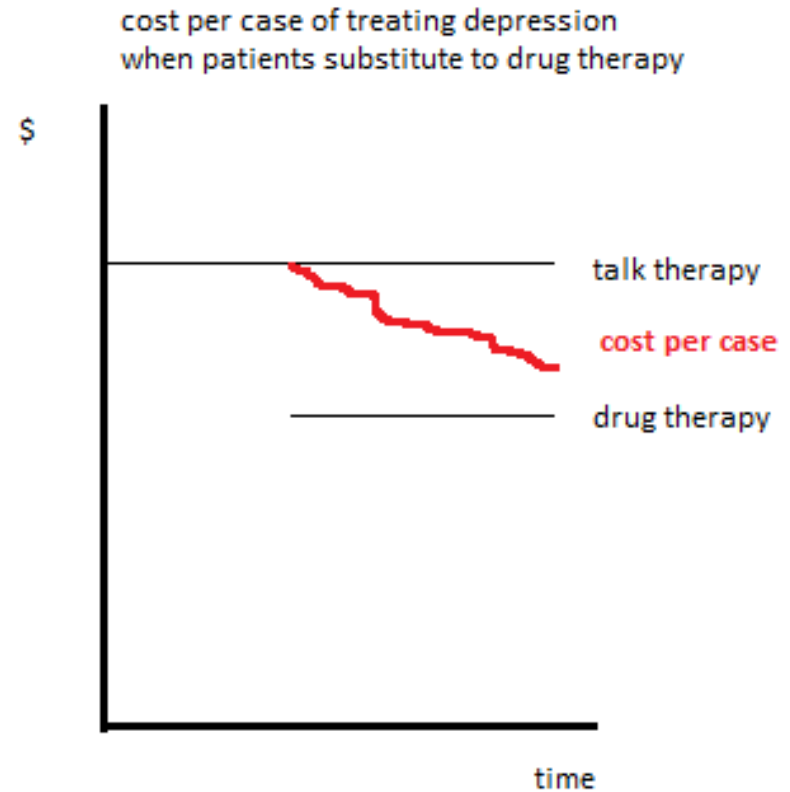# *Implication 2: Redefining output also implies new price indexes*

- The new price indexes are the change in average expenditure per episode for each disease
- They can reflect any shifts in services across industries that alter the cost of treating disease

cost per case of treating depression
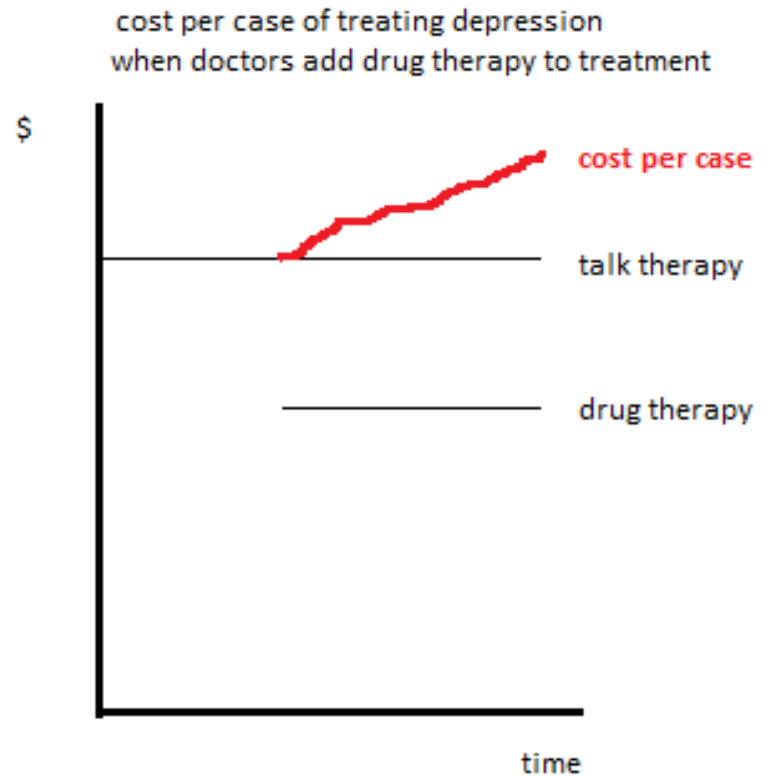when patients substitute to drug therapy

$

talk therapy

cost per case

drug therapy

time

- The new price indexes are the change in average expenditure per episode for each disease
- They can reflect any shifts in services across industries that alter the cost of treating disease.

- Disease-based indexes can rise slower than traditional service price indexes with shifts in treatments
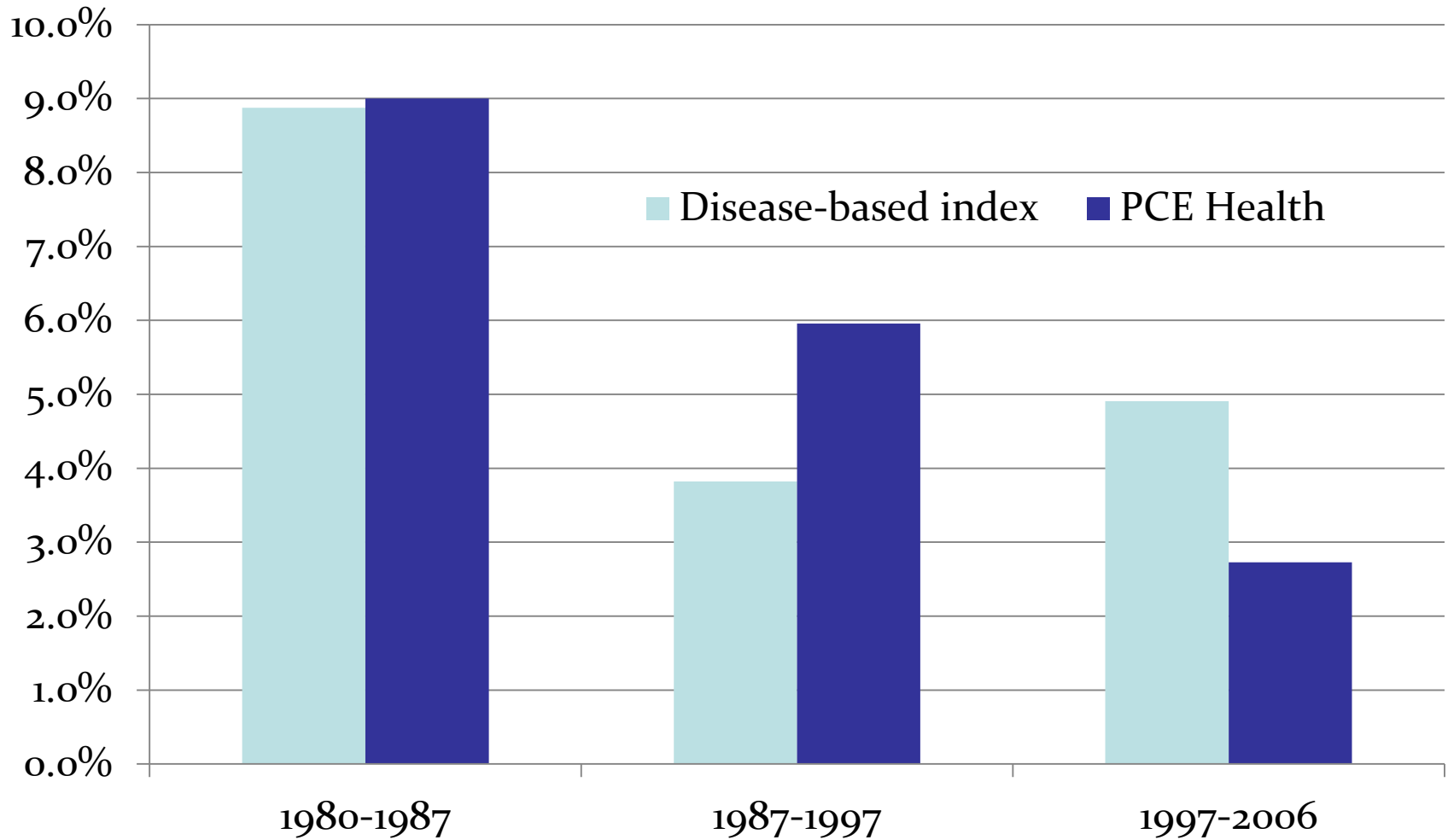
cost per case of treating depression when patients substitute to drug therapy

$

talk therapy

cost per case

drug therapy

time

- The new price indexes are the change in average expenditure per episode for each disease
- They can reflect any shifts in services across industries that alter the cost of treating disease.
- Disease-based indexes can rise slower than traditional service price indexes with shifts in treatments
- With increases in utilization, disease-based indexes can rise faster than traditional price indexes

cost per case of treating depression
when doctors add drug therapy to treatment

$

cost per case

talk therapy

drug therapy

time

Recent research shows growth in a disease-based price index can rise faster or slower than the PCE price index

Legend: Disease-based index | PCE Health

Y-axis: 0.0% to 10.0%

X-axis categories: 1980-1987, 1987-1997, 1997-2006

Source: Aizcorbe and Highfill, "Medical Care Expenditure Indexes for the US, 1980-2006"

Implication 3: New Price Indexes imply change in Value Added for Industry Accounts

- Real Value Added = Gross Output – Intermediate inputs
- Input prices will stay the same for intermediate commodities
- Use new disease-based price index for all affected disaggregated sectors
- Our current method in the Health Care Satellite Account allocates spending proportionally across all industries
- Productivity in certain health sectors will change
- More research is needed to evaluate other methods to incorporate these new indexes

$$MCE_d = \frac{c_d^t}{c_d^0} = \frac{\sum_s (c_{d,s}^t \, x_{d,s}^t)/N_d^t}{\sum_s (c_{d,s}^0 \, x_{d,s}^0)/N_d^0}$$

- Redefines the "service" provided by medical care as the treatment of disease:
  - Expenditures = spending on the treatment of depression
    (all spending: $\sum_s (c_{d,s}^t \, x_{d,s}^t)$)
  - Output = number of patients treated for depression
    (number of cases: N_d^t)
  - Price = spending per patient treated for depression
    (cost per case: c_d^t)
- Does not take marginal improvements to health from treatment (outcomes, "quality") into account

Overview of disease allocation methods

General strategies for disease allocation:

1. Encounter-based approach
2. Episode-based approach
3. Person-based approach

BEA findings on methodological selection and inflation:

- Using large data, various approaches produce similar disease-based inflation estimates
- Greater sensitivity to methodology when measuring disease-based inflation using smaller samples

MCE and SPI Construction

- Medical Care Expenditure Index (MCE) – Expenditure per Episode:

$$MCE_d^t = \frac{c_d^t}{c_d^0}$$

- Service Price Index (SPI)

$$SPI_d^t = \frac{p_d^t q_d^0}{p_d^0 q_d^0}$$

- Decomposition

$$MCE_d^t \approx SPI_d^t + SUI_d^t\text{-}1$$

$$(SUI_d^t\text{-}1 \text{ is utilization})$$

Examples of utilization changes

- **Decreases in utilization**
  - Shift from inpatient to outpatient
  - Shift from outpatient and inpatient to doctor's office
  - Shift to drugs with cost offset (e.g., depression)
- **Increases in utilization**
  - Increased use of high technology imaging
  - Shift or increased use of more costly branded drugs (e.g., for high cholesterol)
  - Shift to more procedures per office visit

Plan for release of first version of Health Care Satellite Account in Dec. 2014

- *Survey of Current Business* (SCB) article with tables with nominals, reals, and associated price indexes for disease-based measures for 2000-2010 period with 2 alternatives

  - Alternative 1: Based on the Medical Expenditure Panel Survey (MEPS)

  - Alternative 2: Based on blended results using MEPS, MarketScan® claims data, and Medicare claims data

  - Detailed tables will be available to download from the BEA website

MEPS Data

- Administered by Agency for Healthcare Research and Quality (AHRQ)

- Nationally representative panel sample

- Encounter level data

- Civilian non-institutionalized population

- All sources of healthcare spending

- Coverage, utilization and expenditures from Household Component files reconciled with medical providers

MarketScan® Claims Data

- Commercially-insured patients from the MarketScan® Data from Truven Health

  - More than 2 million enrollees in each year

  - Sample period 2000-10

  - Convenience sample → application of population weights using MEPS

- Selection of patient-level sample population:

  - Not in a capitated plan

  - Has a drug benefit plan

  - Included only if the individual is enrolled for the full year

Medicare Claims Data

- Medicare Fee-for-Service medical care claims (5 percent random patient-level sample of enrollees)

  - Approximately 2 million enrollees each year

  - No prescription drug claims until Part D implementation in 2006

  - Prescription drug expenditures per episode imputed using MEPS data for 2000-2010 sample period

- Selection of patient-level sample population:

 - Excludes Medicare Advantage enrollees

  - Application of population weights using MEPS

Construction of MEPS index

- Raw MEPS data files used (pool 2 years of data)

- Encounter Method using Primary Diagnoses

- MCE indexes at most disaggregated level (260 Clinical Classification Software (CCS) categories)

- Disease-based nominals, price indexes and reals for 18 ICD-9 chapters.

- NIPA Control Totals

- Fisher chaining used in National Accounts structure to get Real PCE and GDP

Construction of Blended Index

- Construct MCE at the CCS category level
- Use MarketScan® claims data for people with employer-provided health insurance
- Use Medicare Fee-for-Service Claims data for people on Medicare
- Use MEPS data for all other spending (e.g., Medicaid, uninsured)
- Aggregate using population weights from MEPS

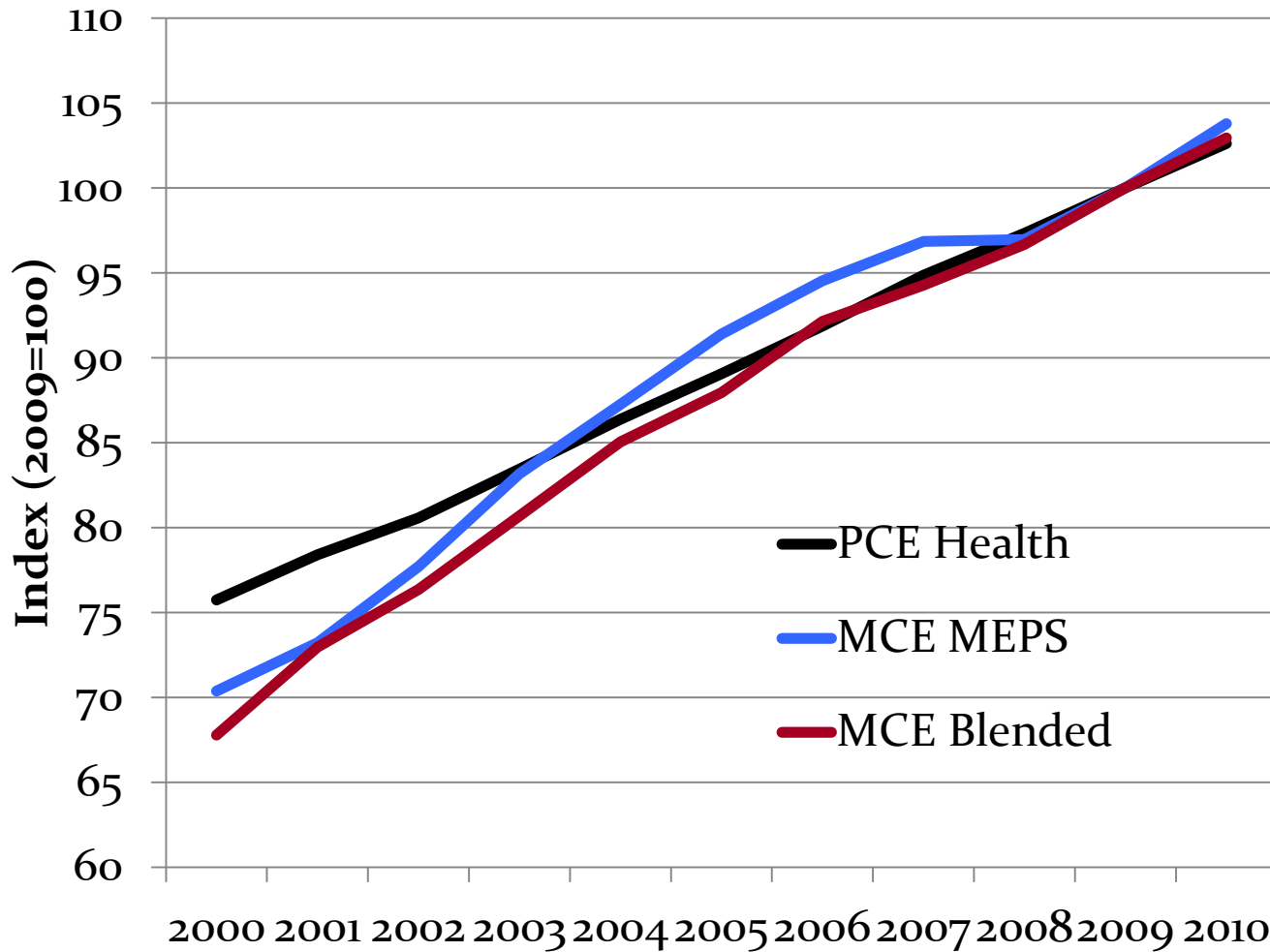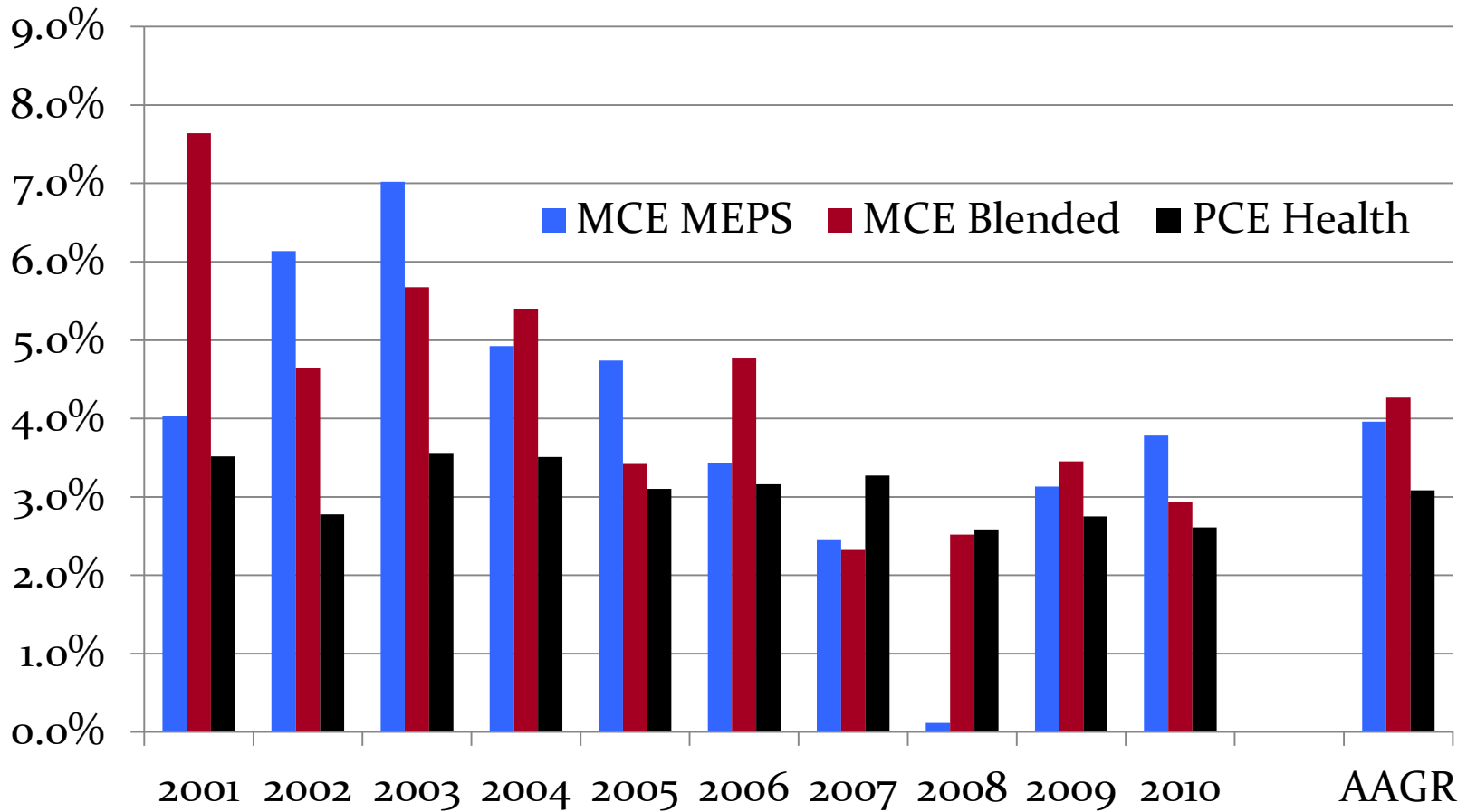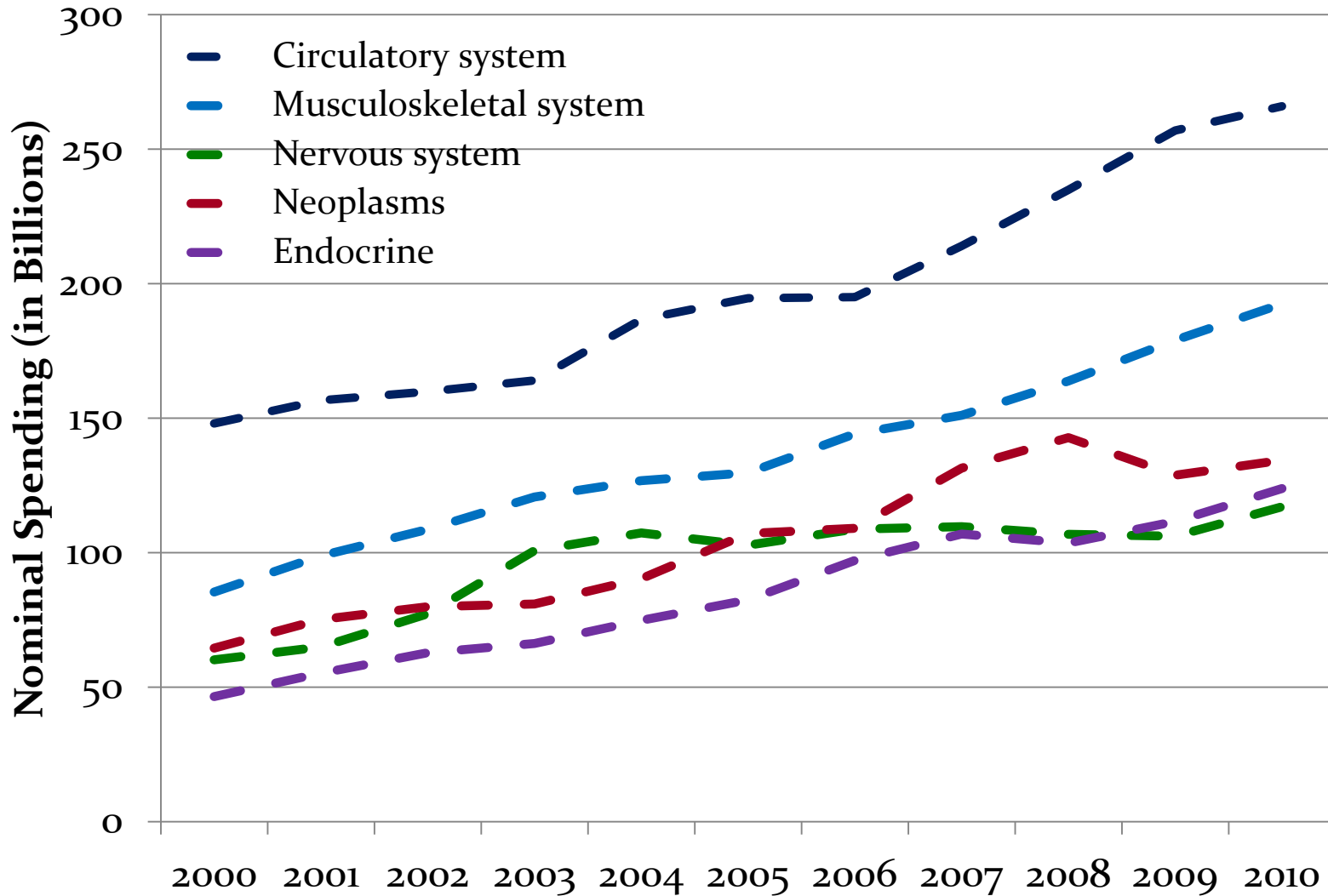# Comparing Expenditure Shares by Disease (2000-2010 Average)
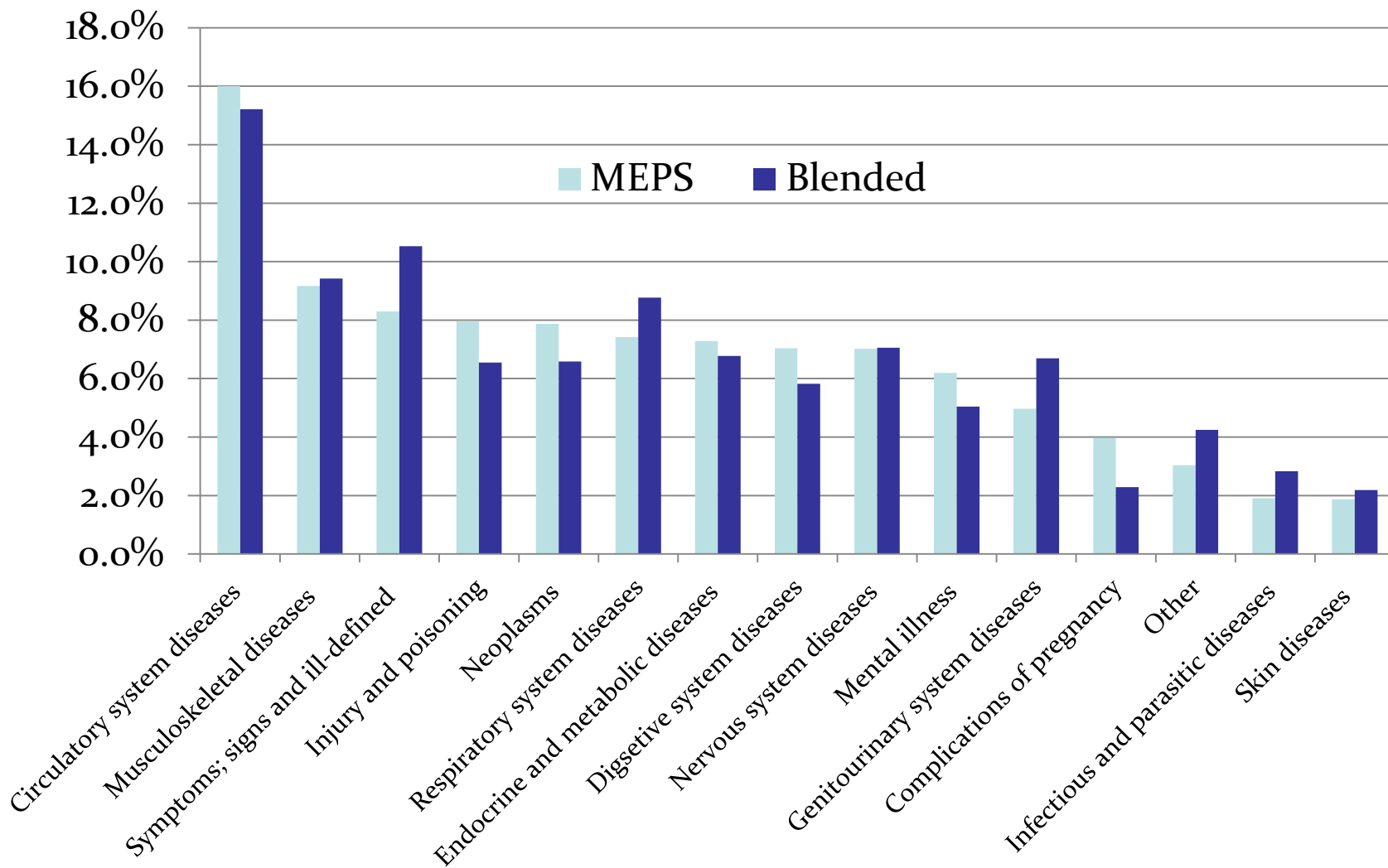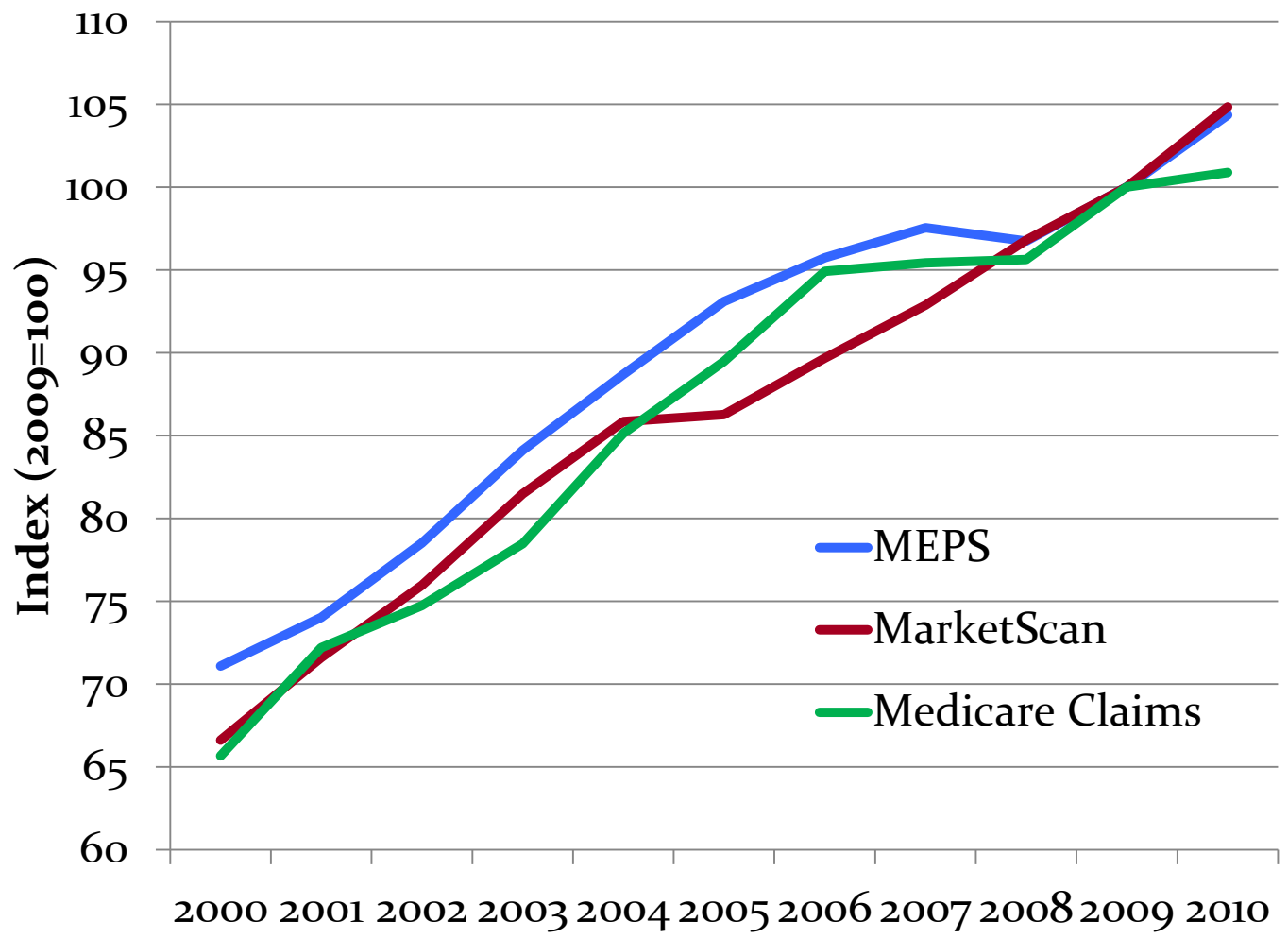
MCE MEPS, and MCE Blended yields faster growth than PCE (2009=100)

Many years show different changes in prices
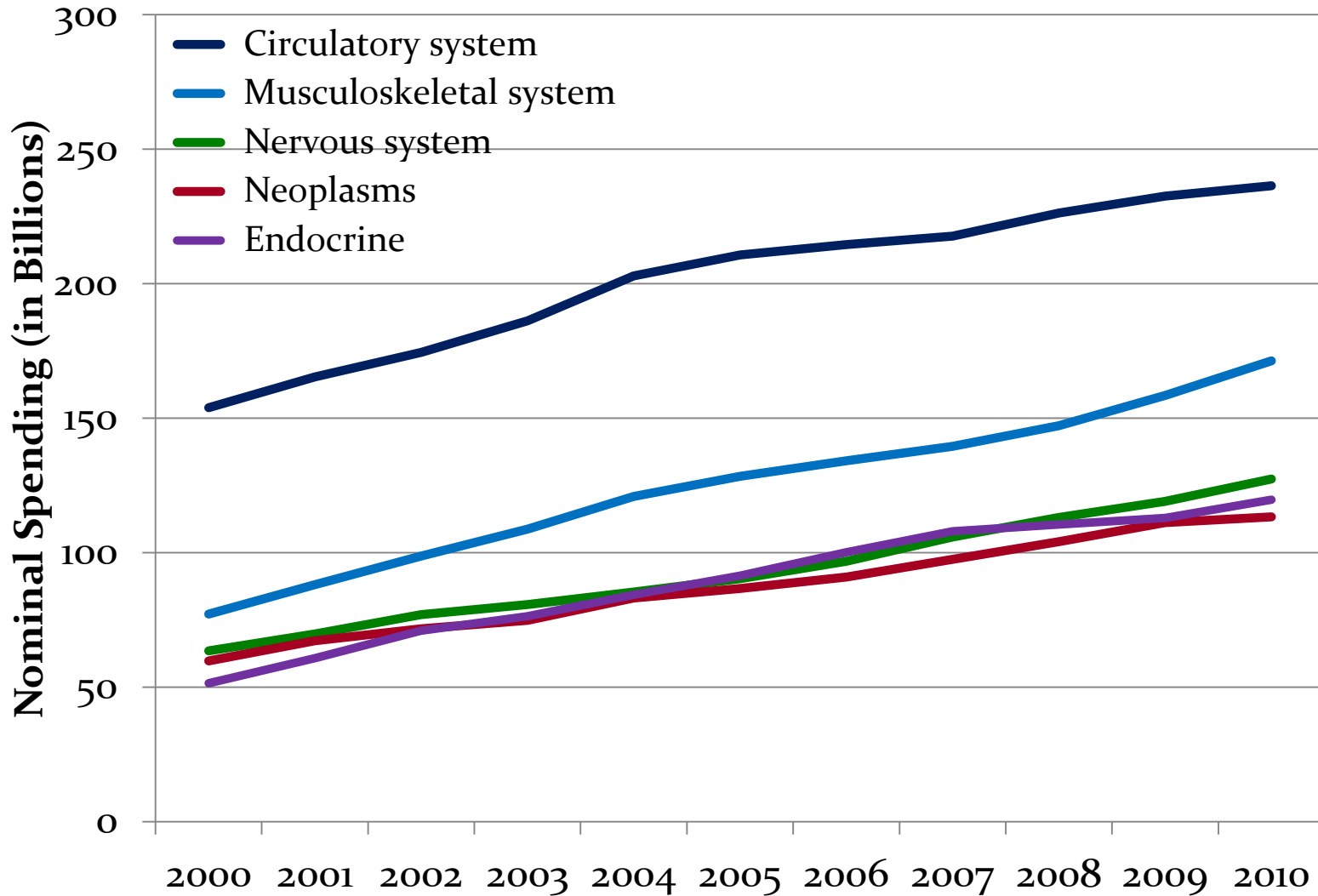
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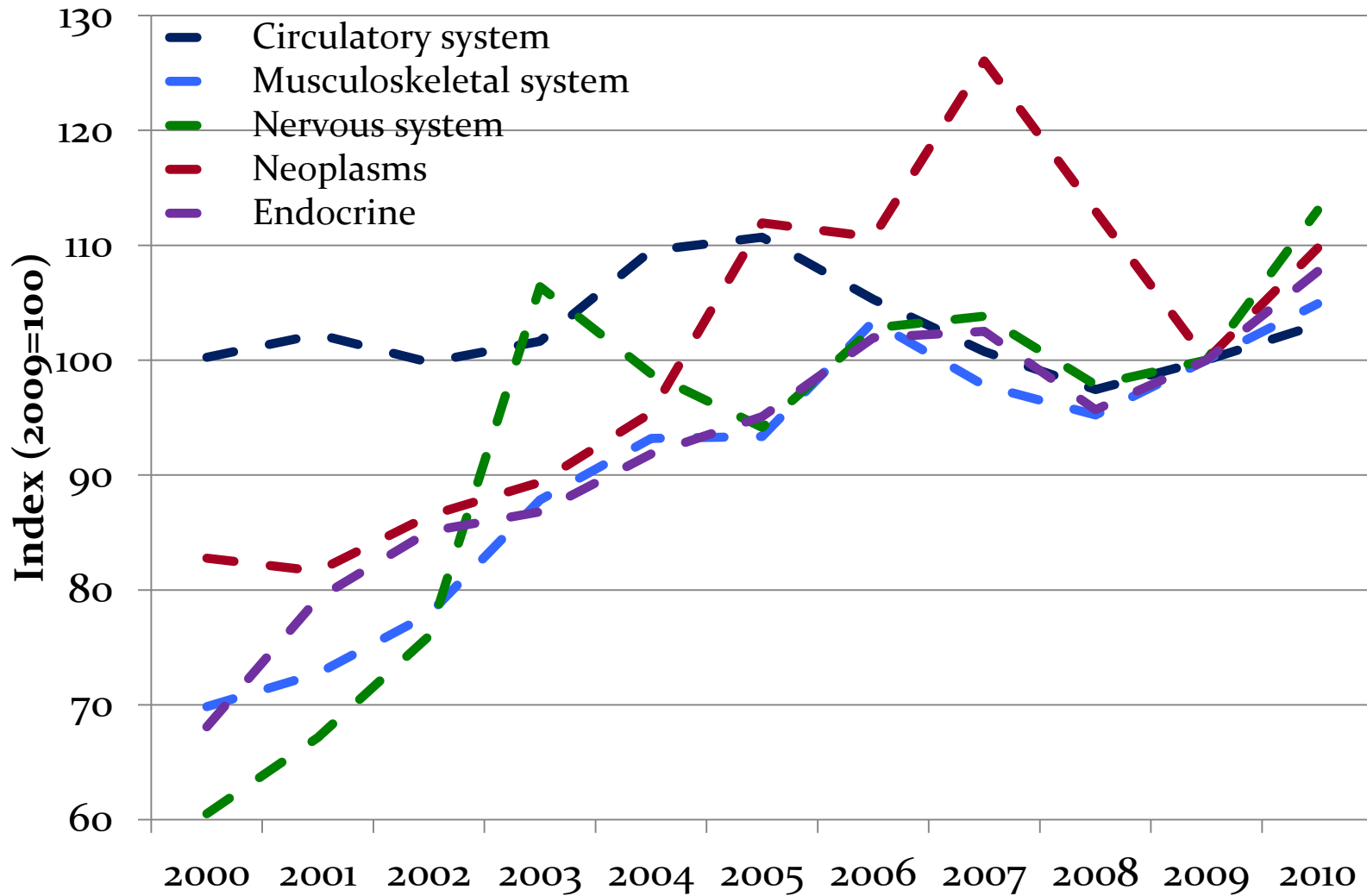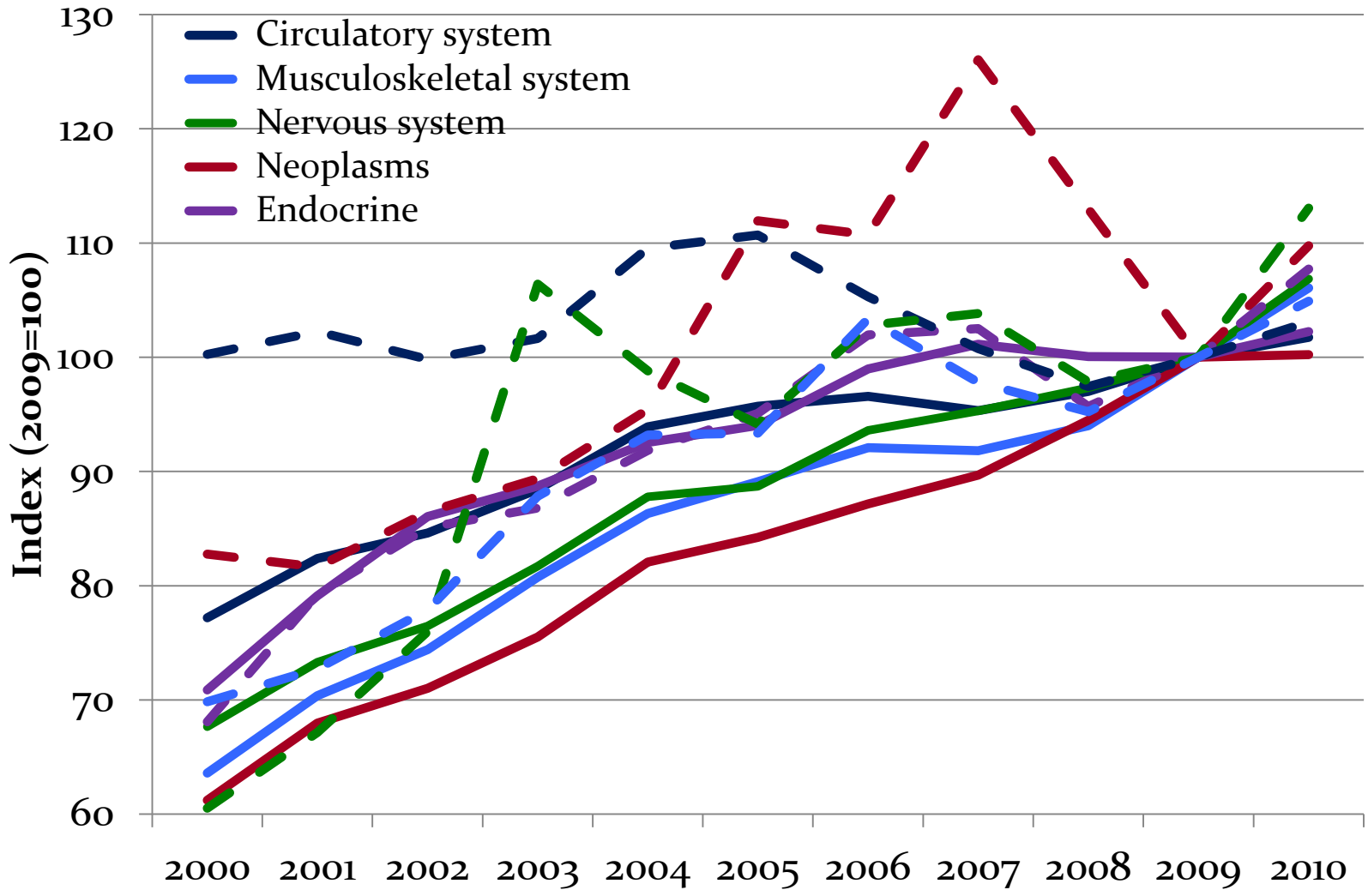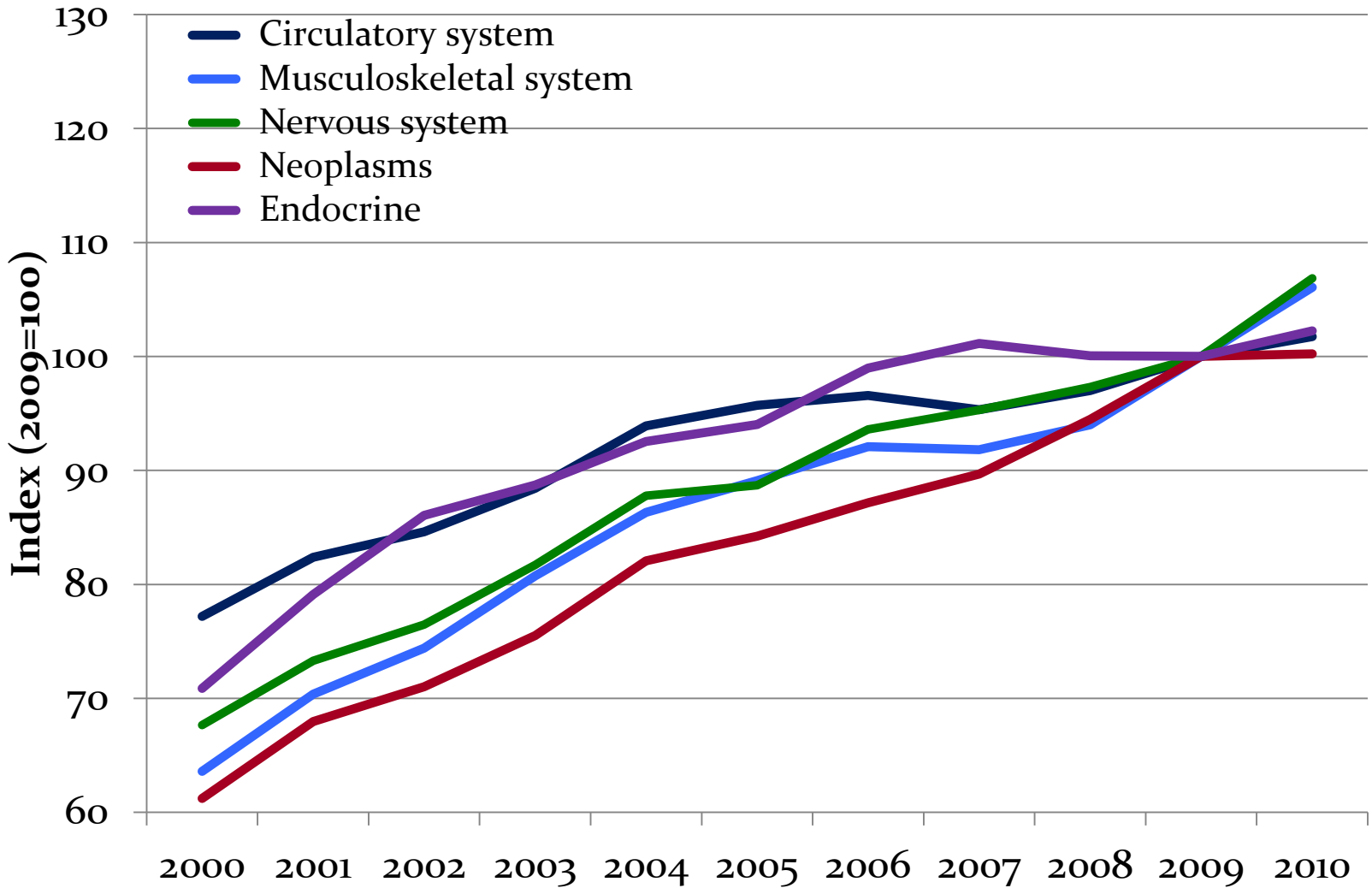U.S. DEPARTMENT OF COMMERCE

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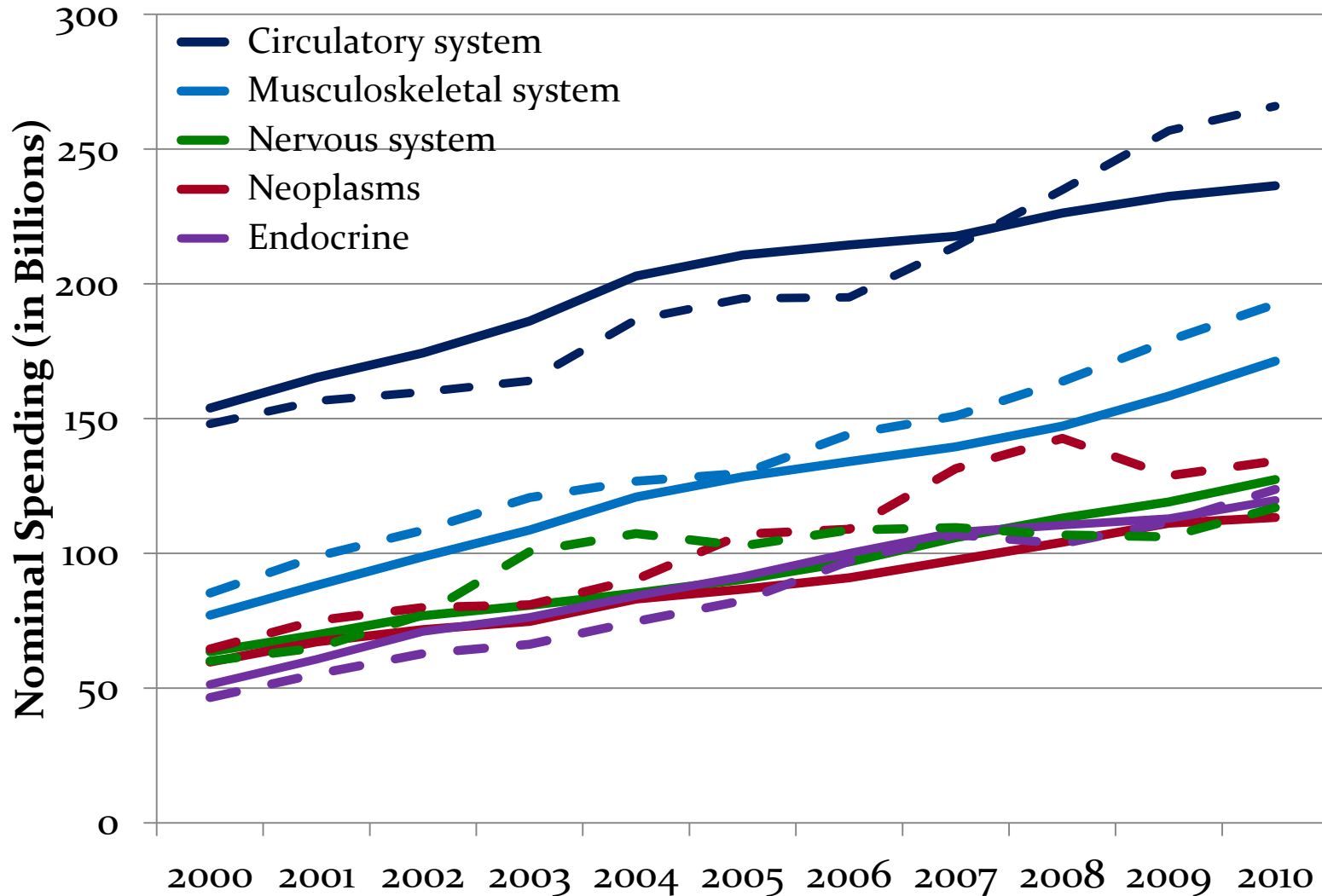
Trends in disease-based price indexes are less volatile using the Blended index

Trends in disease-based price indexes are less volatile using the Blended index

The New Structure for Health by Function

Current MEPS, Billions of Dollars	2000	2010
Health	**1,109.60**	**2,080.40**
Health services	**1,052.20**	**1,979.20**
Medical services by disease	**900.7**	**1,722.40**
Infectious and parasitic diseases	18.9	35.9
Neoplasms	64.5	134.3
Endocrine, nutritional and metabolic diseases	46.5	123.8
Mental illness	66.1	111.1
Diseases of the nervous system and brain	60.1	117
Diseases of the circulatory system	148	266
Diseases of the respiratory system	73.4	117.1
Diseases of the digestive system	49.6	108
Diseases of the genitourinary system	38	79.4
Complications of pregnancy; childbirth	38.1	59.3
Diseases of the skin and subcutaneous organs	16.7	27.3
Diseases of the musculoskeletal system	85.3	192.5
Injury and poisoning	85.6	135.2
Symptoms; signs and ill-defined conditions	85.7	157
Other	24	58.5
Diseases of the blood and blood-forming organs	3.2	11.9
Congenital anomalies	6.6	13.2
Certain conditions originating in	3.5	6.9
Residual codes; unclassified; all E	10.6	26.5
Medical services by provider	**151.5**	**256.8**
Dental services	63.6	104.5
Nursing homes	87.9	152.3
Proprietary and government nursing homes	56.8	100.2
Nonprofit nursing homes services to households	31.1	52.1
Medical products, appliances and equipment	**57.4**	**101.3**
Other medical products	25.2	45.6
Pharmaceutical products (w/o Rx drugs)	23.2	41.7
Non-prescription drugs	23.2	41.7
Other medical products	1.9	4
Therapeutic appliances and equipment	32.2	55.6
Corrective eyeglasses and contact lenses	19.9	29.7
Therapeutic medical equipment	12.3	25.9

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2000-2010 Average Annual Real Growth Rate of Health by Function

	MEPS Index	Blended Index
Health	2.40%	2.10%
Health services	2.28%	1.97%
Medical services by disease	2.44%	2.07%
Infectious and parasitic diseases	0.42%	2.65%
Neoplasms	4.60%	1.48%
Endocrine, nutritional and metabolic diseases	5.35%	4.91%
Mental illness	3.77%	2.81%
Diseases of the nervous system and brain	0.41%	2.41%
Diseases of the circulatory system	5.74%	1.54%
Diseases of the respiratory system	-0.32%	0.37%
Diseases of the digestive system	2.12%	1.10%
Diseases of the genitourinary system	2.73%	0.47%
Complications of pregnancy; childbirth	-1.20%	-0.30%
Diseases of the skin and subcutaneous organs	-0.90%	1.29%
Diseases of the musculoskeletal system	4.15%	2.91%
Injury and poisoning	-0.80%	0.03%
Symptoms; signs and ill-defined conditions	0.22%	5.24%
Other	1.93%	2.25%
Medical services by provider	1.29%	1.29%
Dental services	0.64%	0.64%
Nursing homes	1.77%	1.77%
Proprietary and government nursing homes	1.94%	1.94%
Nonprofit nursing homes services to households	1.44%	1.44%
Medical products, appliances and equipment	4.85%	4.85%
Other medical products	5.29%	5.29%
Pharmaceutical products (w/o Rx drugs)	5.15%	5.15%
Non-prescription drugs	5.15%	5.15%
Other medical products	6.92%	6.92%
Therapeutic appliances and equipment	4.49%	4.49%
Corrective eyeglasses and contact lenses	2.39%	2.39%
Therapeutic medical equipment	7.38%	7.38%

	MEPS Index	Blended Index
Health	**3.99%**	**4.29%**
Health services	**4.14%**	**4.47%**
Medical services by disease	**4.16%**	**4.53%**
Infectious and parasitic diseases	**6.20%**	**5.93%**
Neoplasms	**2.86%**	**5.05%**
Endocrine, nutritional and metabolic diseases	**4.69%**	**3.73%**
Mental illness	**1.49%**	**2.80%**
Diseases of the nervous system and brain	**6.45%**	**4.67%**
Diseases of the circulatory system	**0.28%**	**2.80%**
Diseases of the respiratory system	**5.12%**	**4.34%**
Diseases of the digestive system	**5.86%**	**5.21%**
Diseases of the genitourinary system	**4.77%**	**5.27%**
Complications of pregnancy; childbirth	**5.79%**	**4.59%**
Diseases of the skin and subcutaneous organs	**5.97%**	**4.92%**
Diseases of the musculoskeletal system	**4.15%**	**5.25%**
Injury and poisoning	**5.52%**	**5.45%**
Symptoms; signs and ill-defined conditions	**6.00%**	**5.41%**
Other	**7.23%**	**5.46%**
Medical services by provider	**4.07%**	**4.07%**
Dental services	**4.43%**	**4.43%**
Nursing homes	**3.81%**	**3.81%**
Proprietary and government nursing homes	**3.81%**	**3.81%**
Nonprofit nursing homes services to households	**3.81%**	**3.81%**
Medical products, appliances and equipment	**0.95%**	**0.95%**
Other medical products	**0.79%**	**0.79%**
Pharmaceutical products (w/o Rx drugs)	**0.84%**	**0.84%**
Non-prescription drugs	**0.84%**	**0.84%**
Other medical products	**0.34%**	**0.34%**
Therapeutic appliances and equipment	**1.08%**	**1.08%**
Corrective eyeglasses and contact lenses	**1.67%**	**1.67%**
Therapeutic medical equipment	**0.34%**	**0.34%**

PCE Health by Function	
Actual PCE Health	**3.3%**
Using MCE MEPS	**2.4%**
Using MCE Blended	**2.1%**
Overall PCE	
Actual PCE	**2.1%**
Using MCE MEPS	**1.9%**
Using MCE Blended	**1.8%**
GDP	
Actual GDP	**1.6%**
Using MCE MEPS	**1.5%**
Using MCE Blended	**1.5%**

Industry Example: Average Annual Real Growth Rates between 2000 and 2010 for Gross Output and Value Added

Industry Description	Gross Output			Value Added		
	Current	Alternate		Current	Alternate	
		Blended	MEPS		Blended	MEPS
Health care and social assistance	3.4%	2.0%	2.3%	2.8%	0.7%	1.1%
Ambulatory health care services	3.4%	2.1%	2.3%	3.4%	0.8%	1.3%
Offices of Physicians	3.8%	2.3%	2.6%	3.8%	0.9%	1.4%
Ambulator health care services excl	3.1%	1.9%	2.1%	3.0%	0.7%	1.2%
Hospitals	3.5%	2.1%	2.4%	2.6%	0.6%	1.0%
Nursing and residential care facilities	2.3%	2.3%	2.3%	1.4%	1.4%	1.4%
Social assistance	3.6%	3.6%	3.6%	2.5%	2.5%	2.5%

Schedule and Future Work

- **Schedule**
  - December release of SCB article with 2000-2010 estimates
  - SCB release of updated data for Health Care Satellite Account for 2011 and 2012 (Spring 2015)
  - CNSTAT expert meeting (Spring/Summer 2015)
- **Future work**
  - Creating a longer time series and current estimates
  - Evaluate the impact on Industry and Income accounts
  - Evaluate spending data for nursing homes
  - Continue to evaluate data sources – MEPS, MarketScan®, Medicare, along with Medicaid and others
  - Evaluate quality adjustment
  - Evaluate impact of severity
  - Continue to work with BLS and CMS on consistent measures of disease-based spending and prices

Selected BLS and BEA research

- "Producing disease-based price indexes," Bradley, Cardenas, Ginsburg, Rozental, Velez, *Monthly Labor Review*, 2010

- "Alternative Price Indexes for Medical Care: Evidence from the MEPS Survey," Aizcorbe, Bradley (BLS), Herauf, Kane, Liebman, Pack, Rozental (BLS), BEA Working Paper, 2011

- "Changing Mix of Medical Care Services: Stylized Facts and Implications for Price Indexes," Aizcorbe and Nestoriak, *Journal of Health Economics*, May 2011

- "Household Consumption Expenditures for Medical Care: An Alternate Presentation," Aizcorbe, Liebman, Cutler, and Rosen, *Survey of Current Business*, June 2012

- "Feasible methods to estimate disease based price indexes," Bradley, *Journal of Health Economics*, 2013

- Calculating Disease-Based Medical Care Expenditure Indexes for Medicare Beneficiaries: A Comparison of Method and Data Choices, Hall and Highfill, BEA Working Paper, 2014

- "Implications of Utilization Shifts on Medical-Care Price Measurement" Abe, Dunn, Eli Liebman and Adam Shapiro, *Health Economics*, Forthcoming

- "Geographic Variation in Commercial Medical-Care Expenditures: A Framework for Decomposing Price and Utilization " Dunn, Shapiro, Liebman, *Journal of Health Economics*, 2013

- Developing a Framework for Decomposing Medical-Care Expenditure Growth: Exploring the Issue of Representativeness, Dunn, Liebman, Shapiro, *Measuring Economic Sustainability and Progress,* NBER volume

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