Introduction to Health Economics (In the Context of HTA)

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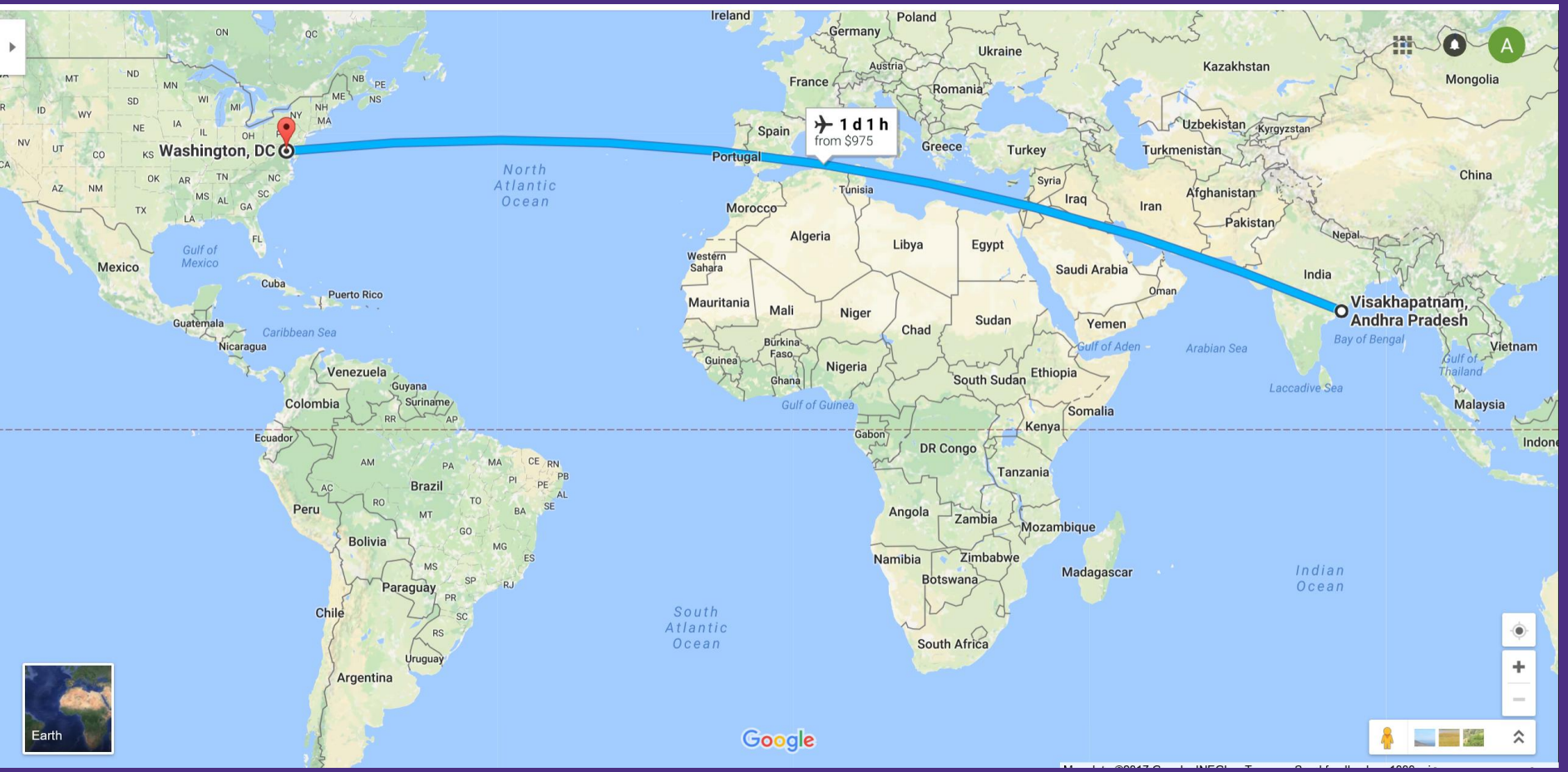
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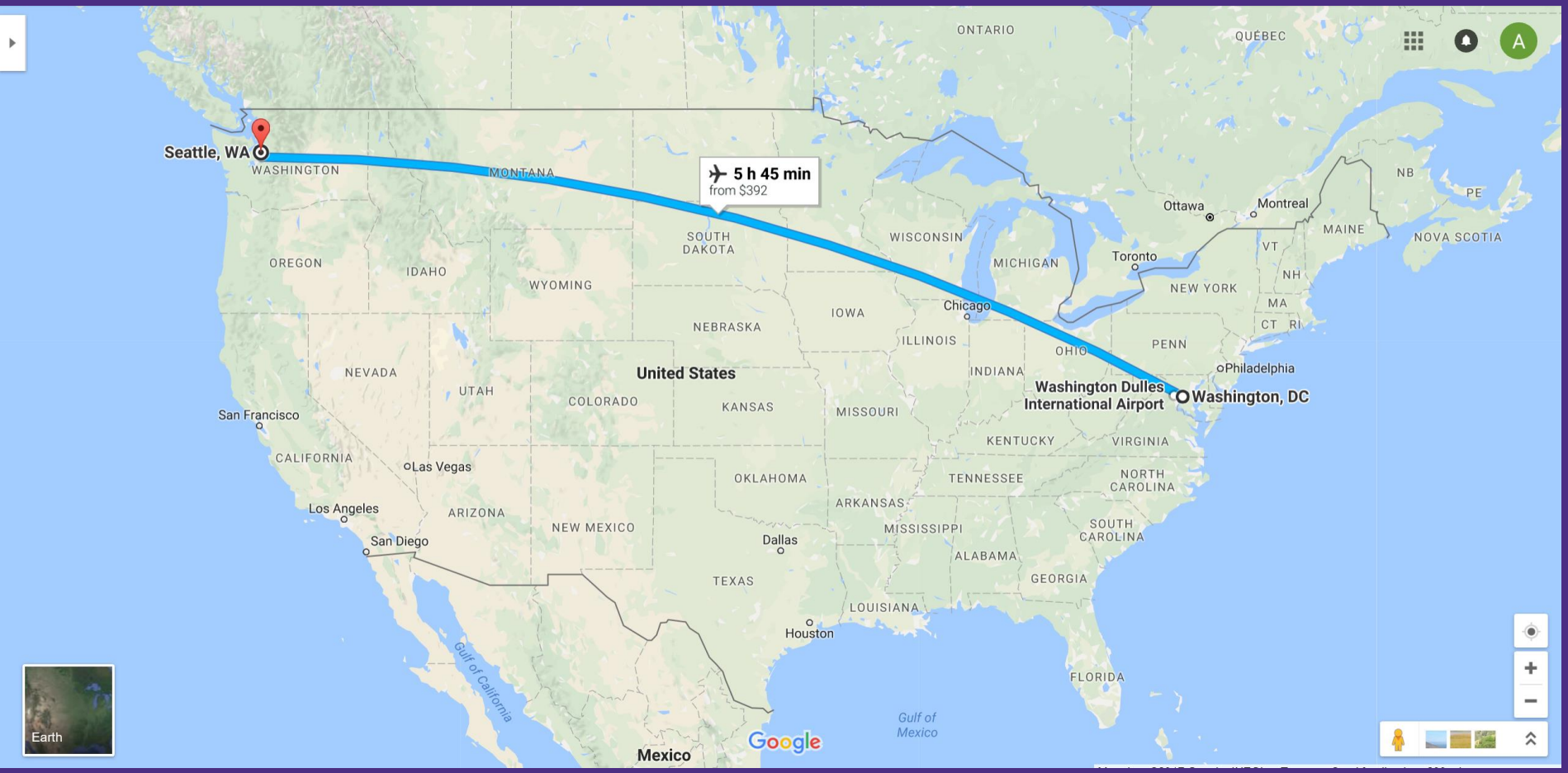
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About Me

- **BS Pharm Tech, Jadavpur University, Kolkata**
- **MS, Biostatistics, UNC Chapel Hill**
- **PhD, Health Economics, University of Chicago**

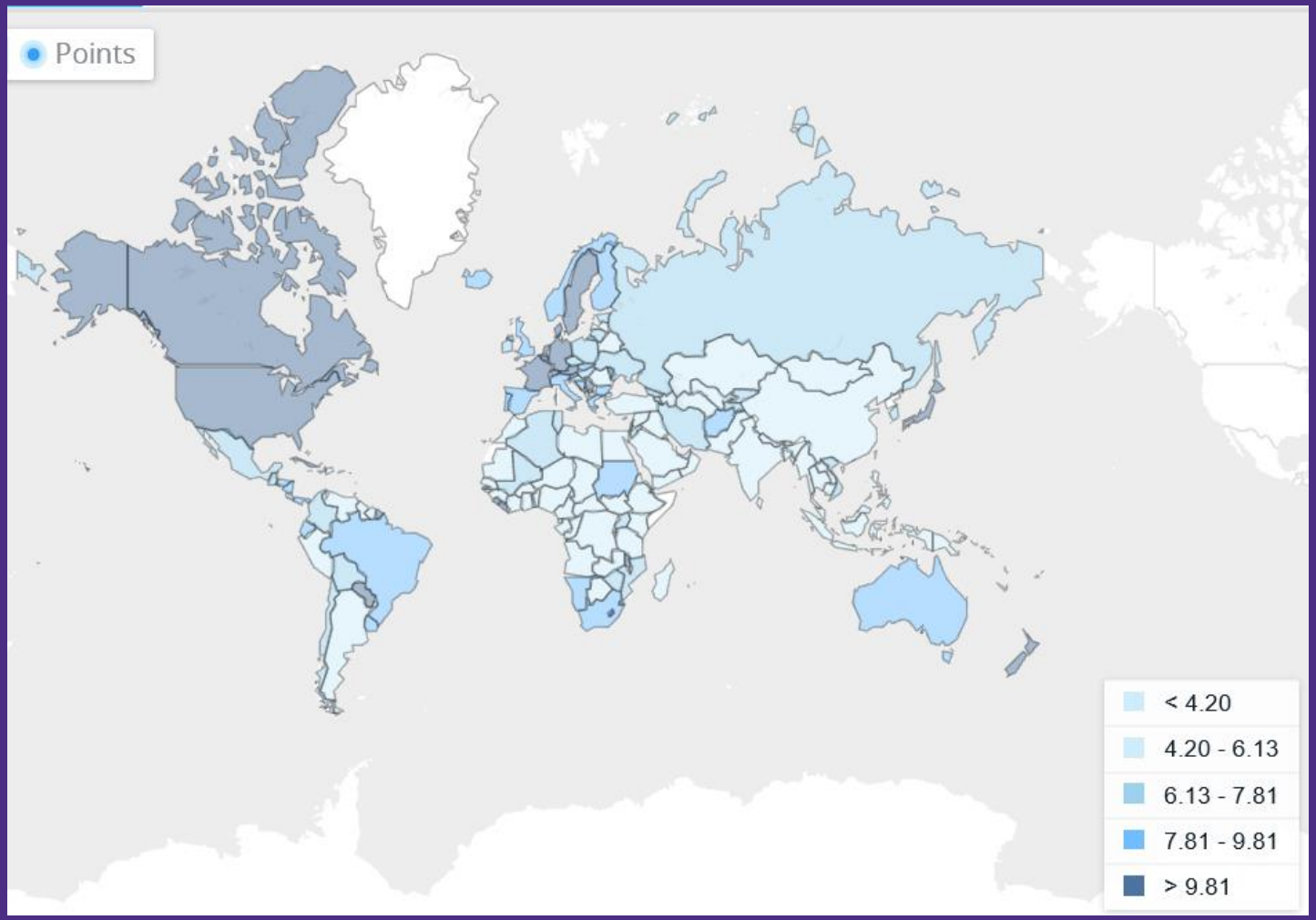
- **Primary interest:**
  - **Value-based health care**
  - **Program evaluation and micro-behaviors**
  - **Econometrics**

- **http://faculty.washington.edu/basua/**
- **@basucally**

Introduction

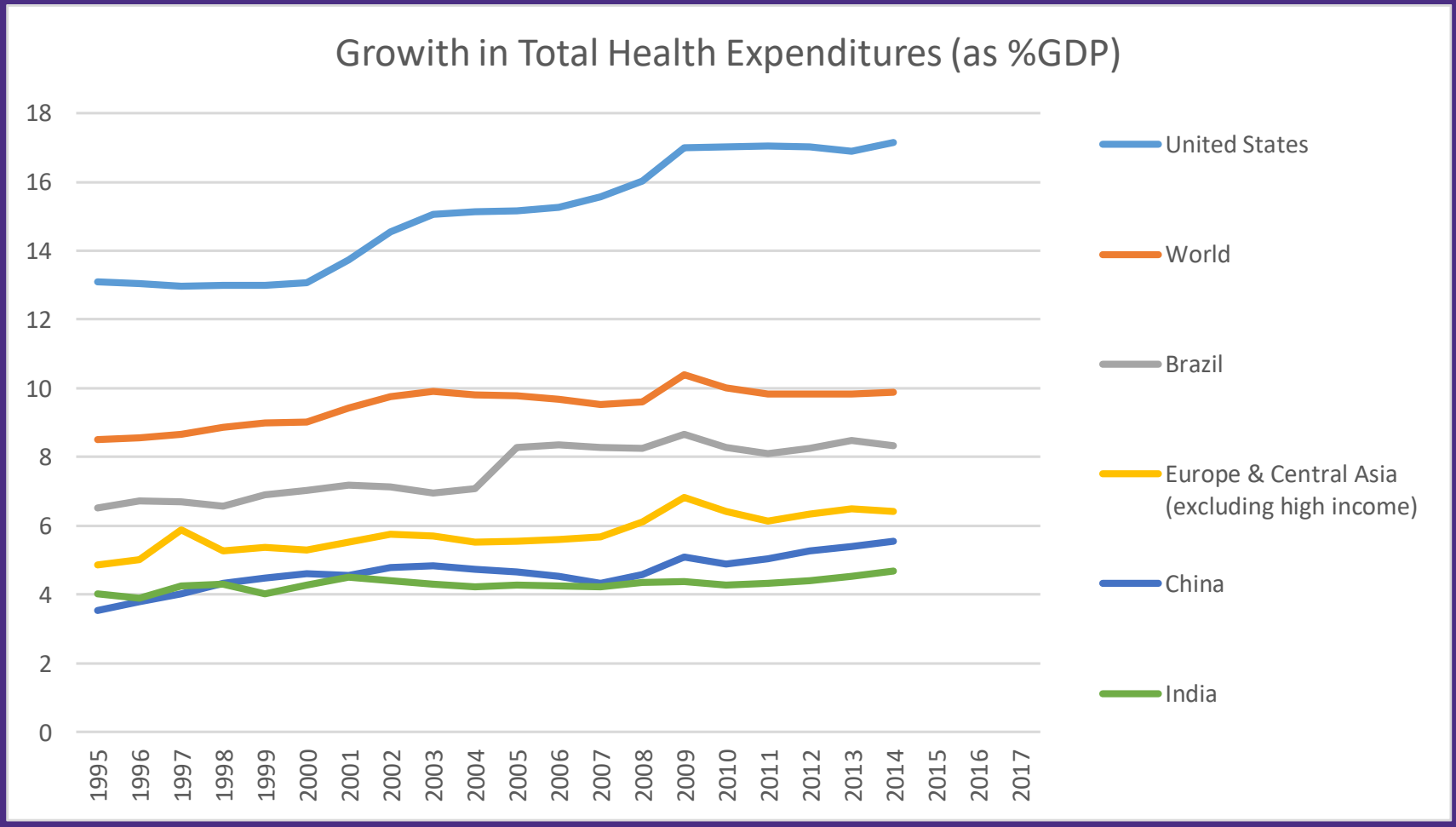
- **Health care expenditures are growing almost everywhere in the world**

Healthcare expenditures as a %GDP



Source: World Health Organization Global Health Expenditure database

Healthcare expenditures as a %GDP

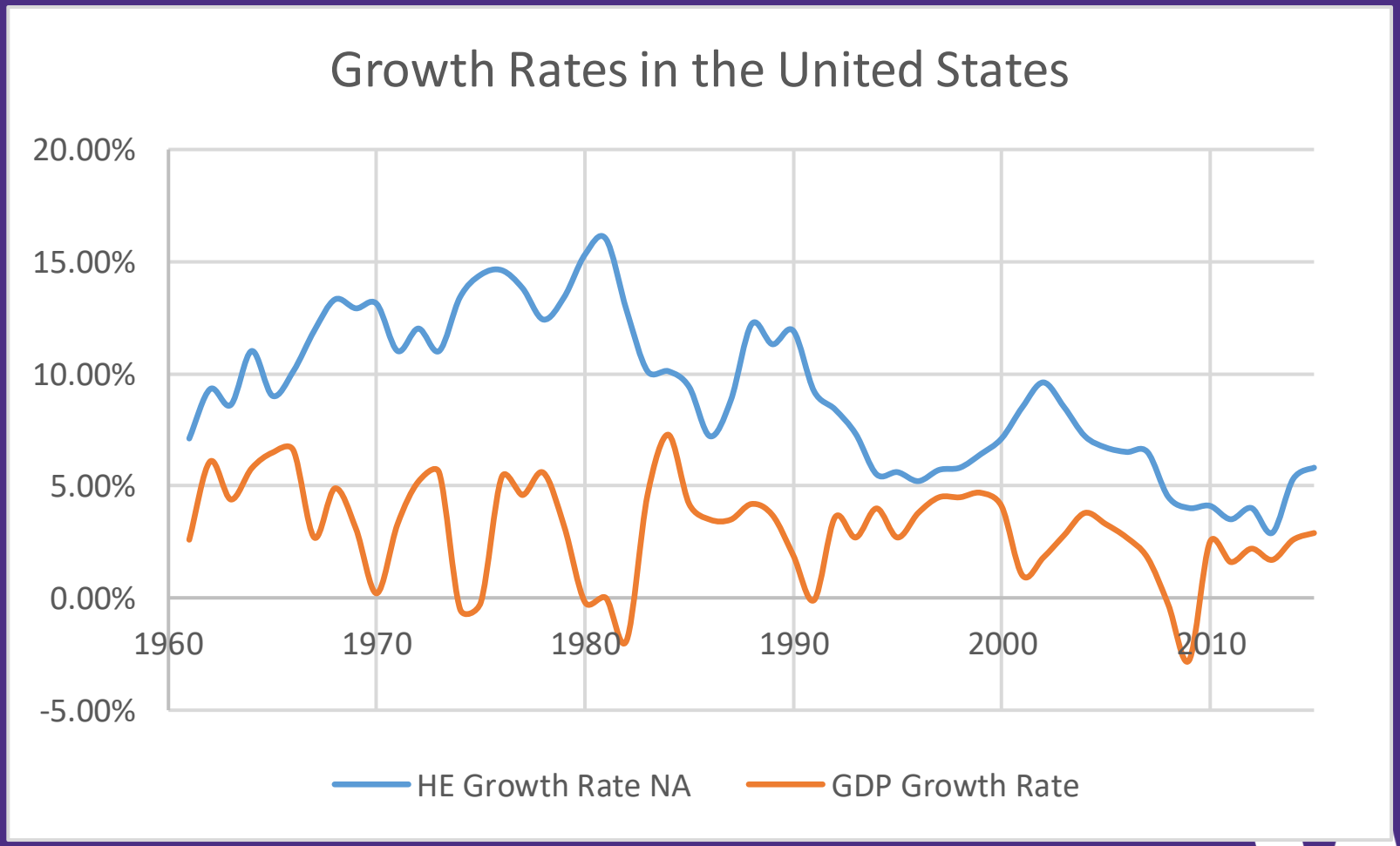


Source: World Health Organization Global Health Expenditure database

Increases in Health Care Costs

- **Nominal Terms:**
  - **$27 Billion in 1960**
  - **$3.2 Trillion in 2015**
- **As a percentage of GNP:**
  - **5% in 1960**
  - **17.5% in 2015**

Growth Rates in the United States



Source: World Health Organization Global Health Expenditure database

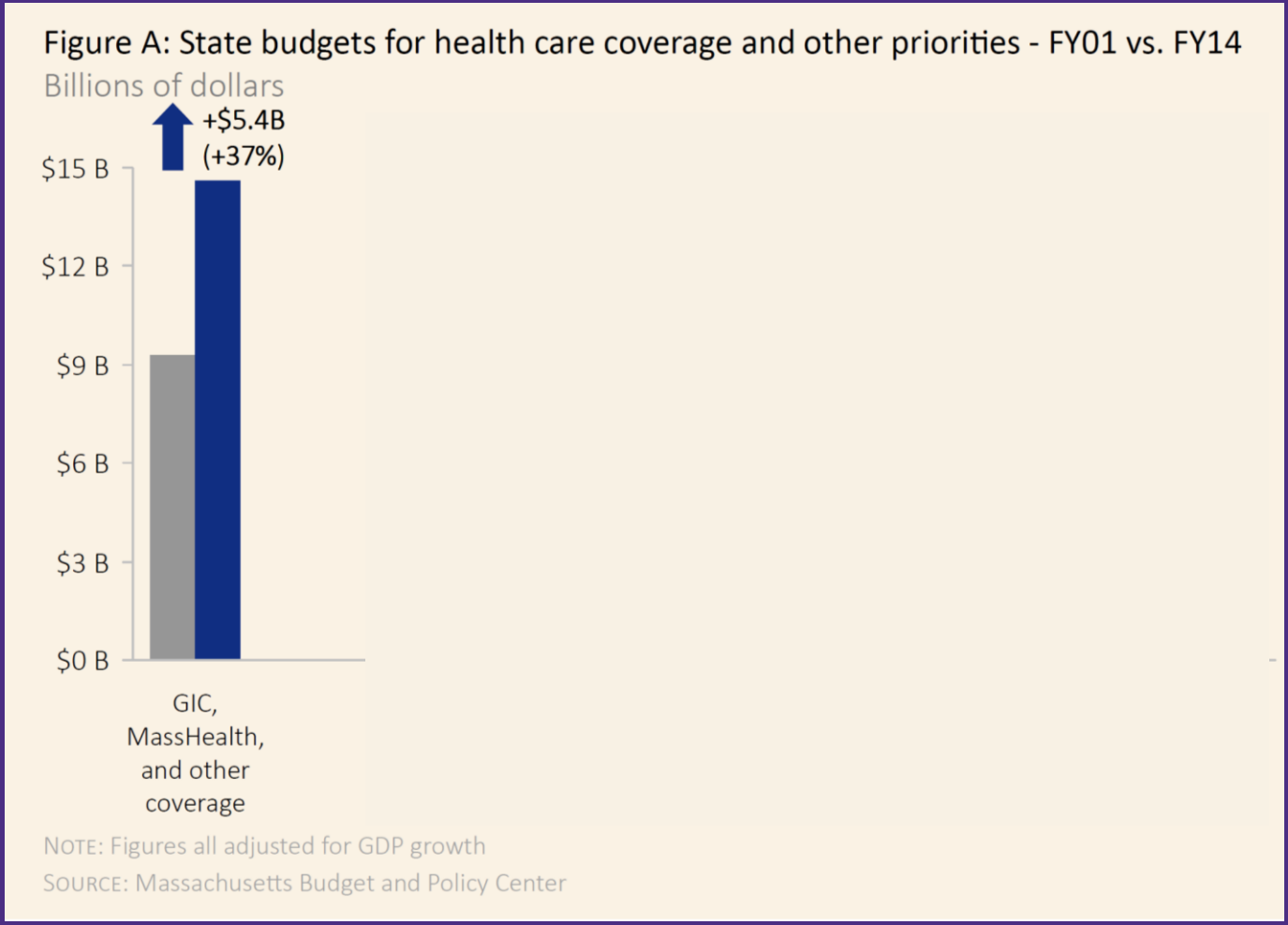
Increases in Health Care Costs

- **Since 1960, health care spending has grown by 2.5% more per year than the rest of the economy**
- **Expenditures = Price*Quantity**
- **Reasons:**
  - **Growth in quantity: 1.6% per year**
  - **Growth in prices: 0.9% per year**
- **Much of growth in prices is growth in quantity**
- **Spending rising because we are doing more**
- **More recently price also increasing.**

Growth in AMI Expenditures (Cutler et al., 1998)

AMI Treatment	1984 Use	1991 Use	Annual Growth	1984 Exp.	1991 Exp.	Annual Growth
Avg. Reimbursement				$11,175	$14,772	4.0%
Type of Treatment:						
Medical Management	88.7	59.4	-4.2%	$9,829	$10,783	1.3%
Catheterization	5.5	15.5	1.4%	$15,380	$13,716	-1.6%
Angioplasty	0.9	12.0	1.6%	$25,841	$17,040	-5.9%
Bypass Surgery	4.9	13.0	1.2%	$28,135	$32,117	1.9%
Price Index				$14,981	$14,772	-0.2%
Quantity Index				$12,047	$14,772	2.9%

Expansion of Health Insurance



Source: http://www.mass.gov/anf/docs/hpc/2013-cost-trends-report-final.pdf

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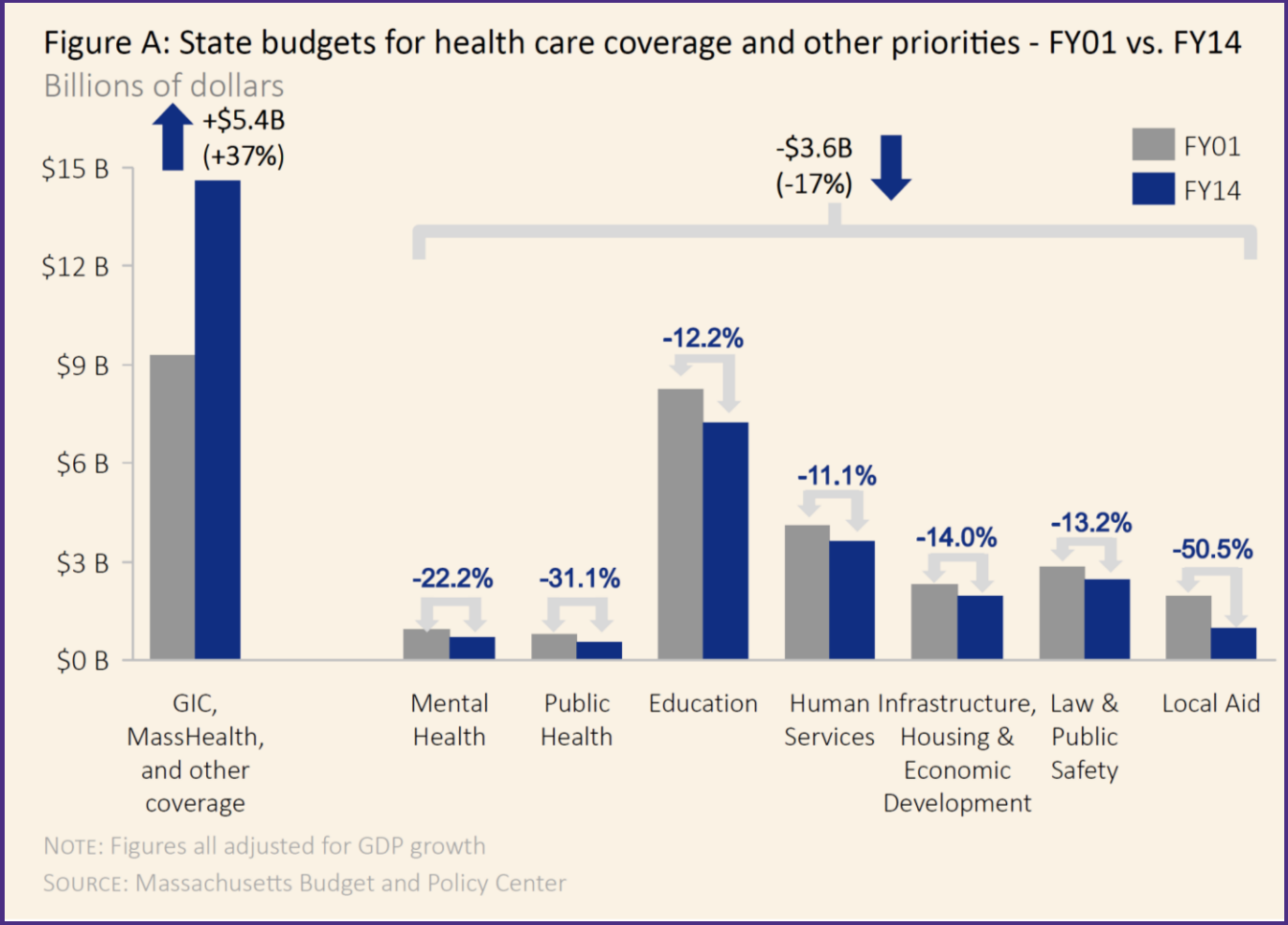
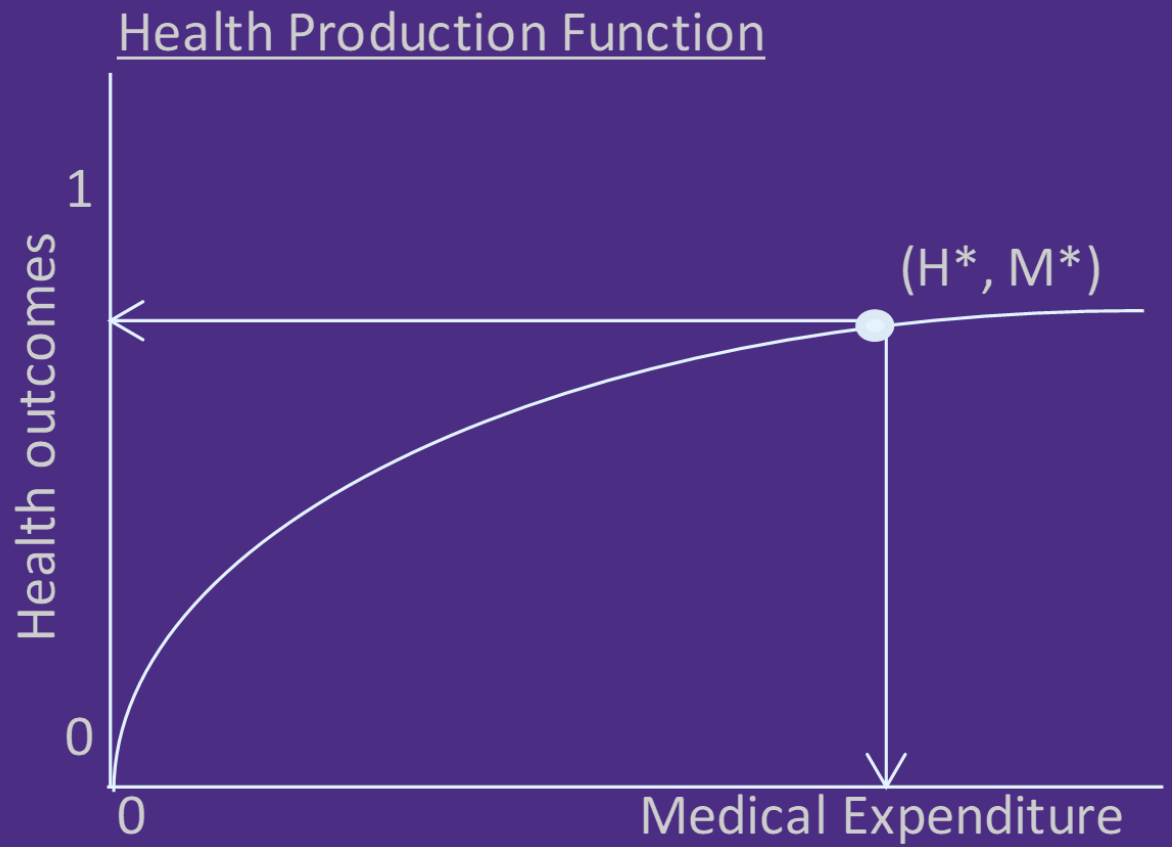


Source: http://www.mass.gov/anf/docs/hpc/2013-cost-trends-report-final.pdf

Concerns about value for money

- **Enthoven (1978, 1980): "Flat-of-the-curve medicine"**



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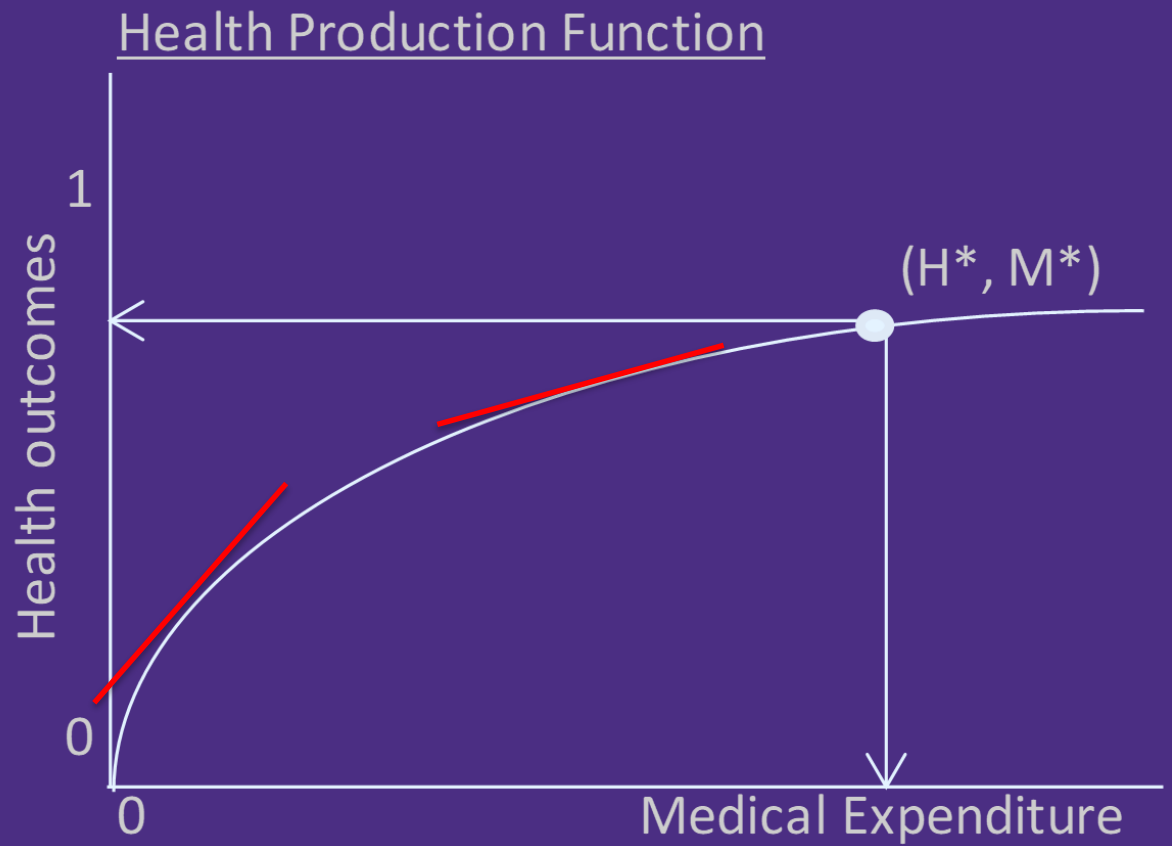

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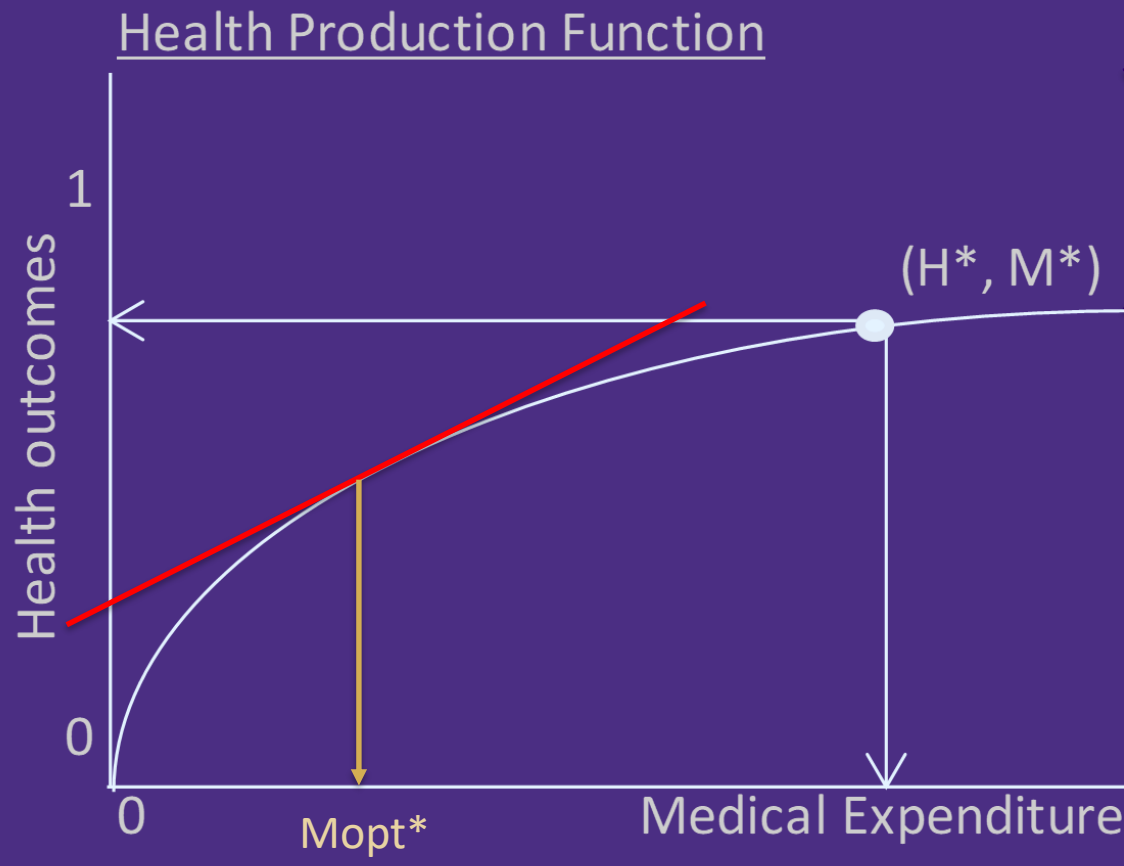

Real-world production function

- **Medical care inputs are discrete in nature**
  - **Surgery versus radiation**
  - **Drug A versus Drug B**
- **Estimate incremental production**
  - **Cost-effectiveness analysis**
  - **Comparable metric of benefit - QALYs**
- **Determine decision making criterion**
  - **Cost-effectiveness thresholds and alternatives.**

Incremental Cost-effectiveness Ratio (ICER)

- **For comparing two treatments,**

C1 = Expected Costs of the old Tx
C2 = Expected Costs of the new Tx
B1 = Expected Benefits of the old Tx
B2 = Expected Benefits of the new Tx

An incremental cost-effectiveness ratio (ICER) can then be formed as

ICER = (C2 – C1) / (B2 – B1)

ICER

- **Interpretation of ICER:**
  - **It is the shadow price of an extra unit of Benefit produced by new treatment over the old treatment**
  - **Interpretation differs when incremental costs or incremental benefits are negative**

	$(B_2 - B_1) \leq 0$	$(B_2 - B_1) > 0$
$(C_2 - C_1) > 0$	Dominated	$/QALY
$(C_2 - C_1) \leq 0$	$/ QALY	Dominant

Decision Making with ICER

- **What should we do? Answer depends on 2 factors:**
  - **What is the available budget?**
  - **How much do we value each unit of benefit?**
- **How do we determine if the price of the addition benefit produced by the new treatment is worth it?**
  - **Need an external reference standard.**
  - **This reference standard is called the "threshold value" in CEA. It is the marginal willingness to pay by the decision maker for an extra unit of benefit.**
  - **In US, the unofficial standard is $100 - $150K/QALY (some use $50K/QALY threshold)**

Decision Making with ICER

- **What should we do? Answer depends on 2 factors:**
  - **What is the available budget?**
  - **How much do we value each unit of benefit?**

Example (Goldie et al, 1999)

	Exp. Costs	Exp. QALYs
No Screening	**$71,060**	**62.40 months**
Annual Pap Smear	**$73, 740**	**64.91 months**

> **ICER = (73740 – 71060) / {(64.91 – 62.40)/12}**
= $2680/ 0.209 QALY
= 12,800 $/QALY

If threshold was $10K/ QALY, Annual pap smear is not cost-effective

If threshold was $50K/ QALY, Annual pap smear is cost-effective

Selected Events Since the First Panel

1996: US Panel publishes report

1998: WHO Choice project

1999: NICE established in UK

2004: IQWiG founded in Germany

2005: HAS created in France

2008: Advisory Committee on Immunization Practices (ACIP) establishes CEA guidelines for CDC

2010: Health reform (ACA) in US prohibits newly-created PCORI from developing or cost/QALY threshold

2014: Gates Reference Case for Economic Evaluation

2016: Second Panel on CEA publishes report

2nd Panel on CEA in Health and Medicine

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Principles of cost-effectiveness analysis

- **Principle based on "opportunity costs" concept**
- **Use of resources in one way prevents their use in other ways.**
- **"The opportunity cost of investing in a healthcare intervention is best measured by the health benefits (life years saved, quality adjusted life years (QALYs) gained) that could have been achieved had the money been spent on the next best alternative intervention or healthcare programme"**

Palmer and Raftery BMJ 1999

Application of principles of cost-effectiveness analysis

- **Perspective**
- **Choice of comparisons**
  - **Should *do-nothing* option be considered**
  - **Comparison to *standard of care***
- **All analyses are incremental**

Palmer and Raftery BMJ 1999

Second Panel Recommendations

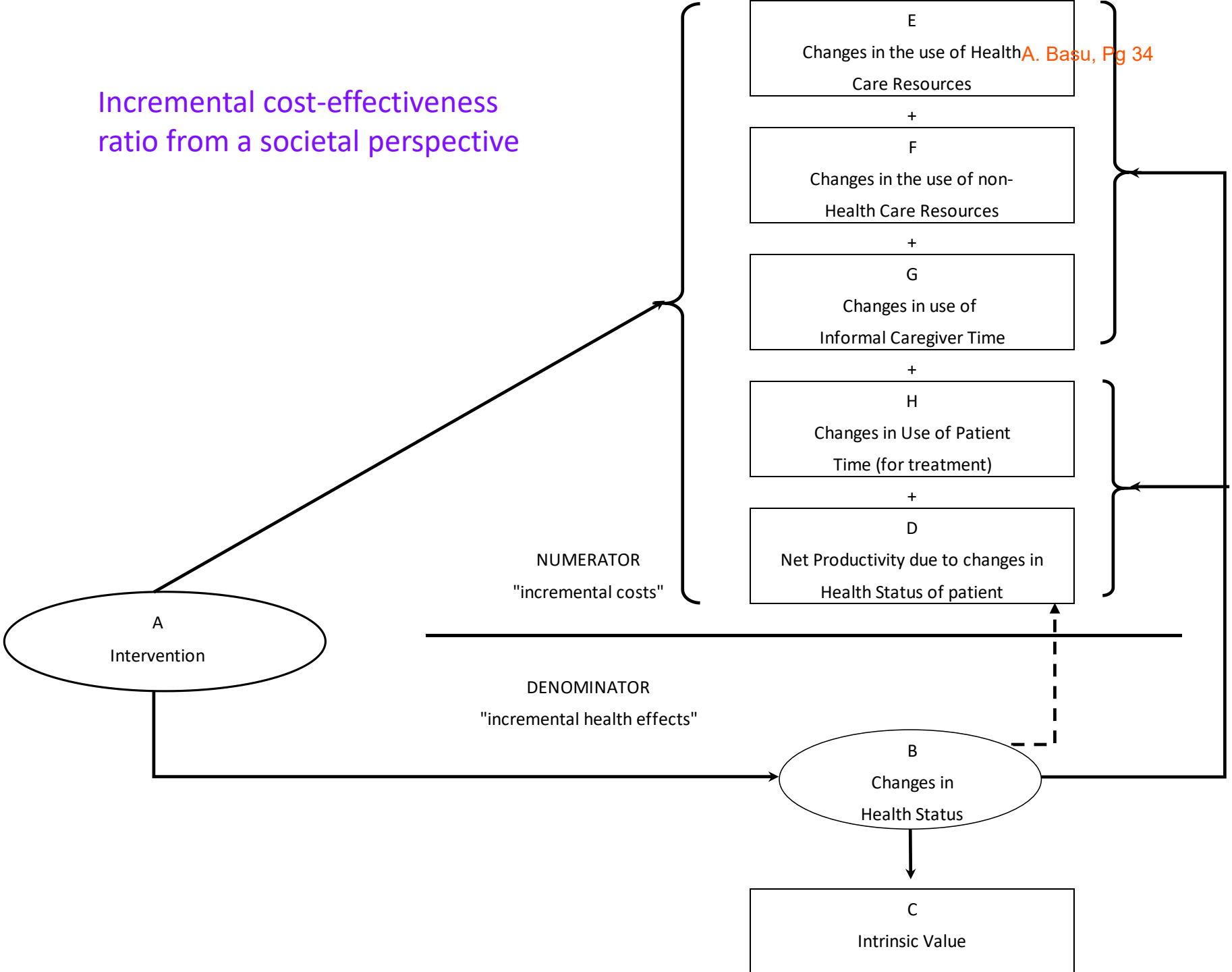
2nd Panel reference cases

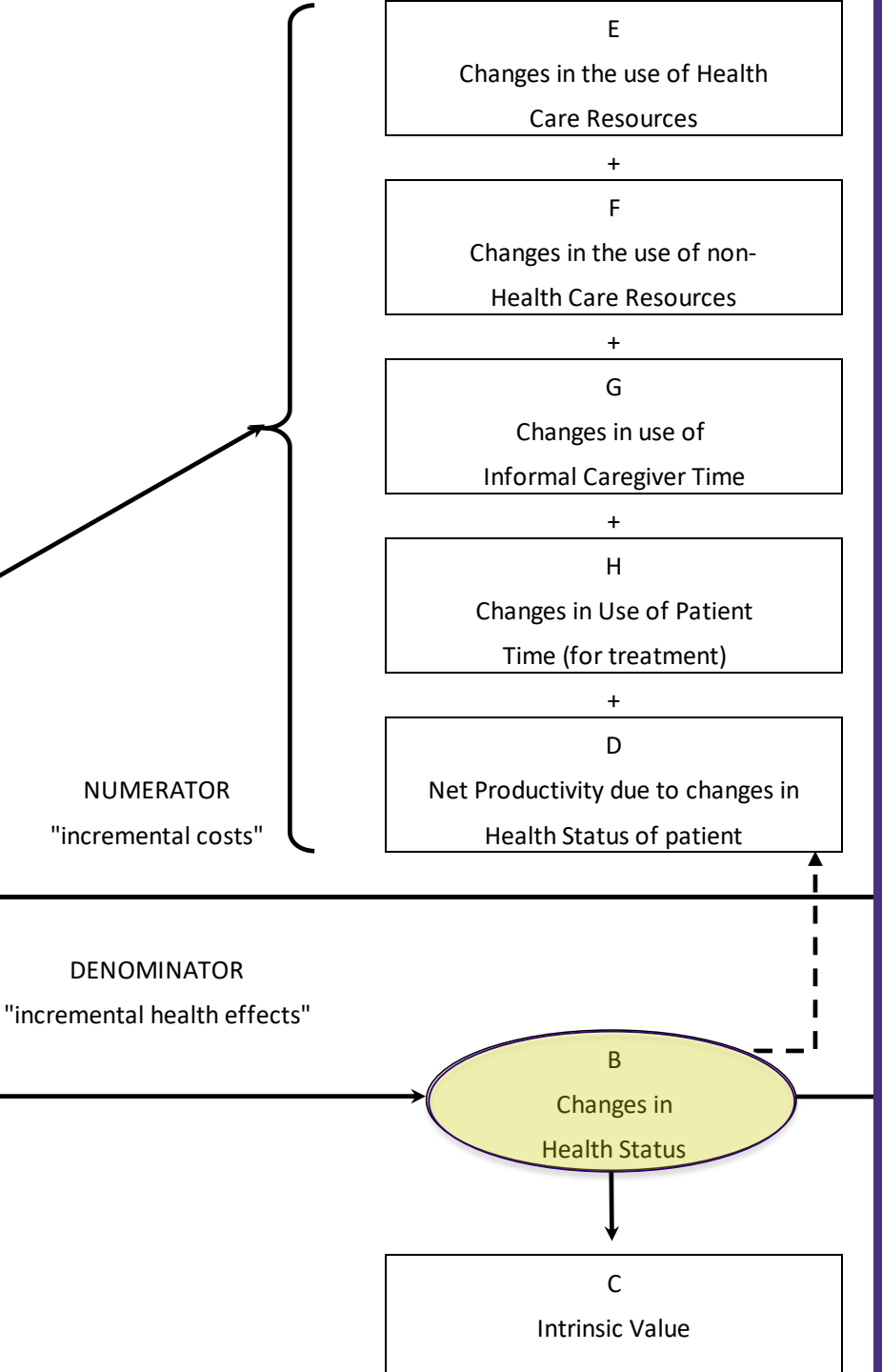
- **The Reference Case Provides a Standard Set of Methods to Promote the Comparability of CEAs**
- **A healthcare sector reference case :**
  - **formal healthcare sector (medical) costs borne by third-party payers and paid for out-of-pocket by patients**
  - **Both types of medical costs include current and future costs, related and unrelated to the condition under consideration.**

2nd Panel reference cases

- **A societal reference case**
  - **medical costs (current and future, related and unrelated) borne by third-party payers and paid for out-of-pocket by patients,**
  - **time costs of patients in seeking and receiving care,**
  - **time costs of informal (unpaid) caregivers,**
  - **transportation costs,**
  - **effects on future productivity and consumption, and**
  - **other costs and effects outside the healthcare sector.**

Incremental cost-effectiveness ratio from a societal perspective

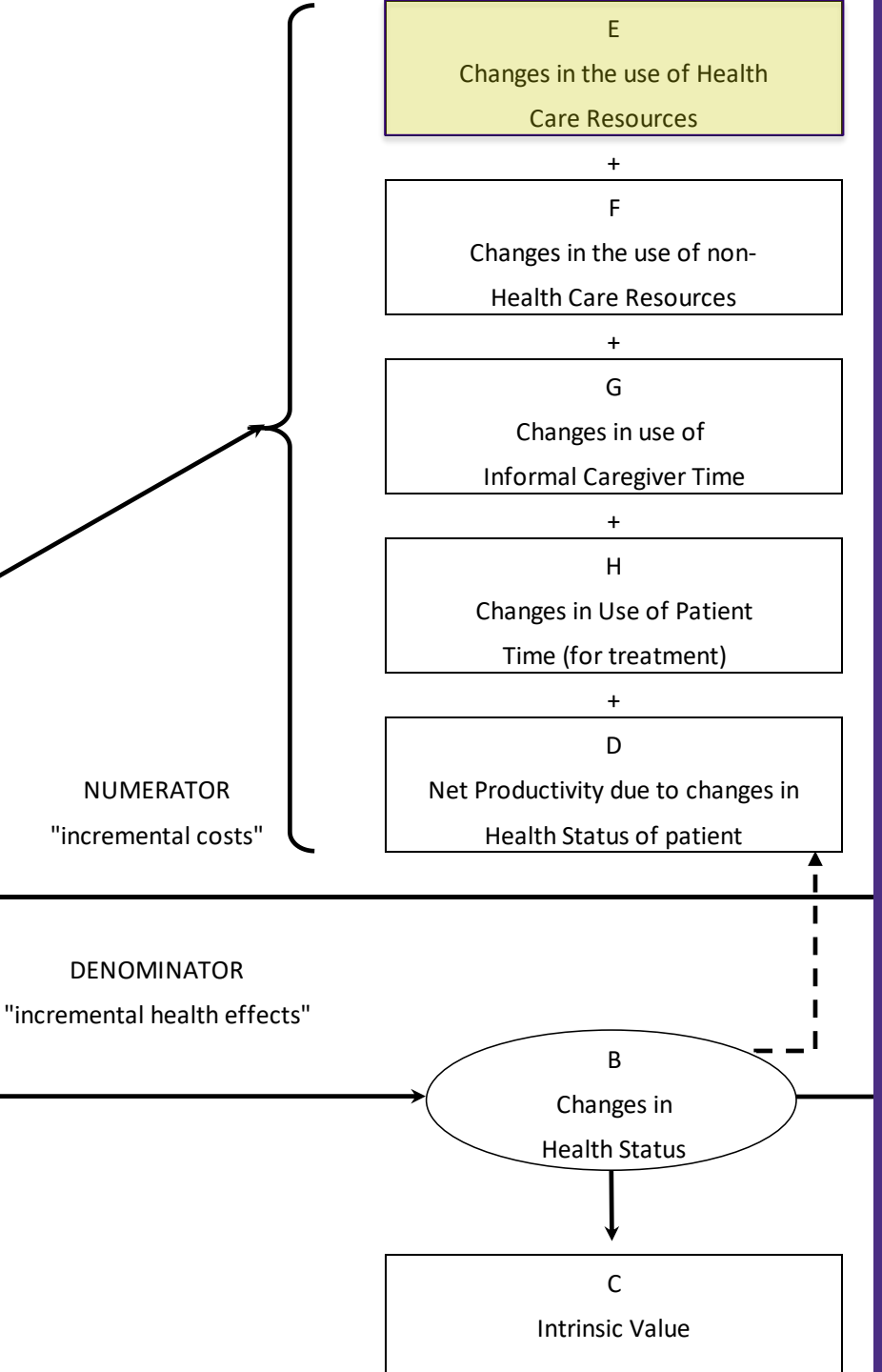




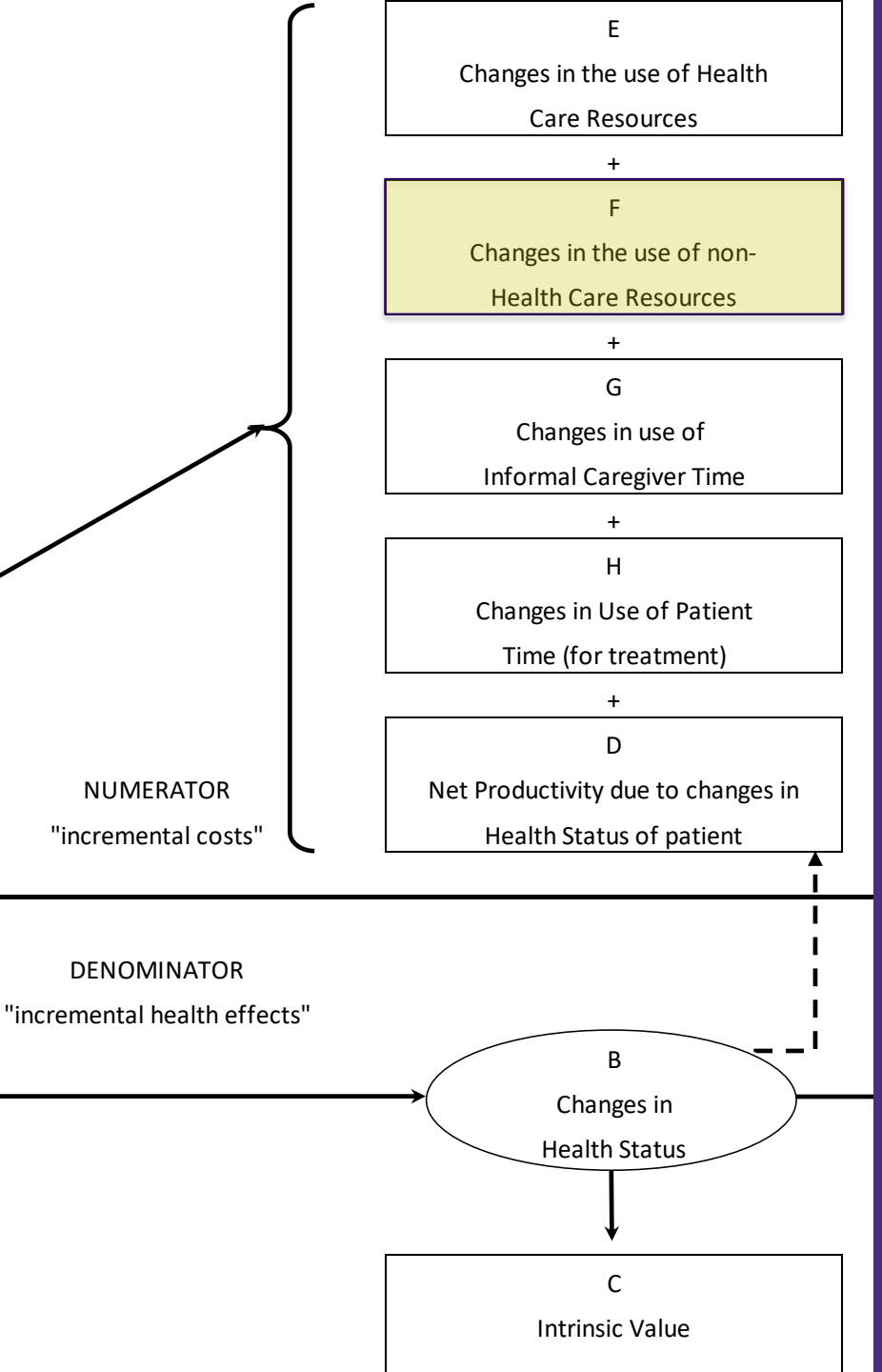
Typically measured in QALYs or DALYs

Typically considered in Health Sector perspective

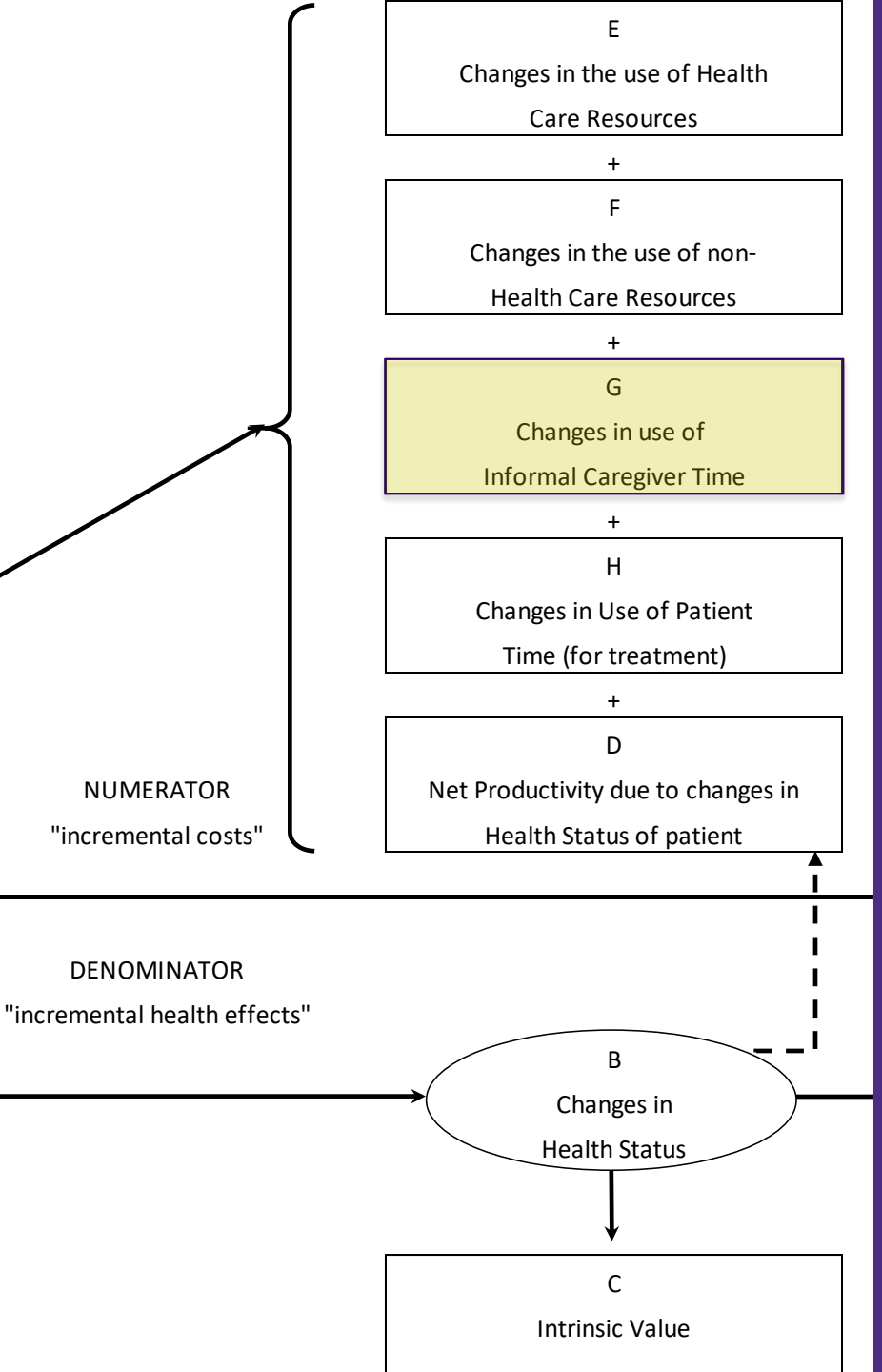
A. Basu, Pg 36



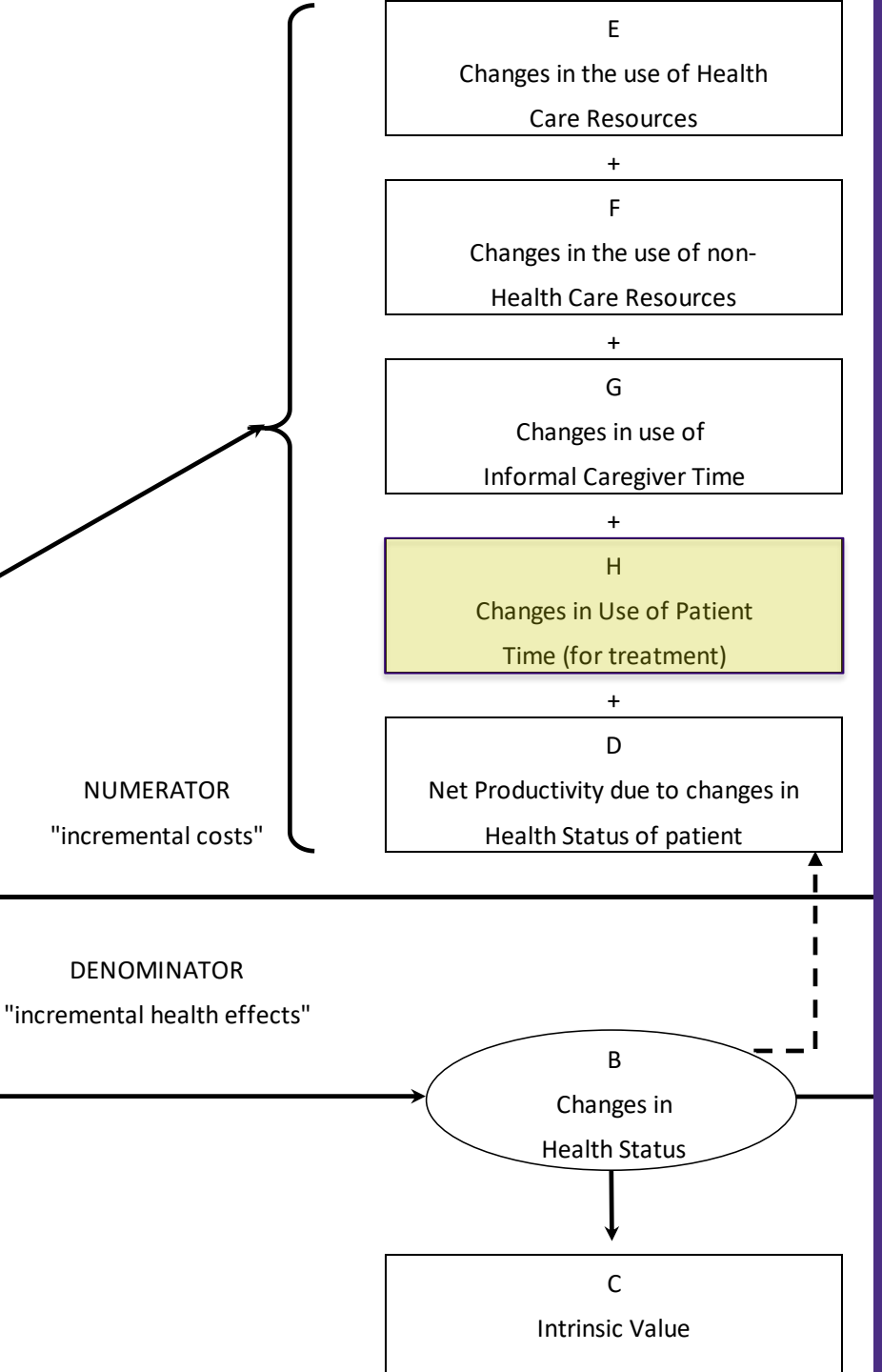
e.g. effects on criminal justice system, social care resources

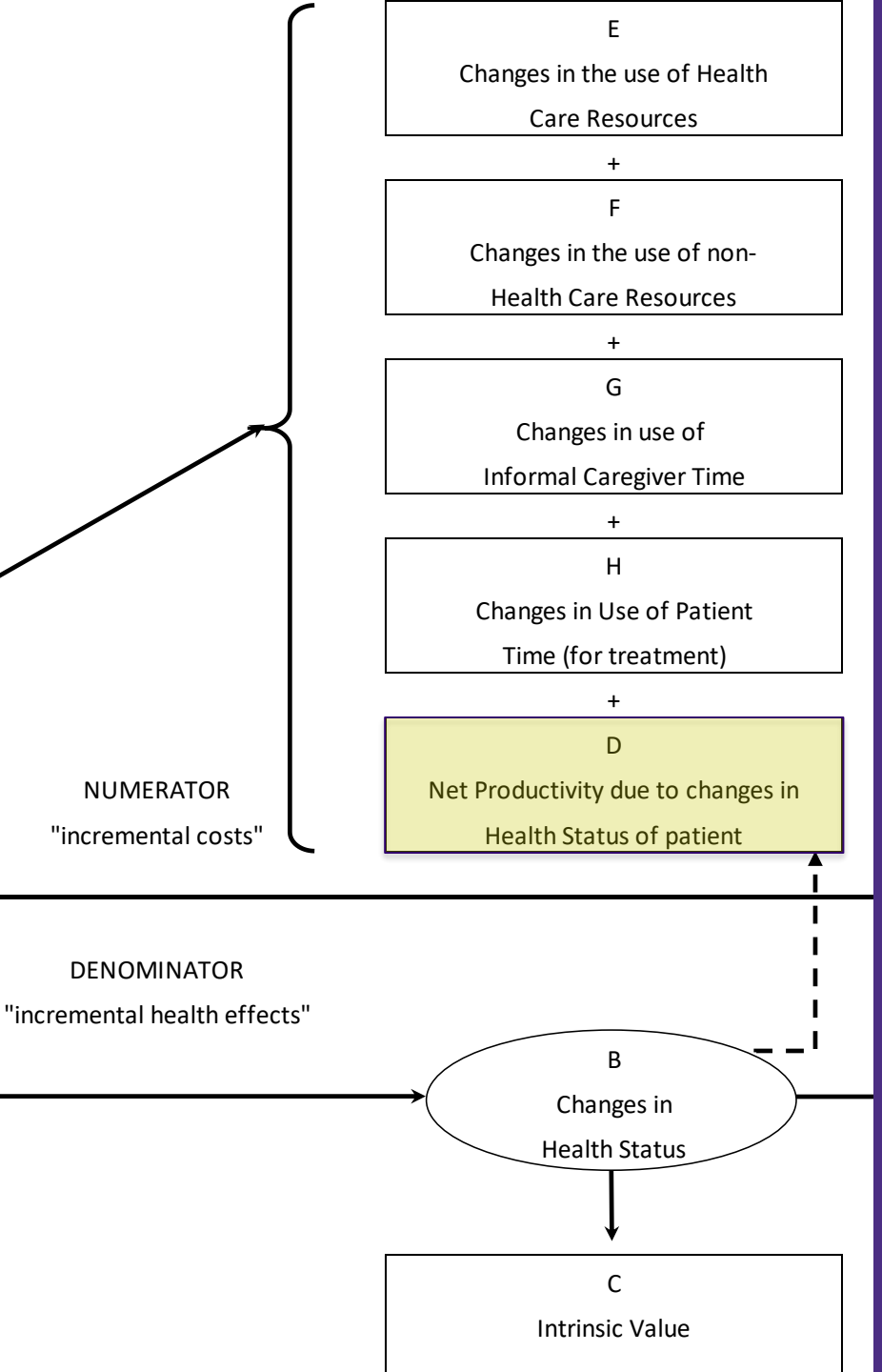


Costs of caregiving (.e.g sick child, sick parent, sick spouse)



A drug versus surgery, Tele-health





Critical component of value

- Health improves nations GDP!

Productivity

S(H)·[(L(H) + IL(H) + HP(H) – C(H)]

Where

H = Health; (H) = indicates dependence on health

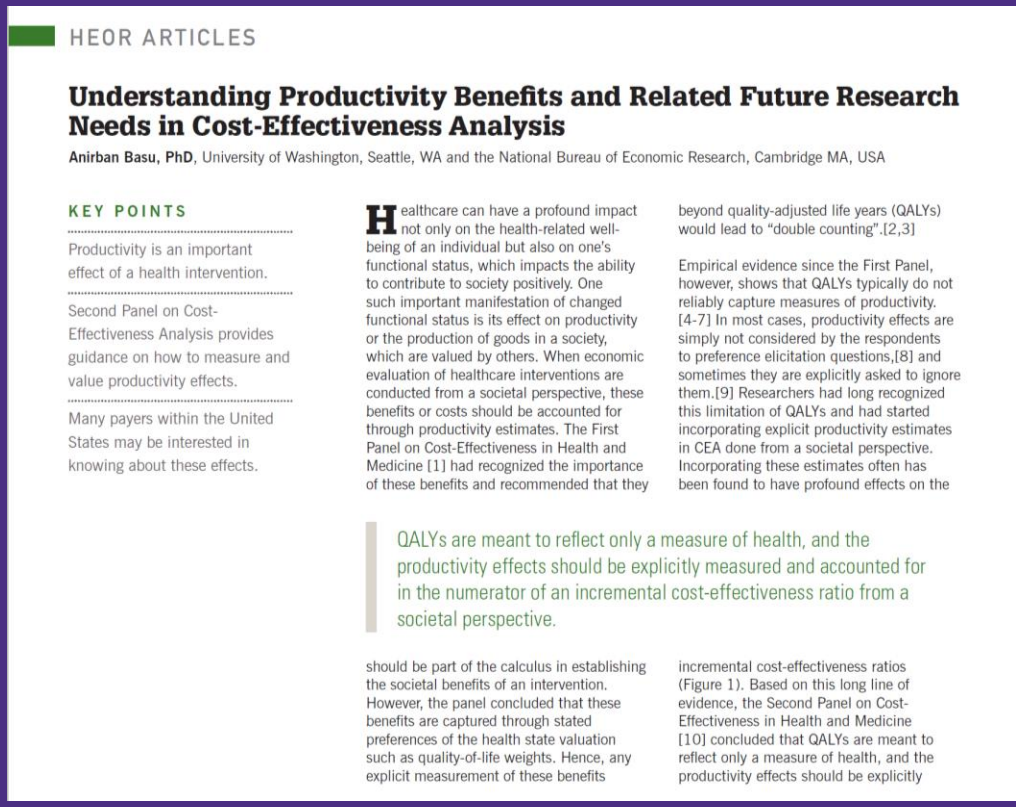
S = survival to that specific period

L = Labor production

IL= Informal labor production

HP = Household production

C = Total consumption, and



HEOR ARTICLES

Understanding Productivity Benefits and Related Future Research Needs in Cost-Effectiveness Analysis

Anirban Basu, PhD, University of Washington, Seattle, WA and the National Bureau of Economic Research, Cambridge MA, USA

KEY POINTS

Productivity is an important effect of a health intervention.

Second Panel on Cost-Effectiveness Analysis provides guidance on how to measure and value productivity effects.

Many payers within the United States may be interested in knowing about these effects.

Healthcare can have a profound impact not only on the health-related well-being of an individual but also on one's functional status, which impacts the ability to contribute to society positively. One such important manifestation of changed functional status is its effect on productivity or the production of goods in a society, which are valued by others. When economic evaluation of healthcare interventions are conducted from a societal perspective, these benefits or costs should be accounted for through productivity estimates. The First Panel on Cost-Effectiveness in Health and Medicine [1] had recognized the importance of these benefits and recommended that they should be part of the calculus in establishing the societal benefits of an intervention. However, the panel concluded that these benefits are captured through stated preferences of the health state valuation such as quality-of-life weights. Hence, any explicit measurement of these benefits beyond quality-adjusted life years (QALYs) would lead to "double counting".[2,3]

Empirical evidence since the First Panel, however, shows that QALYs typically do not reliably capture measures of productivity. [4-7] In most cases, productivity effects are simply not considered by the respondents to preference elicitation questions,[8] and sometimes they are explicitly asked to ignore them.[9] Researchers had long recognized this limitation of QALYs and had started incorporating explicit productivity estimates in CEA done from a societal perspective. Incorporating these estimates often has been found to have profound effects on the incremental cost-effectiveness ratios (Figure 1). Based on this long line of evidence, the Second Panel on Cost-Effectiveness in Health and Medicine [10] concluded that QALYs are meant to reflect only a measure of health, and the productivity effects should be explicitly

> QALYs are meant to reflect only a measure of health, and the productivity effects should be explicitly measured and accounted for in the numerator of an incremental cost-effectiveness ratio from a societal perspective.

Basu, ISPOR Value and Outcomes Spotlight 2018

Distributional issues

- **Whose wage to use?**
  - **Age and gender specific (First panel recommendations)**
  - **Age specific?**
  - **Median wage across all age, gender, race?**

  - **Same level of stratification for production and consumption?**

COST-EFFECTIVENESS ANALYSIS THRESHOLDS

Threshold for Health

- **Assuming that**
  - **there is a well defined health care sector,**
  - **with its own budget,**
  - **whose goal is just to maximize health,**
  - **A cost-effectiveness analysis be done from a health care sector perspective.**
  - **Threshold for decision making driven by the opportunity costs (health forgone) at the margin of the budget constraint.**
- **For a societal perspective**
  - **A cost-effectiveness can be done by accounting for all benefits produced and resources consumed in the society**
  - **Threshold for decision making driven by marginal value of health.**

Estimation of threshold

- **Marginal value of health from societal perspective**

- **Marginal value of health from a health care sector perspective with a fixed budget**

Societal Estimates

Methods	Median Value of life (US 2004 $ million)	Threshold $/QALY estimate (US 2004 $)
Human Capital	$0.62	$29,161
Revealed Preference – Job risks	$10.70	$504,070
Revealed Preference - Safety	$2.36	$109,929
Contingent Valuation	$3.98	$189,847
OVERALL	$4.94	$235,431

Based on Hirth et al. 2000

Other approaches to valuing health

- **Society's willingness to pay for a health unit must exceed the incremental cost-effectiveness of "modern" health care compared to pre-"modern era"**
  - **Supposedly, produces a lower bound**
  - **$95K/LY, $109K/QALY**

- **The incremental cost-effectiveness of health insurance for nonelderly adults in the United States without employer- or government subsidized health insurance.**
  - **Reflects costs and benefits they are not willing to pay**
  - **Supposedly an upper bound.**
  - **$264K/LY, $297K/QALY**

Braithwaite et al. 2008

Social Valuation

- **In general, how individuals value health insurance may be a great way to understand how they value health**

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Toward a Hedonic Value Framework in Health Care

Anirban Basu, PhD[1,2,3,*], *Sean D. Sullivan, PhD*[1]

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A few points about societal threshold..

- **Cannot be less than GDP per capita**

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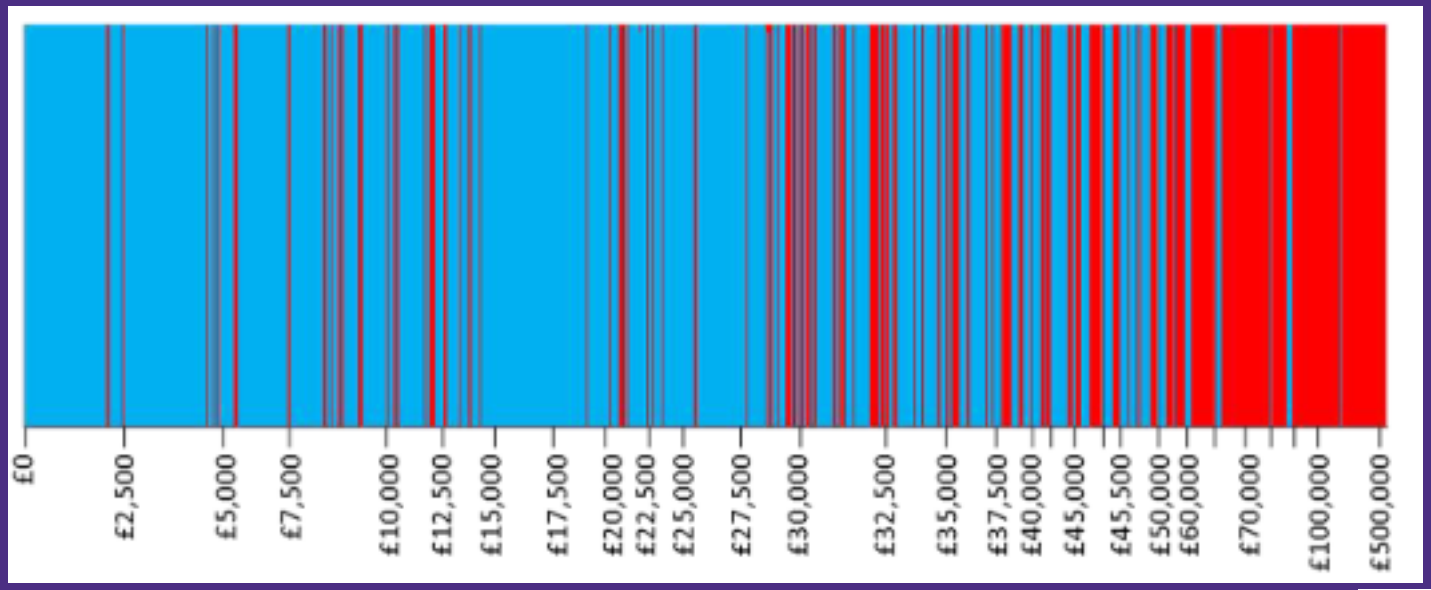

Dakin *et al.* *Health Economics* 2014; DOI: 10.1002/hec.3086

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- **Threshold(s) should keep up with inflation**

A few points about societal threshold..

- **Cannot be less than GDP per capita**
- **A true single threshold is irrelevant.**
- **Threshold(s) should keep up with inflation**
- **Alternative thresholds can be used to address vulnerability of patients**

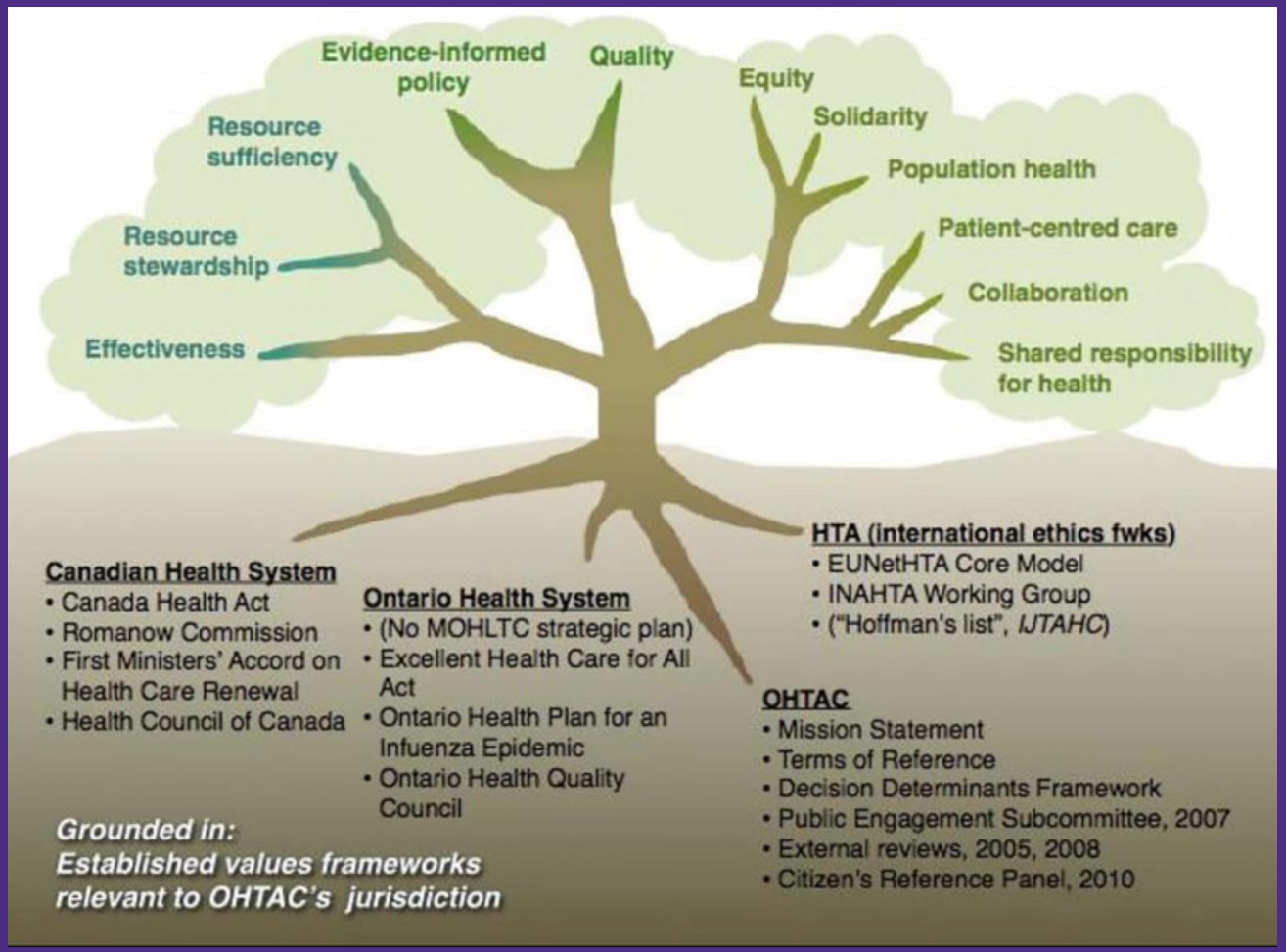
Health Technology Assessment

Health Technology Assessment

"policy tool for informing decision makers who must manage the entry and use of pharmaceuticals, medical devices, and other technologies (including complex interventions) within health systems, for example, through reimbursement and pricing"

- Kristensen et al. ISPOR Report VIH 2019

Health Technology Assessment



Krahn et al. Int J Tech Assess Health Care 2018

Decision Framework in HTA

- Attributes that define the scope of decision making;
- Decision rules for those attributes, which may be formal and explicit, as in the case of multi-criteria decision analysis, or less formal;
- The processes by which decisions are made.
  - composition of the committee;
  - how information is gathered, synthesized and presented, and by whom;
  - how the deliberation is structured; and
  - how recommendations are formulated

Mature European HTA bodies

	France (HAS/CEESP)	Germany (IQWiG)	Sweden (TLV)	England (NICE)	Italy (AIFA)	Netherlands (ZIN)	Poland (AOTMiT)	Spain (RedETS/ISCIII or ICP[a])
Function	Autonomous, advisory	Autonomous, advisory	Autonomous, regulatory	Autonomous, advisory	Autonomous, regulatory	Autonomous, advisory	Autonomous, advisory	Autonomous, advisory
Expert committee	CEESP	Assessment: IQWiG scientific personnel[b]; Appraisal: G-BA	The Board for Pharmaceutical Benefits	Technology Appraisal Committee	AIFA's Technical Scientific Committee and CPR	Committee for societal consultation regarding the benefit basket	Transparency Council	ICP[c]
Topic selection	HAS (about 90% submitted by the manufacturers, 10% requested by the MoH)[d]	Not applicable (all drugs applying for marketing authorization, excluding inpatient)	TLV (only outpatient and high price drugs)	DH in consultation with NICE based on explicit prioritisation criteria[e]	AIFA (all drugs submitted by manufacturers)	Mostly on its own initiative; sometimes at the request of MoH	MoH[f] (in the case of manufacturer submission—triggered by MAH)	Not subject to any specific known procedure[g]
Guidelines for the conduct of economic analysis	Yes	Yes (however, CBA is not standard practice)	Yes	Yes	In progress	Yes	Yes	Spanish recommendations on economic evaluation of health technologies

Angelis et al. Eur J Health Econ 2018

Typical attributes considered by these agencies

- **Burden of Disease**
  - Severity
  - Availability of treatments (i.e. unmet need)
  - Prevalence
- **Therapeutic and Safety Impact**
  - Efficacy
  - Clinically meaningful outcomes
  - Surrogate/intermediate outcomes
  - HrQOL outcomes (Generic/disease specific)
  - Safety
  - Dealing with uncertainty
- **Innovation level**
  - Clinical novelty
  - Ease and comfort of use
  - Nature of treatment
- **Socio-economic impact**
  - Public Health benefit/value
  - Social productivity
- **Efficiency considerations**
  - CEA
  - CBA/BIA
- **Other considerations**

Analysis Methods for Economic Evaluation

	France (HAS/CEESP[a])	Germany (IQWiG)	Sweden (TLV)	England (NICE)	Italy (AIFA)	Netherlands (ZIN)	Poland (AOTMiT)	Spain (RedETS/ISCIII or ICP)
Perspective	Widest possible to include all health system stakeholders[l]	Usually statutory health insurant[m]	Societal	Cost payer (NHS) or societal if justified	Italian National Health Service[n]	Societal (report indirect costs separately)	The public payer's perspective, public payer and patient (by law)	Cost payer (NHS) and societal (rarely used), and they should be presented separately
Subgroup analysis	Yes (when justified)	Yes	Yes	Yes	Yes	Yes	Yes (if needed, but	Yes
Discounting								
Costs	4% (up to 30 years) and 2% after	3%	3%	3.5%	Not available (update in progress)	4%	5%	3%
Outcomes	4% (up to 30 years) and 2% after	3%	3%	3.5%	Not available (update in progress)	Under review—will probably be set at same level as costs discounting	3.5%	3%
Sensitivity analysis	0%, 3% (6% max)	0–5%	0–5%	0–6%	Not available (update in progress)	Not obligatory	5 and 0% for costs and outcomes 0% for outcomes 5% for costs[s]	0–5%

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ISPOR Report

Identifying the Need for Good Practices in Health Technology Assessment: Summary of the ISPOR HTA Council Working Group Report on Good Practices in HTA

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HEOR Competencies

https://www.ispor.org/strategic-initiatives/more/heor-competencies-framework