

Connecting Health and Economics

Hugh Gravelle

Centre for Health Economics
University of York

CHE Seminar 7 April 2011



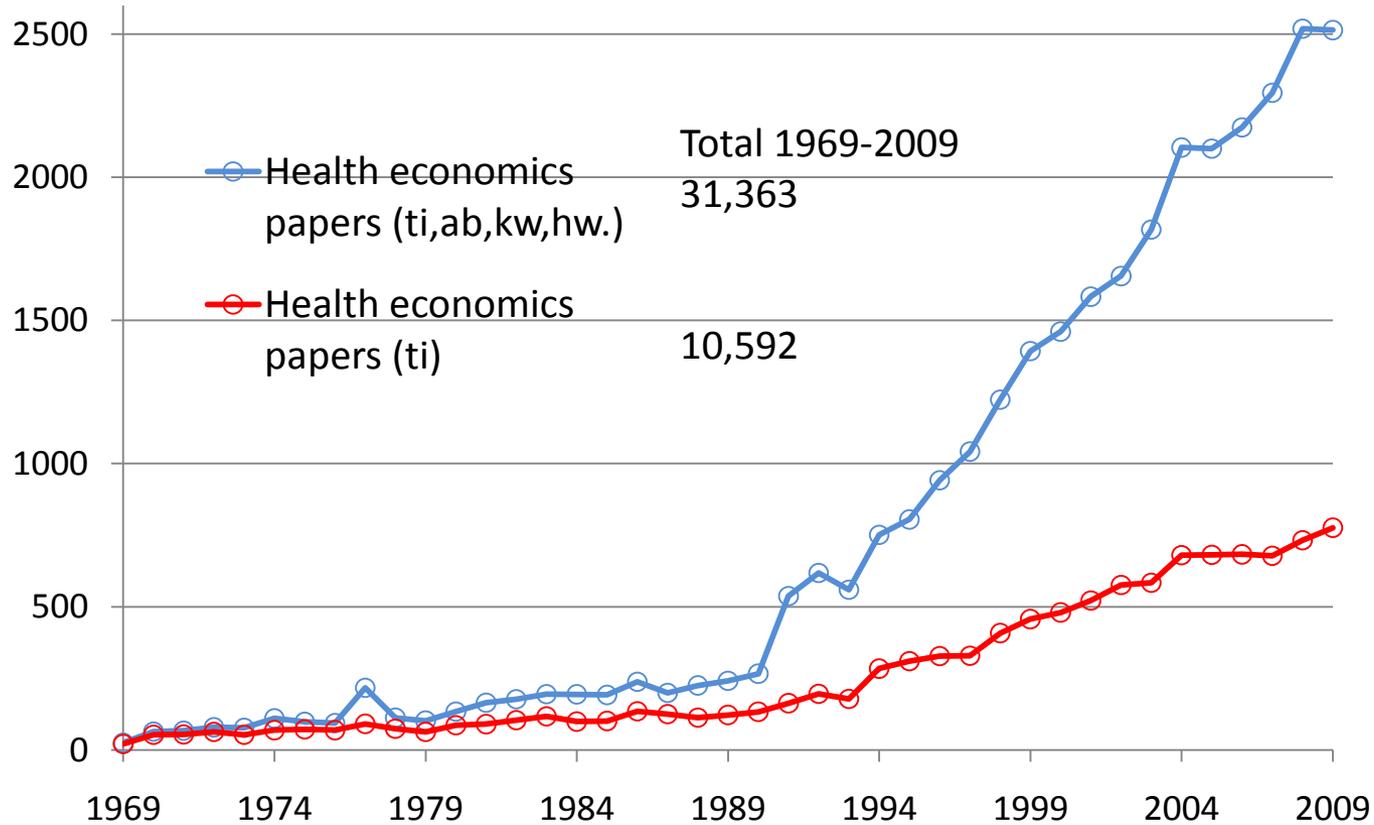
THE UNIVERSITY *of York*

Outline

- Current state of health economics
- Contribution: models of decision making in health and healthcare
 - Aid understanding
 - Guide policy
- Challenges

How are we doing?

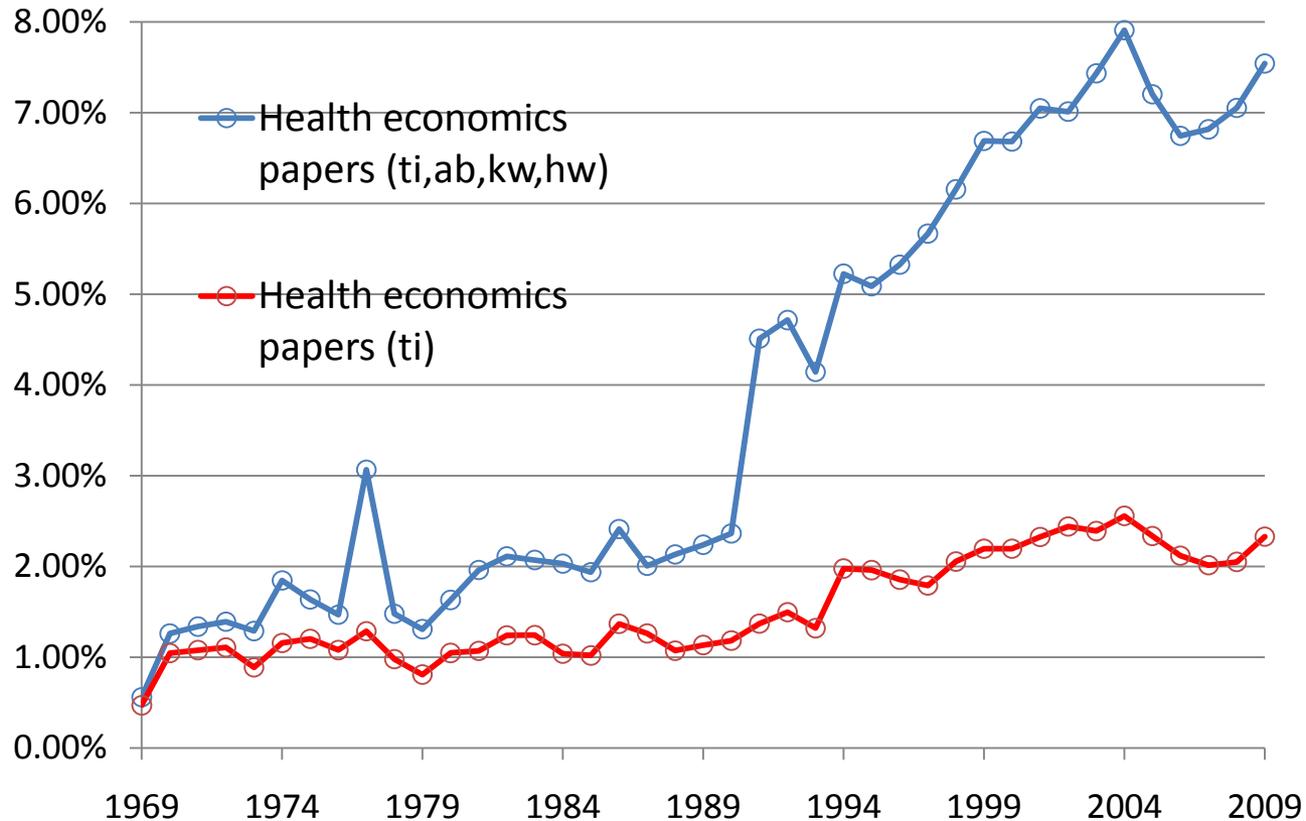
Health economics papers in EconLit 1969-2009



Search terms: “health”, “healthcare”, “medical”, “medicine”, “pharmaceutical”, “physician”, “doctor”, “nurse”, “nursing”, “hospital”, “general pract*”, “GP”

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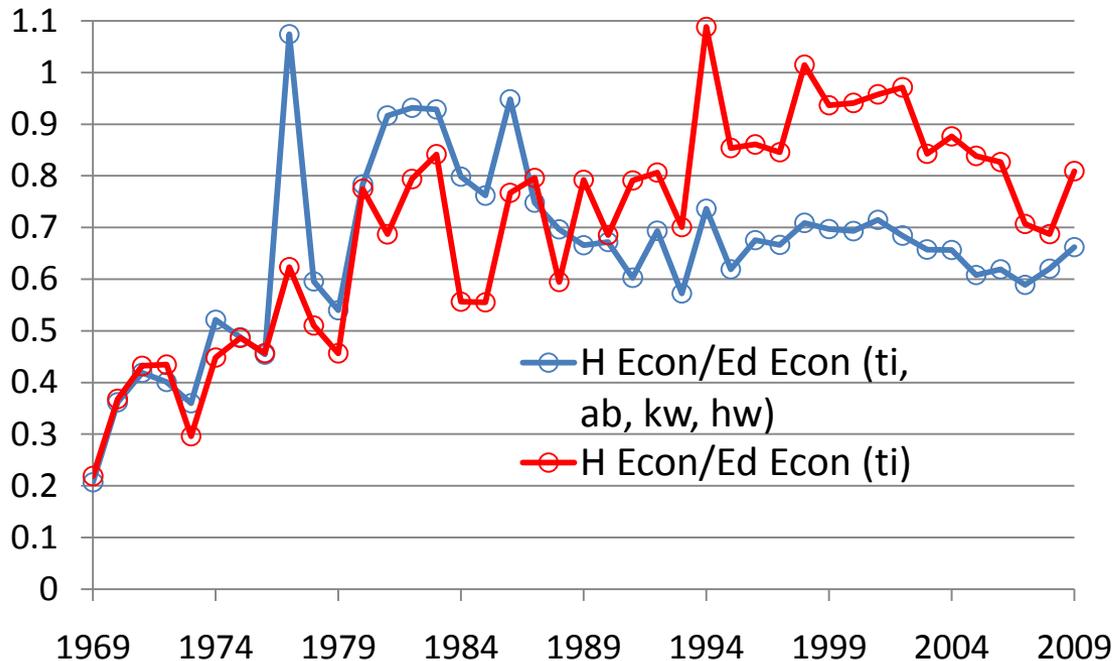
Health economics papers in EconLit 1969-2009 % all papers



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How are we doing?

Ratio of health to education papers: EconLit 1969-2009

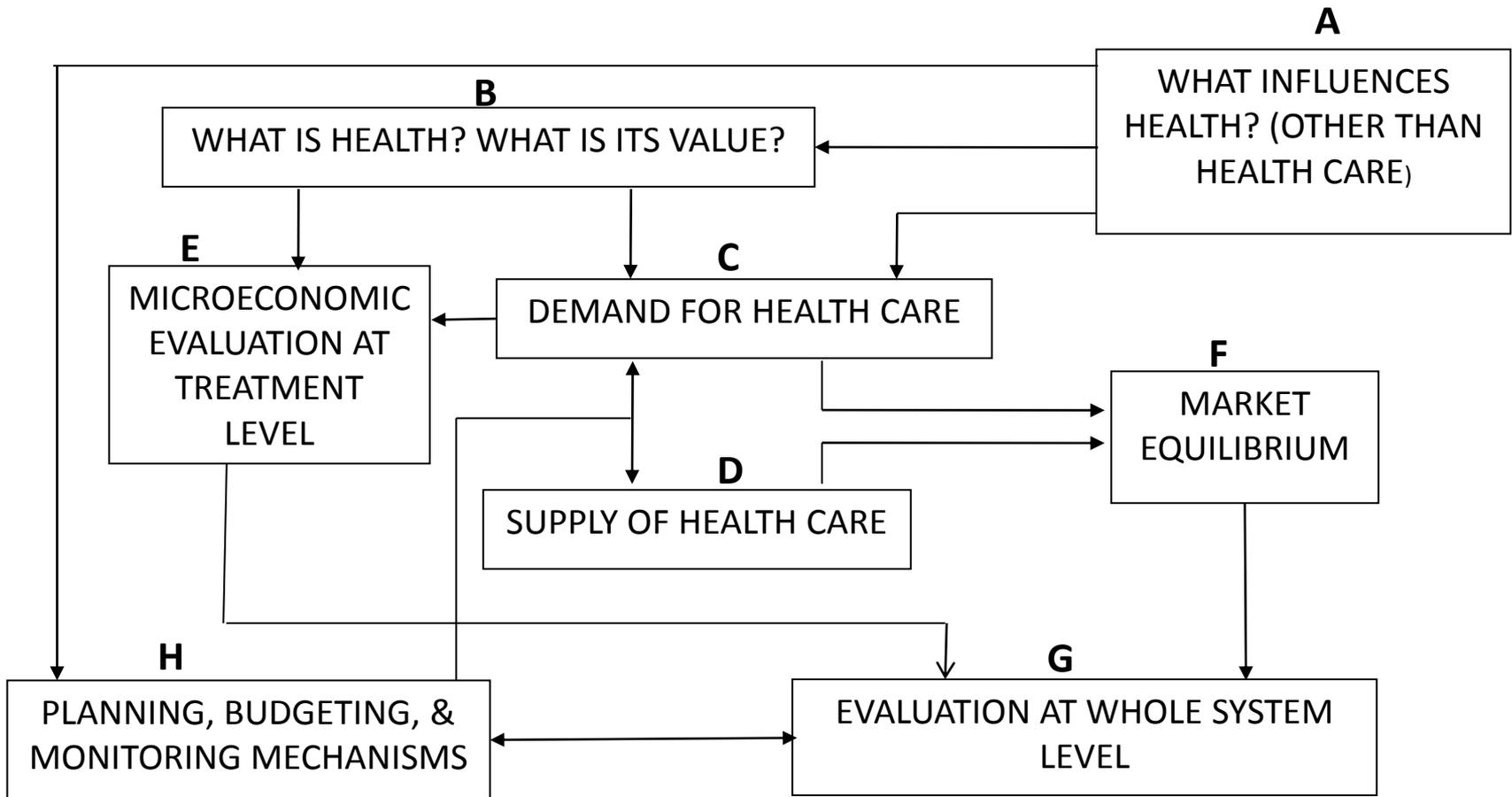


Search terms:

“health”, “healthcare”, “medical”, “medicine”, “pharmaceutical”, “physician”, “doctor”, “nurse”, “nursing”, “hospital”, “general pract*”, “GP”;

“education”, “school*”, “human capital”, “teacher”, “pupil”, “student”, “college”, “university”, “class size”, “classroom”

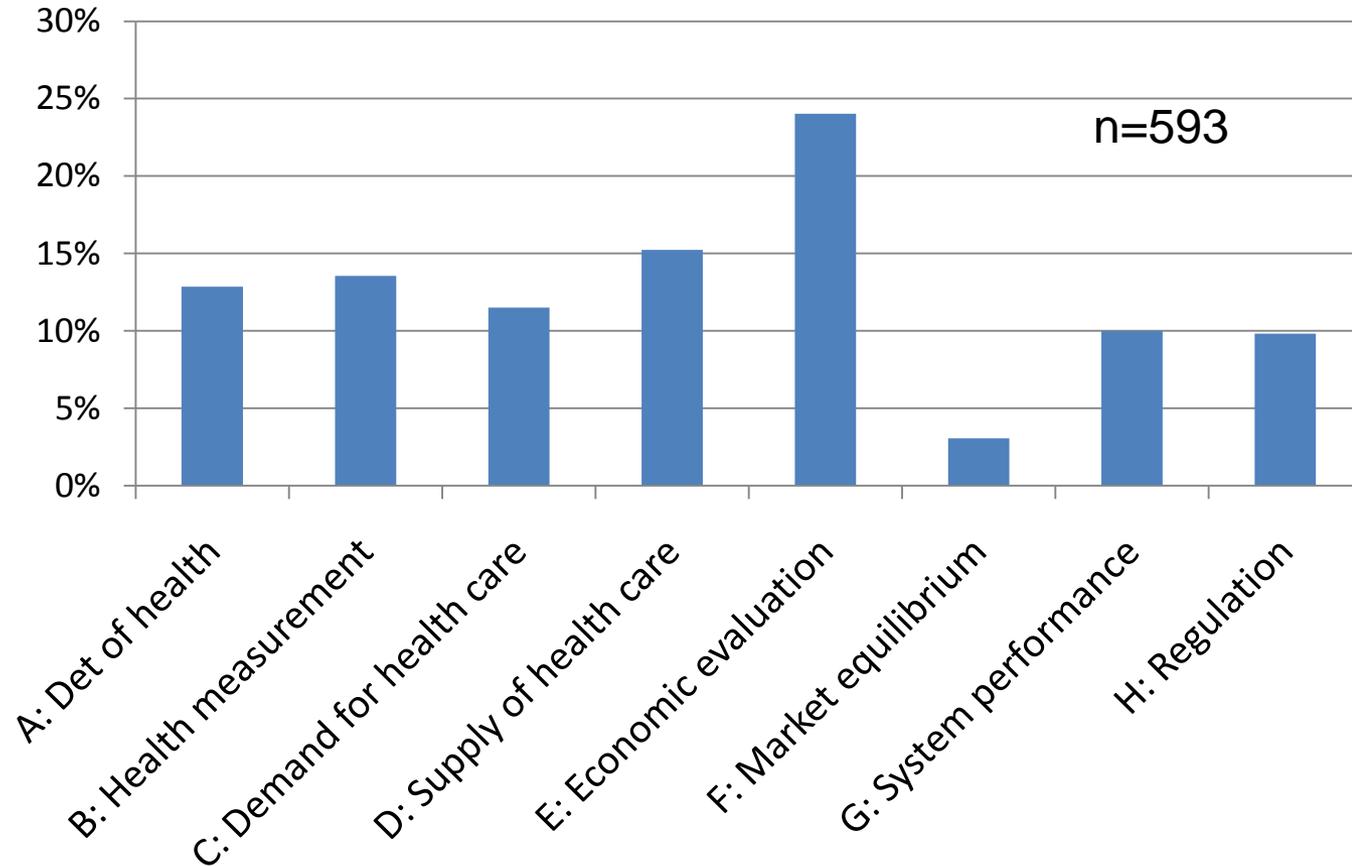
What are we doing?



Williams, A. 1987. "Health economics: the cheerful face of the dismal science?" In *Health and Economics*, A. Williams, Macmillan, London

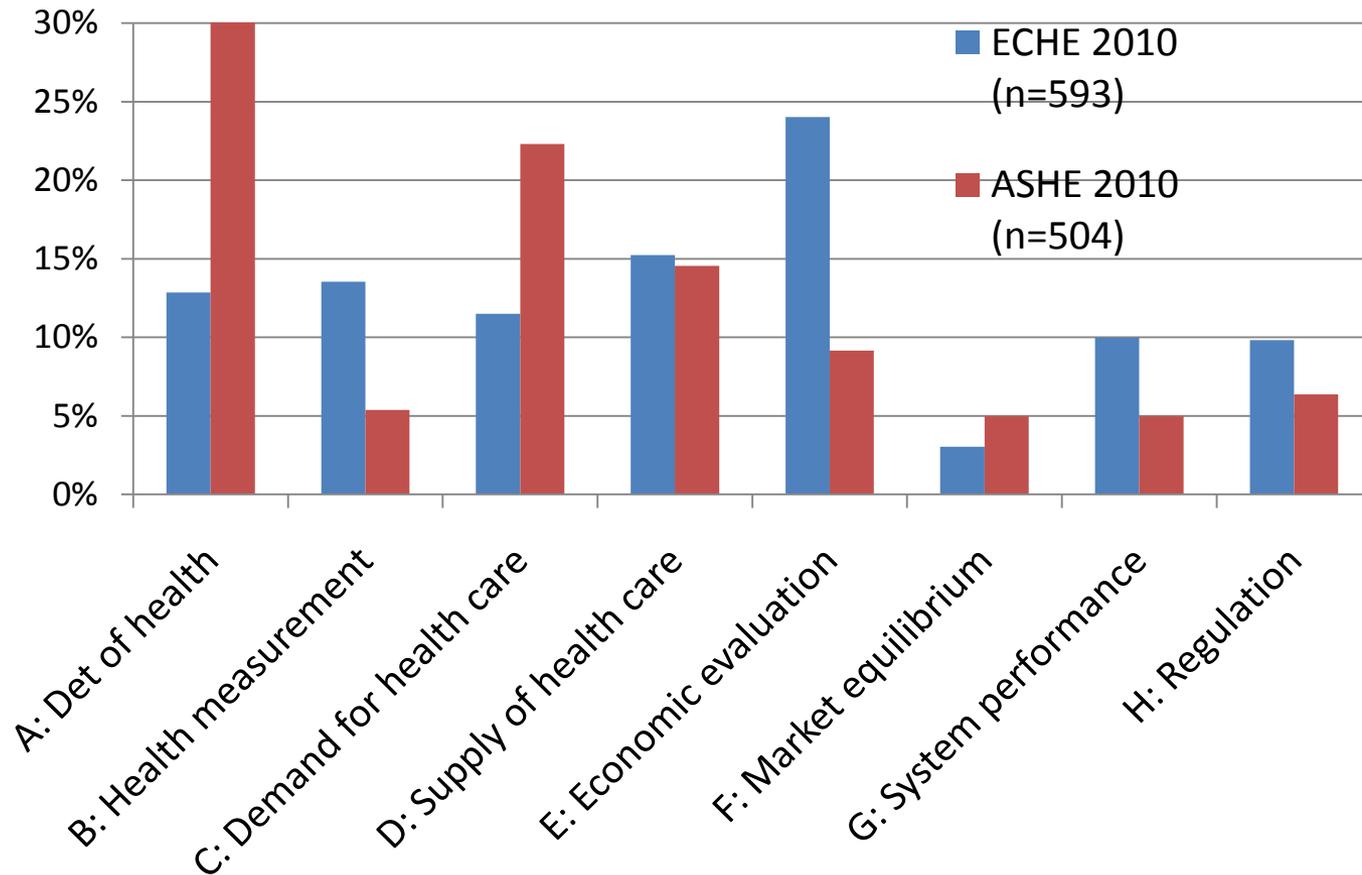
What are we doing?

ECHE 2010 conference abstracts



Atlantic differences

ECHE vs ASHE conference abstracts



Economic analysis of health and health care

“If economists could manage to get themselves thought of as humble, competent people, on a level with dentists, that would be splendid!”

John Maynard Keynes (1931), *Essays in Persuasion*

“If politics is the art of the possible, research is surely the art of the soluble.”

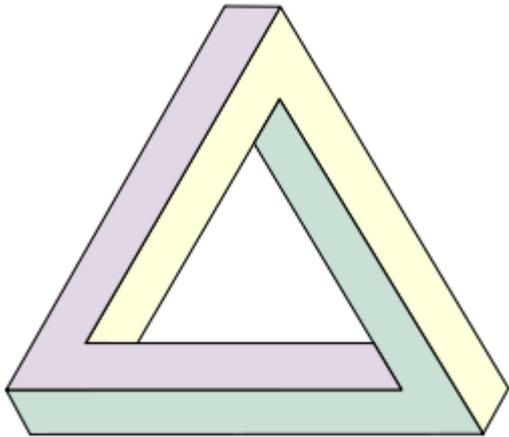
Peter Medawar (1967), *The Art of the Soluble*

Economics is the art of the modellable

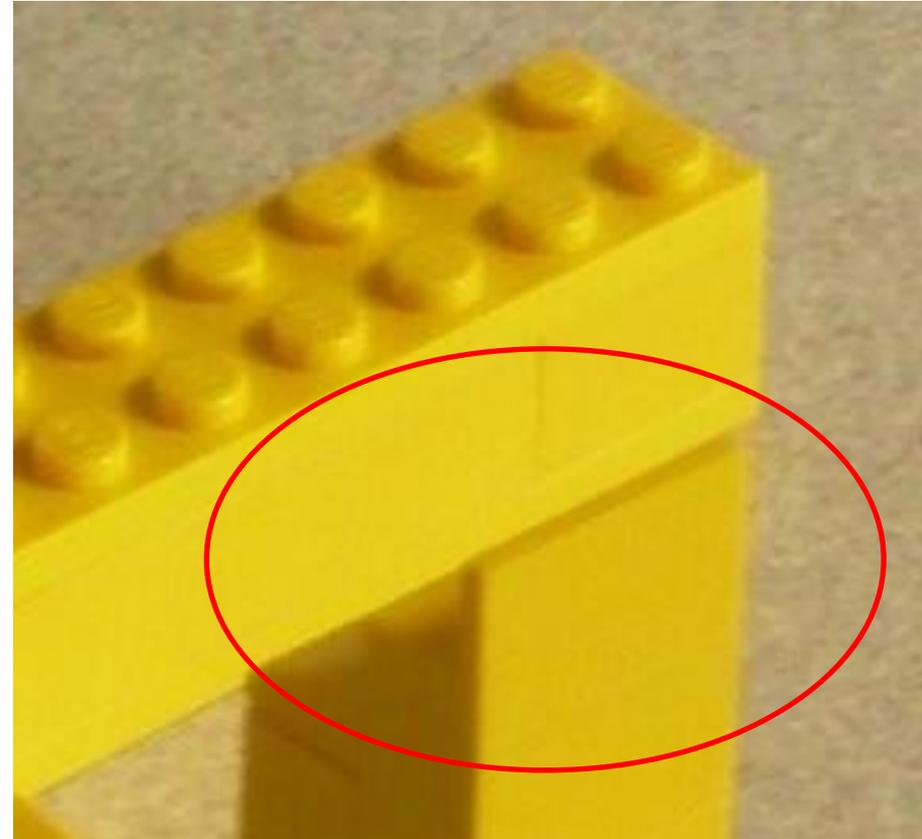
Merits of formal modelling

- Expression of concepts in formal language promotes clarity
- Implicit assumptions easier to detect
- Derive all implications of explicit assumptions
 - including the unexpected
- Promotes logical coherence
 - Are assumptions compatible with each other
 - Do conclusions follow from assumptions?
 - Do same conclusions follow from other assumptions?

Reutersvärd - Penrose Tribar



Feasible if modelled in 2 dimensions?



Impossible if modelled as 3 dimensional object

Tribar statue: Perth Western Australia



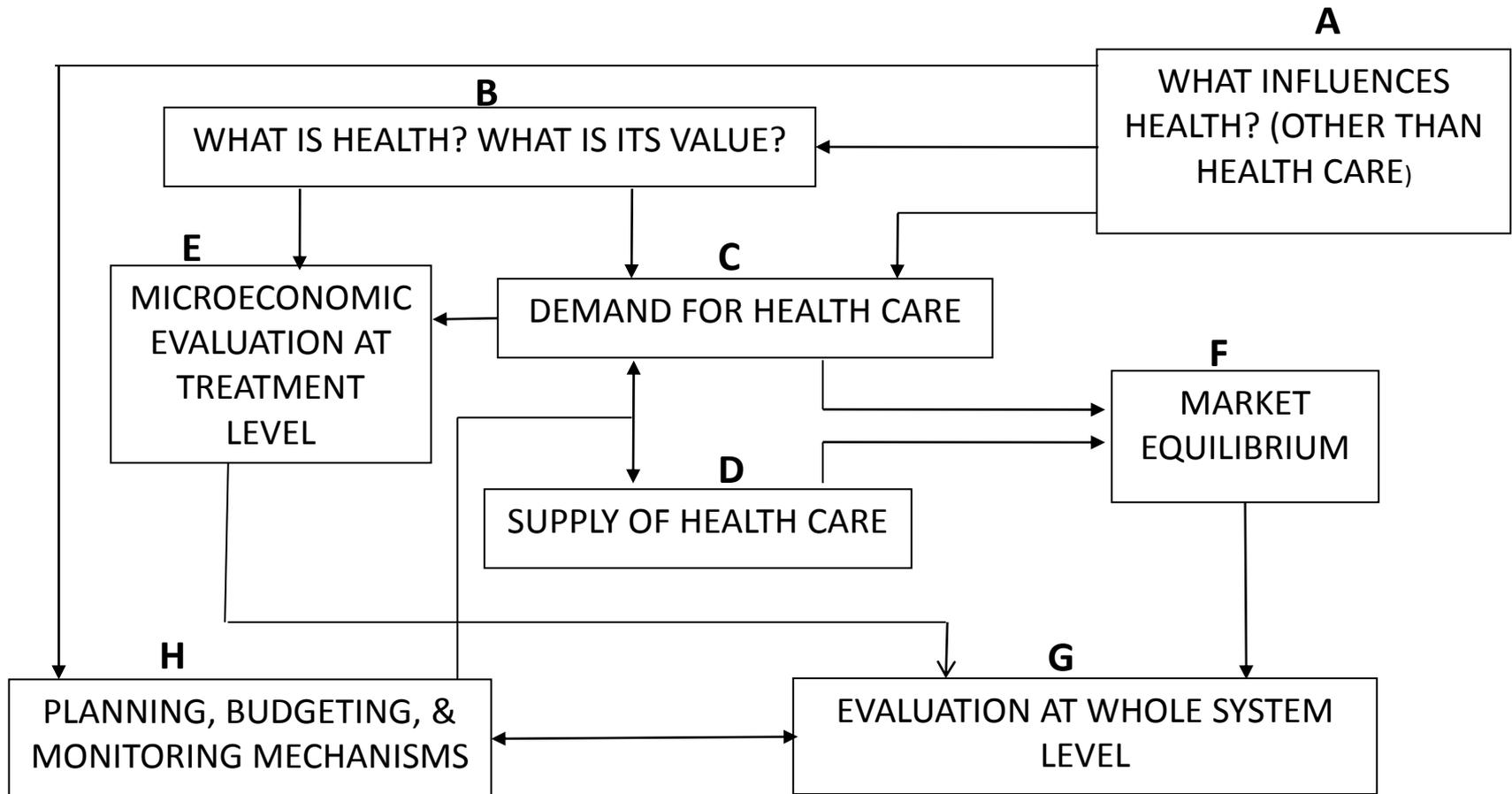
Tribar statue: Perth Western Australia



Art of the modellable

- Economic models: building blocks
 - Preferences
 - Constraints
 - Information
 - Equilibrium concept
 - Adjustment mechanism
- Explicit models required
 - Logical testing
 - Empirical testing
- Rich set of model building blocks
- Increasingly useful data sets

Health economics



Williams, A. 1987. "Health economics: the cheerful face of the dismal science?" In *Health and Economics*, A. Williams, Macmillan, London

A. Determinants of health: epidemiological approach

- Epidemiology: estimate health production functions with exogenous inputs
 - Ingenious use of natural experiments
 - Snow's analysis of association between households' water supply companies and cholera mortality to test for effect of water quality (Freedland, *Statistical Models and Causal Inference*, 2010)
 - Limited recognition of endogeneity problems
 - Doctor supply and population health (Cochrane et al, JECH 1978; Young, JECH 2001)
 - Little use of IVs (Greenland, IJE 2000)

A. Determinants of health: contributions

- Economic approach: data generated by decisions - some inputs in health production function are endogenous
- Models of decisions affecting health
 - Guide specification (explanatories, lags,...)
 - Highlight potential endogeneity problems
 - Guide choice of IVs: Auster et al (JHR 1969); Rosenzweig & Schultz (JPE 1983)

A. Determinants of health: contributions

- Demand for health (Grossman, JPE 1972)
- Rational choice models of obesity
 - Standard preferences (Lakwadalla & Philipppson, AER 2005) : technological change induced decreased price of food, increased implicit price of exercise
 - Behavioural preferences (Cutler et al, JEP 2003, NBER 2003): hyperbolic discounting: self control and commitment
- Genes, health and behaviour
 - Genetic markers as IVs – collaboration of economists and epidemiologists (EG von Hinke et al, CMPO 2009)

A. Determinants of health: challenges

- Effect of income on health
 - IVs (eg local unemployment rates: Ettner, JHE 1996)?
 - lottery wins (eg Lindahl, JHR 2005; Apouey & Clark, IZA 2010)?
 - Negative income tax experiments? (Connor, JECH 1999)
 - What are the health consequences of eg a 10% reduction in the state pension?
- Health and relative deprivation
 - Little formal modelling
 - Papers using population level data still published
 - Mixed results from multi-level studies
 - changes in absolute position imply changes in relative position
 - Is the question soluble?

A. Determinants of health: challenges

- Population health and health care
 - Many studies of effects of particular treatments
 - Very few of effects of (i) doctor supply (ii) total health care expenditure on population health
 - But geographical or cross sector funding decisions require information of effects of total health care expenditure on health
 - What is the effect of increased NHS spending on the health of the population, of particular geographical or socio-economic population sub groups?

B. Measuring and valuing health: contributions

- “Valuing” health: numerical representation of preferences over dimensions of health
- Health utility measurement $h = h(d_1, \dots, d_n)$
 - Specification of dimensions of health d_1, \dots, d_n
 - Health utility functions $h(d_1, \dots, d_n)$ via decision models (TTO, SG) (Torrance et al, HSR 1972)
 - Theoretical foundations of QALYs (Pliskin et al, OR 1980)
 - Large number of applications

B. Measuring and valuing health: contributions

- Valuation of health: marginal rate of substitution between health and other goods

$$u(y, h(d_1, \dots, d_n))$$

- Life satisfaction and CV, EV for health (eg Groot, HEc 2006)

$$\text{marginal value} = -\frac{\partial y}{\partial h} = \frac{\partial u}{\partial h} / \frac{\partial u}{\partial y}$$

B. Measuring and valuing health: contributions

- Valuation of changes in risk

$$V(y, \pi) = \pi u_1(y+e_1, h^1) + (1-\pi)u_2(y+e_2, h^2)$$

$$\text{Marginal value of risk} = -\frac{\partial y}{\partial \pi} = \frac{\partial V}{\partial \pi} / \frac{\partial V}{\partial y}$$

- Theoretical foundations
 - Dréze, 1962; Jones-Lee, 1976; Broome, *Economica* 1985; Johannsson, 1995
- Estimates VoL by revealed & stated preference
 - Thaler & Rosen (1977); Cropper et al, RFI 2011)

B. Measuring and valuing health: challenges

- Generic health utility measures insensitive to specific conditions eg cataracts and EQ5D? (Espallargues et al, Inv Opth Vis Sc 2005)
- Experience or decision utility (Dolan & Kahneman, EJ 2008)
 - whose preferences?
 - measured when?
- Wide ranges in estimates of monetary valuation of health
- Value of life near death (Philipson et al, NBER 2010)

C. Demand for health care: contributions

- Derived demand model
- Effect of insurance
 - RAND Experiment (Newhouse et al, 1993)
 - Many observational studies
- Welfare economics of insurance
 - Ex post moral hazard (Pauly, AER 1968)
 - Ex ante effects: income transfer between healthy and unhealthy states of the world (Nyman, JHE 1999)

C. Demand for health care: challenges

- Ex ante moral hazard
 - Does health care insurance change illness probability via prevention?
- Does quality of health care affect demand?
 - Crucial step in argument for fixed price quality competition

D. Supply of health care: contributions

- Provider altruism: McGuire, 2000; Koszegi, QJE 2006; Caplin et al, EJ 2004
- Providers respond to financial incentives
 - Hospitals and DRGs (Newhouse, 2002)
 - SID (Gruber & Owens, RJE 1996)
- Property rights matter (Gaynor & Pauly, JPE 1990; Gaynor et al, JPE 2004)

D. Supply of health care: challenges

- Preferences of organisations
 - Hospitals: aggregation from preferences of doctors, managers...
- Effect of ownership type on quality (Eggleston et al NBER 2006)
 - Varieties of not for profit organisation
- Cost functions: effects of hospital size and scope on quality and cost

E: Economic evaluation: contributions

- Formalised role in regulatory bodies
- Opportunity costs matter, not just effectiveness
- Generally accepted set of modelling tools (Drummond et al 2005; Gold et al 1996)
 - Decision trees, Markov models, sensitivity analysis....
- Value of information (Claxton, JHE 1999)

E. Economic evaluation: challenges

- Regulatory bodies
 - equal discounting of costs and health effects
 - healthcare sector not social perspective
 - CEA rather than CBA
- More positive modelling
 - Extract more information from RCTs (Chan & Hamilton, JPE 2006; Malani, JPE 2006)
 - Extend external validity
 - Improve estimates of opportunity costs: how do decision makers in health care sector respond to budget cuts?

F. Market equilibrium: contributions

- Rationing by waiting (Lindsay & Feigenbaum, AER 1984)
- Rational epidemics (Geoffard & Philipson, AER 1997; Boulier et al, BJEAP 2007)
- Information asymmetries can imply peculiar comparative statics (Pauly & Satterthwaite, Bell JE 1981)
- Effects of information (Dranove et al, JPE 2003)

F. Market equilibrium: challenges

- Few models of public sector decision making: positive political economy
 - Crucial for policy re relative size and structure of public health care sector
- Variations across providers in
 - LOS; costs; outcomes; admission thresholds...
 - Persistent and mostly unexplained
 - Due to unobserved characteristics of
 - Patients? Providers? Markets structure?
- Market structure and outcomes
 - Ambiguous theory predictions
 - Limited evidence

G. System evaluation: contributions

- Social preferences for health
 - Welfarism and extra welfarism (Culyer, OxREcPol 1989)
- Inequity measurement
 - Wagstaff et al, SSM 1991; Kakwani et al, JEcts 1997; Jones & Lopez-Nicolas, HEc 2004
- Welfare foundations of inequity measures
 - Wagstaff, JHE 2002; Bleichrodt & van Doorslaer, JHE 2006; Fleurbaey & Schokkaert, JHE 2009

G. System evaluation: challenges

- Inequality measures
 - Require positive models of health, health care to interpret underlying correlations of health, income
 - Multivariate inequality? Why not welfare functions?
- Efficiency measurement
 - No theoretical foundation in models of decisions (Leibenstein, AER 1966, Stigler, AER 1976)
 - Data envelopment analysis
 - Stochastic frontier estimation - Newhouse (JHE 1994)

H. Planning, budgeting, monitoring: contributions

- Risk rating/formula funding (Carr-Hill et al, 1994; Ellis et al HCFinRev 2004; Schokkaert, HEc 1998)
- DRG pricing (Newhouse, 2002)
- Effects of targets and regulations (Propper et al, BJEAP 2008)
- First law of policy evaluation: in complex systems with asymmetrical information all policies have unintended consequences
 - Fundholding; QOF; NHS wage regulation

H. Planning, budgeting, monitoring: challenges

- Is more information for patients welfare increasing?
- Does P4P crowd out intrinsic motivation?
- Does provider or insurer competition increase welfare?
- Should providers be split from purchasers?
- Is free entry of providers welfare increasing (Mankiew & Whinston, RJE 1986)?
- Do for profit firms perform better?
- Rewards for innovation
 - Incentive mechanisms (patents, licensing, tendering, competitions...) affect both innovation and use

Future prospects for health economics

- Rich economics model building toolbox
- Improving data
 - Cohort studies
 - Linked administrative data
- Increasing policy demand for solutions to important problems
- EG: Implications of population aging, obesity and related policies
 - Combine methods from health economics sub disciplines (economic evaluation, positive modelling of behaviour of patients & providers)

Go forth and model

