Written Exam at the Department of Economics winter 2016-17

Health Economics

Final Exam

December 21st 2016

(3-hour closed book exam)

SUGGESTED ANSWERS

Please note that the language used in your exam paper must correspond to the language for which you registered during exam registration.

This exam question consists of 4 pages in total

NB: If you fall ill during the actual examination at Peter Bangsvej, you must contact an invigilator in order to be registered as having fallen ill. Then you submit a blank exam paper and leave the examination. When you arrive home, you must contact your GP and submit a medical report to the Faculty of Social Sciences no later than seven (7) days from the date of the exam.

Part I – Access to Health Care

There is substantial geographic variation in health care expenditure and utilization.

Some variation may be driven by differential access to health care.
A recent study (Lu and Slusky, 2016) asks "What are the effects of access to Women Health Clinics on women's preventive care?" The answer relies on survey data of women aged 18-44 in Texas and Wisconsin.

Consider the following regression:

$$y_{iz} = \beta_0 + \beta_1 distance_{iz} + \delta X_{iz} + \gamma_z + \varepsilon_{iz} \qquad (1)$$

The variable y_{iz} measures the outcome of interest, e.g., whether an interviewed women i, living in ZIP-code z, had a routine preventive check-up or a cancer screening. The right-hand-side variable of interest, $distance_{iz}$, is the travel distance in 100 Miles from the woman's ZIP-code of residence to the nearest Women Health Clinic. X_{iz} is a vector of individual level controls including age, marital status and employment status. γ_z are ZIP-code fixed effects. ε_{iz} is an error term.

Question 1:
What is the interpretation of β_1 and how can its sign inform us about the health effects of access to health care?

Answer:
Equation (1) potentially tests the association between travel distance to health care providers and the take of preventive care. A negative sign of β_1 would suggest that a longer travel distance decreases the probability of a women taking up preventive care. Hence, the cost of/access to care determines preventive care takes up in an expected manner (higher cost leads lower demand).

Question 2:
What is the fundamental problem of using estimates of β_1 from equation (1) for policy recommendations regarding access to health care?

Answer:
Fundamentally equation (1) could suffer from omitted variable bias or endogeneity. For instance, although the equation controls for zip-code fixed effects, there may be unobserved individual specific effects in the error term determining both where people choose to live (and effectively travel distance) and preferences for preventive care. This could be the case if people take into consideration the general access to health care in a given neighbourhood when they consider to reside it. That would bias the estimate of β_1 downwards, because those choosing to live close to health care providers are a selected group who demands health care more than others.

Now in 2011 and 2012, the states of Texas and Wisconsin enacted severe budget cuts in health care. Consequently, both states decided to close a large number of Women Health Clinics. Now imagine that you have a survey including data from the times both before and after the budget cuts and consider the following regression equation that augments equation (1) by including the time subscript, t, and time-fixed effects τ_t:

$$y_{izt} = \beta_0 + \beta_1 distance_{izt} + \delta X_{izt} + \gamma_z + \tau_t + \varepsilon_{izt} \quad (2)$$

Question 3:
What is the idea behind equation (2) and why is an estimation of (2) more likely to reveal a causal relationship than equation (1)?

Answer:
Equation (2) exploits that some areas experince the closure of clinics and, hence, increase the travel distance (access to care) for some women. That increases the cost gaining health care. If the clinic closures are truly exogenous and unanticipated, they should change the costs of preventive health care across individuals in a way that is orthogonal to the individual specific and unobserved preferences for health care. In that way we would estimate a causal effect of access to health care. Still, a number concerns remain. For example, if the policy makers are choosing endogenously to close clinics in areas where the demand is particularly low, or where they believe the population preferences for is particularly low, then the omitted variable bias from eq (1) is not resolved. Furthermore, the omitted variable bias is not resolved if women chose to move immediately due to closures.

Table 1 shows the estimated parameter estimate of β_1 from equation (2). Columns (a) and (b) estimates the effects on a representative sample of women aged 18-44. Columns (c) and (d) estimates the effects on a subsample of the women with the lowest level of education. All estimates are statistically significant.

	Full sample		Low education	
	Clinical breast exams	Routine Check-ups	Clinical breast exams	Routine Check-ups
	(a)	(b)	(c)	(d)
Driving distance (100 miles)	-0,064	-0,027	-,177	-0,081
Controls	x	x	x	x
Time and ZIP Fixed effects	x	x	x	x
Observations	4702	4823	1677	1743
R^2	0,57	0,63	0,48	0,56

Question 4:
Discuss whether the results of Table 1 are consistent with previous empirical results from the literature on the socio-economic differences in health?

Answer:
(the answer may refer to chapter 4 in the textbook and Cutler and Lleras Muney 2006, "Education and Health, Evaluating Theories and Evidence")
The table is informative about women's health behaviours and reveals a negative sign of β_1 in the full sample. Hence, travel distance has a negative causal effect on women's preventive care. Moreover, this effect is larger for women of low education.

*This is consistent with previous literature. Cutler and Lleras-Muney (2006) shows substantial differences in the health **behaviours** dependent on education. For instance, highly educated are more likely obtain preventive care such as flu shots, take vaccines and mammograms, pap smears and Colonoscopies. Highly educated are less likely to smoke, drink a lot, being obese and use illegal drugs.*

*More broadly, health **outcomes** also differ by socio-economic and educational status. Eg. Cutler and Lleras Muney (2006) shows a significant educational gradient in mortality, which has a causal interpretation in Lleras-Muney (2005). Exploiting American tax-data combined with local area characteristics Chetty et al. (2016) shows that socio-economic differences in mortality are primarily driven by health behaviours (such as drinking and smoking).*
Moreover, a huge literature tests the mechanisms and hypotheses about early life events (tests of the fetal orignins hypothesis), the role of income, stress/allostatic load (Whitehall studies), the Fuchs hypothesis etc. The answer may elaborate on these health outcomes and mechanisms, too.

Question 5:
Present and discuss other potential sources of geographic variation in health care utilization and whether they have a causal effect on health outcomes?

Answer:
(may rely on Finkelstein, Gentzkow and Williams 2016, Doyle 2011 and Doyle et al 2015)
A fundamental issue when studying geographical variation in health care utilization is to understand if they are driven by the demand (patient characteristics) or supply (provider characteristics) side factors. Eg. Some areas may have particular populations that demands more and specific types of care. Some areas, hospital and clinics attracts specific types of physicians (cowboys vs comforters) that prefer specific treatment styles.
Investigating movers from one area to another Finkelstein, Gentzkow and Williams (2016) disentangles the share of geographic variation that is determined by area specific fixed effects related to the supply side factors and patient characteristics. They find that 50-60% of the variation is coming from the supply side (differential provider style).
The next question is then whether higher expenditure leads to better health outcomes for the patients. To circumvent endogenous expenditure due to local patient characteristics Doyle (2011) investigates whether tourists to Florida, who experience a heart attack or a stroke during their vacation, have a higher survival probability if they by chance is admitted to a high vs. low expenditure hospital. He finds that higher expenditure significantly increases survival probabilities. In Doyle et al. (2015) the authors investigate, whether the ambulance company that picks up a heart-attack or stroke patient have an effect on survival. The argument is that emergency call centers allocate ambulance companies by a rotation principal, wherefore it is exogenous to the patient which ambulance company that picks the patient up. Because some ambulance companies are likely to take the patient to specific hospitals, the authors can estimate the causal effect of being admitted to specific hospital. They find that higher expenditure is associated with higher survival probabilities.

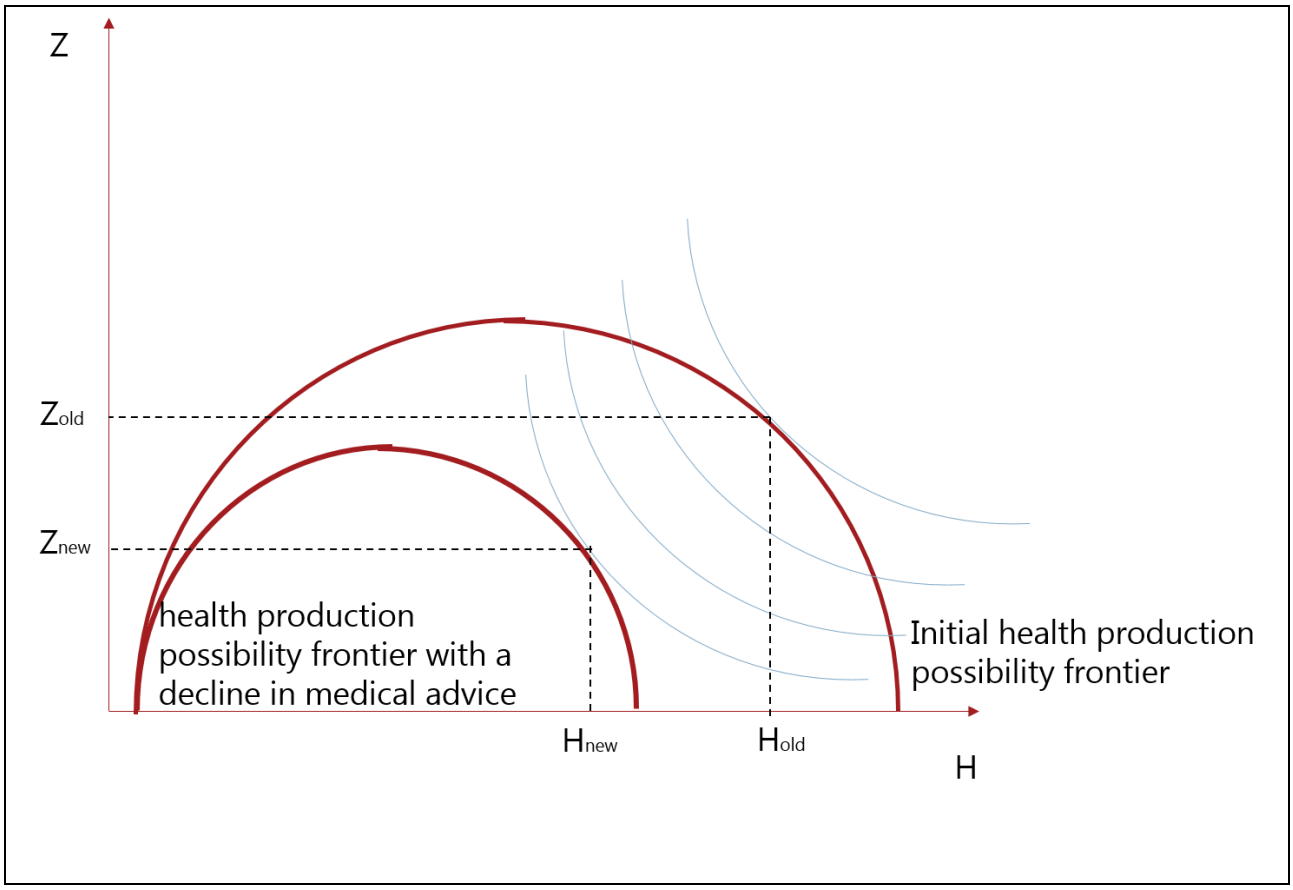
Part 2- The Grossman Model

Consider the Grossman model in a single period framework and imagine a sudden and exogenous decline in the quality of medical advice.

Question 6:
Imagine that better medical advice leads to more effective individual health investments and increase the highest achievable level of health. How is the optimal level of health and other goods affected by the quality decline in medical advice? Explain your analysis in a graphical illustration.

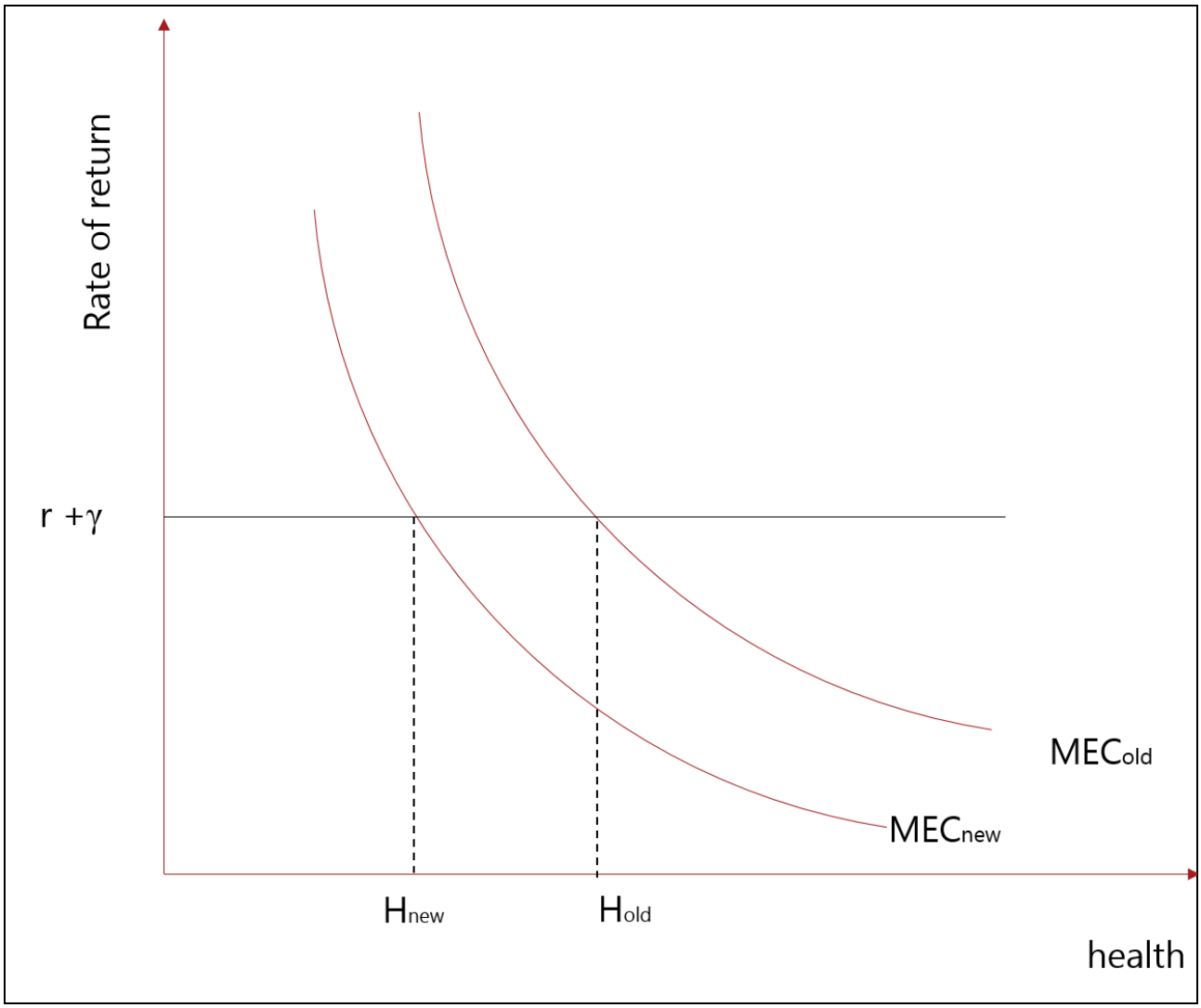
Answer:
(The answer to this question may refer to chapter 3 in the text book).

In the Grossman the health, H, and other goods, Z, enter the utility function. However, both types of goods are also produced by the individual himself. The graphical illustration plots standard indifference curves (blue) and the production possibility frontier (red).
The decline in medical advice (eg., due constrained access to health care) is switching the production possibility frontier inwards, leading to both lower levels of health and other goods.



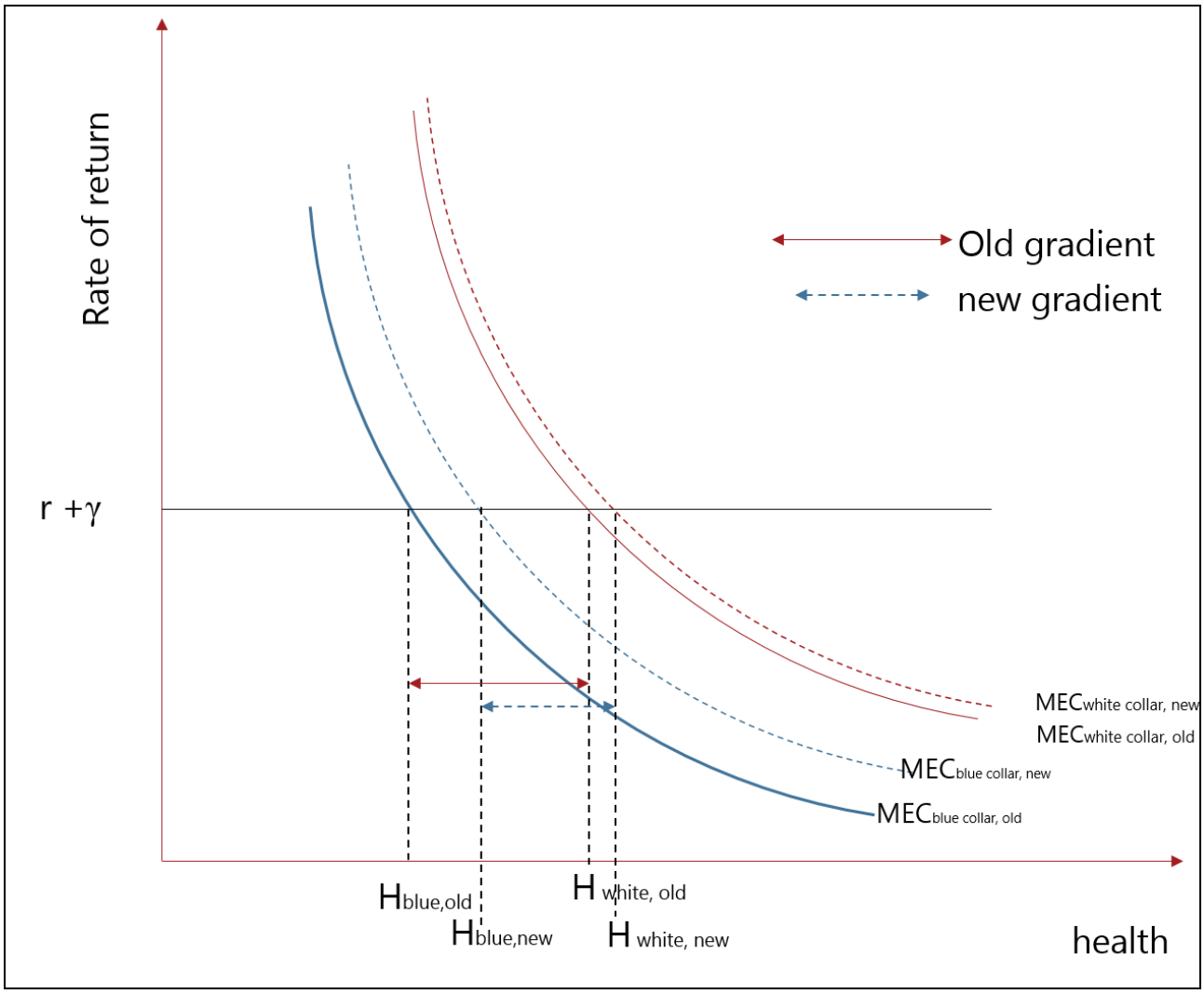
Question 7:
Consider health as an investment good in a multi-period model. How does a decline in medical advice affect the optimal level of health in this setting? Explain your analysis in a graphical illustration.

Answer:
The return on health investments in a multi-period setting is the discounted utility over the life cycle. The decline in medical advice leads to a reduction in the efficiency of adopting health technologies. The decline in the return leads to the MEC curve switching inwards. The opportunity cost of the investment r +γ (market interest on alternative investments and the underlying depreciation of the health capital) remains unchanged. Consequently, the optimal level of health declines.



Question 8:
Imagine that medical advice has a positive, but declining marginal returns in education. A policy is introduced to mitigate health shocks to firm-specific human capital. Specifically, all workers are offered on-the-job health check-ups and medical advice. What is the theoretical prediction for the educational gradient in health capital if (a) all workers take the medical advice and (b) only white-collar workers (the highly educated) choose to take the medical advice?

Answer:
In the current case blue collar workers have different MEC curves, with blue collar workers' MEC curve lying below the white collar workers. The White collar workers are initially more efficient producers of health. In case (a), sketched in the picture below, the on-job health check-ups provides the same intervention for the blue and white collar workers. However, the marginal effect for the blue collar workers is larger than that for white collar workers. The switch in the MEC curve is therefore larger for the blue collar workers than for the white collar workers. And keeping everything else constant, the gradient in (inequality) in health capital will decline.
If the white-collar are the only group of individuals, who takes the medical advice as suggested in (b) the health disparity will increase.



Part 3 Health Policy

The answer to this part may rely on Chapters 15-18 in the textbook, with particular emphasis on 15-16. Moreover, papers by Siciliani and Hurst (2005) and Jensen (2013) may be of particular relevance.

Question 9:
Outline the fundamental principles of Beveridge systems and how they were reformed in the past few decades.

Answer:
The Beveridge systems have the following fundamental principles: Universal coverage through a single payer, publicly owned hospitals and public employed health professionals, health expenditures funded by taxes and no insurance premiums, fees or out of pocket expenditure.

The main focus in the systems is equity. Given government funded full coverage of health expenditures adverse selection is less of a concern compared to, say, US or Bismarck systems. But one of the great challenges in Beveridge systems is moral hazard. The lack of market pricing to clear markets, rationing of care is handled with queuing, gatekeeping and in some countries limiting coverage through health technology assessments.

Generally, Beveridge systems have underwent a number of reforms in the past few decades to change providers' and patients' incentives and behavior with aim of controlling costs and increase efficiency. Many of the reforms take inspiration from elements from Bismarck and US systems.

Examples may include (but not limited to):

The hospital budgets:
While maintaining single payer principals, payments have switched from global budgets (block grants) towards prospective payments such as DRG reimbursements or payments by results.

Waiting times and queues:
Different polices reforms targeting waiting lists directly (eg. gaurantess), supply side (extra funding to increase production, targeting productivity in public hospitals via eg. DRG, increased capacity, increased patient choice) or demand side policies (prioritizing patients, raise thresholds for treatment eligibility, private health insurance policies)

Primary Care Physicians:
Switched from capitation payments to fees-for-service.

Health Technology Assessments and Cost-benefit analyses to prioritize:
UK for instance introduced NICE and set a limit for willingness to pay for specific medication.

Question 10:
Discuss benefits and maladies of these policy changes.

Answer:

The hospital budgets:
Benefits: By fixing a reimbursement by admission diagnosis group, prospective payments schemes incentivize hospitals to minimize costs and avoid unnecessary and potentially expensive treatments. Maladies: Potentially perverse incentives to under-treatment of patients and DRG creep due to asymmetric information between physicians and payer (physicians may up-code ill-defined diagnoses on admission to maximize reimbursements)

Waiting times and queues:
Generally, waiting times is less of problem than say 20 years ago. So some of the reforms may have had positive effects.
Gaurantess:
Reduced long waiting times. However, no large effects on mean or median waiting times. Requires additional resources.
Increase capacities:
positive effect but costly
Prioritizing patients (eg. By a priority score): Reliable for general surgery, but less so for diagnostics and scanning
Raising clinical Thresholds: Tend to reduce long waiting times, but specialists may be reluctant to control demand
Subsidized private health insurance: seems to decrease waiting times, but breeches with fundamental equity principals

Primary Care Physicians:
Jensen (2013) showed that fee-for-service payments of pregnant young women lead to better outcomes for the children compared to pregnant women whose physician were employed in capitation contracts. However, hard to find evidence of effects in other treatments than for pregnancies.

Health Technology Assessments and Cost-benefit analyses to prioritize:
Benefits: Seems control cost in the hospital sector and takes the prioritizing decision of patients away from individual physicians. Maladies: Implicitly sets a value on life, which is politically tense. The threshold values of say £30,000 per qaly within NICE, may be used as a target measure for pricing drugs. Deny people treatments.