Homework 3

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Deadline: Tuesday 7th May

Please submit your homeworks in SIS in a pdf format. The homeworks should be typed. Homeworks must be uploaded to SIS by midnight on the due date. Late submissions will receive zero points.

You should work out your own homework individually, but feel free to discuss with other students if you are struggling with a particular question.

TIP 1: Always answer all questions and subquestions, even if your answer is not perfect. An empty answer gives zero points.

TIP 2: Read questions well and address everything they ask (e.g. question 1a not only asks you to derive the inverse demands but also asks for your intuition for why they indicate imperfect substitutes).

TIP 3: Brief answers are perfectly fine (as long as they are to the point and address the questions).

1 Reading (30 points)

Read sections 1 and 5.5 of the attached Econometrica article by Bloom *et al.* (2013), which estimates spillovers from firm R&D. Based on the text, answer the following questions.

a) The key contribution of the paper is that it separately measures two distinct types of spillover effects between firms. What are these and how do they differ? [10 points]
b) How do the authors manage to obtain separate estimates of these two types of spillovers? [10 points]
c) The authors estimate the effects of the two types of spillovers on firm value, patenting and productivity. What do they find? Do the results make intuitive sense? [10 points]

2 Reading (30 points)

Read the introduction to the attached American Economic Review articles by Budish *et al.* (2015), which argues that there is a private underinvestment in long-term research because long projects shorten the effective duration of patent protection. Based on the text, answer the following questions.

a) According to the authors, why is there much more research on late-stage cancer than on cancer prevention? How is this related to the fact that most cancer treatment trials have mortality-based clinical trial endpoints? [5 points]
b) Why does cancer research provide a suitable testing ground for the idea that long-term research is disproportionately underfunded? [5 points]
c) The authors show that there is a negative correlation between the commercialization lags and R&D investments. What supporting evidence do they offer to suggest that this correlation actually entails causality? [5 points]
d) What two mechanisms could explain the empirical results of the paper? Are the authors able to discriminate between these two mechanisms? [5 points]
e) Which policy changes might counter the underinvestment in long-term projects? What are the advantages and disadvantages of each policy? [5 points]

f) According to the authors, how many life-years are lost each year in the United States due to the longer commercialization lags? How did they arrive at the number? [5 points]

3 Reading [40 points]

Read the attached Journal of Economic Perspectives article by Bloom *et al.* (2019), which discusses policies that governments can use to promote innovation. Based on the text, answer the following questions.

a) What is the key difference between the nature of innovation in developed and developing countries? [5 points]
b) According to the authors, should government intervene in the markets when it comes to innovation? Why? [5 points]
c) What is the difference between R&D grants and R&D tax incentives. What might be the advantages and disadvantages of each type of support? [5 points]
d) What is the evidence on the effectiveness of R&D tax incentives? Why might the effects of R&D tax incentives on overall R&D be somewhat weaker than some studies suggest? [5 points]
e) How can immigration policies affect innovation? [5 points]
f) According to the authors, what is the relationship between competition and innovation? [5 points]
g) What is the mission-oriented approach to innovation policy? Which historical precedents are put forward by the proponents of the mission-oriented approach? [5 points]
h) Upon reading the paper (also note Table 2 in the paper), in your opinion, what are the best ways to encourage innovation? [5 points]