I. Market Failures and Knowledge (2 – 3 pages)

Question: 1) What market failures do economists argue occur in markets for knowledge? In what ways do these market failures affect the level of innovative activity?

Answer: Markets for knowledge, similarly to other markets, face the basic issue of how to allocate scarce resources. In a properly functioning market the actors acting in their own self-interest would determine the socially desirable optimal level of effort to be invested in production of knowledge. Efficient markets assume that all costs and benefits are known and accounted for by each actor in the economy and reflected in the price. Economists argue that markets for knowledge are not working properly (the efficient outcome is not reached) and we observe the following sources of market failures:

- Inability of inventors to appropriate all the benefits to society from their invention (emerges from the public good nature of the knowledge - non-rival and non-excludable; and because of positive externalities, such as knowledge spillovers).
- Moral hazard stemming from uncertainty of scientific process.
- Marginal cost pricing often not possible because of the discrete nature of knowledge (cannot be sold in small units) and because of the large fixed costs required in production of knowledge.

In general, these market failures, if uncorrected, lead to a less than optimal level of innovative activity. This does not mean that there is no innovative activity at all, but its level and nature is changed to focus on those areas or ways of producing knowledge where the market failures are less prevalent. More specifically, the attempts of companies to deal with these market failures might result in altered patterns of research (favoring those areas that lend themselves to easier exclusion, have more predictable and shorter term results and require less investment upfront), altered structure of industry (vertically integrated, highly consolidated) and such production methods that best ensure that company can appropriate the benefits (secrecy, striving for lead time, making use of learning curve advantages and concerted sales and marketing efforts). In addition to these measures that companies can undertake independently,
there are three key policy options for correcting the market failures relating to knowledge (discussed below).

**Question:** 2) How each of the three policies – intellectual property rights, direct government subsidies of R&D, and R&D tax credits – help to encourage more innovative activity? Explain how each of these policies addresses the market failures present in markets for knowledge. What differences do you find in how each of these policies is likely to affect both the level and the type of innovative activity done?

**Answer:**

Granting *intellectual property rights* to the innovator or the creator of the knowledge, in economic terms, is a method for appropriating benefits of the knowledge. This policy addresses the market failures emerging from the public good nature of the knowledge by assigning property rights and introducing excludability and addresses the marginal cost pricing problems by allowing a temporary monopoly situation which results in an increase of marginal rate of return. This policy has been the cornerstone for encouraging innovative activity in virtually all sectors by creating tangible economic incentives and also by encouraging diffusion of the knowledge. Both of these aspects also have tradeoffs that can be seen as slowing the pace of innovative activity. The temporary monopoly acts as a barrier for entry of new competing firms thus keeping the price above the socially optimal level and slowing the technology transfer. The fact that gaining intellectual property protection involves disclosure of key information about the invention might deter some firms from obtaining it and thus the diffusion of knowledge is discouraged. Fine-tuning the intellectual property policy to achieve the best balance between the private and social rates of return for an ever wider and more complex range of inventions is a constant struggle.

The key issue in determining whether *direct government subsidies for R&D* help to encourage overall innovative activity is whether the resulting research complements or substitutes the private R&D. If the resulting research complements private R&D, either through spillovers of knowledge, infrastructure or signals to the market, that means that the policy has encouraged
innovative activity. If the government supported R&D substitutes the private it can have a negative effect on the overall innovative activity as the private firms do less than they would do otherwise. This policy plays a large role in ensuring that the innovative activity is targeted in the areas where no private research is done since direct funding can be earmarked for specific purpose. The other two policies are much weaker on this count. Direct government support is also used to address the moral hazard problem more generally and can also lower the cost of capital and increase the rate of return for private firms. These effects are key in encouraging longer term, more complex and costly scientific research projects, ideally those with higher social rate of return.

*R&D tax credits* are intended to stimulate private spending on research by lowering the marginal cost of capital. An important feature of this policy is its inevitable heterogeneity with respect to different firms and different research projects at different points in time, which makes it difficult to assess the net effect of this policy on individual firm behavior and the overall innovative activity. The policy addresses the market failures arising from the moral hazard problem – the lower cost of capital might induce to undertake riskier and less certain projects, and can help to remedy the marginal cost pricing problem. This policy leaves the decision as to which R&D projects to pursue at the discretion of the firm, which means that there is maximum freedom as to what type of innovative activity to pursue.

To conclude, the three policies are in essence complementary and encourage the innovative activity in different ways and stages of the business process. A firm can make use of R&D tax credits regardless of whether it succeeds or not and thus this instrument encourages any innovative activity. Intellectual property protection is reserved for those that have succeeded in producing an invention that qualifies under the legislation and allows the inventor to recapture the investments and gain profit. Government subsidies for R&D ideally target those areas where markets and the previous incentives are not sufficient to encourage adequate and timely R&D. Subsidies for R&D can cover any R&D costs, but they can also be designed to reward the “winner”.
This is an example of a well-written and carefully thought out answer. Note how, at the beginning of the answer to each section, the author clearly and succinctly states what the key concept is. For example, the introductory paragraph to the first part defines what market failures are and why they are important. He/she then proceeds to give specific examples that pertain to markets for knowledge. Note that a long, detailed explanation is not necessary. By clearly emphasizing the main points and not presenting irrelevant information, the author is able to accomplish his/her goals for this part of the question in a single page. Similarly, in the second section the author clearly states what market failure is addressed by each of the remedies considered. In this way, the responses in the second part are linked to the issues raised in the first part of the question.