



Analyse the role of economic forces in accounting for how and why governments in capitalist societies have sought to influence innovation since the mid-19th century. In this context assess the strengths and weaknesses of patents in influencing the incentives for invention.

Registration Number: 2005128

EC203-6-SP: Technological Change: Past, Present and Future Prospects

Departments of Economics, University of Essex

Word count: 2957

Introduction

With government policies and objectives typically seeking to mitigate market failure, government action may influence innovation directly as well as unintentionally. In free enterprise economies, generalising capitalist societies as Western Europe and USA, patent policies are only one of the ways that governments influence innovation. This term paper will be sectioned to deeply analyse governmental policies in capitalist societies in influencing innovation before assessing the effectiveness of patents with potential strengths and weaknesses. Section 1 will include the direct and indirect role of governments in influencing innovation since the mid-19th century, while section 2 will address the strengths of patents in influencing the incentive for invention. In contrast, section 3 will portray the weaknesses of patents in influencing the incentive for innovation, lastly followed by a conclusion.

Section 1: Role of governments in influencing innovation since the mid-19th century

As acknowledged by Arrow (1972), the general accepted presumption is that unregulated free enterprise economies allocate insufficient resources towards innovation. Despite this, as analysed below, governments can have a direct role in influencing innovation through the use of patents, prizes, and funding of research; as well as having an indirect role in influencing innovation through means such as competition policy, regulation, and taxation.

The role of governments in directly influencing innovation

Since the mid-19th century, governments have utilised a variety of policies and techniques to influence innovation directly. Interpreted by Mansfield (1986), patents are at the forefront of many nations policies regarding technological innovation. The use of patents is usually attributed to protect inventors whose inventions are commercially successful through allowing the inventor to solely control the use of their invention. Further analysis and evaluation of the use of patents will be discussed in sections 2 and 3 of this paper.

Direct and indirect funding of research is also a method in which governments can apply to influence innovation. Direct funding of research can occur in many forms through projects, with a significant form in capitalist societies being through the military. Military funding can be seen as partly for security purposes, partly secrecy and also to become advantageous in competition over rival nations. An example of this is the Pentagon having to accelerate innovation to discourage conflict and therefore rapidly implement cutting-edge technology to guarantee U.S. military dominance. In addition, as analysed by Bonvillian, Van Atta and Windham (2019), funding areas of the economy such as the military often benefits civilian usage, for example with the internet. DARPA (Defense Advanced Research Projects Agency), also known at various times as 'ARPA', had military applications such as missile defence however also had dual-use technologies. As a result, DARPA was significant in the

development and conceptual basis for the ARPANET, a revolutionary network for distributing digital resources among geographically detached computers and furthermore, were critical in the ARPANET becoming operational. Conducting a deeper analysis of DARPA emphasises that it has had a pivotal impact in driving innovation in numerous fields. DARPA has been recognised as supporting various businesses foster innovation through the providing of resources and expertise. In addition, the research and development approach adopted by DARPA is a prime illustration that could guide other entities in cultivating ingenuity and propelling technological progress. Furthermore, governments have previously utilised their own agencies to conduct agricultural research, for example enhancement of crop resistance to drought. This is a commendable means of capturing an externality and applying knowledge to benefit society. Moreover, we can infer that governments can also play a role in influencing innovation through indirect funding through direct research at universities. Proposals for research opportunities, as well as a request for proposal (RFP) are often used by government agencies and while governments indirectly fund innovation through university it is often basic research and is usually heavily guided. Despite this, RFP's can have a significant impact on the influence of innovation as it encourages the creation of new solutions and as a result of the direct and specific criteria, innovative approaches can become essential to stand out and consequently be eligible for funding.

Moreover, the bestowal of prizes for specific advancements and innovation can also be seen to directly influence innovation. Despite there not being a systematic policy eminent; prizes are typically bestowed by private organisations. Prizes for specific advancements have historically directly influenced innovation such as the Orteig Prize; a prize offered by New York hotelier, Raymond Orteig, for the first non-stop flight between New York and Paris. The awarding of prizes for specific innovations can be evaluated to be an incredible driver of innovation. Firstly, the addition of prizes can promote collaboration for innovative purposes as well as encourage the distribution of knowledge to decipher complex matters. Furthermore, awarding prizes can motivate innovators to solve problems with more promptness for the purposes of recognition as well as financial incentives. When analysed in greater detail, this accelerated progress of innovation, through the allocation of prizes, can result in admirable civilian usage and practical methods, such as with the Longitude prize, 1714, where the British government launched the prize for the first chronometer on a ship.

The role of governments in indirectly influencing innovation

The government can also be perceived to influence innovation indirectly through interventions such as competition policy, regulations, and taxation. As stated by Motta (2004), competition policy allocates rules and structure to regulate markets and monopolies. As a result, efficiency and enhanced quality are encouraged by competition. In addition, due to fair competition regulations, it becomes imperative for businesses to adapt and constantly innovate in order to increase market share. Despite this, competition policy has previously been implemented in retort to a company's monopoly caused by innovation. As a consequence, this could require a company to pass on knowledge of their invention and therefore discourage the innovation of a

company if such policies could be implemented. On the other hand, when intensely evaluating competition policy, it can also be seen to indirectly effect innovation in a progressive manner. This could be perceived through the United States government restricting mergers amongst companies for competition purposes. As a result, this gives a company increased incentive to innovate themselves due to companies, such as technological firms, being prohibited from merging with a smaller company. Therefore, the government must ensure that the implementation of competition policy has a progressive impact on influencing innovation, increasing the incentive to innovate while preserving the markets competition.

Additionally, the government implementation of regulation can also have an indirect influence on innovation. Although regulation is not predominantly directed to impact innovative progression; regulation can be directed to have a considerable influence on innovative exertions. Analysing the impact of regulation on innovation, a clear example is within the health and safety sector with the Factory Act. The Factory Act (1833) was implemented by the government to improve conditions for children working in factories. As a result, the role of the government and regulation promoted innovation due to the necessity to conform to the new working conditions while still acting in an economically efficient manner. Therefore, the implementation of regulation indirectly affected the innovative exertions made with regards to factories. Despite this, evaluating the influence regulation has on innovation, we can see that implementing regulation can also be regressive. Due to regulation not being the predominant reason as for implementation, the transitional period for companies as a result of regulation could also potentially decelerate innovation in the short term.

The final method in which will be analysed is the indirect influence of taxation on innovation. As stated by Mukherjee, Singh, and Žaldokas (2017), there is a constant discussion as to the implemented prominence of corporate tax systems in many capitalist societies such as the United States. The general presumption is that the lower the taxes the higher the incentive for firms to innovate and as a result be more competitive. On the other hand, lowering corporate taxes might negatively alter the government budgets and cause an increase to inequality. As indicated by Heider and Ljungqvist (2015), increases in taxes that heighten the advancement of the tax schedule could deter more uncertain projects of innovation. Furthermore, increases in taxes can cause an incentive of debt to companies which should not be the advised method to finance innovation. Moreover, to analyse the influence on innovation in the 1980's, supply-side policies employed caused a surplus in consumption in contrast to the development in productive capacity. This can be evidently displayed through Krugman (2016), interpreting that the implementation of high taxes does not have an undesirable impact on innovation. Consequently, in capitalist societies such as the United States there should be enhanced doubts on the causation between increased corporate tax rates and innovative advancements. This is due to there being no substantial correlation concerning fiscal burdens and economic performance such as innovation.

Section 2: Strengths of patents in influencing the incentive for invention

As briefly addressed in Section 1, patents are a method in which the government can implement to directly influence innovation. The primary purpose of implementing patents is to give the inventor control and permission for an allocated length of time to their invention. As evaluated in this section, there are various strengths of patents in influencing the incentive for innovation such as, the public documentation of patented information, and the protection granted for inventors.

A strength of patents in influencing the incentive for invention is that patents can extend publicly available knowledge due to the obligatory regulation ensuring patents are publicly documented. As a result, due to disseminate knowledge and information, innovation, as well as invention, can increase. Addressed by Nicholas (2013), patents were primarily introduced in 1790 with Thomas Jefferson becoming the first patent examiner. Jefferson opposed the notion of prolonging a monopoly to an inventor under the assumption of solely those who could afford it benefiting from the invention. As a result, Jefferson refrained from patenting his own inventions and rather perceived knowledge as a public good. Consequently, a crucial strength and function of introducing patents is due to the requirement to publicise technical concepts in satisfactory detail, meaning innovative breakthroughs can be made, and others can reproduce the invention. Despite this, economic policy could modify existing patent systems to further influence innovation. Patent boundaries in various industries can be incredibly difficult to examine and increasing the knowledge available could also further enhance the incentive to innovate. Analysed and evaluated by Abramovitz (1989), there is a necessity to balance the potential private rewards of innovation against the social interest of disseminating knowledge to limit the exclusive privilege to the invention and increase competition. However, with regards to compulsory licencing, weaknesses can be apparent when there become exacerbated difficulties due to the limited access the uncodified knowledge personified by skilled workers that contributed to the original developments. Overall, the disseminated knowledge available as a direct result of patent regulations strongly influences the incentive for innovation. Nevertheless, the acceleration of innovation could become even more progressive if patent boundaries became more concise.

Furthermore, protection for inventors and the monopoly profiting for a limited time period is also a significant strength of patents in influencing the incentive for innovation. In 1836, the United States implemented a system in which applied to the validity of patents. Current patent legislation still upholds these functions, such as to influence innovation by giving inventors suitable earnings from their development efforts. In addition to this, as highlighted by Nicholas (2013), competitive markets are able to produce greater innovation as when the market is monopolised, if adequate returns cannot be seized by the inventor affected by research and development costs, there could be a consequent lack of investment towards further innovation. Due to this, it is necessary that protection is granted for inventors and that they are solely profiting from their invention for a limited period of time. Moreover, additional protection for the inventors and revenue for the company can be gained by the inventor licensing their patent for others to use or from selling it. As a result, this can cause a vital source of income for the

inventor and the monopoly could profit for a period of time merely by collecting royalties from a licensed patent. Consequently, despite patents prohibiting others from exploiting the invention to further innovate, through licensing the patent and the protective qualities for the inventor and monopoly, patents can be seen as a significant strength in influencing innovation.

Section 3: Weaknesses of patents in influencing the incentive for invention

Contrasting section 2, this section will evaluate the weaknesses of patents in influencing the incentive for invention in free enterprise economies. The weaknesses that this section will analyse are the potential to create imperfect competition and the limited effectiveness of enforcement.

A weakness of patents in influencing the incentive for innovation is the potential it has to create imperfect competition (or monopoly) with patent pools, or similar collaboration. As stated by Nicholas (2013), a patent pool is an agreement in which multiple patent owners license their patents to each other, or to a third party. As a result, it becomes evident that there can become imperfect competition in the market and consequently this can become harmful to future innovation. In addition, due to the patent protecting the invention for the monopoly, the market could not be perceived as a perfect competition, with many companies selling a homogeneous product. In reality, patents would cause temporary imperfect competition and potential patent pools. Despite this, after the patent expires, the market structure can be assumed to change from a monopoly to a highly competitive and usually saturated market, but not perfect competition. Furthermore, the creation of patent pools usually develop as a means to settle a dispute of litigation circumstances. As a result, when intensely analysed it becomes remarkably clear that patent rights are inherently problematic, causing disputes in which can be solved through further imperfect competition within the market.

Additionally, another weakness of patents in influencing the incentive for invention is the limited effectiveness without international enforcement. Despite the caution of businesses and individuals due to the fear of high legal costs of infringing existing patents, as addressed by Moser (2013), difficulty can be attributed to defining the boundaries of a patent. In addition, patent examiners could distribute patents that protect overlapping areas of invention and therefore multiple companies could possess blocking patents for the same domain of research. As a result, this could cause subsequent infringement litigation and thus hinder innovation. Enforcing consequences of infringing existing patents can not only be complex but also a prolonged assignment. There are numerous measures in which occur such as examining the market to guarantee competitors are not misusing IP, as well as sending cease and desist letters and perhaps further legal conflict. In addition, these measures become significantly more difficult when the infringement occurs internationally. This is because it is difficult to uncover if a company internationally stole your IP as well as recognising if these occurrences are merely a coincidence. Therefore, without international enforcement, patents can have a limited effectiveness when companies have infringed on existing patents. Consequently, despite

international enforcement providing inventors with a system to protect their inventions, when analysing and evaluating stricter enforcement on patents and intellectual property rights it becomes evident that it could have both a progressive and regressive impact on innovation. While incentivising innovation, due to an increase in protection for inventors and monopolies, it can become regressive for innovation due to the fewer overlapping areas of research and limited access to essential innovations, for example within the medicine industry.

Conclusion

In summary, section 1 confirmed that both directly and indirectly, the government have a substantial influence on the incentive for innovation. Furthermore, as alluded to by Aghion, Antonin and Bunel (2021), the use of patents creates an incentive for inventors to innovate through a temporary monopoly in the market of their innovation. In addition, patents also then obligate inventors to diffuse knowledge underlying their inventions subsequently allowing others to innovate on their idea. Section 2 and 3 analyse this by evaluating the strengths and weaknesses of patents in influencing the incentive for invention. In the latter sections, it was shown that there is a balance of both strengths and weaknesses of patents with the main strength being the protection granted for inventors, and the main weakness being the limited effectiveness without international enforcement.

Bibliography

Abramovitz, M., 1989. *Thinking about growth: And other essays on economic growth and welfare*. Cambridge University Press.

Aghion, P., Antonin, C. and Bunel, S., 2021. The power of creative destruction. In *The Power of Creative Destruction*. Harvard University Press.

Arrow, K.J., 1972. *Economic welfare and the allocation of resources for invention* (pp. 219-236). Macmillan Education UK.

Bonvillian, W.B., Van Atta, R. and Windham, P., 2019. *The DARPA model for transformative technologies: perspectives on the US defense advanced research projects agency* (p. 510). Open Book Publishers.

Heider, F. and Ljungqvist, A., 2015. As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. *Journal of financial economics*, 118(3), pp.684-712.

Mansfield, E., 1986. Patents and innovation: an empirical study. *Management science*, 32(2), pp.173-181.

Moser, P., 2013. Patents and innovation: evidence from economic history. *Journal of economic perspectives*, 27(1), pp.23-44.

Motta, M., 2004. *Competition policy: theory and practice*. Cambridge university press.

Mukherjee, A., Singh, M. and Žaldokas, A., 2017. Do corporate taxes hinder innovation?. *Journal of Financial Economics*, 124(1), pp.195-221.

Nicholas, T., 2013. Are patents creative of destructive. *Antitrust LJ*, 79, p.405.