

# THE CASE FOR INTELLECTUAL PROPERTY RIGHTS SHOULD PATENTS BE STRENGTHENED, WEAKENED OR ABOLISHED ALTOGETHER?

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## Key Points

- The case for patents rests crucially on three conditions: that innovation is undersupplied in the absence of patents; that patents promote increased innovation; and that the welfare benefits of any additional innovation outweigh the welfare costs associated with the temporary monopoly that patents generate.
- While it is probably true that innovation is undersupplied, the empirical evidence is mixed on whether patents foster innovation. This may be due to patents stifling cumulative innovation because of holdup and *ex ante* uncertainty over patent rights.
- To reduce the potential for holdup, uncertainty around patent rights should be reduced. Patents should be easily searchable and more easily understood by non-legal experts. In addition, patents should be narrower and more clearly demarcated.
- To the extent that the welfare costs of patents appear to outweigh their benefits, the requirements for obtaining a patent should be tightened. Further, patents should be made less broad and, concomitant with the reduction in the length of the product cycle, the length of patents should also be reduced.

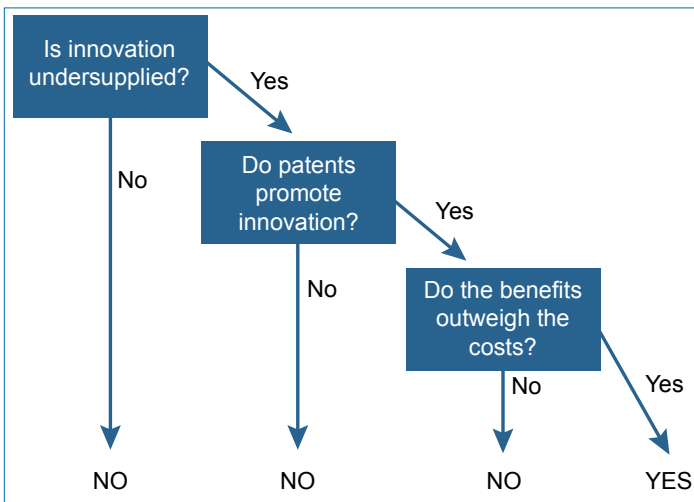
## Introduction

Intellectual property rights (IPR), and patents in particular, date back to as early as the Middle Ages. Historically, they were used by monarchs as a source of revenue or as a means to reward supporters. For example, Queen Elizabeth I granted patents on everyday commodities such as vinegar, starch and salt, which for the latter resulted in a twentyfold increase in its price (Jaffe and Lerner 2004). Not surprisingly, patents were wildly unpopular, and it was in response to this widespread discontent about the arbitrariness of patent grants that the modern patent system began to emerge. Specifically, it was established that the objective of patents should be to increase overall welfare and, as such, they should only be granted for significant innovations, and then only for a limited number of years. But does today's highly evolved patent system achieve this objective? Is public welfare being served best, and if not, should patents be strengthened, weakened or even abolished altogether? In an increasingly globalized economy, where the basis for competitive success often stems from knowledge and innovation, putting in place the right IPR regime is of utmost importance.

A patent gives its owner the right to sue for infringement if anyone tries to make, use, sell, offer, import or offer to import the patented invention into the country that issued the patent (typically for a period of 20 years). De facto, then, patents generate legal temporary monopolies. They trade off static welfare losses due to the deadweight losses associated with a monopoly for dynamic gains resulting from increased incentives to innovate (Arrow 1962; Nordhaus 1969). Thus, the analysis of whether or not to have patents (and how strong to make them) fundamentally comes down to a series of three questions. First, in the absence of patents, is innovation undersupplied by the market? Second, does the existence of a patent regime increase innovative output? Third, do the welfare benefits of the additional innovation that would not have occurred without

the existence of patents outweigh the welfare costs associated with the temporary monopolies that patents create (on both the innovations that occurred due to patenting and the innovations that would have occurred regardless). Only if the answer to all three of these questions is “yes” can we make a compelling economic argument for the existence of a patent regime. Below, each of the three questions is examined in turn, with particular emphasis on the second question since this is the question that has been most studied.

**Figure 1: Should We Have a Patent System?**



Source: Author.

### Is Innovation Undersupplied?

Irrespective of whether patents exist, innovation is likely undersupplied relative to the social optimum for two main reasons. First, innovation and knowledge are unlike other goods because they are non-rival. That is, unlike a regular good that can only be used by one individual at a time, the same idea can be used by many people at once. When individuals or firms develop new ideas, these invariably diffuse to others who draw benefit from them. But since the original innovator, when deciding whether to pursue an innovation, does not take these positive spillover effects into account, the innovator may optimally choose to forgo an innovation that, from a social perspective, would have been optimal to pursue.

A second reason why innovation might be undersupplied is that, even if innovators can prevent others from imitating their ideas, in the absence of perfect price discrimination they will be unable to capture all of the value generated by their ideas. For example, BlackBerry sets a single price for new handsets and thus any consumer who values the handset at more than the selling price gains from the innovation. To the extent that an innovator is unable to capture all of the value of its innovation,

it may optimally choose not to pursue the idea even when it generates more social value than it costs.

Further, in the absence of IPR, innovation may be undersupplied by the market because it is hard for the individual who generated the innovation to exclude others from using it. This creates the possibility that an innovator could invest large sums to develop an innovation, only for it to be imitated by others the second that it is brought to market. Thus, with little benefit to be gained, the individual would optimally choose not to develop the potentially valuable idea, unless the ensuing innovation could be protected.

Overall, while it is not possible to establish with certainty that innovation would be undersupplied in the absence of IPR, it seems reasonable that it would be. That is indeed the general consensus among innovation scholars. Thus, it becomes relevant to ask whether the presence of IPR generates innovation that would not occur without it.

### Do Patents Foster Innovation?

Any argument in favour of stronger patent protection rests crucially on the argument that it will foster more innovation. The theoretical case for this is straightforward. By giving innovators a temporary monopoly, patents increase the value of an innovation and, therefore, also the incentives to innovate. Further, to the extent that the value of an innovation is difficult to observe, patents are a better incentive mechanism than prizes because their value is inherently related to the value of the innovation.

The theoretical argument, however, becomes more complex when one considers the cumulative nature of innovation. The vast majority of innovations build upon earlier innovations and in such cases when both the initial and follow-on innovation are patentable, both patent holders hold blocking rights over the use of the follow-on innovation. That is, the new innovation cannot be taken to market without the agreement of both parties. This creates the possibility for holdup, particularly in the face of information asymmetry or uncertainty. To illustrate the problem, consider a start-up with an idea that will require \$4 million to develop and commercialize but will generate a profit of \$6 million. Whether or not to develop may seem like a no-brainer for the start-up since it can earn a 50 percent return on investment. Even in the case where the idea builds on a previously patented innovation, we would expect the idea to be developed. In such a case, the members of the start-up would approach the owners of the innovation that they are building on to obtain a licence. Crucially, they would do this prior to developing their idea (before incurring the \$4 million sunk cost). A plausible outcome, assuming equal bargaining power, would be that the two parties would split the \$2 million net profit from the project so the start-up could still earn a return of 25 percent on its investment. In such a scenario — where the start-up can approach the previous innovator *ex ante* — profitable

investments will always be undertaken (and the profits net of the investment will be shared).

The problem arises when start-ups are unaware or uncertain about which patents their ideas will infringe upon. In such a case, they cannot approach the earlier innovator prior to investing. If they make the investment anyway, they can find themselves in a situation where, having already spent \$4 million, they still need to negotiate with the earlier inventor over the \$6 million profit. In such a scenario, since both parties have an identical power to block the use of the new innovation, and the \$4 million is sunk, we can expect that each would receive half of the \$6 million that is on the table in the ensuing negotiation. The start-up would thus see a net loss of \$1 million. Optimally, then, if the start-up believes that its innovation may infringe on earlier patents, but it is not possible for it to determine *ex ante* which patents those are, the start-up will choose not to pursue the innovation.

How likely is a scenario such as the one described above? The track record suggests that it is all too likely. NTP, Inc.'s lawsuit against BlackBerry (then Research In Motion) for infringement of its wireless email patent is a well-publicized example. Patent assertion entities (sometimes referred to as trolls) exist to profit from the scenario described above. They accumulate large numbers of broad patents with no intention of making use of the innovations themselves. Rather, their objective is to profit by suing or threatening to sue other parties for infringement, typically only after those other parties have invested large sums to develop their product and take it to market. It is worth noting that in the above example, the early innovator earned an additional \$2 million by not approaching the start-up until after the investment had been made.

To recapitulate, in the presence of cumulative innovation and uncertainty over patent rights, firms may optimally choose not to pursue profitable innovations. The end result is that in certain technological sectors, where patents are broad, rights are uncertain and trolls abound, potential innovators are not even willing to enter the market and society is worse off for it.

## Empirical Evidence

Theoretically, then, patents can either foster or inhibit innovation. Which of these actually occurs is an empirical question, but even here the evidence is mixed. Early empirical work found that countries with higher levels of patent protection also conducted more research and development (R&D) (Park and Ginarte 1997; Kanwar and Evenson 2003; Allred and Park 2007). However, this correlation could just as well have been driven by countries with higher R&D intensity enacting stronger patent protection. Work by Mariko Sakakibara and Lee Branstetter (1999) found that an expansion of patent scope in Japan had no effect on R&D. On the other hand, Yi Qian (2007) found that stronger patent rights do increase pharmaceutical R&D up to a

point, and Joël Blit and Mauricio Zelaya (2015) found that firms perform more R&D in response to stronger patent protection in their export markets. Overall, the evidence is mixed and no consensus has emerged.

Where the evidence is clear is that patents stifle follow-on innovation. Fiona Murray and Scott Stern (2007) found that journal articles experience a 10–20 percent decline in citation rates when the innovation that they contain gets patented (fewer researchers pursue that line of work). Heidi Williams (2013) found that genes that are subject to intellectual property are subject to 20–30 percent less research and product development than genes that are in the public domain. Alberto Galasso and Mark Schankerman (2015) found that when courts invalidate a patent it leads to a 50 percent increase in citations to that patent. These results, of course, do not show that patents impede innovation as a whole. The original innovation may never have occurred without patents, and all types of innovation (follow-on and not) might be lower without patents. But they do suggest that strong patents could stifle the cumulative nature of innovation.

## Do the Benefits Outweigh the Costs?

Even if innovation is undersupplied and patents foster innovation, there may not be a case for strong patents if the welfare costs associated with temporary monopoly prices are too great. Quantifying the benefits of potentially increased innovation and deadweight losses is a difficult exercise that the literature has yet to adequately address. However, figures offered by Dean Baker (2005) from the Centre for Economic and Policy Research offer some guidance. He notes that, in 2005 the United States spent \$210 billion on prescription drugs, and estimates that in a patent-free environment the cost would have been closer to \$50 billion. Baker concludes that as a result of the patent system, the United States spent an additional \$160 billion to generate at most an additional \$25 billion of R&D spending (equal to the total R&D spending of the pharmaceutical industry in 2005). This suggests that the US government might be better off abolishing pharmaceutical patents and using part of the \$160 billion in savings to fund pharmaceutical research directly, with the rest left over for other programs.

What these figures suggest is that the patent system results in a massive transfer of wealth from society to the pharmaceutical industry. It does not, however, show that pharmaceutical patents are welfare destroying. For that, we need to estimate the deadweight losses associated with the higher drug prices that result from patent-induced monopoly prices. Here, too, Baker (2004) offers a back-of-the-envelope analysis. He compares US drug prices with prices in countries where the same drugs are either subject to price controls or are produced by generic manufacturers, and finds that the average increase in price

due to patent protection is close to 400 percent. Depending on the assumed elasticity of substitution, he estimates that the higher prices generate deadweight losses of between \$10 billion and \$55 billion, and this generates additional R&D of less than \$25 billion, since some of this R&D would likely have occurred even in the absence of patents. Such figures suggest that patents are too strong under the current system (at least in pharmaceuticals), and that the benefits associated with potentially increased R&D spending do not outweigh the deadweight losses that are generated by patents.

## Recommendations

Several important prescriptions stem from the analysis. First, if holdup is a problem — as both the theory and the empirical evidence suggest — steps should be taken to minimize the problem. The primary objective here is to increase patent transparency so potential innovators understand the patent landscape and are able to secure the appropriate licences before they innovate. **Patents should be easy to both search and understand.** Most patent offices already make patents searchable online; they would do well to ensure that the content of patents is also easily understood by non-legal experts. Further, **narrower and better demarcated patents** would make it clearer *ex ante* whether a future patent is likely to infringe. As has been suggested by numerous commentators, a further policy option could be for patents to be revoked after a given period of time if the underlying innovation is not used by the patent owner or a licensee. This would, in theory, make it harder for patent enforcement entities to stockpile patents, although in practice such a policy could be hard to enforce.

A second set of prescriptions target the apparent imbalance between the value of the additional innovation that patents engender (if any) and the deadweight losses that they generate. While many experts in the field are calling for patents to be abolished altogether, as happened in Switzerland and the Netherlands at the end of the nineteenth century, a more moderate approach would be to recognize that the pendulum has swung too far in the direction of stronger patents and to weaken patent rights. **Patents should be made less broad**, both by patent examiners ensuring that patents are more focused and by the courts being given the directive that patent coverage should be interpreted more narrowly. Also, the **length of patents could be made shorter**, in particular in technological sectors where the product cycle is short. Paradoxically, while the product cycle has shortened considerably over the last few decades, the length of patents has increased to 20 years in most jurisdictions. Lastly, the patent office could **tighten the requirements for obtaining a patent**, developing stronger criteria for what is considered useful, novel and non-obvious.

As a last point, it is worth noting that while fostering innovation may be a laudable policy objective, patents are not the only means by which to do so. While not discussed here, numerous alternative mechanisms exist, including prizes and direct grants, and such mechanisms should also be considered as an alternative to a patenting regime.

## Conclusion

Overall, the theory and evidence suggest that, in their current form, patents are too strong. While it is likely true that innovation is undersupplied by the market, trying to address this by using patents may be ineffectual or may cause more harm than good. In spite of numerous studies on the topic, the evidence is not conclusive that patents even promote innovation, a necessary condition if patents are to be welfare enhancing. This is perhaps due to the adverse effect of patents on cumulative innovation, particularly in sectors where the breadth of patents is uncertain. Further, even if patents do indeed foster innovation, simple back-of-the-envelope calculations for the pharmaceutical industry suggest that the inefficiency losses generated by patents outweigh the potential value of any additional R&D that is generated.



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## About the Author



Joël Blit is a CIGI senior fellow researching the topic of innovation, including exploring intellectual property rights, closing Canada's innovation gap, and the link between Canadian immigration and innovation. Joël is assistant professor of economics at the University of Waterloo, with expertise in the economics of innovation, technology clusters, intellectual property, entrepreneurship, and international trade.

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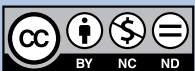
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