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# Patent Exhaustion in the United States and Canada

Olena Ivus

CI GI Papers No. 159 – January 2018

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## About the Author

**Olena Ivus** joined CIGI's Global Economy Program in April 2016, focusing on the innovation and trade research theme. Her research explores the interface between Canada's domestic innovation and international trade.

Olena is associate professor of business economics at Queen's University's Smith School of Business in Kingston, Ontario. Prior to joining Queen's, she was assistant professor at the University of Prince Edward Island and attended as a visiting researcher at the Institute of Economic Research at Hitotsubashi University in Japan.

Her work has been published in leading journals, including the *Journal of International Economics*, *Canadian Journal of Economics*, *Economic Inquiry* and the *Journal of International Business Studies*.

She received a Thomas Edison Innovation Fellowship for 2016-2017 from the Center for the Protection of Intellectual Property at George Mason University School of Law. In 2010, she won the World Trade Organization Essay Award for Young Economists.

Olena holds a Ph.D. in economics from the University of Calgary.

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# About the Global Economy Program

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Through its research, collaboration and publications, the Global Economy Program informs decision makers, fosters dialogue and debate on policy-relevant ideas and strengthens multilateral responses to the most pressing international governance issues.





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## Executive Summary

The doctrine of patent exhaustion represents a check on patent rights, by limiting how a patent holder can restrict use of the patented item, and curtailing the negative social costs of patent rights, such as inflated product prices and hampered diffusion of technology during the patent's term.

The US Supreme Court has recently issued a groundbreaking judgment on the doctrine's scope in the case of *Impression Products, Inc v Lexmark Int'l, Inc*, bringing the doctrine centre stage in the ongoing debate over patent law reform in Canada.

Canadian courts should be more upfront in dealing with issues concerning patent exhaustion, and the public policy goals the doctrine serves. They should adopt a contextual approach to the exhaustion doctrine and its limiting effect on patent rights by allowing express reservation of patent rights to be enforceable only when warranted by the circumstances, with the focus on three factors: the cost of licensing downstream purchasers relative to the value of the licensing contract; the degree of information asymmetry among patent holders, intermediaries and end-users; and the underlying technological complexity.

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## Introduction

Recall that a patent gives its holder a statutory right to exclude others from making, using, selling or importing the patented invention for a specific period. This right of exclusion, in turn, allows the patent holder to earn a monopolistic return on the cost of their creation, and derive the material reward for their intellectual effort and research leading to the invention. This is the textbook argument in favour of intellectual property (IP) protection: the exclusive nature of IP rights obtained provides the creator with an incentive to innovate. The downside is that such IP rights raise the price of protected products above market levels, limit the diffusion of new technology and innovation, create barriers to follow-on innovation and increase the contracting costs of evaluating and enforcing patents. It appears that the optimal level of IP

protection would be a middle ground, providing sufficient incentive to create and innovate while limiting the social cost of insufficient access to these new creations and innovations.<sup>1</sup>

The rights conveyed by a patent are already limited. A patent and its exclusive rights are conveyed by the state in exchange for public disclosure of the invention. An invention must meet several criteria if it is to be eligible for patent protection (for example, patentable subject matter, novelty or inventive step), and the disclosure of the invention in the patent application must meet certain standards. Once a patent is granted, there are limits on how a patent holder can restrict use of the item. Permissible repairs to a broken patented article are allowed without infringing on the patent.<sup>2</sup> Likewise, the exhaustion doctrine in IP law (sometimes referred to as the “first-sale” doctrine) represents a limit on the rights of the IP owner, and is the focus of this paper.

When a retailer purchases a patented item from a manufacturer, the retailer typically expects it can resell the item to consumers or downstream buyers without infringing on a patent. The exhaustion doctrine addresses the point at which the IP owner's exclusionary right to make, use, sell or import the patented invention ceases. In the context of patent law, the doctrine of patent exhaustion implies that any rights of the patent owner to seek payment from downstream buyers (for example, retailers) are terminated or “exhausted” upon the initial authorized sale of a patented item (for example, by a manufacturer directly authorized by the patent owner).

With the US Supreme Court's recent decision in *Impression Products, Inc v Lexmark Int'l, Inc*, the doctrine of patent exhaustion has again entered the forefront in the debate about patent reform in Canada.<sup>3</sup> In a decision released on May 30, 2017, the Supreme Court held that a patentee's decision to sell a product exhausts all of its patent rights in that item, regardless of any restrictions

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1 Raising the bar for patenting would also reduce the costs of the patent system and improve the quality of patents. As an alternative to patent protection, some authors have proposed the use of innovation inducement prizes, in particular, in cases when the social value of innovation exceeds the private value.

2 A lawful purchaser of a patented item is permitted to repair that item when it breaks, but such a purchaser is not permitted to reconstruct that item by essentially building a new copy of a patented invention.

3 *Impression Products, Inc v Lexmark Int'l, Inc*, 581 \_\_\_\_ (2017) [Lexmark].

the patentee purports to impose, and even when the sale occurred outside the United States. The *Lexmark* decision has effectively weakened the rights of patent owners in the United States.

Canada's Patent Act, in contrast, has no express provisions akin to the exhaustion doctrine, and, likewise, there is no binding court decision establishing that an initial authorized sale of a patented item "exhausts" all rights of the patentee to that item under Canada's Patent Act. On its face, this suggests better protection for patent owners in Canada. Consequently, a patent owner that has placed post-sale restrictions on a product in order to allow for collection of additional licence fees cannot bring a patent infringement claim against a US downstream purchaser, but could do so against the same downstream purchaser in Canada. This disparity in the relative strength of patent protection carries significant consequences for firms' licensing and trade activity, and welfare more generally, and yet the doctrine of patent exhaustion has not received much attention in Canada.

Drawing from recent research in the area of law and economics, this paper discusses the policy implications of patent exhaustion and provides recommendations for the development of the doctrine in Canada. It begins with a brief overview of the development of the exhaustion doctrine and the implementation of the exhaustion policies in the United States and Canada. Since *Lexmark*, the United States follows the rule of absolute or mandatory patent exhaustion, which mandates that all patent rights are exhausted upon initial authorized sale and precludes express reservation of rights. In Canada, the term patent exhaustion is not used in statutes or case law, but the Canadian treatment of patent exhaustion presumes exhaustion while permitting express reservation of rights. This difference translates into stronger rights for patent owners in Canada. The key questions are: What are the policy implications of patent exhaustion? How would a shift in Canadian patent policy from presumptive exhaustion — in which the patent owner can opt out of exhaustion via express contractual restrictions — to absolute exhaustion affect consumer and social welfare? To answer these questions, the paper discusses qualitative arguments for and against absolute exhaustion made in the legal literature, and then summarizes the welfare implications of the exhaustion regime in the context of a formal economic model of domestic

patent exhaustion developed in Olena Ivus, Edwin L.-C. Lai and Ted M. Sichelman (2017). The paper concludes with policy recommendations.

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## The Development of the Exhaustion Doctrine

### The United States

Within the United States, the exhaustion doctrine's development and scope have evolved through the case law. Determining whether the exhaustion doctrine is applicable in a given case was often a contentious matter, and hard to predict. In instances where patent owners sold individual components of a multi-component patented product, such a sale would sometimes trigger the exhaustion doctrine, and sometimes not. Additionally, upstream patent owners often attempted to restrict downstream buyers through a contract in order to preserve their right to collect additional licence fees. Whether and when such downstream contractual restrictions would work to circumvent the doctrine of patent exhaustion has been the subject of many conflicting, and often vague, judicial decisions over the past century. Further complicating the matter is the distinction between national and international patent exhaustion regimes for patented items sold globally. In cases where exhaustion applies to authorized sales within a country, it does not necessarily apply to authorized sales internationally.

In *Quanta Computer, Inc v LG Electronics, Inc* (2008) the US Supreme Court addressed the question of "whether patent exhaustion applies to the sale of components of a patented system that must be combined with additional components in order to practice the patented methods."<sup>4</sup> At issue in the case were three computer technology patents designed to coordinate among system memory (random access memory or RAM) and the system microprocessor's level one and level two caches to ensure that stale data is replaced with current data when read and write requests are processed. LG Electronics purchased the patents-in-suit and licensed them to Intel in

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4 553 US 617 (2008) at 1.

a licence agreement that authorized Intel to manufacture and sell microprocessors and chipsets using the LG Electronics patents. In a separate master agreement, Intel agreed to notify its customers in writing that the licence did not extend to any product that was constructed of both Intel and non-Intel products. Quanta purchased microprocessors and chipsets from Intel and manufactured computers using Intel parts in combination with non-Intel parts, without modifying the Intel components. The Supreme Court held that because the exhaustion doctrine applies to method patents, and because the licence authorized Intel to sell components that substantially embody the patents in question, such a sale exhausted LG Electronics's patent rights. Exhaustion is triggered by, among other things, an authorized sale of a component that is a "material part" of the patented invention — even if it does not completely practise the patent — such that the only reasonable and intended use of the component is to be finished under the terms of the patent.

The Supreme Court's decision in *Quanta* extended the scope of exhaustion as applied to domestic sales, but did little to dispel the confusion about whether a patent owner can impose contractual restrictions on downstream buyers to limit patent exhaustion. The court's decision also left it unclear whether the scope of exhaustion applies to foreign sales, so that an authorized foreign sale of a patented item exhausts a patent owner's US rights to control importation of foreign-purchased products patented in the United States. Since the 2001 decision in *Jazz Photo Corp. v International Trade Commission*, the Federal Circuit Court has held that patent exhaustion does not apply internationally, and that importers who attempted to sell foreign-purchased items within the United States would be liable for patent infringement.<sup>5</sup>

The US Supreme Court has not addressed international patent exhaustion since *Boesch v Graff* (1890),<sup>6</sup> but in the copyright case of *Kirtsaeng v John Wiley & Sons, Inc* (2013), held that the first-sale doctrine applies to copies of a copyrighted work lawfully made abroad.<sup>7</sup> The decision created uncertainty in the area of patent, when it was not clear whether the

court would apply similar reasoning on the topic of international patent exhaustion.

Most recently, in *Impression Products, Inc v Lexmark Int'l, Inc* (2017), the Supreme Court reconsidered the scope of patent exhaustion and ruled that the doctrine's scope should be further expanded. Impression Products purchased printer cartridges from Lexmark's customers both inside and outside the United States, but always subject to contractual restrictions as to Impression's reuse or resale of those products. In violation of those restrictions, Impression refurbished and resold the products in the United States, undercutting Lexmark and its domestic wholesalers in the process. The Supreme Court ruled in Impression's favour, holding that Lexmark exhausted its patent rights in toner cartridges sold in the United States through its "Return Program," and that Lexmark cannot sue Impression Products for patent infringement with respect to cartridges Lexmark sold abroad — which Impression Products acquired from purchasers and imported into the United States — because an authorized sale outside the United States, just as one within the United States, exhausts all patent rights. The court further ruled that a patentee's decision to sell a product exhausts all the patent rights in that item, even where the sale agreement includes clear and express restrictions. The court held that: "When a patentee chooses to sell an item, that product is no longer within the limits of the monopoly and instead becomes the private, individual property of the purchaser, with the rights and benefits that come along with ownership. A patentee is free to set the price and negotiate contracts with purchasers, but may not, by virtue of his patent, control the use or disposition of the product after ownership passes to the purchaser. The sale terminates all patent rights to that item."<sup>8</sup> The court also emphasized that use of patent laws to enforce contractual restrictions is in severe conflict with the long-standing common law principle disfavouring restraints on trade: "allowing patent rights to stick remora-like to that item as it flows through the market would violate the principle against restraints on alienation."<sup>9</sup> The court further stated: "The exhaustion rule marks the point where patent rights yield to the common law principle against restraints on alienation."<sup>10</sup>

5 264 F (3d) 1094, 1105 (Fed Cir 2001).

6 133 US 697 (1890).

7 568 US 519, 133 S Ct 1351 (2013).

8 *Lexmark*, supra note 3 at 6.

9 *Ibid* at 18.

10 *Ibid* at 3.

With the *Lexmark* decision, the US Supreme Court overturned the Federal Circuit Court's ruling in *Jazz Photo Corp v International Trade Commission* that patent rights are not exhausted by an authorized sale abroad (even where no reservation of rights accompanies the sale). The *Lexmark* decision also goes against the government's position that the regime of patent exhaustion should presume that the initial authorized sale of a patented item triggers exhaustion, but should permit upstream patent owners to opt out of patent exhaustion via contractual restrictions. This decision does not prevent the patent owner from suing for breach of the contract instead of in patent law. In other words, despite the loss of patent rights, restrictions imposed in the purchase and sale contract can still be enforced through contract law, just not through a patent infringement lawsuit.<sup>11</sup>

## Canada

The term patent exhaustion is not used in Canadian statutes or case law. There are no express provisions in the Patent Act or Trade-marks Act akin to the doctrine; the Copyright Act contains the only statutory footing for the doctrine, but it is quite limited (Crowne 2015). Instead, the Canadian courts rely on the doctrine of implied licence and the notion that an unconditional purchase of a patented item grants an implied licence to the purchaser to deal with the item without restriction. While the effect is the same, the underpinning principles are different, as licensing is rooted in contract law, and the exhaustion doctrine in IP law.

The doctrine of exhaustion relies on a public policy rationale in limiting rights of IP holders. In *Eli Lilly and Co v Novopharm Ltd* (1998), the Supreme Court of Canada invoked public policy rationales to limit patent rights.<sup>12</sup> Writing for the court, Justice Iacobucci quoted with approval the following passages from the judgment of the court below:

If the patentee sells the patented article that he made, he transfers the ownership of that article to the purchaser. This

means that, henceforth, the patentee no longer has any right with respect to the article which now belongs to the purchaser who, as the new owner, has the exclusive right to possess, use, enjoy, destroy or alienate it. It follows that, by selling the patented article that he made, the patentee impliedly renounces, with respect to that article, to [sic] his exclusive right under the patent of using and selling the invention. After the sale, therefore, the purchaser may do what he likes with the patented article without fear of infringing his vendor's patent [Iacobucci's emphasis].<sup>13</sup>

Justice Iacobucci further stated:

[U]nless otherwise stipulated in the licence to sell a patented article, the licensee is thus able to pass to purchasers the right to use or resell the article without fear of infringing the patent. Further, any limitation imposed upon a licensee which is intended to affect the rights of subsequent purchasers must be clearly and unambiguously expressed; restrictive conditions imposed by a patentee on a purchaser or licensee do not run with the goods unless they are brought to the attention of the purchaser at the time of their acquisition... In the absence of express conditions to the contrary, a purchaser of a licensed article is entitled to deal with the article as he sees fit, so long as such dealings do not infringe the rights conferred by the patent.<sup>14</sup>

Although not explicit, here the court is describing patent exhaustion. The authorized sale of a patented item "exhausts" the patent rights in the item sold, unless those rights are expressly reserved by contract and communicated to purchasers. Only express restrictions could override the implicit right or licence to use or resell the item. Were a purchaser to violate those express restrictions, the purchaser would be liable for patent infringement and the patent holder would have remedies in patent law.

On the other hand, the Supreme Court of Canada decision in *Monsanto Canada Inc. v Schmeiser*

<sup>11</sup> Patent holders prefer to pursue their claims in patent court rather than in contract because patent law offers a wider array of remedies and relief from breach than contract law, in particular, injunctive relief. Also, to enforce downstream restrictions in contract, "privity" (i.e., some direct contractual relationship between the parties) is required. In *Lexmark*, the patent owner *Lexmark* could not assert a contractual claim against the alleged infringer, because the alleged infringer purchased the products-at-issue from the patent owner's customers rather than the patent owner itself.

<sup>12</sup> [1998] 2 SCR 129.

<sup>13</sup> *Ibid* at para 99, quoting with approval Justice Pratte in *Eli Lilly and Co v Apotex Inc* (1996) 66 CPR (3d) 329 (FCA) at 343.

<sup>14</sup> *Ibid* at para 100.

(2004) is viewed as a rejection of the existence of the patent exhaustion doctrine in Canada (de Beer and Tomkowicz 2009).<sup>15</sup> Monsanto accused Percy Schmeiser, a Saskatchewan farmer, of using its genetically modified seeds without a licence. Monsanto's patented genes were discovered in Schmeiser's crop, even though Schmeiser never purchased seeds from or entered into a contract with Monsanto, and so was never bound by Monsanto's standard contract terms about planting next-generation seeds. The court found that Schmeiser used Monsanto's invention without a licence, regardless of how he came to have the seeds, because he knew or ought to have known that the seeds were patented. Without referring to the exhaustion doctrine, the court effectively rejected the basis of the doctrine. In discussing the relationship between patent rights and other property rights, the court held that "ownership is no defence to a breach of the *Patent Act*."

If Canada recognized the exhaustion doctrine, then the sale of the seeds by Monsanto to a nearby farmer would have exhausted Monsanto's patent rights in those seeds, and while the nearby farmer would have been bound by Monsanto's contract and its restriction on the use and reuse of the seeds, Schmeiser would have been under no such restrictions. The case would likely have had a different outcome.

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## The Implications of the Exhaustion Doctrine

As discussed above, the Canadian treatment of patent exhaustion appears to differ from US patent law. The treatment in *Eli Lilly and Co v Apotex Inc* (1998) presumes exhaustion while permitting patent owners to expressly reserve their rights. The treatment in *Monsanto Canada Inc v Schmeiser* (2004) does not recognize the exhaustion doctrine. These approaches differ from the US Supreme Court's interpretation of the exhaustion doctrine in *Lexmark*, which precludes express reservation of rights and follows the rule of absolute or mandatory patent exhaustion. With respect to patent exhaustion for sales by a licensee, the

Supreme Court clarified that "a license may require the licensee to impose a restriction on purchasers, like the license limiting the computer manufacturer to selling for non-commercial use by individuals. But if the licensee does so — by, perhaps, having each customer sign a contract promising not to use the computers in business—the sale nonetheless exhausts all patent rights in the item sold. The purchasers might not comply with the restriction, but the only recourse for the licensee is through contract law, just as if the patentee itself sold the item with a restriction."<sup>16</sup> "In sum, patent exhaustion is uniform and automatic. Once a patentee decides to sell — whether on its own or through a licensee — that sale exhausts its patent rights, regardless of any post-sale restrictions the patentee purports to impose, either directly or through a license."<sup>17</sup>

This difference between the two countries translates into stronger rights for patent owners in Canada. Consequently, a patent owner that sold its products with express reservations of its patent rights could not bring a patent infringement claim against a US downstream purchaser, but could do so against a Canadian downstream purchaser.

Innovators would be wise to consider this disparity in patent protection in their licensing and trade activity, just as legislators would be wise to fully appreciate the consumer and social welfare implications of the competing regimes. Yet despite these important implications, the doctrine of patent exhaustion has not received much attention in Canada.

What are the policy implications of patent exhaustion? How would a shift in Canadian patent policy from presumptive exhaustion (where patent owners can avoid exhaustion via express contractual restrictions) to absolute exhaustion (where patent rights are exhausted upon initial authorized sale) affect social welfare?

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15 *Monsanto Canada Inc v Schmeiser*, 2004 SCC 34, [2004] 1 SCR 902.

16 *Lexmark* *supra* note 3 at 12. Patent rights and remedies would remain available to the patent holder where the licensee makes an unauthorized sale of the patented product.

17 *Lexmark*, *supra* note 3 at 13.



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## The Legal Literature

There is substantial legal literature on this subject. Two common justifications for absolute exhaustion frequently raised in the case law and legal scholarship are that the rule of absolute exhaustion prevents “double charging” by patent owners and precludes “restraints on alienation” of private property.<sup>18</sup> The US Supreme Court emphasized these points in *Lexmark*, stating:

This well-established exhaustion rule marks the point where patent rights yield to the common law principle against restraints on alienation. The Patent Act “promote[s] the progress of science and the useful arts by granting to [inventors] a limited monopoly” that allows them to “secure the financial rewards” for their inventions... But once a patentee sells an item, it has “enjoyed all the rights secured” by that limited monopoly... Because “the purpose of the patent law is fulfilled... when the patentee has received his reward for the use of his invention,” that law furnishes “no basis for restraining the use and enjoyment of the thing sold.”<sup>19</sup>

Furthermore, Ariel Katz (2016) argues that exhaustion increases economic efficiency because it limits IP owners’ power to price patented goods above the competitive level and increases consumer access to intellectual goods through secondary markets (such as rental) or parallel trade (i.e., re-imported goods transacted in a parallel distribution channel by an unauthorized dealer). Aaron Perzanowski and Jason Schultz (2011) argue that exhaustion can reduce consumer lock-in and in doing so, increase competition and promote incremental innovation. Consumer lock-in arises when consumers face high costs of switching to a new technology. Exhaustion enables consumers to lower the barriers to switching by alienating past purchases (for example, it allows a consumer to sell a previously purchased

product and invest the money collected from the sale toward the purchase of a new product). Exhaustion also encourages secondary markets, thereby reducing the price of new products and limits consumer lock-in. Herbert J. Hovenkamp (2016) also argues that exhaustion may prevent tying, resale price maintenance, exclusive dealing and other anti-competitive practices that can be imposed on downstream licensees via contract.

On the other hand, exhaustion can preclude the typically efficiency-enhancing effects of freedom of contract, in particular, when the contractual restraints are vertical in nature (Kieff 2008; Hovenkamp 2011). Modern antitrust law allows for vertical restraints, as they help prevent opportunism and enhance efficiency. Vertical restraints may have a positive impact on competition, because the interests inherent in vertical relationships are divergent and this serves as a check on anti-competitive practices. Some have argued that IP law should likewise permit the imposition and enforcement of post-sale restraints, which are a type of vertical restraints. Katz (2014; 2016) notes in this respect that limiting patent exhaustion to allow for post-sale restraints can be justified only as a solution to organizational problems in situations of joint production and imperfect vertical integration between co-producing or collaborating firms; and when they seek to address short-term concerns, which occur mainly early on, at the production and distribution phases of the product life cycle or shortly thereafter. In all other situations, the exhaustion doctrine should prevail, and other interests should give way to the efficiencies that exhaustion promises.

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## The Economic Model of Domestic Patent Exhaustion

The qualitative literature provides no clear framework for resolving how a shift from presumptive exhaustion to absolute exhaustion would affect social welfare. To tackle this question, Ivus, Lai and Sichelman (2017) developed a formal economic model of domestic patent exhaustion, which focuses on the exhaustion doctrine’s most

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18 Restraint on alienation is “an attempt in a deed or will to prevent the sale or other transfer of real property either forever or for an extremely long period of time. Such a restraint on the freedom to transfer property is generally unlawful and therefore void or voidable (can be made void if an owner objects), since a present owner should not be able to tie the hands of future generations to deal with their property” (<http://dictionary.law.com/Default.aspx?selected=1833>).

19 *Lexmark*, *supra* note 3 at 6.

basic concern: the ability of the downstream consumer to resell or use the patented good (without price or other restrictions) in the absence of a separate licence from the patent owner.

The model set-up is simple. Consider a closed economy in which there exists one good. Consumers, who are the end-users of the good, purchase at most one unit of the good. Importantly, consumers differ in their type, which determines the consumer willingness to pay for the good. A consumer with high type is a high-valuation consumer, who has higher willingness to pay for the good; a consumer with low type is a low-valuation consumer, who has lower willingness to pay for the good. This distinction between consumer types is important, as the model shows that these consumers are impacted differently by a shift in the patent exhaustion regime.

Production of the good requires labour, materials and one differentiated component that is patented by a third-party patent holder and for which no substitute exists. That is, the patent provides market power to the patent holder. Suppose the unit cost of producing the good (inclusive of labour and materials cost but exclusive of the possible licence fee for the component) is constant and equals  $c$ . A potential manufacturer of the good must obtain a licence from the patent holder to make and sell the component  $x$  as part of the final good. *Ex ante*, there is a large number of identical, potential manufacturers of the good, but the patent owner licenses the component to only one manufacturer. This is because doing so maximizes the patent holder's rents from licensing fees.<sup>20</sup> The chosen manufacturer thus becomes a monopolist in the market for the good that it produces and sells to consumers.

The patent holder chooses which licensing strategy to implement in order to maximize its overall rent. One option is to set a manufacturer licence fee and authorize the manufacturer to provide a sublicense to all consumers. This is called a pure manufacturer-licensing scheme. Alternatively, the patent holder could directly license each downstream consumer at a consumer-specific licence fee. This is the pure consumer-licensing scheme. Another option is to engage in mixed

licensing, i.e., sublicense some consumers via the manufacture while directly licensing others.

The patent holder's optimal licensing strategy depends on the applicable regime of patent exhaustion and the transaction costs in licensing. Dealing (either directly or through an intermediary) with a very large class of end-consumers is costly for the patent holder. The model incorporates the transaction cost in consumer licensing into the analysis, which is critical since the magnitude of this cost determines the consumer and social welfare implications of the patent exhaustion regime. Dealing with the manufacturer is also costly for the patent holder, but given that the patent holder is striking the single licensing deal with the manufacturer, this cost is low in comparison and may be ignored for simplicity.

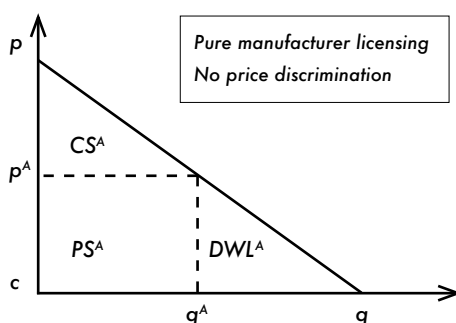
Consider first the equilibrium outcome when patent exhaustion is absolute. Under the absolute patent exhaustion regime, when the manufacturer sells the good to the consumer, the patent holder loses all rights to proceed against consumers for patent infringement; an authorized purchase from the manufacturer gives a consumer the right to use and resell the good without paying any additional licence fees to the patent holder. Consequently, the patent holder engages in pure manufacturer licensing. Also, since neither the patent holder nor the manufacturer can price discriminate between the high-valuation and low-valuation consumers without fear of arbitrage, the manufacturer sets a uniform price for all consumers.

Figure 1 illustrates the equilibrium outcome under the regime of patent exhaustion. It plots the linear demand function and shows that at the uniform price  $p^A$  (where the index A stands for "absolute"), the quantity demanded is  $q^A$ , which equals the number of consumers who purchase good  $y$ . The patent holder maximizes its profits with an up-front, lump-sum royalty and with this fee, extracts all profit from the manufacturer. With the unit cost of producing  $y$  equal to  $c$ , the patent holder's rent is  $PS^A$ . Consumers who are willing to pay more than  $p^A$  earn consumer surplus of  $CS^A$ , but those consumers who are willing to pay less than  $p^A$  and more than  $c$  are not served. Since  $q$  units of  $y$  would have been demanded at the price of  $c$ , the resulting deadweight loss (i.e., loss of economic efficiency) is  $DWL^A$ .

<sup>20</sup> With more than one manufacturer, the competition among manufacturers would reduce the patent holder's overall rent.



**Figure 1: The Regime of Absolute Patent Exhaustion**

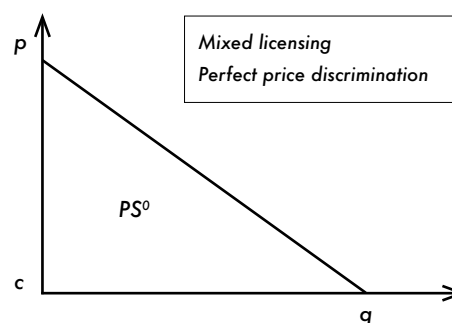


Source: Author.

Now consider now the equilibrium outcome when patent exhaustion is presumptive. Under the presumptive patent exhaustion regime, when the patent holder imposes downstream contractual restrictions on consumers via the manufacturer, consumers must enter into a licence with the patent holder or risk patent infringement. Assuming a licence from the patent holder only provides a right to use the good but not to resell it, arbitrage will not occur and the patent holder can engage in price discrimination. As such, when the regime of patent exhaustion permits downstream contractual restrictions, the patent holder can capture the entire total surplus via the manufacturer, but must internalize the transaction cost of consumer licensing. Consequently, the equilibrium outcome in a regime of presumptive patent exhaustion depends on the transaction costs in consumer licensing.

When licensing to downstream consumers is costless for a patent holder, the optimal licensing strategy is pure consumer licensing. Figure 2 illustrates the outcome. The patent holder will set the manufacturer licence fee to zero (in order to have the most flexibility in setting the consumer licence fees) and set the consumer-specific licence fees such that the price of the good equals the maximum price each consumer is willing to pay net of the unit cost of production  $c$ . Under this scheme, all consumers who are willing to pay more than  $c$  are served. The patent holder extracts the entire total surplus and earns the overall rent of  $PS^0$  (where the index  $O$  stands for “opt out”).

**Figure 2: The Regime of Presumptive Patent Exhaustion**



Source: Author.

It is apparent that the resulting deadweight loss is zero in Figure 2, which is in contrast to Figure 1. This is because unlike absolute patent exhaustion, presumptive patent exhaustion allows for welfare-enhancing price discrimination via downstream licensing. This merely confirms the basic economics proposition that price discrimination in the context of patent licensing is optimal in the absence of transaction costs. Thus, from the social welfare point of view, the regime of presumptive patent exhaustion is optimal in static terms (ignoring dynamic effects in promoting *ex ante* investment in product quality) when the transaction cost of consumer licensing is zero. However, the regime of presumptive patent exhaustion is not optimal in static terms from a consumer welfare standpoint. Under the regime of absolute patent exhaustion in Figure 1, high-valuation consumers who are willing to pay more than  $p^A$  earn consumer surplus of  $CS^A$ , while low-valuation consumers who are willing to pay less than  $p^A$  but more than  $c$  are not served. Under the regime of presumptive patent exhaustion in Figure 1, in contrast, all consumers are served, but the patent holder extracts all consumer surplus from these consumers. Consequently, when the transaction cost in consumer licensing is zero, the optimal exhaustion policy depends critically on whether the aim of policy makers is to maximize total social welfare or just consumer welfare.

What if transacting with consumers is costly for the patent holder? The model predicts that when the transaction cost is positive, the patent holder will segment the market and serve consumers under a mixed licensing scheme in the regime of presumptive patent exhaustion. The market will be segmented such that low-valuation consumers are sublicensed via a manufacturer (as under absolute exhaustion) but high-valuation

consumers are licensed directly by the patent holder at consumer-specific licensing fees.

The above result — that presumptive patent exhaustion dominates absolute patent exhaustion in terms of static efficiency from the social welfare point of view — will continue to hold, assuming transaction costs in consumer licensing are sufficiently low. This is because the benefits of price discrimination dominate transaction cost frictions in such cases. Conversely, when transaction costs in consumer licensing are sufficiently high, the regime of presumptive patent exhaustion is inferior in static terms. Here, the patent holder's single-minded goal of maximizing its rent consumes large amounts of surplus via downstream licensing transaction costs, so much so that the transaction cost frictions more than offset the benefits of price discrimination. From the consumer welfare point of view, consumer surplus is realized in both regimes, but it is relatively low under presumptive patent exhaustion. Thus, as before, the regime of presumptive patent exhaustion is not optimal in static terms from the consumer welfare point of view. This outcome is intuitive, as under the regime of presumptive exhaustion, only low-valuation consumers (who receive a sublicence from the manufacturer) earn consumer surplus, while high-valuation consumers (who are subject to price discrimination by the patent holder) lose all their consumer surplus, and the number of consumers purchasing the good under the manufacturer-licensing scheme is relatively low. Under absolute exhaustion, in contrast, all consumers are charged one single monopoly price by the manufacturer (to prevent arbitrage), and so a larger set of consumers earn consumer surplus.

It is instructive to also consider distributive benefits from an absolute or presumptive regime of exhaustion. As expected, the patent holder earns a greater overall rent from the mixed-licensing scheme under presumptive exhaustion, as opposed to the pure manufacturer-licensing scheme under absolute exhaustion. This is intuitive, as the patent holder has more options open to it when the regime of patent exhaustion permits express reservation of rights. On the other hand, consumers differ in their preference toward the patent exhaustion regime. In particular, the interests of high-valuation and low-valuation consumers are conflicting: high-valuation consumers always prefer absolute exhaustion to presumptive exhaustion, while the opposite is true for low-valuation consumers.

The above analysis rests on several simplifying assumptions that could affect the welfare analysis. For example, the model assumes that all parties were omniscient, especially regarding consumer demand. More realistically, the patent owner may not be fully aware of the demand curve of end-consumers. This is particularly the case when the patented good is a mere component of a technologically complex product, and it is difficult to estimate the overall value of the component to consumers. It may also be difficult to determine if a given component would be found by a court to infringe a valid patent. In this case, it will be difficult for the patent owner to estimate a consumer's willingness to pay. Alternatively, a consumer may have difficulty determining whether a product it considers purchasing from a downstream seller is covered by patents. Given this uncertainty, the consumer does not (cannot?) know the highest price they would willingly pay to license any such patents. In order to determine whether it wants to purchase the product, the consumer may have to incur a search cost to determine if it is potentially subject to licence fees to upstream patent owners, or to identify any patents covering the product, and then negotiate licensing fees with any such patent holders.

The presence of these and other information asymmetries may raise overall transaction costs in licensing consumers directly and ultimately amplify the welfare costs of presumptive exhaustion. As an example, assume the patent owner must incur a positive cost to determine the willingness of the consumer to pay for the patented good in order to price discriminate under presumptive exhaustion. This revelation cost makes it harder for the patent holder to price discriminate between consumers. In the context of the model above, the cost will act like an increase in the transaction cost and, thus, makes it more likely that absolute exhaustion would dominate presumptive exhaustion from the social welfare point of view.

The relative efficiency of absolute and presumptive exhaustion is likely to vary widely by industry, technology and product. In this respect, products assembled from many separately patented components (for example, computers and electronics) can be contrasted with those composed of one or a few patented components (for example, chemicals or pharmaceuticals). With the increasing complexity of technology — such that products often contain numerous

components patented by many different patent holders — scholars have voiced concern regarding high transaction and royalty costs that exceed the marginal value of the product. Complex products covered by many patents can exacerbate the effects of high transaction costs.

As an example, consider the following scenario. Suppose the production of the final good by a downstream manufacturer requires, in addition to materials and factor inputs, two patented components,  $x_1$  and  $x_2$ . Each of the components is patented by a different patent holder. The components are intermediate goods manufactured by upstream manufacturers. In the context of the model presented above, the downstream manufacturer plays the role of the consumer of the intermediate goods.<sup>21</sup> Assume further for simplicity that transaction costs are roughly fixed per component and that the downstream royalties for a multi-component final good do not differ from a single-component final good of equal value. Under this scenario, transaction costs in a multi-component good (with multiple patent owners) will cause more transactional friction and, hence, will burn up more surplus than for a single-component product. In other words, when the transaction cost in licensing to the downstream manufacturers is large, there is a stronger case in support of absolute exhaustion for products in which multiple components are patented by different patent holders.

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## Conclusion and Policy Recommendations

The results in Ivus, Lai and Sichelman (2017) suggest that the regime of presumptive or absolute patent exhaustion may be more efficient depending on the industry, technology and product of concern. In keeping with their findings, the authors have proposed that courts adopt a contextual approach in their application of the exhaustion doctrine

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21 The downstream manufacturer's willingness to pay is derived from its profit motive. For example, the downstream manufacturer's willingness to pay for  $x_1$  is equal to the price of the final good minus the unit material and input cost, and minus the per unit royalty paid to the owners of patents contained in  $x_2$ . In general, this willingness to pay varies across different downstream manufacturers.

and allow express reservation of patent rights when warranted by the circumstances. The focus should be on four key considerations.

First is the cost of licensing downstream parties relative to the value of the contract. When these costs are significant, absolute patent exhaustion is superior in static terms because it does not permit the patent holder to require direct licences from downstream consumers and thereby prevents the patent holder from "burning up" large amounts of surplus via downstream licensing transaction costs. Conversely, when the transaction costs of licensing downstream parties is low (as when the patent owner licenses to large downstream manufacturers, who, in turn, combine the patented component together with unpatented components en masse), the regime of presumptive patent exhaustion would be superior in static terms.

Second is the degree of information asymmetry between patent holder, intermediaries and consumers. Information asymmetry arises when parties to an economic transaction possess different material knowledge. In the context of the model in Ivus, Lai and Sichelman (2017), information asymmetry acts like an increase in the transaction cost. Thus, in the presence of large information asymmetries, the regime of absolute patent exhaustion dominates the regime of presumptive patent exhaustion in terms of static efficiency. In Canada, the law requires that "limitation imposed upon a licensee which is intended to affect the rights of subsequent purchasers must be clearly and unambiguously expressed."<sup>22</sup> To the extent that this requirement limits information asymmetries between the parties to a licensing transaction, it serves to lessen the loss of economic efficiency in the regime of presumptive patent exhaustion.

Third is the underlying technological complexity of the alleged patent-infringing product. As the number of components in a given product that are patented increases (especially involving multiple patent owners requiring separate negotiations) and transaction costs (such as search, information and negotiation costs) are high, the loss of efficiency under presumptive exhaustion rises. Thus, when dealing with complex-technology products, courts should be more reluctant to enforce reservations of rights by the patent holders, because such contractual

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22 *Eli Lilly and Co v Novopharm Ltd* [1998] 2 SCR 129 at para 100.

restrictions will “burn up” large amounts of surplus. Absolute exhaustion reduces the transaction cost inefficiency by requiring fewer inbound licence agreements to manufacture the product. Additionally, absolute exhaustion may reduce the costs of using patented components in further innovation- or commercialization-related activities by downstream entities. Complex products often require further downstream innovation and commercialization to achieve viability (Sichelman 2010), and so absolute exhaustion may be more attractive in complex-product industries.

The last consideration is the distribution of social welfare. If one values consumer surplus more than producer surplus then absolute exhaustion is statically efficient, since the consumer surplus from a regime of absolute exhaustion tends to exceed the consumer surplus in a regime of presumptive exhaustion. However, low-valuation consumers are better served by a regime of presumptive exhaustion. If this vulnerable group’s welfare is prioritized, then presumptive exhaustion is the better choice.

The model presented in this paper considers a single country in isolation and abstracts from international considerations. Studying patent exhaustion in the global context involves additional policy factors. Absolute international exhaustion, which is the rule in the United States since *Lexmark*, does not forbid parallel importation of products protected by US patent rights. When parallel importing is legal, there is an incentive for firms outside the United States to create parallel distribution channels for re-importing patented products into the United States without the authorization of the US patent owners. Such incentives are strong in low-price markets, where prices are below the US level. However, opportunities for arbitrage are typically short-lived. Since arbitrage limits the ability of patent owners to price discriminate internationally, patent owners adjust their pricing strategy to prevent parallel imports. Prices for patented products tend to rise in low-price markets, while falling in the other markets, as a result.<sup>23</sup>

The disparity in the treatment of patent exhaustion between Canada and the United States also carries significant consequences for firms’ licensing and global production decisions. A patent owner that has placed post-sale restrictions on its product in order to allow for the collection of additional licence fees cannot bring a patent infringement claim against a US downstream purchaser, but could do so against the same downstream purchaser in Canada. This implies that a firm that sources components abroad and uses these components to produce final products destined for the Canadian market must trace the patent rights of each component (i.e., determine which subcomponents in the global component are within the scope of a valid and enforceable patent and whether the patentee has reserved patent rights in Canada) and enter into a licence with the patent holders or risk patent infringement in Canada (Ivus and Lai 2017). The transaction cost of gathering this information and obtaining the legal rights when necessary could be high enough to reduce business activity and increase patent infringement litigation in Canada, as well as reduce the competitiveness of Canadian firms in the global market.

23 Parallel imports is a mechanism for defeating international third-degree price discrimination (Malueg and Schwartz 1994; Saggi 2013; Valletti 2006; Valletti and Szymanski 2006). In the presence of transportation costs and other costs of accessing foreign markets, arbitrage would be imperfect, and some amount of international price discrimination would remain.

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