

THE STRATEGIC USE OF PATENTS IN INTERNATIONAL BUSINESS

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ABSTRACT

This paper investigates how multinational enterprises (MNEs) use patents strategically. While patents are a feature (if often implicit) in the leading economic theories of the MNE, and while many analyses have explored the role of patents in international investment and trade, there are no studies, to my knowledge, of how patents can be leveraged strategically in international business. To this end, we develop an analytical framework based on the concepts of “exclusion” and “diffusion,” which is inspired by both economic theory and work on competitive positioning and the sources of competitive advantage, but applied to the international firm. The complexities of the patent system allow for a range of strategic behaviors. MNEs do not, necessarily, exercise their exclusive rights to prevent others from exploiting the innovation. And the information disclosure requirement in the patent law, intended to help others learn from patented knowledge, can fulfill other purposes, such as signaling. Elements of an international patent strategy include determining where and when to seek patent protection, how best to enforce international patent portfolios, and “mining” patent documents and databases for competitive intelligence in international markets. Policy implications, and some broader perspectives for the theory of the MNE, are briefly discussed.

Keywords: Multinational enterprise, international business strategy, patents

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This paper investigates how multinational enterprises (MNEs) use patents strategically. While patents are a feature (if often implicit) in the leading economic theories of the MNE, and while many analyses have explored the role of patents in international investment and trade, there are no studies, to my knowledge, of how patents can be leveraged strategically in international business. To this end, we develop an analytical framework based on the concepts of “exclusion” and “diffusion,” which is inspired by both economic theory and work on competitive positioning and the sources of competitive advantage, but applied to the international firm. The complexities of the patent system allow for a range of strategic behaviors. MNEs do not, necessarily, exercise their exclusive rights to prevent others from exploiting the innovation. And the information disclosure requirement in the patent law, intended to help others learn from patented knowledge, can fulfill other purposes, such as signaling. Elements of an international patent strategy include determining where and when to seek patent protection, how best to enforce international patent portfolios, and “mining” patent documents and databases for competitive intelligence in international markets. Policy implications, and some broader perspectives for the theory of the MNE, are briefly discussed.

1. Introduction

This paper investigates how multinational enterprises (MNEs) use patents strategically. With the growing importance of intangible assets to create value, patents have become increasingly central to business strategy (Cohen *et al.*, 2000, Rivette and Kline, 2000a,b). Yet while patents are arguably a feature (if often implicit) of the leading economic theories of and perspectives on the MNE (e.g. Hymer, 1976, Buckley and Casson, 1976, Magee, 1977, Caves, 1982, Hennart, 1982, 1991, Hill and Kim, 1988, Kogut and Zander, 1993), and while much work has been done on the role of patents in international investment and trade (e.g. Maskus, 2000, Bertin and Wyatt, 1988, Mansfield, 1993, Prima Braga, 1995), there are no studies, to my knowledge, of the ways in which patents can be leveraged strategically in international business to achieve a variety of different goals.

It is intended, in this paper, to sketch out the preliminary outlines of such a framework. The framework is based on the concepts of “exclusion” and “diffusion,” which are central to the economic analysis of patents and appropriability (e.g. Nelson, 1959, Arrow, 1962,, and arguably also underlie the analysis in the business economics literature of competitive positioning and the sources of competitive advantage. Thus our framework is inspired by economic theory, but focuses

on its implications for the international firm, much as Michael Porter's (1980) classic work on competitive strategy builds on the logic of welfare economics and industrial economics, but turns this logic "on its head" to develop its relevance for strategy.

In the strategic management literature, patents are generally included in the analyses of the sources of competitive advantage, both in terms of the market power they confer (Scherer, 1980, Porter, 1980), as a means by which firms can profit from their investments in R&D (e.g. Teece, 1986), as a source of first-mover advantages (Lieberman & Montgomery, 1988), and as isolating mechanisms (Rumelt, 1984) by which firms can extract rents from internal resources. But this logic has not been applied systematically to the analysis of the MNE. Thus the approach proposed here incorporates elements of both the "market power" perspective on the firm, where patents can be seen as a means to enhance the MNE's position in international markets, and the "resource-based perspective" on the firm, where patents can be seen as a firm-specific source of competitive advantage for the MNE. We ask: *How can MNEs utilize patents as an integral part of their overall strategies to win international competitive advantage?*

Multinational enterprises, we contend, seek to leverage patents as a part of a larger effort to maximize the value of their intellectual property. The complexities of the patent system allow for a range of strategic behaviors. MNEs do not necessarily exercise their exclusive rights to prevent others from exploiting the innovation. Liberal licensing, for example, can be employed as part of a deliberate strategy to diffuse the invention as widely and rapidly as possible. And the patent law's information disclosure requirement, intended to help other firms learn from patented knowledge, can fulfill other purposes. For instance, patents can serve as a signal of strategic intent, an indicator of stock market value, or an expression of worth in an upcoming merger negotiation.

The paper starts by reviewing the relevant literature on the role and importance of patents in the context of the MNE. After demonstrating that this work does not address the central issue of this paper - the strategic use of patents in international business - we propose, in Sections 3 and 4, the preliminary outlines of a framework based both on the economic analysis of the patent system, and on how patents can function as a source of competitive advantage. Section 5 applies this logic to the multinational enterprise. Key elements of an MNE patent strategy include determining where and when to seek patent protection, how best to enforce international patent portfolios, and leveraging

patents for competitive intelligence. These are all seen through the lens of the fundamental trade-offs implied by exclusion and diffusion. In Sections 6 and 7, we briefly discuss some of the implications of this analysis for policy, and for the theory of the multinational enterprise.

2. Patents in the context of the MNE

2.1. The role of patents in the theory of the MNE

A review of the literature on the theory of the multinational enterprise indicates that patents, in many respects, form an important aspect of the leading economic theories and perspectives on the MNE. Their role, however, is not explored in any specific sense. Work on developing an economic theory of the MNE dates from the 1960s, 1970s and 1980s (see citations above). The classic early economic analysis of the patent system goes back even further, to the 1950s and 1960s (e.g. Penrose, 1951, Nelson, 1959, Arrow, 1962). These studies, which underline the effects of the different types of failures associated with markets for basic research, not only pre-dates the early theoretical work on the MNE, but perhaps also, to some degree, informed this work. As far as I am aware, the link between the market failures associated with innovation and the patent system, and those associated with MNE positioning, knowledge transfer and resource use, has never been made explicit.

Central to the economic analysis of the patent system are the dilemmas implied by basic trade-offs between static and dynamic efficiency. What is the “optimal” allocation of resources to invention and innovation? The answer to this question depends on the goals society wishes to achieve. On the one hand, it is arguably “optimal” to encourage the diffusion of new knowledge as rapidly and widely throughout society as possible, so that it may be allocated to its most efficient uses. On the other hand, it is “optimal” to provide firms with the incentive to undertake the costs and risks of R&D - and if so, they must be able to earn rents from these investments, which can be facilitated by taking out a patent.

The patent system addresses this dilemma by giving inventors temporary exclusive rights to their new technology in exchange for disclosing the details in the patent document, so that others can

learn from the new knowledge and build on it in their own innovative activities. Thus the patent monopoly, in itself, does not prevent the wider diffusion of new knowledge. What it prohibits is imitation: rivals must substantially change and improve an existing patented invention in order to take out their own patent. Firms can also license out their patented technologies to others.

In the development of an economic approach to the MNE, it has similarly long been recognized that markets for knowledge are imperfect. Several types of imperfections characterize these markets. Hymer's theory of the MNE (1960), for example, built on the assumption that U.S. foreign investors did not license their technology to indigenous firms because this would have weakened their market power. By investing abroad, MNEs can thereby overcome the problems associated with protecting patented knowledge.

Failures in knowledge markets have also been a central theme in the transaction cost theory of the MNE. Here, in contrast to Hymer's approach, emphasis is placed not on the market distortions created by monopoly power, but on the difficulties of overcoming the transaction costs associated with defining property rights and negotiating and enforcing contracts. Scholars in this tradition maintained that MNEs preferred to own their plants abroad in order to internalize these transaction costs (e.g. Buckley and Casson, 1976, Hennart, 1982). This basic logic has been further developed by Hill and Kim (1988) in their "dynamic" approach to the MNE, where they utilize transaction cost economics to explain the transition between alternative governance modes (wholly owned subsidiaries and licensing).

Magee (1977) proposed an "appropriability theory of the MNE," based on the concept of an industry technology cycle that paralleled Vernon's product life cycle (1966). He suggested that MNEs were specialists in the production of information which was less efficient to transmit through markets than internally, and that they chose to produce sophisticated technologies because these technologies were more easily appropriated than simple ones. Firms could seek to appropriate the profits from their investments in R&D by different mechanisms, including patents, trade secrets, and collusion. The importance of the different methods varied according to the age of the technology. For inventions, patents were the most effective; for innovations, a combination of patents and secrecy; and for standardized competitive products, a combination of secrecy and collusion.

Zander (1991) explored the role of patents in a study of the factors affecting technology transfer in international business. He distinguished between mechanisms for voluntary dissemination, by which MNEs deliberately sought to transfer technology throughout the organization, and involuntary (undesired) dissemination, facilitated by imitation. As regards the latter, Zander explored a range of methods by which MNEs could seek to reduce the imitation of their inventions, including patents, trade secrets, lead time, and the like. Patent effectiveness, he pointed out, can vary greatly according to industry and type of product concerned.

In 1993, Kogut and Zander suggested a new interpretation as to the rationale of the multinational enterprise, building on the evolutionary theory of the firm. The MNE, they argue, does not arise due to failures in markets for buying and selling knowledge, but due to its superior organizational efficiency in transferring knowledge to foreign subsidiaries. The more tacit the technology is (defined in terms of the difficulties of codifying and teaching it), the more likely it was transferred internally across borders. Knowledge that was easier to codify and teach was typically transferred to third parties through licenses and other contractual agreements. (According to Love, 1995, however, conditions of market failure are still central to their analysis.)

Other scholars (e.g. Gupta and Govindarajan, 2000, Ensign, 1999, and Buckley and Carter, 1999, have also suggested that understanding the nature of internal and external knowledge flows are key to our understanding of the MNE. Bresman, Birkinshaw and Nobel (1999) explored the factors affecting the transfer of knowledge in international acquisitions. Whether knowledge transfer was effected in the form of patents, they found, was associated with the degree of its articulability, the size of the acquired unit, and the date of acquisition. Other scholars have focused on the strategic dimensions of the use of knowledge by the MNE. Karahan (2002), for example, develops the argument that more and more industries are becoming knowledge-intensive, explores the importance of firm-specific or proprietary resources in explaining why firms expand internationally.

But these studies all essentially view patents as mechanisms to achieve larger goals - market power, a reduction in transaction costs, appropriability, knowledge transfer. But the strategic importance of patents *per se* as a means to secure international competitive advantage, was not explored.

Moreover, these theoretical perspectives all emphasize the value of patents in terms of restricting

access to knowledge and preventing imitation, not on patents as instruments with specific features, that can be leveraged to achieve a variety of strategic goals. Our approach, to be developed in the next section, allows for the possibility of using patents to *diffuse* new technologies as widely as possible. What matters is the degree to which the one approach - or the other - can help the MNE to win international competitive advantage.

2.2. The effectiveness and importance of patents in international business

Several empirical studies have been carried out on the importance and effectiveness of patents in international investment and trade. Bertin & Wyatt (1988), in a questionnaire survey, investigated the strategic use of patents by multinational enterprises. Patents, they found, could serve a variety of purposes, ranging from protecting new technology to blocking competitors to establishing the legal basis by which to enter a foreign market. Mansfield (1993) has also explored the role of intellectual property rights in technology transfer and economic development. He determined that while the great majority of the U.S. firms surveyed reported that the strength or weakness of the local IPR regime was important for FDI, there was no statistically significant link between the strength of IPR protection and the extent of U.S. FDI. Again, much depended on the industry concerned. To take one final example, Pamela Smith (2001) explored how patent rights have affected U.S. exports, and on U.S. knowledge transferred outside and/or inside the country and the MNE. She found that strong foreign patent rights increased the sales and licensing activities of the subsidiaries included in her analysis, particularly when the countries involved had strong imitative abilities.

Many analyses focus specifically on how intellectual property rights affect MNE willingness to invest abroad, particularly in the Third World (e.g. Babak, 2000, Sanyal & Turgut, 2001), but also with regard to industrialized countries that have strengthened patent protection in particular sectors such as pharmaceuticals (e.g. Pazderka, 1999) and biotechnology (e.g. Shan and Song, 1997). Most studies indicate that goods with strong IPR protection tend to be among the fastest-growing technologies in international trade. Adams & Godshaw (2002) have investigated the role of intellectual property rights in transfer pricing, and Schutz & Hall (1999) have considered the legal aspects of protecting and intellectual property rights in international markets.

Intellectual property rights are national in scope, and countries have historically differed considerably on the scope and breadth of patent protection. Depending on the level and nature of technological development, different countries may have different interests as regards the strength of patent protection. Broadly speaking, the stronger the patent protection, the stronger the incentive it provides to innovate; the weaker the patent protection, the more quickly patented information will be diffused throughout society, with benefits both to imitating firms and consumers in the form of price reductions.¹

Thus countries with large, innovative companies and technology exporters tend to prefer strong intellectual property regimes, both in their own countries and in the countries to which they export. Countries with less innovative countries that are technology importers will tend to prefer weaker IPR regimes. This means that MNEs will typically prefer strong IPR regimes, while certain of the countries to which they export, particularly in the Third World, may prefer weak IPR regimes.

There is also a large literature on the economic impact of international patent conventions (see Maskus, 2000). Agreements like the Patent Cooperation Treaty and the European Patent Convention enable MNEs to apply for the same patent in multiple designated countries by submitting one international patent application, whereby they can economize on fees. The TRIPS (Trade-Related Intellectual Property Rights) under the WTO represents an even more ambitious attempt to standardize international patent rules and practices (though it does not handle actual patent applications). Numerous scholars have considered the implications of the increasing international standardization of intellectual property rights (e.g. Maskus, 2000, Sood, 1998), particularly with regard to developing countries (e.g. Primo Braga, 1995, Samahon, 2000). But none of these investigations, to my knowledge, explore specifically how MNEs can use patents to achieve international competitive advantage.

Finally, in addition to this, many empirical international business studies make use of patents as technological indicators. For example, Beaudry (2001) uses patent statistics to investigate how firm performance is influenced by the strength of the industrial cluster in which it is located. Guellec and Van Pottersberghe de la Potterie (2001), Belderbos (2001), Frost (2001), Kumar (2001), Cantwell & Immarino (2000a, 2000b), to name but a few of the most recent studies, have used patents as

indicators of patterns in international R&D cooperation and the location and characteristics of MNE R&D. These analyses, however, are not directly relevant to the issues explored here, given our emphasis on the strategic role and effectiveness of patents.

All in all, while work on the role and importance of patents in the context of the MNE cover a wide range of relevant issues, no studies have specifically addressed the central issue of this paper - the strategic use of patents in international business. To this end, we propose the development of a theoretical framework based on the concepts of “exclusion” and “diffusion,” which derive not from the literature on the MNE but from work in economics and business strategy. The next section briefly reviews the most important contributions in this regard; subsequently, we link these findings to the analysis of the MNE

3. Exclusion and diffusion in the economics literature

3.1. The economic analysis of the patent system

Several key questions have informed the economic analysis of the patent system. First, what is the optimal patent scope? There exists a long-standing economic literature on how adjustments in the patent term can be used to create the best balance between benefits and costs (e.g. Nordhaus, 1969, Scherer, 1980). Generally speaking, the longer the life of the patent, the greater the benefits that can be accrued by inventors, and therefore the greater the incentive to invest in R&D. At the same time, the longer the period of monopoly control, the greater the amount of deadweight loss generated. In principle, the optimal patent life is different for each invention – though for practical reasons, countries have sought to establish more general rules about patent length and scope, since these are easier to administer.

If patent protection is too broad, it may place too much market power in the hands of the patentee. This may lead to the problem of “pre-emptive patenting” (Gilbert and Newbery, 1982), where firms apply for patents on new technologies (before they know whether the technology is commercially valuable for them) to prevent rivals from doing so, or “patent races” (Harris and

Vickers, 1985), where firms compete to be first to patent a particular area of technology, diverting resources which might otherwise have been spent on R&D.

Considerable work has focused on analyzing the trade-offs between the incentive benefits of patent protection, and the dead weight welfare losses due to monopoly. From the beginning, lawmakers recognized that a delicate balancing act is involved. On the one hand, there was a desire to encourage and reward inventors by allowing them to exclude others from making or selling their inventions, given that imitators did not have to bear the original costs of invention and development. On the other, there was an awareness of the social costs. By requiring patentees to disclose the details of the invention in the patent, it was hoped to encourage the rapid diffusion of the ideas behind the invention. While others could not produce the invention itself, they could learn from the patent document and build on it, with an eye to taking out their own patents, thereby also furthering technological progress generally.

Evaluating the economic effects of the exclusion and diffusion elements in the patent system is complex. Scotchmer (1991), for example, pointed out that the broader the protection conferred by the patent, the greater the problems faced by “second-generation” inventors seeking to build on what is known to create their own new technologies. Yet if patent protection is too narrow, “first-generation” innovators may not take out patents in the first place. Cooperative arrangements like licensing can protect not only the incentives to innovate, but also benefit second-generation innovators.

Ordover (1991), addressing the same general issue, argues that strong patents are not necessarily inimical to the diffusion of knowledge, to the extent that they reduce the incentive to keep the knowledge secret, and strengthen the legal basis for licensing. Nor do weak patents necessarily decrease the incentives to invest in R&D, as for example when companies engage in extensive cross-licensing to share the benefits of these investments. Thus it is extremely complex to determine how strong patent protection “should” (optimally) be.

Finally, the information disclosure requirement of the patent law can be said to encourage the publication of new knowledge that otherwise might be kept secret. One of the societal benefits of

patent disclosure is to reduce duplicate (and therefore wasteful) R&D, since other firms are aware of what their rivals are doing.

None of these insights, however, have been systematically applied to the analysis of the strategic role of patents in international business. Potentially, we argue, they can be of great value in this regard.

3.2. Industry studies

Other scholars have explored industry differences in the importance and effectiveness of patents (e.g., Mansfield, 1986, Levin *et al.*, 1987, Bertin and Wyatt, 1988, Harabi, 1994, Cohen *et al.*, 1998). Such studies have found, among other things, that patents are relatively more important in industries like pharmaceuticals and chemicals, where R&D costs and risks are high but production costs of successful drugs relatively low. In other industries, such as rubber or textiles, patents play a minor or insignificant role. When firms are asked to rate patents in relation to other strategies of appropriability such as secrecy and lead time, they typically find patents less effective (with the important exception of pharmaceuticals).

These studies have demonstrated that patents can be used both to exclude other firms, and as a means to share technology or to diffuse it widely throughout society. In the pharmaceutical industry, for example, innovators may well take out hundreds of patents on marginal variations of the same basic invention, to erect a patent “fence” to keep unwanted competitors and imitators out. In other industries, for example electronics, patents are used primarily as negotiating tools in complex licensing arrangements. The reason is that inventions in this industry are cumulative; firms cannot proceed without access to each other’s inventions, which they achieve through cross-licensing. In pharmaceuticals, firms can develop and market their inventions largely independent of each other.

While the emphasis in this work has been on the relative importance and effectiveness of patents according to industry, firm size, and the like, some scholars have also explored how the economic and procedural aspects of patenting can act to shape firm behavior. To be patented, an invention

must be new, non-obvious, and industrially applicable. This means not only that many inventions cannot be patented, but also (depending on the scope of the patent claims) that the extent of the protection given may vary considerably. An important reason why patents are important in the pharmaceutical industry, for example, is because the invention can be described precisely in the patent, and it is relatively easy to show how one invention differs enough from existing inventions to receive patent protection (Levin et al., 1987). This makes it easier not only to apply for patents, but also to enforce them.

Again, these insights have not been applied systematically to the question addressed in this paper. But industry differences can clearly be of key importance in understanding the dynamics of business strategy - and by extension, the role of patents in this regard.

4. Exclusion and diffusion in the business strategy literature

4.1. The sources of competitive advantage

In the business strategy literature, while the terms “exclusion” and “diffusion” are not, to my knowledge, used specifically in the way suggested here, the underlying logic is implicit both in work on the analysis of market positioning strategies, building off the foundation of industrial economics, and the resource-based view of competitive advantage.

With regard to exclusion, firms can use their patent holdings to exclude others from making, selling or using their new products or processes for 20 years. By taking out multiple patents on the same basic invention, and subsequent patents on improvement inventions, an innovator can seek to block access to its technology more broadly, and for an even longer period. In the market positioning literature (Scherer, 1980, Porter, 1980), patents are seen a form of entry barrier, and as a means to ward off the threat of substitutes. With new prescription drugs, for example, few substitutes exist, especially during the period in which the firm holds a patent on the drug. When the patent expires, generic producers can produce these drugs at substantially lower cost, since the production cost does not have to cover the costs and risks of the original investment in R&D. In the resource-based view of the firm, patents are seen as barriers to imitation. Rumelt (1984), for example, develops the

concept “isolating mechanisms” to describe barriers that individual firms can impose that limit the *ex post* equilibration of rents, making it costly for competitors to imitate its products.

The second concept, “diffusion,” can be said to refer to the use of patents to implement cooperative strategies, both for marketing positioning and optimal resource allocation. Depending on the desired end, different types of licenses are available. Exclusive license agreements include the licensee but exclude all others. Such licenses can thereby fulfill the function of entry barriers or isolating mechanisms. Liberal license agreements make the technology available to all qualified comers at reasonable fees. Patent licenses are leveraged here not to bar access to others, but to facilitate the rapid and widespread diffusion of the technology.

Yet in both streams of literature, the strategic role of patents has tended to be subsumed under other areas. Emphasis is placed on patents as a means of protecting knowledge, not on maximizing the value of the firm’s intellectual property, and their role in other aspects of R&D design and competitive strategy not been appreciated. Exceptions include Teece (2000), and Grandstrand (2000), who analyze more generally how firms can protect and exploit their intellectual capital to win competitive advantage. Yet no attention, to my knowledge, has been paid to how the complexities - and peculiarities - of the patent system can shape firm strategies.

4.2. The strategic role of patents

In the past ten years, a number of studies focusing specifically on the strategic use of patents have also emerged (e.g. Rivette and Kline, 2000a,b, Davis, 2001). Patent protection has been extended into new areas like software and biotechnology, patent rights have been strengthened around the world. All large firms – and increasing numbers of small ones – now see patents as an integral part of business strategy and a source of competitive advantage.

Patents can serve a multitude of purposes. They can form the basis of a joint venture, be licensed, bought and sold. As Grindley and Teece (1997) have pointed out, patents have become a key element in the “proactive” management of intellectual capital by firms in high tech industries. Rivette and Kline (2000a,b) discuss patents as the new competitive battlefield, where strategies of

“patent mining” and “patent mapping” can become potent competitive weapons. Patents can function to “enclose” a rival’s patents, so that it cannot proceed without paying license fees. Or they may function as signals to would-be stock market investors that the firm possesses the juridical basis for continued future growth, and that it will not face a lawsuit from a firm possessing the patent rights to the technology. Patents can serve as indicators of the productivity of individual inventors, or individual firms. Patent holdings can additionally serve as a tool in strategic interfirm negotiations, and as the legal basis for the division of property rights in research collaborations.

Moreover, patents have become increasingly important as an indicator of value for companies, particularly for start-up firms. If a new venture has a strong patent position, this indicates both that it is serious about its product development plans, and that it is less likely to be blocked from developing and marketing its technology in the future by patent lawsuits initiated by rivals. The Internet arguably makes it easier for such firms to stimulate market awareness of their patents by using them as signals. Access to web-based patent information has encouraged firms to develop their own tools to manipulate this information (Davis, 2002).

5. Exclusion and diffusion in the context of the MNE

Based on the insights from Sections 3 and 4, this section explores how the concepts of exclusion and diffusion might be applied to the analysis of the MNE.

5.1. Strategic value of patents for the MNE

Multinational enterprises can use patents to obtain varying degrees of exclusivity, depending on the circumstances. One approach is to apply for a broad patent to protect the basic technology, followed by a series of applications for more narrow patents to cover marginal improvements, in all of the markets in which the firm plans to do business. In this way, the MNE can assemble an international "wall" or "cluster" of dozens or even hundreds of patents covering all commercially relevant variations of the innovation. Depending on the nature of the innovation, the MNE might apply for the first patents at a very early stage in the life of a promising invention, when it is not yet clear

whether it will be a technical or commercial success. In other cases, the firm will only try to patent inventions with a strong chance of technical success and a clear application to existing products (Bertin and Wyatt, 1988).

In principle, MNEs can leverage such patent “clusters” to obtain effective patent protection in all areas of the world in which they seek to commercialise their new products and processes. Such protection enables them to plan the international introduction of a new product. Thus they can limit their initial development and marketing strategies to particular countries, starting perhaps in one or two selected countries, to test the market for the good on a limited scale, all the while knowing that would-be imitators cannot copy the innovation and introduce it elsewhere in the world themselves, since they have already patented the good in those countries.

The exclusive right provided by the patent can also be used as the legal basis for knowledge sharing, either before or after commercialization. An example is the extensive use of cross-licensing by the major international players in semiconductors and electronics (Grindley & Teece, 1997), as mentioned above. This approach involves a different combination of exclusion and diffusion than the tight enforcement of monopoly rights. Even though knowledge is shared (and thereby diffused) in a cross-license, the involved firms still practice a form of exclusion, in that other firms not party to the agreement may not make, use, or sell the technology. The advantage of sharing patented technologies is that it clarifies the positions of the two parties and (*ceteris paribus*) simplifies the drafting of the contractual agreement.

Diffusion of knowledge via the patent system may be achieved not only through the implementation of cooperative patent strategies, but also via the disclosure requirement. When a patent application is delivered, the priority date, the name and address of the inventor(s), the organization to which the patent right has been assigned, and the subject of the invention are registered. When a new product is patented, the details of the invention are published in the patent document – it cannot be kept secret. Just as the disclosure requirement is important to society (see Section 3.1), it also carries important strategic implications for the MNE. On the one hand, the MNE cannot prevent publication. On the other, it can leverage this requirement to its benefit.

Thus the MNE can use its patents to “signal” strategic intent, both to would-be competitors, and potential candidates for cooperation in a joint venture or licensing agreement. Patent applications help the MNE to mark off its “territory”, and indicate where its research may go in the future. If the MNE has decided to go into a new technological area, for example, a series of patent applications can both make this intention crystal clear, and underline its seriousness. Smaller firms will be forced to take notice and make their plans accordingly. Perhaps they will prefer to redirect their inventive efforts, perhaps to explore some form of collaboration. MNEs can also use patent information to gather competitive intelligence on its rivals, the focus of Section 5.2.3.

In this sense, diffusion (in the form of the disclosure of the patent) is a form of exclusion, to the degree that the firm seeks to block others from patenting in the area. Patents also demonstrate to would-be stock market investors that the firm is not likely to face damaging lawsuits in the future. The use of patents as signals raises a number of interesting questions. How important is the value of such signals? How often do they serve to foster cooperation (attracting the interest of a potential licensee, for example)? To what extent are they misinterpreted? There has been considerable work on the use of patents as signals, but not in terms of their relation to knowledge management.

It should be emphasized that the value of patent information is limited in significant ways, depending on the nature of the innovation, and the ability of the firm to assimilate and learn from this information. First, due to time lags between the filing of the application and its publication, the information disclosed may well be out of date. Sometimes, valuable information in the form of technical know-how critical to commercializing the innovation - but not to obtaining the patent - may be deliberately be left out of the patent. Third, it may be difficult, given the sheer amount of information available in patent documents, to determine what is of value.

According a study by Arundel & Steinmeuller (1998) of the value of patent databases for small and medium-sized European firms, respondents felt that the information disclosed in patents in the IT sector had little value, since it was quickly outdated. But in another sector characterized by rapid technological change - agro-biotechnology - published patent information was felt to be highly useful (see also Hartnell, 1996). The reason was that equivalent information was often not published in the scientific literature; patents were often the only place where it was publicly available.

5.2. Key elements of an MNE patenting strategy

5.2.1. Where and when to seek international patent protection

Achieving effective international patent protection can be extremely costly. The MNE must decide in which countries it seeks protection, and how that can be accomplished most cheaply. Some multinationals have hundreds or even thousands of patents on their inventions. Just to take one example, as of 1994, IBM held 3,435 patents on semiconductor devices and manufacture, Toshiba held 2,492, Texas Instruments held 2,336, AT&T held 2,342, and Hitachi held 2,218. See Grindley and Teece, 1997, p. 17). The costs of applying for patents, and maintaining them through annual renewal fees, can be very high. Firms that seek extensive international patent protection can obtain cost savings by applying via one of the international patent conventions, such as the European Patent Convention. While recent years have witnessed an increasing harmonization of the patent laws around the world, country differences still do exist.

The value of patents for exclusion and diffusion might also vary from country to country, depending on the MNE's overall development and marketing strategy. In some countries, the MNE might choose to patent the invention and market it through its own subsidiaries. In others, it might choose to enter into exclusive license agreements with one local partner. Alternatively, it might find it to its advantage to conclude a series of license agreements with local firms, with the aim of disseminating the technology as quickly as possible.

Another recent trend is that firms that previously kept process inventions secret are now patenting them (a practice that might be labelled "preemptive diffusion"). According to the patent law, if information about a new product or process has been published in *any* source, in any language, around the world, it is not novel, and therefore not patentable.. This is true even of process inventions they have used for some time. If the MNE does not patent these inventions, it runs the risk that another firm will do so – and demand that the innovator pay license royalties for the privilege of continuing to develop its own process. According to the patent law, the inventor may

continue to use processes originally kept secret, even if they are patented by others - but may not further improve them.

5.2.2. Leveraging and enforcing international patent portfolios

Once patent protection has been obtained, the MNE needs to develop an effective strategy to leverage and enforce its patents internationally. A few writers have picked up this theme. Schutz & Hall (1999), for example, noting that patents have become increasingly important in international business, argued that patent attorneys need to develop skills to conceive winning strategies when contemplating litigation. But little work along these lines has been done in the business economics literature.

The costs of enforcement of international patent portfolios can be high. First, the patent-holder needs to detect the infringement. The greater the extent of international patent protection, the more difficult this will be. Subsequently, the MNE must decide whether the benefits of pursuing the infringer are worth the costs. Differences in national systems can further increase such expenses. MNEs often seek to settle with suspected infringers out of court, both because this ultimately costs less, but also because it requires extra resources to understand the particular laws and practices of each different country.

By pursuing a strategy of tracking down infringers and suing them in court, the MNE is clearly following an “exclusion” strategy. By choosing not to pursue infringers, it implicitly is preferring a diffusion strategy. Perhaps the MNE determines it is too costly to win such a lawsuit. But there can also be advantages simply in having the technology disseminated quickly.

One big question here concerns how much to patent inventions in the Third World. As mentioned earlier, the TRIPS agreement (Trade-Related Intellectual Property Rights), under the WTO, was ratified in 1995, standardizing the content and enforcement of patents and other intellectual property rights around the world (including, as of 2005, most of the world’s poorest countries). Yet enforcing patent rights international can be complicated, as exemplified by the problems

experienced by the leading pharmaceutical multinationals in enforcing their patent rights on medicine to cure AIDS and other diseases in South Africa.

5.2.3. Patents as a source of information for competitive intelligence

As mentioned above, patents are used increasingly as a source of competitive intelligence. The disclosure requirement of the patent law is arguably quite important in shaping the MNE's ability to access and use knowledge. For example, they can scan patent databases to obtain an overview of what other firms are doing. Many patent databases have been constructed by national and international patent authorities, international organizations, and private companies. The information can be collated to identify new R&D and market opportunities, and to keep track of what competitors are doing. When the application is published, more information is revealed, including the patent's specifications, claims, and citations of previous patents. Scientists and engineers can study the details of these patent documents.

Patents can form a highly value source of information (Kahaner, 2000, Hall *et al.*, 2000, Stephenson & Riley, 1982). By reading the patents of competitors in related fields, and systematizing this information, it is possible to glean information about who is important in a given field, and where key potential competitors are likely to emerge. Software technicians have created new data-mining and visualization techniques, enabling the generation of "patent maps" of the firm's own and competitors' R&D activities, showing their relative strengths and weaknesses. Armed with this knowledge, an MNE can attempt to block its rivals and strengthen its own proprietary positions. Patent mining can additionally reveal the relative age of the patent holdings of a potential target for acquisition (particularly the date of expiration), so that the would-be buyer can evaluate whether or not its patents will continue to be valuable over the longer term.

Multinationals can draw on patent intelligence to identify good prospects for acquisitions or joint ventures. While this information can never give a complete picture, it can be compared with other sources and with word of mouth reports. Patent applications, studied rigorously with the aid of advanced computer techniques, can be analyzed to indicate where the MNE's main competitors are

operating. Managers can use this information as part of their decisions as to whether or not to “leave the market to them,” or go in and try to compete.

In an example described by Rivette and Kline (2000b, p. 157), a chemical firm constructed a patent map in the area of elastomer technology. The firm could quickly see that it was weak in this technology, with only 2 patents. Its chief rival, by contrast, held 138 patents; all in all, chemical companies held more than 8,000 patents in elastomers. Technicians and managers could study the patent map, determine which companies held related patents of interest, and take a closer look at these companies in terms of their size, financial position, R&D plans, and so forth, and decide how to proceed. To go more aggressively into the area of elastomers, the firm could choose among several options (or some combination): pursuing its own product development/patenting activities, licensing existing patents, initiating joint ventures with companies with related patent holdings, or acquisitions of such companies.

Depending on the circumstances, MNEs can use this patent intelligence as part of an exclusion or diffusion strategy. If a competitor has applied for a patent in an area of interest to the MNE, it can try, perhaps, to buy up the patent, and or to take out its own patents in the same area in an effort to reduce the economic value of the competitor’s patent. Alternatively, it can use the information as the basis of putative license agreements, or perhaps as the legal basis for a joint venture.

6. Some policy implications

The increasingly strategic use of patents in international business raises a number of policy issues. First, how can these activities best be regulated? Adams and Godshaw (2002), for example, investigated the role of intellectual property in transfer pricing. Just as multinational enterprises are becoming increasingly aware of the strategic value of their intellectual property rights, so have governments become increasingly aware of the effects of different IP strategies on where global profits are recognized.

A related question concerns the degree to which the patent system should be applied equally to industrialized and developing countries. The patent system evolved in the industrialized countries

(more or less) in harmony with the ongoing technological changes in those countries. For many centuries, inventors were accustomed to patenting new products and processes, and building on existing knowledge to creating new technologies. In the Third World, technologies and medicines have largely been developed without patent protection. Thus tensions cannot help but arise when the patent system, fine-tuned to the technological ideals and advances of the industrialized countries, is imposed “from above” on societies with different traditions.²

Prima Braga (1995), in assessing the economic effects of the TRIPS agreement, argues that it will most likely tend to strengthen international trade (reducing the incidence of internal technology transfers in multinational enterprises), international investment, and general technology transfer from north to south. On the other hand, it will probably also lead to higher prices in the Third World, and thus the transfer of rents from south to north, in that developing countries can no longer produce cheap copies of drugs that are patented elsewhere, but have heretofore been excluded from patentability there. Ultimately, the treaty might lead to the replacement of imitators by licensees in the developing countries, and greater R&D investments in the south, and ultimately stronger economic development in the south, as domestic companies become innovators in their own right. Yet at least in the short run, the economic effects of the TRIPS agreement have proved to be highly disruptive for the developing countries, particularly with regard to drugs. A related issue concerns the patentability of the laboratory versions of other types of products used for centuries by traditional societies, such as seeds or medicinal potions. To what extent should MNEs be granted patent rights on such products, for inventing methods to synthesize them artificially?

7. Conclusion

As stated in the Introduction, this study builds on concepts from the economic analysis of patents and appropriability, but turns the logic of welfare economics “on its head” to develop its implications for firm strategy. This follows the same pattern as that pioneered by Michael Porter, in his classic work *Competitive Strategy* (1980). In economic theory, entry barriers are seen as an impediment to perfect competition, and government policies should be designated so as to eliminate entry barriers as much as possible. Porter pointed out that if firms wish to outcompete other firms, they should specifically try to erect entry barriers.

Similarly, we have in this paper to demonstrated how the economic justification of the patent system, when turned “on its head,” can indicate how firms can win competitive advantage from thinking strategically in terms of the concepts of exclusion and diffusion. While these terms are not used specifically in the strategy literature, we have argued that the underlying logic is the same. Our approach to the MNE can be said to incorporate elements of both the “market power” perspective on the MNE, where patents are seen as a means to enhance the MNE’s position in international markets, and the “resource-based perspective” on the firm, where patents are seen as a firm-specific source of competitive advantage. Competitive advantage can sometimes be won by exclusion, other times by diffusion – or some combination.

Another key issue concerns patenting in the Third World. MNEs could, at least in theory, extend their IPR protection into every corner of the world. But is this in their long-term interests? Where can one best draw the line? Even if the multinational is legally “in the right,” such incidents can cause damaging costs to reputation if the MNE’s patent strategy is seen as overly exploitative. These issues revolve as much around intellectual property rights as broader ethical concerns of corporate power and responsibility.

A final key issue involves how best to coordinate patenting activity within the context of the multinational enterprise. If the MNE has several subsidiaries in a country, for example, which should take out the patent? A related issue concerns knowing what other divisions in the corporation are doing. In one case in point described to the author, the patent divisions in two different subsidiaries of the same multinational each brought the same opposition with regard to another firm’s patent to the EPO – apparently without being aware of each other’s activities! These coordination activities are important, given that efforts by MNE management as to whether to use

patents for “exclusion” or “diffusion,” to be effective, must be coordinated among the relevant people throughout the firm. Internationally, since the MNE’s goals may differ from country to country, it is important to coordinate these general strategic objectives with leveraging patents.

The framework suggested here could be further developed in several ways. One might, for example, investigate the nature of different kinds of exclusion, for example: partial exclusion, exclusion as a form of signalling, and so forth. Further, instead of breaking down use of patents according to industrial sectors, could look at differing strategic value of patents according to general industry age (new industries, mature industries), or the nature of the firm (fx multiproduct conglomerates vs. high tech).

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NOTES

¹ This is not necessarily true, as contended by Ordover (1991); see Section 3.1

² It should also be recognized that the problems confronting the developing countries go far beyond patent policy. In the recent controversy between the South African government and the pharmaceutical companies, the government admitted that even if the price of anti-AIDS drugs fell so much as only to cover actual production costs, the medicine would still be too expensive to solve the country's AIDS crisis.