Abstract

We explore conditions under which multinational pharmaceutical companies (MNPCs) can profit from their cross-border operations, by learning to collaborate and compete (co-opete) with local companies in emerging economies. The proposed collaboration takes the form of market co-creation and an ?open-innovation?-type model. This complements more conventional competitive strategies, such as acquisitions of local firms by MNPCs. In order to support our argument, we adopt cooperative game theory and submit-employ the assumption, that firms in developing-emerging countries can increase the size of the market, through their possession of complementary assets and capabilities, to those of the ?developed? countries. In such a case, we show that collaboration between firms in the two sets of countries that takes the form of ?open innovation?, and fosters market co-creation, can also foster trade, thereby allowing both firms and nations to profit. We also show how provisions from TRIPS, (and more recently ACTA), can be leveraged to foster the collaborative outcome.
How can MNEs Profit from trade in Pharmaceuticals through “Open Innovation” and Market Co-creation: can TRIPs (and ACTA) help foster trade?

ABSTRACT

We explore conditions under which multinational pharmaceutical companies (MNPCs) can profit from their cross-border operations, by learning to collaborate and compete (co-opetition) with local companies in emerging economies. The proposed collaboration takes the form of market co-creation and an ‘open-innovation’-type model. This complements more conventional competitive strategies, such as acquisitions of local firms by MNPCs. In order to support our argument, we adopt cooperative game theory and submit-employ the assumption, that firms in developing-emerging countries can increase the size of the market, through their possession of complementary assets and capabilities, to those of the ‘developed’ countries. In such a case, we show that collaboration between firms in the two sets of countries that takes the form of “open innovation”, and fosters market co-creation, can also foster trade, thereby allowing both firms and nations to profit. We also show how provisions from TRIPS, (and more recently ACTA), can be leveraged to foster the collaborative outcome.

Keywords: intellectual property rights, “open innovation” market co-creation, MNPCs, bargaining, learning.
1. INTRODUCTION

Recent advances in IB scholarship have witnessed renewed interest on the issue of learning and knowledge accumulation by MNEs, following original contributions by Buckley and Casson (1976), Cantwell (1987), Johanson and Valhne (1977), and Kogut and Zander (1993), see Pla-Barber and Alegre (2007), Pitelis (2007), Brouthers et al (2009), Kafouros et al (2008) Petersen et al (2008). However these ideas have yet to be applied to currently topical issues of co-opetition, ‘open innovation’, market co-creation and their potential resultant benefits from adopting these to benefits from trade and FDI. Our aim is to do this in this paper, paying attention to the topical issue of trade and investment in pharmaceuticals by MNEs and firms in host markets.

The traditional division of labour in global pharmaceutical sectors involved Western multinational companies producing novel drugs and emerging market firms specializing in “generic” versions of these drugs. This division is now in question. Emerging market firms in countries such as India, pursue a series of novel strategies that range from “branded generics” to the production of novel drugs on their own, through collaboration with foreign firms, and/or by acquiring foreign drug-makers. To achieve this, Indian firms leverage their location advantages at home, which include complementary assets, such as relationships with hospital and doctors, but also cost leadership and frugal innovation. In turn, Western companies are now entering the global “generics” market. US firm Abbott, for example has recently bought Indian firm Piramal. Between 2006 and 2010 alone, six major Indian companies have been taken over by Western drugs companies; Matrix Lab by Mylan, Dabur Pharma by Fresenius Kabi, Ranbaxy Labs by Daiichi Sankyo, Shanta Biotech by Sanofi Aventis, Orchid Chemicals by Hospira, and Piramal Healthcare by Abbott. Numerous other
acquisitions are taking place, leading to a fluid situation, where companies from the “North” and the “South” are now invading each other’s traditional strongholds.

The emerging rivalry is partly a result of international agreements, such as TRIPS (Trade-Related Aspects of Intellectual Property Rights) and more recently ACTA (the Anti-Counterfeiting Trade Agreement), which restrict the space for the production of generics. Such restrictions foster attempts to move up the value chain by producers of generics, through differentiation (branded generics) and the invention of new drugs. This triggers a move by large multinational pharmaceutical companies (MNPCs) to leverage their might, in order to acquire their competitors. It is, arguable, that in so doing, both parties, miss-out on an opportunity to collaborate, in order to co-create new markets, by adopting an “open-innovation”-type strategy. This involves each party specializing on their comparative advantages to co-create markets and value, and then competing to capture as much out of the co-created value as possible. By learning to co-opete this way, firms can increase the overall pie, thereby benefiting more than when pursuing traditional integration-based types of rivalry. To the extent that TRIPS and ACTA help engender such co-opetitive outcomes, it can be claimed that both types of firms (and nations) can profit by leveraging the constraints imposed through TRIPS and ACTA-type legislation. In doing so, this could help realize the original objective of the TRIPS agreements, which are now widely believed to have been rather optimistic (Kyle and McGahan, 2009). Below, we aim to substantiate the above arguments, through the use of a simple cooperative game theoretic model and suggest that learning to play the co-opetive game is critical for mutual benefit to be fostered.

The recently proposed ACTA agreement, in particular, that was aimed to be added to the complex landscape of global trade regulation has raised some public
disquiet. The purpose of ACTA was to stop the trade of goods that violate intellectual property (IP) regulations. For this purpose it harmonizes the actions that signatory members need to take when dealing with such goods and guides courts on how to calculate the damages that they award in case of infringement. In this respect, ACTA acts as a complement to the TRIPS agreement that introduced minimum standards of IP protection while allowing each country to follow its own norms when implementing these minimum standards in national legislation.

Proponents of ACTA argue that the uniformity it introduces in terms of calculating damages, will protect IP rights and foster trade. Uniformity of IP rights was also central when drafting the TRIPS agreement. However, on this front TRIPS has not been a total success. Instead, TRIPs might have helped ignite a conflict over who owns and controls the pharmaceutical’s market of developing and emerging countries (DECs); a problem that affects the lives of more than 2 billion people. The reasoning behind TRIPS was arguably influenced by what are known in economic theory as “North-South” models.¹ These models argued that global IP protection would enable IP producers in developed countries (DCs) to extract rents by selling/licensing their IP to DECs. That in turn would foster technology transfer. Unfortunately, what we have witnessed is a conflict between DC and DEC firms (and their governments) vis-à-vis the control of the DEC pharmaceuticals market. In this paper our aim is to explain the raison d’être behind this dispute, to provide a solution within the limits imposed by TRIPS, and to outline how ACTA-type legislation may affect the proposed solution.

We argue that recent developments in entrepreneurship, strategy and innovation-learning literature, in particular the concepts of market creation and co-creation, and that of “open innovation” can be employed in addressing this problem.
Specifically, we propose that the scope for collaboration following TRIPS depends critically on the ability of DEC firms to extend the market by adding value to the product, though adaptation to local market conditions, and the development of complementary assets and capabilities, such as local distribution systems and knowledge. In particular, we suggest that for as long as local producers can manage to increase the size of the overall market, then the additional market created can provide a bargaining space within which both parties can successfully try to find a cooperative solution. The *sine qua non* for the success of such policies concerns the appropriate use of the threat of limiting the damages that a DC firm is entitled to. By enforcing a strict and uniform view on the way damages should be calculated, ACTA reduces the force of this threat in a way that can propagate the conflict.

In game-theoretic terms, the problem we aim to address can be described as follows. DC drug firms, most of which are multinational pharmaceutical companies (MNPCs), are trying to protect their investments (in current and future drugs) by following legal/marketing/pricing strategies that are seen by DECs as being out of tune with the realities that DECs face in their struggle to fight diseases, such as AIDS. In response, DECs have challenged these strategies, arguing for drugs that are affordable for the average DEC user. The MNPCs claimed that the resulting reduction in revenues, would hinder the introduction of newer drugs to local markets, thereby creating a dynamic inefficiency problem. Considering that the cost of introducing a new drug is very high and the millions of lives that are at stake, the conflict (which we elaborate upon in the next section) appears as a critical one to deal with.

In order to address the problem we employ a cooperative theory bargaining model where a MNPC bargains with a DEC drug firm on how to split the profits from a drug that has been introduced as generic in the DEC, an act the MNPC considers as
being unlawful. Firms can either bargain, or resort to a legal conflict that can be resolved by a court. Our focus on generics is justified by the frequent use DEC's make of such drugs in order to reduce prices. In addition, we cast the problem in a cooperative game theoretical frame, as this seems to be more in line with the arguments employed by the two parties of the conflict (see below).

Our approach allows us to also study how the threat of a reduction in damages that limits the MNPC’s profits, can affect the bargaining outcome. Hence, we are able to shed light on the conditions under which the two parties can reach a compromise that fosters trade. For our purpose, the reduction in question does not have to limited to a reduction in damages. In fact all actions by DEC's that terminate practices facilitating the extension of a patent (“ever-greening”) and/or adopting compulsory licensing (thereby effectively nullifying the drug’s patent breadth) will have a similar effect because they diminish the drug’s monopoly profits and, equivalently, the damages that courts can award.

As we argue the threat of reducing the damages that an MNPC is awarded, is a strategy that, if properly used, can aid a cooperative solution. We show that by employing this threat, the area under which bargaining is possible can increase. This is because a reduction in damages diminishes the MNCPs profits if it prevails in court. Thus, the MNPC is disinclined to follow a strategy of litigation.

Furthermore, working within the context of a Nash bargaining framework, the outcome of litigation also affects how the DEC firm and the MNCP negotiate a settlement. Specifically, considering that bargaining depends not only on the gains from a successful settlement, but also on what happens if the two parties fail in their bargaining effort (in which case litigation ensues), a reduction in damages, shifts the
balance of power towards the DEC firm, by negatively affecting the DC firm’s anticipated returns from litigation.

In view of the above, we complement extant policies that focus on IP rights as the main instrument for bridging the technology gap between DCs and DECs. We argue that agreements such as TRIPS/ACTA that focus on IP rights may not suffice to generate the transfer of technology from rich to poor, and that one way to bridge the gap is through the adoption of complementary capabilities enhancing policies in DEC countries. Furthermore, bearing in mind that the Doha Ministerial Agreement permits generic imports, these policies do not need to be employed by all DECs. All that is needed, theoretically, is for one country, e.g. India, to successfully develop the expertise, allowing her to export generics to other DECs.

The possession of complementary capabilities by firms in DECs can in this context help foster co-operation with MNPCs, through market extension and creation. Once this is seen as such by both parties, it can effectively result in market co-creation (Pitelis and Teece, 2010). However, since this co-creation need not benefit the firms and countries which do not possess complementary assets and capabilities, it is akin to the “open innovation” approach that has in recent years become popular among established firms (Chesbrough, 2003; Chesbrough and Appleyard, 2007; Gassmann et al, 2010), inasmuch as it “delegates” the additional R&D to a local producer who may be in a better position to increase the drug’s value added to the local market, in a way that can allow both firms to profit². Learning to co-operate this way is a critical condition for such an approach to be pursued.

Structure-wise, the paper proceeds as follows. In Section 2 we provide background information and a literature survey that introduces the reader to the issue.
In Section 3 we introduce a stylized model. Section 4 provides final comments, conclusions and policy implications.

2. SOME BACKGROUND

2.1 IP, DC-DEC Conflict and TRIPs

The TRIPS agreement is an international treaty that is administered by the World Trade Organization (WTO), which was negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), in 1994. The agreement’s main aim was to standardize IP regulation among signatory members, by specifying minimum standards for IP protection. The reason behind such an international harmonization was the belief that by lifting country restrictions on IP, all IP producers would face similar standards of protection across countries. Such standardization would promote the trade of advanced technological products, allowing DECs to benefit from advances made by DC firms.

So far the anticipated benefits from TRIPS have not materialized in all cases. While the agreement might have benefited countries like China and Korea who have witnessed an overwhelming increase in their IP production, in the area of pharmaceuticals, the benefits of TRIPS are under serious question (Kyle and McGahan, 2009).

IP rights are intangible. Therefore, the boundaries of what is claimed by the inventor in a patent specification are foggy and have to be properly marked-down, often by courts. Consequently, disagreements as to the ownership of technology are frequent. Such disagreements are especially important for pharmaceuticals because of the long-term planning needed in order to create and market a new drug and the multi-
billion cost that it involves. Subsequently, it comes as little surprise that drug firms expected that the TRIPS agreement would allow them to better protect their IP.

The requisite long-term planning that plagues drug production with uncertainty over profitability, forces DC firms (which usually are MNPCs) to fiercely protect their DC market, as this constitutes their main revenue provider. Thereby, it is not surprising that DC pharmaceuticals follow a more or less global homogeneous pricing strategy for their products. This strategy is usually dictated by difficulties in assessing local market conditions (and the ensuing demand curve), by their marketing strategy and, perhaps more importantly, by an effort to stop their own drugs being re-imported to their home market from DECs, where they could have been sold for a fraction of the price. This physical arbitrage is called parallel trade.

Homogeneous pricing has caused dismay among DEC patients who are faced with drug prices beyond their reach. This is further exacerbated by the fact that the needs of DECs patients frequently differ drastically from those of DCs. For example, a well known DC drug may be inappropriate for DEC climates, as it may lose its potency if left out of the refrigerator (this is frequently the case in many DEC pharmacies), and/or it may not respond well to the physical characteristics of the local population as most drugs are developed for a DC-specific clientele.

Faced with medical emergencies and an inability to afford patented off-the-shelf medicines that are priced beyond their reach, some DEC governments threatened MNPCs with “compulsory licensing” (permitted under certain circumstances by TRIPS). Under a compulsory license a generic form of the drug (which in this case is still under patent protection) is produced and distributed locally. In turn, the country issuing the license must pay the original developer some form of compensation, which is normally a fraction of the price that would have prevailed if the original
producer was operating under the limited monopoly that patent protection implies. In short, even though the product is still under patent protection, it is deliberately priced as if it faced competition from substitute products. This is tantamount to limiting the drug’s patent breadth to a point where substitute products can enter the market, thereby eroding profit margins.

A generic drug is produced and distributed without patent protection and, as a result, generics are usually introduced when the statutory period of patent protection expires. This allows competitors to create products containing the same active ingredients as the original formulation. A generic can also be introduced while the drug is still under patent protection through the aforesaid compulsory licensing. Prior to the TRIPS agreement, it was the prerogative of a DEC to copy and rebrand popular medicines. They did not frequently resort to such practices partly because of their inability to create such products. However, some DECs (notably India) now have such a capacity. However, as TRIPS implies a uniform level of IP protection, coping and rebranding products that are under patent protection is now an illegal practice that constitutes infringement.

Regarding compulsory licensing, a blow against MNPCs came when in 1997 South Africa, facing an AIDS epidemic, enacted the Amendment to Article 15 (C) of the Medicines and Related Substances Act 101 (which allows the Minister of Health to provide less expensive generic forms of essential medicines, including anti-HIV therapies). South Africa came under pressure from the US and other DCs that are home to MNPCs. This pressure climaxed when pharmaceuticals challenged the Act’s validity. Specifically, in 1998 the Pharmaceutical Manufacturers Association and 40 drug firms tried to stop the Act by taking legal action against the government. The argument used was that, even though South Africa was facing an AIDS epidemic, the
introduction of generic drugs would undermine the ability of pharmaceuticals to recoup their R&D cost.  

South Africa’s lead was later followed by countries such as Thailand, Malaysia, Indonesia and Brazil, who also faced medical emergencies. In most cases MNPCs faced with the threat of a compulsory license, refused to significantly lower their prices, offering, instead, to donate large quantities of the drugs in question.

In addition, DC drug firms have tried to limit the use of generics by attempting to increase the patent life of their products. In doing so they employ a variety of strategies that allow producers with patents over drugs that are about to expire to retain their monopoly position by taking out new patents (for example over associated delivery systems, and/or new pharmaceutical mixtures), for longer periods of time than would normally be permissible under the law; in general such practices are referred to as “ever-greening”.

In many DECs such practices have failed, because DEC lawmakers have expressed different views (albeit within the limits of the provisions of TRIPS) as to when and how a drug’s patent life may be extended. To provide a well known example, a petition filed by Novartis challenging the constitutional validity of India’s Patents Act (which effectively views IP rights in a way that limits ever-greening) was dismissed in 2007 by the Madras High Court, allowing the introduction of a generic substitute of Novartis’s Gleevec cancer drug. Such a dismissal was viewed by Novartis as a blow on its IP policies, which effectively limits its ability to extract rents from its drugs technology, forcing it to reconsider the introduction of newer and better drugs to the Indian market.  

Similar threats have been voiced by other MNPCs who warn DEC countries that such restrictions to IP trade have implications that go beyond the static benefits
accruing to patients through the use of current off-the-shelf drugs, inasmuch as they impede the introduction of future products in DEC markets. This “dynamic inefficiency” problem is further accentuated when one considers that for the newest lines of biotechnology produced drugs, the original drug’s manufacturer must make available the growth medium and cell line, otherwise the production of a biosimilar\textsuperscript{10} drug is not guaranteed to have the same efficacy as the original formulation.

Suffice it to note that MNPCs have taken legal action to protect their interests against what they see as an unlawful diminution of their IP. Restricting the argument to India, the example of Novartis has recently been followed by Bayer who is arguing before the Indian Supreme Court that the concept of “patent linkage”\textsuperscript{11}, which is currently not codified in Indian law, should protect its Nexavar drug from a generic version introduced by Cipla Ltd. Even more recently, Novartis went to court in September 2011 to challenge India’s patent law, Section 3.1, which seen in conjunction with other provisions, stipulates that a new form of a well-known drug can only be patented if it provides evidence of significantly improved therapeutic efficacy over existing medicines.

MNPCs have not restricted their actions to voicing their concerns/threats and taking legal action against what they effectively perceive as infringement. They have also applied pressure to their respective governments to use their political weight in resolving the conflict. Thus, even though the threat of initiating a dispute settlement proceeding at the WTO has not formally been contemplated upon, the US government has actively pursued bilateral treaties, commonly known as TRIPS-plus, which restrict such practices.\textsuperscript{12}

To this end, the “Special 301 Report” also deserves to be mentioned. The “Special 301 Report” is a list put together by the Trade Policy Staff Committee that
advises the US Trade Representative on which countries have in place barriers to trade due to IP rights not being adequately protected in national laws\textsuperscript{13}. The threat of trade restrictions as a policy instrument has been the favourite approach of the EU when using its political weight in a similar manner. For example, under EC Council Regulation 1383, which allows pharmaceuticals to claim "suspicion" that some products "might" violate IP rights, Dutch customs officials withheld shipments of generic AIDSs drugs from India to Nigeria, claiming that they were counterfeit, infringing on the original products. This seizure followed earlier ones involving high-pressure generic drugs for Brazil.

ACTA is the latest addition in the arsenal against infringed and pirated products. Article 16 authorizes border authorities to seize, ex officio, goods that are suspected as being counterfeit trademark goods. In fact, ACTA allows seizures of goods in-transit between two countries where neither countries’ laws are violated. Moreover, the onus of proof falls on the producer and the accuser need not significantly justify its suspicion.

Of notable concern is ACTA’s article 9.1\textsuperscript{14} that focuses on damages. Specifically, article 9.1 requires courts to consider any legitimate measure of value the product’s producer submits. This may include, inter alia, lost profits, the value of the infringed goods, or services measured by the market price, or the suggested retail price. Furthermore, article 9.2 requires that compensation should at a minimum reflect the profits derived from infringement; as calculated via the methods set in 9.1. In all, the view of ACTA is that the calculation of damages should be based upon the assumption that a single copyright infringement equates to an economic harm for the rights holder that is as significant as a lost sale. The scope behind this assumption is
questionable as DECs patients (in most cases) are not able to afford the drugs in question. Hence, infringement per se does not result in lost sales.

In a nutshell, either because of different views as to when a generic drug can be legally introduced, and/or the threat of parallel trade (or any other reason prohibiting differential pricing that keeps DEC drug prices high), there exist barriers to IP trade that undermine the realisation of the intentions of TRIPS’ draftees. Our aim in what follows is to explore the circumstances under which both the MNPCs and DEC patients can benefit from TRIPS, by lifting obstacles to IP trade. To put it differently, we endeavour to understand how the aforementioned “dynamic inefficiency” problem can be shifted. We propose that the possession of complementary capabilities by DEC firms can help engender market extension, which can facilitate market co-creation through an ‘open innovation’-type mutually beneficial arrangement between the parties to the conflict.

2.2 Some Relevant Literature in Economics and Management

There is a wealth of literature that examines how market size, prices, or IP protection, can affect the marketing and development of new drugs. However, most of this concentrates on DCs. For example, Acemoglu and Linn (2004), using U.S. demographical data, analyze the effect of market size on pharmaceutical innovations and find that a large potential market size aids the entry of new drugs. Along the same path, Civan and Maloney (2006) and Lichtenberg (2005) reach similar conclusions by looking at the distribution of drug development by disease, while measuring potential market size through worldwide mortality (see also Lichtenberg, 2006, whose study concentrates on the market size among different types of cancer drugs).

Focusing on drug prices, Grabowski and Vernon (1981, 2000) employed firm-level data to examine the determinants of US pharmaceutical R&D and found that
expected returns are an important explanatory variable for R&D intensities. A similar study for Japanese pharmaceuticals, reaching a largely similar conclusion, was carried out by Mahlichi and Schluga (2006). Along these lines, Giaccotto, Santerre and Vernon (2005), using time series aggregate data for major US pharmaceutical firms, estimated that, had real drug prices not grown at all, there would have been 350 fewer drugs introduced during the 1980-2001 period. Moreover, Abbott and Vernon (2007), through a Monte Carlo simulation, concluded that a 40%-50% reduction in drug prices would lead to a 30%-60% drop in R&D. Focusing on MNPCs, Danzon and Ketcham (2003) showed that due to policy changes, MNPCs chose not to introduce some of the newest drugs in the New Zealand market, while Danzon, Wang, and Wang (2003) suggested that price regulation can lead to delays in the launching of the latest drugs.

The effect of IP protection on the availability of new drugs for DCs has been the focus of Lanjouw (2005), who studied 68 countries at all income levels over the period 1982-2002. The author found that countries’ choices on how to regulate pharmaceutical prices and protect innovation have a significant influence on whether and how quickly drugs become available to their consumers. As she notes,

“Increasing the strength of a patent system to include long-term protection on pharmaceutical products appears to spur market entry – among the high-income countries. For the low- and middle-income countries that are currently being encouraged to move to stronger protection through trade policy, the evidence that extending protection enhances access to new pharmaceuticals is mixed” (p. 24).

Focusing specifically on the effects that TRIPS had on pharmaceutical innovation for DECs, Kyle and McGahan (2009), using a dataset on drug development projects from
1990 to 2006, find that the positive effects on research effort and location that one anticipated from the introduction of TRIPS appears to be confined to relatively rich countries.

The aforementioned mixed empirical results are at odds with what economic theory predicted. Since the 1990s a wealth of literature emerged that aimed to understand the implication of IP rights on long term growth and international trade. This literature, frequently referred to as North-South literature (because it models the effects of trade and IP rights on two dissimilar economies, a wealthier and more innovative Northern economy and a poorer, lacking in R&D Southern economy), provided theoretical arguments in support of TRIPS and the unification of IP rights. This is because it largely supports the idea that strengthening IP rights will result in more innovations in Northern countries, which will then trickle down to Southern countries, thereby enhancing their innovative ability and leading to more growth and welfare.\(^{15}\)

In offering a taxonomy and the main insights of this literature, a good starting point is the model of growth and international product cycles developed by Grossman and Helpman (1992), the cornerstone of which is that (assuming symmetric IP rights) new products are invented in the North but eventually imitated by the South. This strand of the literature led to models that study market size effects and transfer effects, such as Grossman and Lai (1989), Deardorff (1992), Lai and Qiu (2003), and Scotchmer (2004). In these models poorer countries, that are not as innovative as their richer counterparts, can face a different trade-off between static efficiency and growth, from that faced by richer countries. This difference is the result of poorer countries’ lack of factor endowments, or equally because of the smaller market size that DEC innovators face. The main implication of these models is that a uniform
regime of IP protection engenders a transfer of royalties from the Southern to the Northern countries.

Based on Diwan and Rodrik (1991), a series of papers, such as Acemoglu and Zilibotti (2001), Thoenig and Verdier (2003), and Gancia and Bonfiglioli (2008) studied the effect of IP rights on innovation and welfare in the South, when there are specific products that it needs to consume. The consensus of this literature is that, the more specific those products are, the more would less stringent IP rights reinforce the bias of innovation in favour of the needs of the North (DCs), thereby harming the South (DECs).

The above literature touches upon the difference in preferences between North and South, a topic further elaborated by a series of papers that assume non-homothetic preferences between the two countries, allowing the poor to prefer different products and technologies and lower product variety in general; see Gilles (2004), Föllmi and Zweimüller (2006), and Murphy, Shleifer and Vishny (1989). As expected, results depend on the nature of preferences and on whether innovation is vertical (increasing production/output –presumably benefiting the poor), or horizontal (leading to greater variety –more valuable for the rich).

In a more recent addition to this literature Dinopoulos and Segerstrom (2010) employed an endogenous growth framework and model how MNPCs innovate, and the way they engage in adaptive R&D to learn how to transfer their manufacturing production from the high-wage North to the low-wage South. Their main argument is that profit flows earned by firms increase when they are successful in transferring their production to the South. However when firms are successful in transferring their production to the South, they also become exposed to a positive rate of imitation by Southern firms. They find that stronger IP protection in the South (i.e., the adoption
and implementation of the TRIPs agreement) leads to a permanent increase in the rate of technology transfer to the South (to local affiliates of MNPCs) and a permanent increase in adaptive R&D spending in the South by these affiliates.

The apparent gap between expectations and perceived reality in pharmaceuticals could be the result of how we study the problem. Specifically, considering that the North-South literature is effectively a side-product of growth theory, it is based on assumptions that may be questionable when considering the dynamics of R&D, trade, and imitation between Northern and Southern economies. Such assumptions include perfect competition and labour mobility. Furthermore, as this literature concentrates on the country’s long-term growth path the microeconomics behind R&D and imitation are underexplored and all solutions are non-cooperative (i.e. the Southern country has no option but to abide with the profit maximizing will of the Northern country, if it wants to benefit from the Northern firm’s technology). Our intention is to complement the literature, by focusing on dissimilar “North-South” firms that are not perfectly competitive, where trade between the two regions is not always an equilibrium outcome and that bargaining (a cooperative solution) between the two parties can lead to a Pareto optimal result, where both countries gain from trade and imitation. As noted, we show this to be the case when DEC firms possess complementary assets and capabilities that can extend the market.

3. A SIMPLE MODEL OF DC-DEC CONFLICT AND BARGAINING

In what follows, we examine a conflict between two agents, where only one has the right to use a specific input. Even though we structure the model in terms of the aforementioned conflict over pharmaceuticals, the model’s insights are more
general and can capture an array of similar situations. Specifically, we assume two pharmaceutical firms that wish to sell in the same market. Firm 1 is an MNPC who faces competition from firm 2, a smaller DEC producer. We assume that firm 2 has created a drug that is only sold to its domestic market and assume that there is a disagreement between the two firms as to whom the owner of the drug’s IP is. More specifically, firm 1 believes that the drug of firm 2 is infringing on its patents.

This disagreement can either be settled through a settlement, or, alternatively, the two parties can proceed with some form of adjudication. To simplify things we assume that this adjudication takes the form of litigation in a DEC court (nonetheless, any type of arbitration that accords with international norms is suited for our purpose). Focusing on the DEC’s legal system, we assume that the DEC has signed TRIPS and there is IP legislature in place. Hence, the issue of infringement is considered as a legal issue that must be treated according to international regulations, and 1 can win in court with probability $\mu \in (0,1)$. If firm 2 is found to be infringing, it will have to return the appropriated profits and pay a fine/damages. 

The yardstick used by courts in calculating damages, is the foregone profits from the sale of the infringing good.$^{16}$ Accordingly, we model damages in terms of the loses $l_1$ that the plaintiff has suffered via infringement, framing damages as $\zeta l_1$, where $\zeta \in [0,1]$ corresponds to domestic legal norms. Even though $\zeta$ must be positive it can vary. One way to vary $\zeta$ is by changing the patent breadth/length of patented drugs. Specifically, a reduction in the drug’s patent breadth/length must lower the drug’s monopoly profits thereby diminishing $l_1$. We use $\zeta$ as a choice variable.

Upon perceived infringement, firm 1 can choose any of the following 3 strategies: a) do nothing (strategy $N$), b) litigate (strategy $L$), or c) try and settle the dispute via an out of court settlement (strategy $S$). As one must first file the case and
then settle, we assume that strategy \( L \) precedes \( S \). If there is no infringement and firm 2 does not copy 1’s technology then we don’t have a conflict, a strategy which is denoted by \( \text{NC} \). We present the game tree in Figure 1.

[Figure 1 approximately here]

We pause for a minute to examine the prerequisites for strategy \( S \). A settlement can arise only if infringement has resulted in additional collective profits, which in the parlance of game theory are referred to as the bargaining surplus. This surplus, denoted here by \( V \), must be positive. Otherwise, (e.g. if infringement resulted in the same collective profits) infringement merely resulted in a redistribution of the pie (with firm 2 appropriating a share of 1’s existing market), subsequently the case can only end up in court. The only way for \( V \) to be positive is for firm 2 to have expanded the market by using the infringed technology in creating a drug that is best suited to fit local needs\(^\text{17} \). In such a case, even though a settlement is not guaranteed, the two firms have something to bargain on. Naturally, if the two firms fail to reach an out of court settlement, the case can only proceed to a final court hearing. In what follows, bargaining will be modelled through the so called Nash product. This is a technique that specifically accounts for the need of \( V \) to be positive.

3.1 The demand curve

In deriving a demand curve that will allow the model to establish the payoff from each strategy in an endogenous way, we focus on how the firms compete in terms of technological sophistication. The argument is not framed in terms of Cournot competition because the marginal cost of producing a drug is close to zero. Thus both parties can produce unlimited amounts at will. The case of Bertrand competition is also faced with limitations. For example, if the model was to focus on prices, we would be faced with two caveats. Primarily we know that, if the firms price their
products without being constrained by the fear of parallel trade, unrestricted trade would prevail. More importantly, if 2 pursued the low-cost strategy that is needed as to enlarge its market share (increasing \( I \)), it would follow a strategy that could have easily been followed by 1. Consequently, as 2 merely appropriates a fraction of 1’s market, strategy \( S \) is void and litigation ensues.

On the above basis, we henceforth operate under a \textit{ceteris paribus} assumption, assuming that both firms charge the same price, which we use as a numeraire. In such a setting, considering that the marginal cost of producing a drug is very small, demand \( q \) coincides with firm profits \( \pi \). Accordingly, consider a duopoly in which firms 1 and 2 produce output \( q_1 \) and \( q_2 \). We allow for a simple differentiated demand equation that is a function of product prices, as well as the degree of technological sophistication \( d_1 \) and \( d_2 \) that diversifies the product from its substitutes. As both firms charge the same price, this allows for a cross-price effect that is almost identical to the own-price effect. Subsequently, the effect of each firm's price cancels each other out, allowing the differences in the technological sophistication between products to be the driving force of demand.

Bearing in mind that: a) firm 2 (by infringing on 1’s patented technology) appropriated 1’s technology and created a product of similar characteristics, and b) unless firm 2 manages to increase the market size (by providing additional characteristics to the drug) there cannot be a settlement, our focus on technological sophistication is merited. In fact, the capability to provide technological sophistication, and the firm’s own ability to provide additional value added (through own R&D), is what the model focuses on. Accordingly, if there is no conflict (strategy \( NC \)), the firms face the following demand,

\[
q_{1,NC} = M_{1,NC} - d_{2,NC} + d_{1,NC}, \text{ and } q_{2,NC} = M_{2,NC} - d_{1,NC} + d_{2,NC}.
\]
where $M_{1,NC}$ and $M_{2,NC}$ denote each firm’s fixed demand. Moreover, $d_{1,NC} > 1$ and $d_{2,NC} > 0$ respectively denote the technological sophistication that each firm incorporates into its product when there is no conflict. Since, by assumption, firm 1 has a greater degree of technological sophistication $d_{1,NC} > d_{2,NC} > 0$.

For strategy $N$, demand is given by,

$$(2) \quad q_{1,N} = M_{1,N} - d_{2,N} + d_{1,N}, \text{ and } q_{2,N} = M_{2,N} - d_{1,N} + d_{2,N},$$

where $d_{1,N}$ and $d_{2,N}$ respectively denote the firms’ technological sophistication and $M_{1,NC}$ and $M_{2,NC}$ capture each firm’s fixed demand. Bearing in mind that the technological sophistication of firm 1 has not been altered via infringement, $d_{1,N}$ must be equal to $d_{1,NC} > 1$. In contrast, we assume that infringement increased 2’s technological sophistication, making $d_{2,N} > d_{1,NC} > 1$.

Assuming for the moment that fixed demand does not change with infringement, infringement increases 2’s technological sophistication and demand, while correspondingly decreasing 1’s demand by an equal share. Thus, infringement per se does not alter the firms’ collective profits, making $V$ equal to naught. Nonetheless, if we are to assume that fixed demand changes with infringement, then we can derive a positive $V$. This surplus is created by the parallel shift in the demand curve that resulted from an increase in fixed demand, and it’s not (as argued above) the result of 2 appropriating a share of 1’s market.

With the above in mind we model fixed demand as,

$$(3) \quad M_{1,NC} = M_1 + d_{1,NC}, \text{ and } M_{2,NC} = M_2 + d_{2,NC}$$

$$M_{1,N} = M_1 + d_{1,N}, \text{ and } M_{2,N} = M_2 + d_{2,N}.$$  

This formulation suggests that fixed demand is determined by i) a fixed component, $M_1$ and $M_2$, which is not altered by infringement, and ii) a variable component captured by the degree of technological sophistication that changes with infringement.
3.2 The payoffs from each strategy

To best illustrate our argument, we initially frame the payoffs taking the demand/profits of each strategy as exogenous, substituting the respective demand equations into the final equations. Accordingly, denote the profits of each firm when there is no conflict as, \( \pi_{1,NC} \) and \( \pi_{2,NC} \) respectively. Equally, when infringement takes place the firms’ profits are denoted as, \( \pi_{1,N} \) and \( \pi_{2,N} \) respectively. Subsequently, infringement results in \( l_1 = \pi_{1,NC} - \pi_{1,N} \) losses for the plaintiff and \( l_2 = \pi_{2,N} - \pi_{2,NC} \) gains for the infringer as attested by equation (4) below.

\[
(4) \quad l_1 = \pi_{1,NC} - \pi_{1,N} \quad \text{and} \quad l_2 = \pi_{2,N} - \pi_{2,NC}.
\]

Prior to infringement the collective profits of the firms were, \( \pi_{1,NC} + \pi_{2,NC} \), while post infringement these profits become \( \pi_{1,N} + \pi_{2,N} \). By comparing the ex-post to the ex-ante collective profits, we can derive the surplus that infringement has generated. Thus, infringement has altered the sum of collective profits as follows,

\[
(5) \quad V = (\pi_{1,N} + \pi_{2,N}) - (\pi_{1,NC} + \pi_{2,NC}).
\]

If the firms settle they need to reclaim lost profits and split up \( V \) into two shares of \( \varepsilon_1 \) and \( \varepsilon_2 \) respectively, i.e. \( V = \varepsilon_1 + \varepsilon_2 \). This implies that the profits that the two firms derive by following strategy \( S \) should be equal to the profits that they would have respectively captured in the absence of settlement (\( \pi_{1,N}, \pi_{2,N} \)), plus their bargaining shares (\( \varepsilon_1, \varepsilon_2 \)). Subsequently, the firms’ profits from settlement, respectively denoted as \( \pi_{1,S} \) and \( \pi_{2,S} \) are, \( \pi_{1,S} = \pi_{1,N} + \varepsilon_1 \) and \( \pi_{2,S} = \pi_{2,N} + \varepsilon_2 \).

Allowing the two firms to bargain in a cooperative fashion, before underlining the Nash product (which when maximized provides the bargaining share of each firm) we must establish the threat points that each firm faces. In other words, we need to find how the two firms split \( V \) when settlement fails and the case is decided by a court. In this case, if 1 wins (with probability \( \mu \)), it must get back the \( l_1 = \pi_{1,NC} - \)
\( \pi_{1,N} \) profits that 2 appropriated, plus the \( \zeta l_1 \) damages that it is entitled to; if it loses firm 2 captures the entire \( V \). This reasoning implies that 1’s threat point is \( \mu(1 + \zeta)l_1 \).

Focusing on firm 2, if the case goes to court and 2 wins, it can legally appropriate its full share of its contribution to \( V \), which is \( l_2 = \pi_{2,N} - \pi_{2,NC} \), making 2’s threat point equal to \( (1 - \mu)l_2 \); if it loses it gets naught. Accordingly, the firms maximize the following Nash product, 

\[
\max_{\varepsilon_1, \varepsilon_2} [(\varepsilon_1 - \mu(1 + \zeta)l_1)(\varepsilon_2 - (1 - \mu)l_2)]
\]

where \( V = \varepsilon_1 + \varepsilon_2 \). The FOC of the this maximization problem is,

\[
\varepsilon_1 = \frac{1}{2}(l_2 \mu + l_1((1 + \zeta)\mu - 1)), \quad \text{and} \quad \varepsilon_2 = V - \varepsilon_1.
\]

Note that both \( \mu \) and \( \zeta \) have a positive effect on the bargaining share of firm 1 and a negative on firm 2. Hence, increasing the damages awards, or the probability of prevailing in court, shifts the balance of power towards firm 1.

We can now frame the problem of litigation. Specifically, if after filing the case the plaintiff wants to pursue litigation then the firms’ profits from litigation are,

\[
(7) \quad \pi_{1,L} = \mu(\pi_{1,N} + (1 + \zeta)l_1) + (1 - \mu)\pi_{1,N} - cl_1,
\]

\[
(8) \quad \pi_{2,L} = \mu(\pi_{2,N} - (1 + \zeta)l_1) + (1 - \mu)\pi_{2,N} - cl_1,
\]

where \( c > 0 \) captures the overall cost of legal representation in terms of \( l_1 \). We assume that both firms incur a similar cost. In (7), \( \mu(\pi_{1,N} + (1 + \zeta)l_1) \) denotes the profits that 1 attains by winning the court case with probability \( \mu \). These should be equal to the \( \pi_{1,N} \) profits that accrue to 1 when infringement takes place, plus the \( l_1 \) profits that it foregoes due to infringement, to which one should add the \( \zeta l_1 \) damages that 1 is entitled to. On the other hand, if 1 loses its case, with probability \( (1 - \mu) \), then it can only get \( \pi_{1,N} \). Equation (8) draws a similar picture for the infringer, who has to pay damages and return the profits it appropriated (i.e. \( (1 + \zeta)l_1 \)) if it loses the case, while if it wins it can legally get the profits from infringement, i.e. \( \pi_{2,N} \).
Considering that, in this model, demand corresponds with profits, we now have all we need in order to determine the equilibrium solution. Specifically, by substituting equations (1)-(3) to (4)-(8) we can determine the payoffs and, correspondingly, \( l_1, l_2, V \). In particular, \( l_1 = d_{2,N} - 1, l_2 = 2(d_{2,N} - 1), V = d_{2,N} - 1, \) and \( \epsilon_1 = (d_{2,N} - 1)(3 + \zeta)\mu - 1 \). Since, \( d_{2,N} > 1, \epsilon_1 \) is positive (allowing for bargaining to ensue) if \( \mu > \frac{1}{3 + \zeta} \). Accordingly, comparing strategies we derive:

**The subgame (comparing litigation to settlement for both firms).**

Litigation is preferred to settlement (for firm 1) if,

\[
\mu > \frac{1 - 2c}{1 - \zeta},
\]

Litigation is preferred to settlement (for firm 2) if,

\[
\mu > \frac{3 + 2c}{1 - \zeta}.
\]

Since \( 3 + 2c > 1 - 2c \), the area under which equation (10) holds is always above the one in which equation (9) applies. Therefore, since filing the case does not require the approval of both firms, as long as equation (9) holds (the lowest barrier of the two), the case will be filed by firm 1 even though firm 2 still wants to pursue the settlement option. As a result, in the subgame we only need to focus on equation (9).

**The main game.**

For the main game we do not need to focus on firm 2 because the decision to litigate (or not) is taken by firm 1 only. Accordingly, comparing payoffs we derive the following inequalities for firm 1. Litigation is preferred to doing nothing if,

\[
\mu > \frac{c}{1 + \zeta}.
\]

Settlement is better than doing nothing if,

\[
\mu > \frac{1}{3 + \zeta}
\]

an equation that is identical to the condition for \( \epsilon_1 > 0 \) we derived earlier.
The above equations can be plotted for different values of $\zeta$. As we have been modelling a game that includes a subgame and the main game, we must first plot the subgame and on top of it impose the main game. Accordingly, plotting (9), we can define the area (in terms of $\mu, \zeta$) under which strategy $L$ dominates $S$. Having defined the subgame, we can then plot (11)-(12) in the area mapped by the subgame. In doing so, we can determine if in the area under which strategy $L$ (or $S$) prevailed during the subgame, a strategy of $NC$ prevails during the main part of the game.

By plotting the above equations for a $c=0.4$ we derive figure 2, which shows the areas under which the three strategies prevail. It should be noted that, assuming infringement has taken place, the probability of firm 1 winning in court has to be on par with the one we see in DCs, which is on average close to 0.5. Subsequently, it is the upper part of the graph (above the thin dotted line representing $\mu=0.5$) that broadly matters for our purposes. With this in mind, figure 2 draws a picture of two areas. In the upper left hand side, litigation prevails and this area increases with $\zeta$. In the upper right hand side, settlement ensues. Suffice it to say that, if the probability of prevailing in court for firm 1 is small enough (i.e. $\mu$ is small), 1 will not take any action against infringement. Thus, it comes to no surprise that in this part of the graph (the lower part of figure 2), we see a large area in which strategy $N$ prevails.

[Figure 2 approximately here]

4. DISCUSSION, CONCLUSION AND POLICY IMPLICATIONS

We have shown that the adoption of some plausible assumptions and related cooperative game theory, as well as the employment of the ideas of complementary capabilities for market extension by DECs, can help bridge the apparent gap between
theory and perceived reality by providing a way out of the conflict and benefit both parties. In particular the possession of complementary capabilities by DEC firms can extend the market, thereby leading to market co-creation of the ‘open-innovation’-type. In this framework, MNPCs agree to share the now extended market, allowing DEC firms to “infringe” (‘quasi-infringement’) on their IP. The resulting division of labour is comparable to ‘open innovation’, and helps co-create new markets.

Our paper also suggest that the rhetoric currently employed in the debate (one that involves the threat to lower prices) may be a tool used by DECs in order to increase the bargaining power of their firms, which can help them reach a successful settlement solution with their MNPC rivals. This policy is void, when the firms of the DECs do not possess complementary assets and capabilities that allow them to enhance the characteristics of their generic products, thereby adding value. If the producers of generics fail to increase the product’s value added, it is hard to avoid the problem of dynamic inefficiency, as the MNPC and the DEC producer enter into a conflict that is more likely to be resolved via litigation. The paper shows that legal instruments, such as damages awards (whose use by TRIPS is unregulated, but may become regulated through ACTA-type legislation), if prudently used, can help lead to a settlement.

Bearing in mind that there is a wealth of evidence showing that (contrary to expectations) the increase in IP protection that followed the implementation of TRIPS does not seem to have led to the additional investments needed to fight the largely neglected DEC diseases, we argue that, even though IP protection will not on its own lead to additional investments by MNPCs, it may nevertheless aid negotiations (between local producers and MNPCs) for the creation of new products that are best suited for local needs. Subsequently, as long as the firms from DECs have the
capacity to do R&D that enhances the characteristics of the product, the two parties can resort to a technology transfer mechanism akin to “open innovation” (in the form of a division of labour between the two parties on the types of innovation pursued), which leads to market co-creation. In so doing it bypasses the problem of dynamic inefficiency and helps foster trade.

The overall policy suggestion stemming from our analysis is that, for as long as firms have something to bargain on, there can be a settlement between the two firms that can foster trade. However, this settlement depends on the policy variable $\zeta$, and decreasing $\zeta$ is shown to positively affect the area under which settlement prevails. Subsequently, concerning managerial practice, our paper suggests that DEC firms should aim to develop complementary assets and capabilities for product adaptation and market extension. Governments could assist with market co-creation, by encouraging firms to acquire and leverage knowledge, complementary assets and capabilities and learning, as well as seek to create a space that fosters the possible identification of co-operative solutions.\textsuperscript{20}

In short, it is arguable that conventional competitive strategies, that involve horizontal integration (through acquisitions), and inter-country, intra-industry rivalry (which is now taking place), will be inferior as compared to our proposed strategy of co-opetition through market co-creation. If pharmaceutical firms are to survive in a world where (due to high R&D costs) the failure of even one future drug can be perilous to a firm’s existence, they should focus more on managing the value added that can be created through “infringement” by allowing technology transfer to be a two way street. This can facilitate learning by firms in DECs, thereby furthering absorptive capacity that can in turn foster market co-creation, trade and internationalisation through the accumulation of knowledge and learning (Brouthers
et al, 2009). This includes learning to co-opete and co-create markets and adopt open innovation-type approaches, by being able to identify the potential benefits of such strategies. This extends the knowledge-learning-based view of the MNE (Johanson and Valhne, 1977; Kogut and Zander, 1993; Pitelis, 2007; Pla-Barber and Alegre, 2007) to the issue of market and institution co-creation, a recent and rather under-explored concern of IB scholarship (Pitelis and Teece, 2010).

REFERENCES


FIGURES

Figure 1

No infringement  Infringement

Do nothing

File the case

Settle

Litigate

Figure 1
In drawing this figure we have assumed $c=0.4$. The thick curvy line represents equation (9) and the dark arrow adjacent to it represents how this line moves if $c$ increases. The dotted line represents equation (11). The thick straight line represents equation (12) and the dark arrow adjacent to it shows how the line moves if $c$ increases.

Unlike ‘closed innovation’ that takes place within corporate R&D labs, ‘open innovation’ is based on collaboration between different parties, such as firms, universities, consumers, and indeed rival firms. Work by Dunlop-Hinkler et al. (2010), suggests that breakthrough innovations are more likely to be the outcome of collaboration efforts between pharmaceuticals.

For a survey of IP rights, see Rockett (2010).

For a comprehensive discussion on why drug firms avoid differential pricing, see Yadav (2010).

As Yadav (2010, pg 39) notes on the subject, “In fact, unexpected shortages were often observed in countries that were net exporters in the arbitrage e.g. Greece or Spain, as manufacturers tried to limit the quantities they would sell to wholesalers in countries with lower prices in order to avoid arbitrage to the United Kingdom and Germany.”

It should be noted that a compulsory license is allowed by TRIPS for medical emergencies. In fact, among the first users of this provision was the US, who in 2001 issued a compulsory license for Bayer’s Cipro anti-anthrax drug, a move that was later followed by Canada.

Generic drugs induce competition that frequently leads to disproportionate price reductions. For example, as Wilson (2010) argues, the price of first-line combinations of Stavudine, Lamivudine and Nevirapine dropped (upon the introduction of a generic) from $20,000 in 2000 to $90 in 2010.

At the time, this argument seemed rather exaggerated, as it is understood that drug firms fully recoup their R&D cost from the patients and the insurance systems of DCs; Kyle and McGahan (2009).

Novartis has subsequently filed a case at the Indian Supreme Court that is pending to this day.

Biosimilar is a term used in describing subsequent and officially approved versions of biopharmaceutical products made by a different sponsor following patent and exclusivity expiry of the original product.

Patent linkage is the term used to refer to the practice of drug quality regulators (in this case the Drugs Controller of India) denying marketing approval for generic drugs citing existence of patents.

For example, between the US and Korea.

A point to note in this case is that, as Sell (2003) argues, most countries included in this list between 1996 and 2000 were requested by lobbying interests such as the Pharmaceutical Research and Manufacturers of America and the International Intellectual Property Alliance.

Article 9.1: “Each Party shall provide that, …..a Party’s judicial authorities shall have the authority to consider, inter alia, any legitimate measure of value the right holder submits, which may include lost profits, the value of the infringed goods or services measured by the market price, or the suggested retail price.”

Even though this view appears to be contradicted by DECs, especially in pharmaceuticals, necessitating the need for the Doha ministerial agreement that watered down many of the TRIPS’ positions, there is surprising little empirical literature on the issue. An exception is Branstetter et al. (2006) who conclude that improvements in IP protection result in increases in technology transfer from US-based multinationals to their affiliates in reforming countries.

Sometimes courts derive damages through the accumulated royalties resulting from a hypothetical licensing agreement. In theory both methods should provide identical results.

And/or if they possess complementary assets and capabilities, such as market knowledge, distribution networks, etc. (Teece, 1986).

There are two different approaches as to who incurs the litigation cost. The USA approach is one in which each party pays its own cost. In the British approach, the losing party incurs the cost of the legal battle. In the above equation every party has to pay a cost c. However, this cost is not intended to focus on the actual cost of the court case. This is because the actual cost of the particular legal defence is just a small fraction of the overall cost that each firm has to incur in providing legal representation. In fact, bearing in mind the large stakes involved, the overall cost must also include: the cost of setting-up a functioning in-house (or associated) legal department, the cost of monitoring the use of the specific patented technology, the cost of researching the case etc. Subsequently, c expresses the overall cost of
legal representation. Moreover, considering that both parties must have legal representation in the DEC, this cost cannot be drastically different for the two firms. Thus, we allow both firms to incur the same cost. Lanjouw and Schankerman (2004) suggest that larger firms face a lower litigation cost in protecting their IP. This result is based on the way such firms protect their IP in the USA. Outside of their home country there is nothing to suggest that such firms carry more legal weight than domestic rivals. Nonetheless, in previous versions of the paper we modelled \( c \) as a function of each firm’s patent portfolio. Such an approach does not alter the paper’s main results. However, inevitably, it shifts the emphasis of the paper to the structuring of legal costs, which is beyond the scope and focus of this paper.


20 The recent case of Brazil’s successful threat to suspend US patents if the US does not ease up on cotton subsidies and on its credit export guarantee program for US farmers, is a case in point (STRATFOR, 2010).