Promoting intellectual property monetization in developing countries : a review of issues and strategies to support knowledge-driven growth

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Promoting IP Monetization in Developing Countries:

A Review of Issues and Strategies to Support Knowledge-driven Growth

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Introduction

The TRIPS Agreement, by ensuring stronger intellectual property rights (IPR) regimes around the world, has globalized the IP system and stimulated greater cross-border trade in knowledge assets. Technology transfer, a term still not defined in the WTO framework, has come to be seen as the primary strategy for developing countries to gain access to much needed, but legally protected, knowledge assets owned in developed economies. It is not particularly surprising that the IMF's Balance of Payment statistics show that most developing countries pay much more in licensing and royalty fees to third parties than they receive. The transfer of technology from the developed to the developing world through licensing arrangements is an important process that merits discussion. The role of technology transfer in development has received considerable attention (Teece 1977; Liu 1995; Bozeman 2000; Hewitt-Dundas 2011; Saggi 2002; Schrank 2004). However, while technology transfer remains a major issue in global economic governance debates, it is equally important to recognize the alternative IP commercialization techniques available to actors in both the developed and developing world. By recognizing these alternatives, developing nations may eventually begin to close the gap that prevails in IP commercialization globally.

As IP ownership grows, it is increasingly significant to identify the various mechanisms available to rights holders in developing countries to commercialize their intellectual property rights (IPRs). This study reviews several IP monetization strategies in order to emphasize the ways that IP can be used to generate domestic innovation and growth within developing nations. Essentially, we are asking: what methods enable developing country innovators to commercialize their technology within their own nation and abroad? In doing so, we explore the variety of IP monetization techniques that exist and assess the extent to which they promote active markets for technology in developing countries. IP defines a wide spectrum of rights including copyright, trademarks, design rights, patents and geographical indicators. Our analysis remains focused on patent monetization strategies. This is to retain analytical clarity and also because patents generate the most economic value globally. However, it is also important to recognize that these other forms of IP can be proactively developed and monetized through mechanisms such as securitization, licensing, and secondary markets.

This report outlines the different commercial tools available to innovators in the developing world in order to monetize patents and foster the diffusion of technology, thus attracting opportunities for joint ventures and other forms of international technological collaboration. This method contrasts with more common approaches that investigate how developing countries can attract Foreign Direct Investment (FDI) from Multinational Corporations (MNCs) through the enforcement mechanisms of a strong IP regime. Since academic research typically evaluates IPRs from an enforcement perspective, the role of IPRs in developing countries is primarily conceived through the prism of the influence of 'weak' vs. 'strong' IP regimes (Gould and Gruben 1996; James 2001; Lanjouw and Lerner 1997). While the rule of law is certainly a constitutive element of functioning markets, this research does not assess which policy reforms are needed to guarantee ownership over IPRs in developing countries. This question has already been extensively discussed in academic and policy circles (Maskus and Reichman 2004; Helfer 2004; Hassan et al. 2010). Instead, the focus of this paper remains on the mechanisms that promote uptake of patent monetization techniques. Accordingly, patent owners in developing countries are not conceptualized as passive receivers of proprietary innovation developed

elsewhere, but rather as active participants in an increasingly global economic system that could be driven just as much by emerging markets as established ones. While we recognize the institutional constraints that patent owners may face, and the fact that developing countries are lagging behind the developed world in fostering genuinely domestic innovation, we argue that there are ample opportunities for patent owners in developing markets to leverage their IP to promote economic growth. We suggest that the IP ownership divide may be closing, but that substantial differences persist in the extent of IP commercialization in various countries. Emerging markets that are becoming global leaders in IP ownership seem to lag behind in relation to the financial returns they are able to generate from their innovations. While bilateral licensing remains a valuable mechanism to extract value from IP, we posit that developing countries can capitalize on both market- and policy-driven IP monetization mechanisms in order to promote active technology markets. These include patent securitization, patent exchange platforms, public-private technology transfer initiatives, and public support in patent litigation procedures. A combination of institutional support and the adoption of alternative commercialization processes should help developing nations promote stronger technology markets and generate more financial returns from IP in the future.

The paper is structured as follows. First, IMF licensing statistics are reviewed for a small sample of countries in order to increase understanding of the degree of IP commercialization internationally. Then, statistical evidence from the WIPO database on global patent stocks is used to demonstrate the growing ownership of IP in developing nations. The WIPO data suggests that the IP divide, defined as the gap in IP ownership between developed and developing countries, is gradually narrowing for the more technologically sophisticated developing countries. However, a significant divide persists in terms of IP commercialization. While this may be driven by differences in patent quality around the globe, we focus here on the relevance of IP monetization options in addressing this divide. The second section briefly outlines the key concepts of patent monetization and presents multiple case studies in order to identify some of the instruments available to commercialize IP assets. It explores the role of patent securitization, online patent exchanges, technology transfer offices and joint public-private funding, and finally the impact of public litigation support for small innovating firms.

The Intellectual Property Commercialization Divide

The Global Distribution of Licensing Revenue

In order to get a more detailed picture of the global licensing landscape, a set of 22 countries was selected for analysis. The selection process sought to ensure that a variety of income levels and geographic locations were represented in the study. This was done to provide a more differentiated understanding of the global licensing landscape. Accordingly, we included a range of high-income, middle-income and low-income countries in our study. The selection also sought to emphasize large emerging economies that represent significant international markets. Those selected among the high-income countries with a GNP per capita above $25,000 were the USA, Germany, Japan, France and Italy. The middle-income countries selected, with a GNP per capita of $5000 - $25,000, were Botswana, Brazil, South Korea, Poland, the Russian Federation and South Africa. From low-income countries with a GNP per capita below $5,000, we selected Bolivia, China, India, Indonesia, Kenya, Morocco and the Philippines. In making this selection

we also sought to represent a diverse range of geographies in order to avoid focusing on a single region. While data on licenses and royalties received was available for all countries, it was not possible to get comprehensive data relating to all stocks of patents and trademarks in all of the selected countries. Despite this limitation, our findings suggest that global licensing revenues continue to grow. However, revenues remain unequally distributed across nations. Interestingly, the gap in licensing revenues is stronger than the gap in patent ownership. Though the growth in licensing revenues can be seen as an indicator of the greater efficiency of technology utilization, we still observe strong differences in the global distribution of licensing revenue.

In table 1 below (ranked according to license fees received), high-income countries are marked in violet, middle-income countries are marked in red and low-income countries are marked in black. The IMF data used in this classification is not ideal because it reflects licensing and royalty revenues received from a range of forms of intellectual property and intellectual capital (IC), such as patents, trademarks, business franchises and copyright. Balance of payment data for license fees can be misleading because it captures many intra-firm transactions that are not specifically tied to knowledge creation and patent monetization. For example, a country may have a high level of receipts because of a favourable tax environment or because of the prevalence of profit-shifting techniques such as transfer pricing. This is an important limitation to the conclusions that can be drawn from this data. However, it is the best data currently available worldwide and it still offers valuable insights on capital flows associated with various forms of IP and IC. While certainly not sufficient to establish a causal relationship between patent ownership and licensing revenue, it provides a useful illustration of the IP commercialization divide. It is an interesting fact in itself that the only data available on monetary streams associated with IP does not offer clearly disaggregated indicators. This may reflect a lack of awareness regarding the need to grasp the value of IP in terms of its commercial relevance. The majority of existing innovation indexes continue to measure innovation output primarily in terms of patents held rather than according to the economic value of those patents. This is unfortunate because it suggests to policy makers in the developing world that stimulating higher levels of patent filings is sufficient to foster domestic innovation. Patent quality, discussed later, is an equally significant concern.

Table 1. Royalty, license fees received and paid and balance of payments 2009

Country	Royalty, License Fees Received	Royalty, License Fees Paid	Balance of Payments (Receipts – Payments)
USA	$89,791,000,000	$25,230,000,000	$64,561,000,000
Japan	$21,698,003,549	$16,834,707,247	$4,863,296,302
Germany	$13,785,314,963	$14,104,405,685	-$319,090,723
France	$9,396,708,004	$5,274,174,766	$4,122,533,238
South Korea	$3,184,800,000	$7,049,000,000	-$3,864,200,000
Italy	$1,115,444,961	$1,898,982,186	-$783,537,225
Russian Federation	$493,670,000	$4,106,950,000	-$3,613,280,000
Brazil	$433,807,800	$2,512,044,100	-$2,078,236,300
China	$429,452,520	$11,065,271,082	-$10,635,818,562
India	$192,555,770	$1,860,283,808	-$1,667,728,038
Poland	$103,000,000	$1,542,000,000	-$1,439,000,000
South Africa	$47,725,840	$1,658,023,465	-$1,610,297,624
Indonesia	$38,128,141	$1,530,107,289	-$1,491,979,148
Kenya	$19,215,790	$21,477,786	-$2,261,997
Bolivia	$2,500,000	$18,650,000	-$16,150,000
Philippines	$2,000,000	$421,000,000	-$419,000,000
Morocco	$1,910,484	$48,852,466	-$46,941,982
Botswana	$531,087	$11,600,056	-$11,068,969

(Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files)

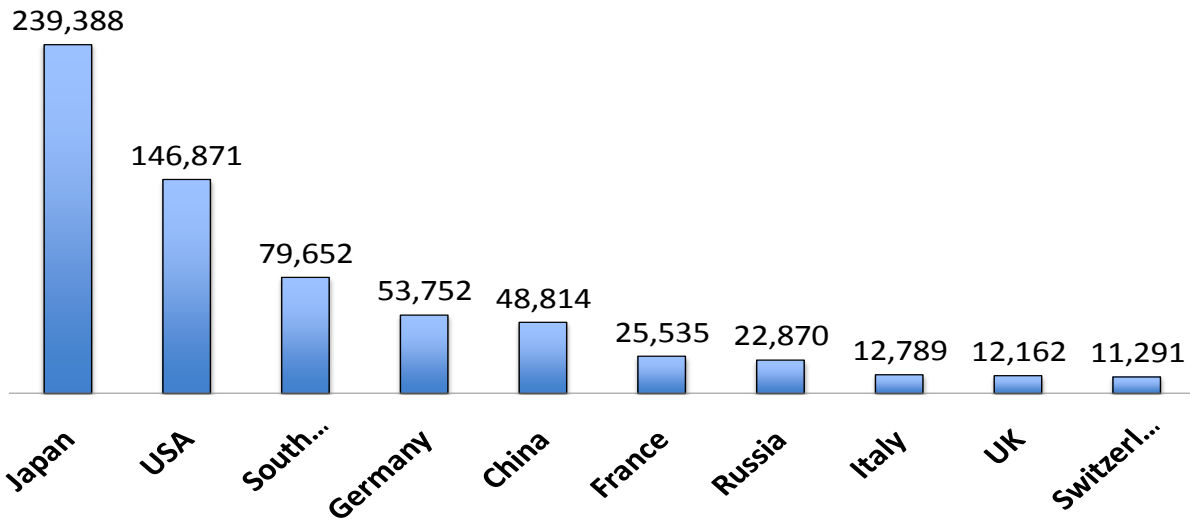
The table indicates significant differences in the total economic value of royalties received and paid. Whereas high-income nations pay and receive royalties in the range of trillions of $US, low-income countries perform extremely poorly in comparison. The data suggests that low-income countries may remain marginalized in the international IP system, despite being increasingly integrated into the legal and economic framework that supports it. To argue that IP has negative side effects for developing countries in general does not appreciate that they may, in fact, suffer from a lack of exposure to and experience with this relatively new international system of proprietary innovation. While developing countries do currently suffer from lower technological capability and less valuable IP, greater experience with alternative IP monetization mechanisms could be a step towards addressing the current gap in licensing revenues.

With the exception of the USA, Japan and France, all countries in our sample dispose of a negative balance of licensing payments. This makes the majority of the surveyed countries net importers of IP. This is not necessarily a bad thing. If, for example, the imported IP helps domestic actors leverage foreign innovation as an engine of economic growth, then it can be positive. This will depend on the locus of analysis, since different conclusions are possible if one focuses, for example, on social welfare or economic output metrics. However, if the country owns large patent portfolios itself but pays more in licensing than it receives, then it is likely, subject to the underlying quality of the IP portfolio, that they are not adequately commercializing their IP. These two possibilities are not mutually exclusive. A nation may effectively leverage imported IP but remain ineffective at trading its own IP. The accumulation of patent portfolios for other strategic reasons such as a deterrent to litigation, a bargaining chip during negotiation, and as a signal for start-up financing will also impact these figures.

A Narrowing IP Ownership Divide

IP encompasses several rights including copyright, trademarks, design rights, patents and geographical indicators. The IMF data relating to balance of payments unfortunately does not distinguish between them. Since the focus of the IP monetization section below is on patents, it is important to explore the existing gaps between patent ownership and commercialization. Data on global patenting trends is also far more comprehensive than other forms of IP, making it a more reliable indicator on which to base the analysis.

Figure 1. Patent Grants: Top 10 Countries of Origin, 2008



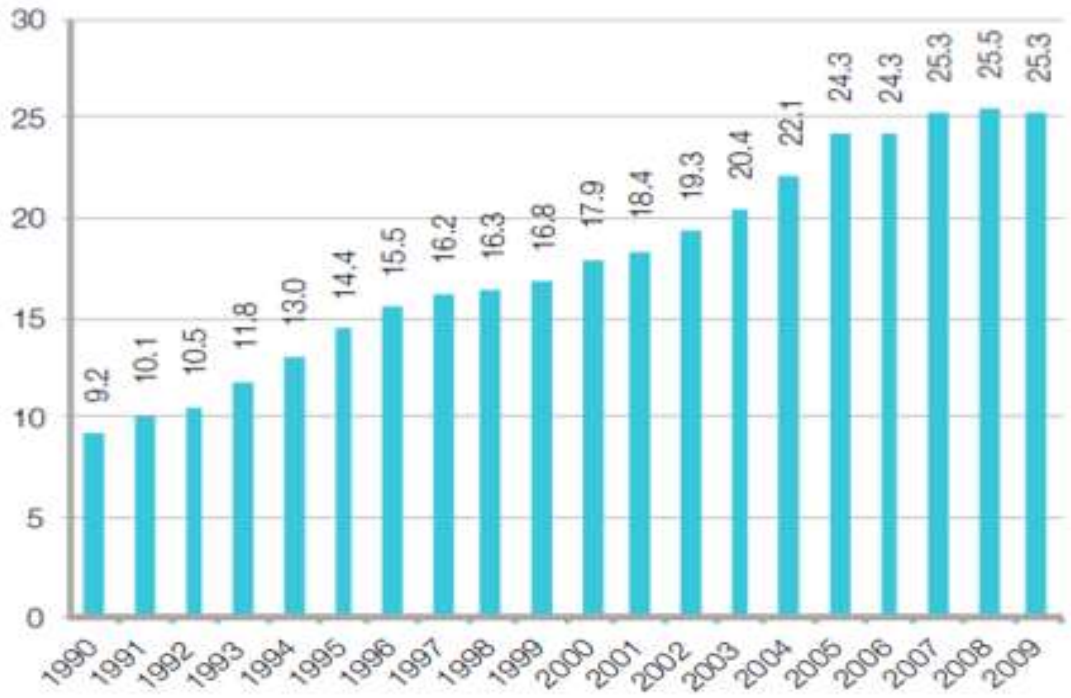
(Source: World Intellectual Property Organization)

Data on patent grants by country of origin is frequently used as a measure of innovation output. This is because it is cost-effective, publically available time-series data that provides detailed information relating to the origin of inventors and applicants (Trajtenberg 1990). As shown in Figure 1, countries that perform well in terms of total patent grants do not necessarily perform well in terms of the total revenue generated from these rights. This is an important finding, since innovation is focused on commercializing patent assets, among other knowledge assets. What is most striking is that South Korea, China and Russia hold the third, fifth and seventh largest patent portfolios respectively. The USA, which drastically outperforms all other nations in terms of IP royalties Balance of Payments, only holds the second largest portfolio. This may be the result of strong publishing industries in film, music and books, but is also likely to be influenced by the variety of patent commercialization techniques evident in the USA. It is particularly interesting that China, Brazil and South Korea own some of the largest patent portfolios but dispose of negative Balance of Payments in terms of IP licensing and royalty revenues. While the quality of their patents is an important determining factor, it also suggests that they may be in a strong position to benefit from patent monetization mechanisms.

Figure 2 suggests that innovation seems to be increasingly international in character. As R&D collaboration increases across national boundaries, the number of patent applications with at least one foreign inventor is steadily growing. Though this data does not indicate which country or

income group these inventors are from, it suggests a stronger focus on international R&D alliances and collaboration. This is a positive development since a higher level of collaboration should help stimulate technology transfer and knowledge spillovers.

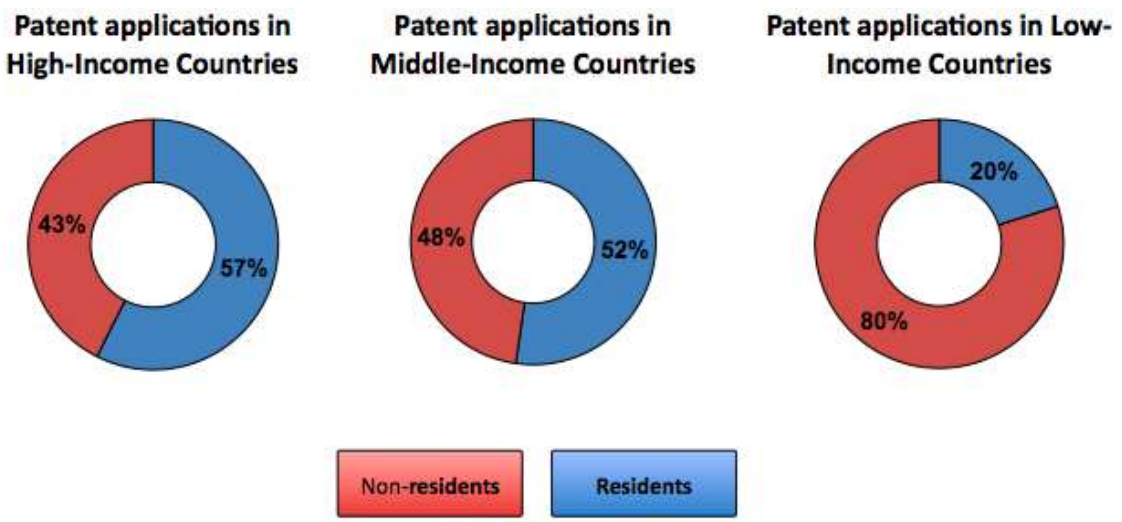
Figure 2. Patent Applications Filed Under the Patent Cooperation Treaty (PCT) With at Least One Foreign Inventor, As a Percentage of Total PCT Filings, 1990 – 2009



(Source: WIPO World Intellectual Property Report 2011)

Global data from the WIPO database summarized in Figure 3 suggests the gap between domestic and foreign patent applications is closing in middle-income countries. Compared to 57% of patent applications filed by residents in high-income countries, the middle-income group exhibits a 52% resident filing rate. In contrast, low-income countries continue to experience a significant disparity, where residents file only 20% of patent applications.

Figure 3. Patent Application Share by Income Group, 2008



(Source: WIPO Statistics Database June 2010)

In terms of our sample, it is interesting that in Russia, Poland, South Korea and China patent applications are to a large extent filed by residents. Roughly 75% of patent applications in Poland and South Korea are filed by residents. China has nearly the same distribution of resident to non-resident applications as the USA, with almost 60% of applications filed by residents.

China is an informative case for developing nations. Though patent law has only existed since 1985, the Chinese government has promoted an 'ecosystem of incentives' for individuals to file patents in order to stimulate domestic innovation.[1] Workers and students who file patents earn residence permits to live in attractive areas, while professors increase their chances of winning tenure. Cash bonuses are offered in some cases, the government covers filing costs in others. Corporate income tax can be cut over 10% for companies filing multiple patents. This public sector drive has consequences in the private sector as well: the potential for tax reductions and government contracts pushes firms to offer employees incentives to patent. Huawei pays employees patent-related bonuses of $1,500 to $15,000, partially contributing to its meteoric rise to the top firm for international patent filings. China's total patent filings grew 26% from 2003 to 2009, dwarfing growth in all other regions: 6% in the USA, 5% in South Korea, 4% in Europe and 1% in Japan.[2] Yet, China remains far behind all of these countries in terms of licensing revenue. This may be due to a time-lag between patent ownership and monetization. However, it is more likely the result of policies that incentivize the filing of patents without adequately emphasizing the importance of patent quality for generating licensing income. These incentive systems precipitated a rush in patent filing, often for inventions of little or no value. The rapid rise in utility-model patents, which do not require inventions to be 'novel' and last only 10 years, is a problem in terms of patent monetization. A Thomson Reuters survey in China shows that only one fifth of patent professionals believe Chinese patents are of high quality, a smaller

[1] http://www.economist.com/node/17257940
[2] http://www.economist.com/node/17257940

proportion than any other region in the world included in the survey.[3] Developing nations must balance incentives to file patents with threshold standards for patent quality in order to truly capitalize on IP as a value generator.

Overall, the degree of IP ownership in middle-income and high-income countries is gradually equalizing. Low-income countries remain behind but they are catching up. Though the gap in patent ownership is starting to close for technologically sophisticated developing countries, the gap in commercialization remains significant.

A Growing IP Commercialization Divide

An important consideration affecting patent commercialization potential is that of patent quality. China's ecosystem of incentives has drastically increased the total number of patents filed by residents. Yet, this growth has not resulted in a proportional rise in licensing revenue. The commercial value of a patent depends on its quality, which is roughly synonymous with patent validity in terms of its claims (Noveck 2006), but also includes measures such as forward citations, extent of patent family, and applicable territories. The USA and other developed economies have had significant difficulties with patent quality, which result in litigation costs exceeding returns from patents and inhibit the development of upstream innovations. As emerging economies such as China, India and Brazil strengthen their IP systems, they have adopted more stringent standards towards qualification criteria such as novelty and disclosures of origin (Reichman 2009). In this manner, they hope to avoid the issues that have arisen in developed economies. This example suggests that, in implementing IP regimes, developing countries should look to the experience of developed economies in order to streamline the process and achieve the desired results.

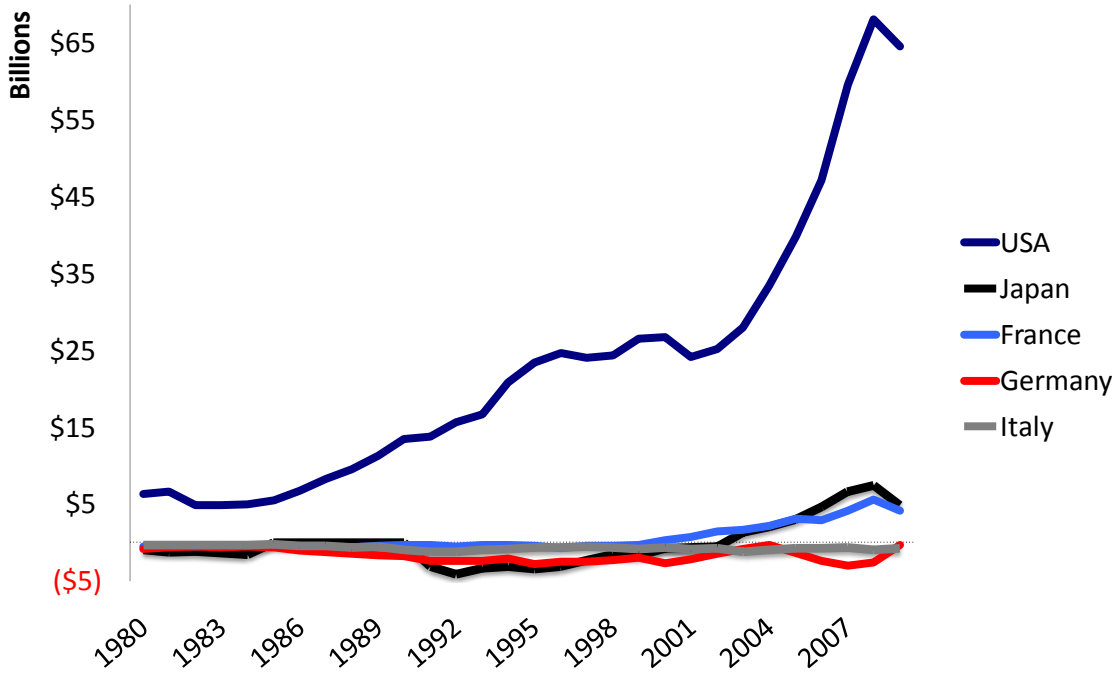
It is not always the size of the patent portfolio that matters. For example, China ranks fourth worldwide in terms of patents for green technologies according to a recent analysis of patent applications filed in 76 countries between 2000 and 2005 but it falls to tenth rank when the analysis is restricted to patents filed internationally (i.e. *claimed priorities* in more than the home country). Brazil also ranks eleventh and then plummets to thirty-first according to the same criteria (Dechezleprêtre et al. 2011). Some patents are also simply less valuable than others in terms of their commercial potential. The fact that Kenya and Botswana pay more in royalties than they receive could suggest both countries simply own IP of lower commercial value or technological relevance. This raises important questions as to why the patent application was filed in the first place. Again, the critical issue of patent quality arises. However, assuming adequate patent quality, the situation suggests the necessary skills and infrastructure to monetize IP internationally do not exist in Botswana or Kenya.

The IMF data provides a rough picture of global monetary flows associated with IP but it is inadequate to make concrete statements regarding the state of each national IP system in detail. Yet, the figures do suggest that the majority of nations struggle with IP commercialization. The difference in the historical performance of the high-, middle- and low-income countries in terms

[3] http://www.economist.com/node/17257940

of licensing Balance of Payments demonstrates this and suggests there is a growing IP commercialization divide.

Figure 4. High-income States: Licensing and Royalties Balance of Payments, 1980-2009



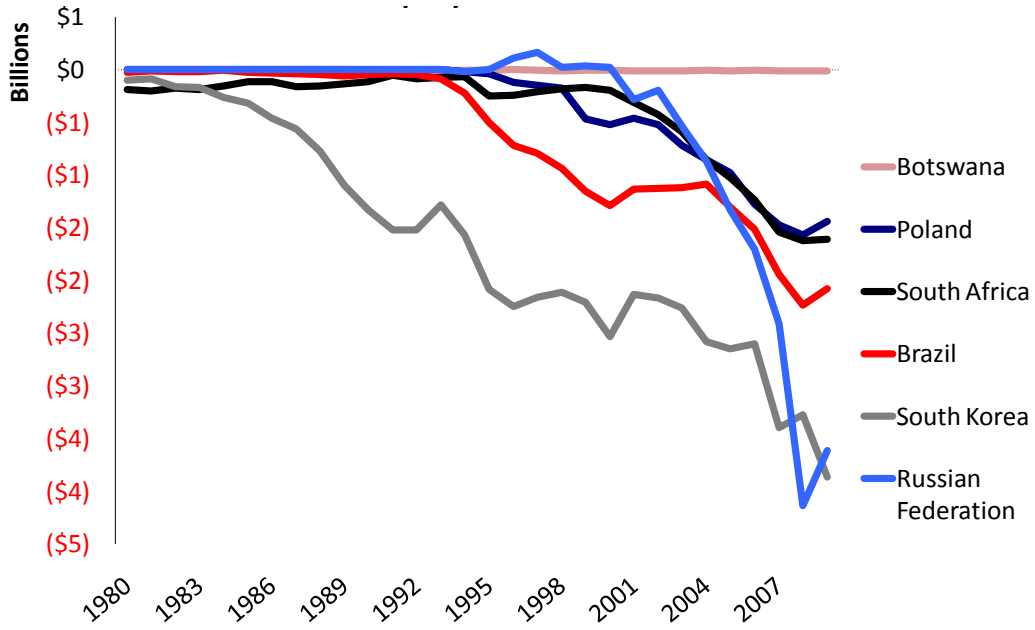
(Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files)

Figure 4 shows that high-income countries all exhibit slow growth or a static Balance of Payments – hovering between + $5 billion and - $5 billion - between 1980 and 2007 (the most recent available year). The USA is the obvious exception in this group. With a phenomenal increase in its Balance of Payments from + $5 billion to + $65 billion, it is the clear historical winner.

The passing of the Bayh-Dole Act in 1980, which enabled US universities, SMEs and non-profit organizations to appropriate control of IP resulting from federally funded research, is often regarded as an important factor in the increase of patenting and licensing activity by these actors. This has led many other OECD and developing nations to consider enacting similar policy measures to stimulate licensing revenue. Clarifying IP ownership in public-private partnerships is a useful policy measure to reduce operating uncertainty and stimulate the commercialization of IP. However, critics remark that it is difficult to disaggregate the effects of the Bayh-Dole Act from other factors that influenced the growth of licensing revenue in US universities post-1980 (David C. Mowery and Ziedonis 2002; D.C. Mowery et al. 1999; Henderson, Jaffe, and Trajtenberg 1998). The highly interactive relationship between US research universities and industrial research groups that existed prior to the Act as well as the structure of US universities, 'which blended financial autonomy, public funding from state and local sources with federal research support' on a large scale, resulted in research that focused on solving agricultural and industrial problems rather than pursuing purely scientific principles (Mowery and Sampat 2005). Given the difference in educational systems throughout the world, the implementation of similar

policies to stimulate the commercialization of public research should be approached with caution. Other scholarship has highlighted technology field differences, recognizing that licensing is not effective to the same degree in all fields and arguing that the Bayh-Dole Act did in fact lead to shifts in university patenting towards fields where licensing is an effective mechanism to transfer knowledge and generate licensing revenue (Scott 2004). Academic study on the impact of the Bayh-Dole Act suggests that technology field differences, the research focus and institutional structures of universities, and the extent of collaboration between public and private actors all influence the extent to which universities can monetize patent assets via licensing. Policy makers in the developing world must appreciate these subtleties when considering similar approaches.

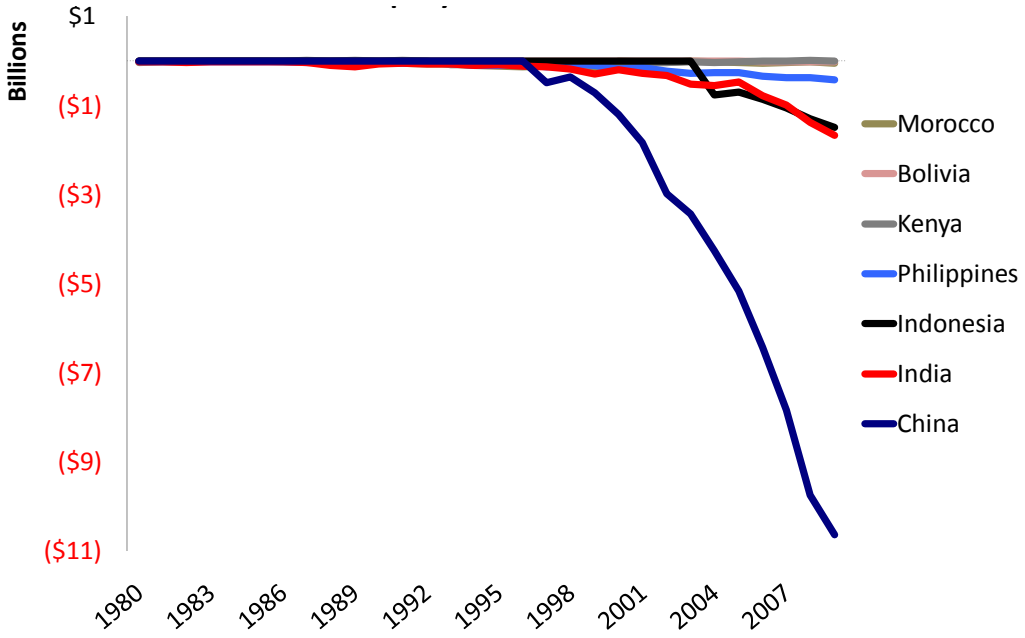
Figure 5. Middle-income States: Licensing and Royalties Balance of Payments, 1980-2009



(Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files)

Figures 5 and 6 show that Balance of Payments for IP royalties in middle-income nations have moderately decreased over time and low-income countries have experienced more rapid decline. 1995 marks a clear turning point for most countries in the sample. While the high-income countries began experiencing a positive increase in Balance of Payments, middle- and low-income countries moved from a static neutral position to an increasingly negative one.

Figure 6. Low-income States: Licensing and Royalties Balance of Payments, 1980-2009



(Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files)

Data from our sample suggests that important gaps in IP commercialization persist. This is the case both in terms of the volume of licensing and royalty revenues and the direction of cash flows associated with innovation. Developing countries seem to be significantly marginalized in this aspect of the international system. Analysis of the entire World Bank dataset for all countries and income categories in 2009 (including those outside our sample) confirms this hypothesis (Table 3).

Table 3. Licensing and Royalties Balance of Payments, 2009

Country Group	Royalty, License Fees Received	Royalty, License Fees Paid	IP Balance of Payments	Payments as a % of Receipts
High income	$177,835,372,041	$156,372,095,047	$21,463,276,994	88%
Middle income	$3,766,598,542	$32,421,925,901	-$28,655,327,359	861%
Low income	$33,678,498	$67,097,779	-$33,419,281	199%

(Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files)

The Monetization of Intellectual Property

Intellectual Property Enables Technology Commercialization

The institutionalization of property rights is a constitutive element of a market economy. Intellectual property is typically conceived as a means of reducing market failures associated with knowledge assets that are non-excludable and non-rivalrous in consumption (Merges 1994). The introduction of property rights over intangibles renders embedded and tacit knowledge codifiable, functional and manageable. In general, the introduction of property rights enables the generation of surplus value. People can still extract 'use value' from land, such as collecting fruits and game, without property rights. However, the introduction of property rights over land enables additional revenue streams not necessarily related to its primary use value, such as rent and sale. In a similar manner, the introduction of IPRs enables people to not only extract value from its primary use, but also through a variety of secondary monetization mechanisms. A major benefit of the IP system is that it institutionalizes a framework that permits people to extract value from the exchange of knowledge, which may be decoupled from its primary use value.

The conventional economic rationale for IP is linked with the hedging of risk associated with research and development. While this is certainly true, we are more interested in elaborating on the various mechanisms available to monetize IP. Like scholars such as Knight (1942) and Schumpeter (1942), we argue that IP bears the potential to foster entrepreneurship as the introduction of property rights is a constitutive element of prospering markets. IP institutionalizes a commercial paradigm over knowledge relations and can thus be seen as a cornerstone of the knowledge based economy. To discuss to what extent it is legitimate to commercialize knowledge relations and where the boundaries of knowledge privatization should be set is not the subject of the paper. This said, the privatization of knowledge relations is an important political issue that should not go unnoticed. Defining knowledge as a tradable good, which can be stored and exchanged, liberates it from a system where knowledge is only as valuable as the ability of the owner to use it. By disaggregating knowledge and invention from its owner, IP is legally packaged for the transfer of ownership through a transaction (May 2002).

IP is the currency of the knowledge-based economy. Without a functioning IP system, knowledge - like labour - cannot be alienated, and its value is limited to the ability or inclination of the innovator to put it to work. Such a system disadvantages innovators by inhibiting their ability to monetize their ideas, which they can do under an IP system even if they lack the time, skills or resources to commercialize it themselves. The IP system places knowledge and ideas in a market system, acting simultaneously as a legal framework that facilitates disputes over ownership and infringement, thus lowering the cost of IP enforcement for individual firms. From a social perspective, the absence of a functioning IP system that can be observed in many developing countries annihilates immeasurable values of knowledge and ideas by providing no system through which to realize their tradable worth (May 2002).

The perspective adopted here of IP as an enabling mechanism for developing nations rather than a defensive right for the prosperous turns traditional understandings of IP on their head. However, both within academia and business there is an emerging trend of recognizing the value

proposition of IP through an intangible assets perspective (Chesbrough 2006; Arora, Fosfuri, and Gambardella 2001; Merges 1999; Feldman and Florida 1994). IP is seen as a powerful emerging asset class that can be proactively managed, developed, and nurtured to enhance business value (Malackowski 2006; Reilly and Schweihs 2004).

Conceptualizing IP as enabling is particularly important for developing countries often considered victims of international IP harmonization (Bettig 1996; May 2009). IP can be an instrument that empowers IP owners in developing countries because it increases the economic advantages derived from property rights and precipitates a governance structure owned and operated by innovators. Yet it is important to move beyond simple conceptions of IP ownership and protection and towards a deeper understanding of how patents can be effectively monetized. The data surveyed above shows how the international divide in patent ownership is gradually narrowing but that the commercialization divide is still significant. In order to demonstrate the variety of strategies available to patent owners in developing countries to monetize their IP, we now turn to case studies of patent monetization techniques. The cases include patent securitizations, patent exchanges, technology transfer and commercialization infrastructure as well as infringement litigation support. Monetization mechanisms were selected on the basis of emphasizing the diversity of options available to innovators in the developing world. The different strategies available to extract greater value from patent assets range from purely market-driven initiatives to public-private partnerships. While patent commercialization strategies necessarily involve private actors, the extent to which they rely on public policy support differs. Significantly, policy makers can help stimulate purely market-driven approaches by identifying relevant stakeholders and increasing awareness of the range of tools at their disposal. However, it is important to note that these market-driven monetization strategies rely on more sophisticated secondary technology markets that take time to develop. The obstacles encountered in this process – including concerns about liquidity, transparency and standardization - are an important topic of academic debate and are elaborated on by Hagelin 2002, McClure 2008, Millien and Laurie 2007, and Ziedonis 2004. This range of options to monetize patents from market to public-private arrangements informs our analytical framework. The patent monetization cases discussed below begin at the private end of the spectrum and proceed onto those initiatives that require a greater amount of policy support.

Patent Securitization

Securitization has emerged as a major financial innovation in the past thirty years (Merges 1999) and the securitization of IP assets has received considerable attention from financial service firms (Malackowski 2006). In the simplest terms, IP securitization enables a company to pool certain rights and sell the future cash-flows associated with them for an immediate lump sum. There are numerous difficulties associated with IP securitization, such as valuation, royalty forecasting, and a lack of secondary markets for IP that are elaborated by Dorris 2003, Calderini and Odasso 2008, Gabala Jr 2004, and Hillery 2004. The most valuable result of IP securitization is the unlocking of liquidity without committing the company's credit, non-IP assets or issuing dilutive stock (Borod 2005). Innovating firms in the developing world often face significant challenges in raising capital to commercialize their innovations due to international investor uncertainty in developing markets. IP securitization presents a valuable opportunity for firms in developing economies to monetize their assets and improve capital liquidity because it distinguishes between

the firm itself and the IP assets in question. When securitized, IP portfolios are decoupled from the IP owning firm, which enables cash to be raised on the basis of the IP itself, rather than the underlying company. This enables investors to hedge risks associated with investment in innovation while permitting IP owners to access the capital necessary to commercialize their inventions. Innovating firms in the developing world with fewer tangible assets to back debt financing can now rely on their intangibles to raise much needed funding. Securitization effectively permits firms that may not be of a high investment grade to access capital through the international market; securitization repositions financial risk into a set of financial instruments such as Special Purpose Vehicles (SPV) or Bankruptcy Remote Entities (BRE) (Anson 2005). By legally isolating the assets that are generating cash flows, investment credit ratings can be massively improved.

While IPR securitization is historically more common with trademarks and copyrights, with patent securitization representing around 13% of total deals and only 9% of volume exchanged between 1997 and 2004 (Kirsh 2005), our focus here remains on patent securitization. Patent securitization has been almost exclusively associated with pharmaceutical patents since the royalty streams are typically more stable than other technologies. However, as secondary IP markets mature and valuation processes become more transparent and standardized, it is highly likely that securitization will diffuse to other technology sectors. The first case of patent securitization, established by Royalty Pharma AG in 2000, has received enormous amounts of academic attention. Founded on royalty payments for Yale University's Zerit HIV drug patent that were licensed to Bristol Myers Squibb through a BRE, $115 million was issued in debt and equity securities in three tranches (Calderini and Odasso 2008). Despite its early amortization, this deal stands as an important landmark in patent securitization. Three years later in 2003 another landmark case occurred when Royalty Pharma struck a securitization deal based on a pool of thirteen drug patents, including four drugs still waiting on FDA approval (Hillery 2004). Receiving a AAA rating from both Moody and Standard & Poor, $225 million in variable funding was raised. By pooling the patents, uncertainty regarding poor royalty performance was mitigated by a diversified portfolio. The issuance of a single tranche along with a robust insurance system also enabled this more successful securitization to raise patent-backed equity (Calderini and Odasso 2008).

IP securitization can raise liquidity without relying on company finance reports, incurring income tax on proceeds, creating new debt on balance sheets and, usually, without losing the right to manage and exploit the IP in the future (Borod 2005; Watanabe 2004). Securitization can simultaneously lower the cost of capital, limit credit exposure and parcel risk across various patents. Pooled patent securitizations also enable innovators in the developing world to gain access to much needed finance by aggregating a large variety of patent rights into a single portfolio, and thus reducing the investor risk associated with a single patent. Patent securitization to date has remained highly geographically concentrated in the USA, most likely due to the maturity of its financial market (Calderini and Odasso 2008). Yet, there is tremendous potential for developing countries because firms in emerging economies can export their IP to developed markets to be securitized according to predictable and functioning market instruments, rather than try to import a range of required investment rules and institutions. While domestic capacity building is essential, securitization increases access to capital immediately and experience with structuring these deals should improve capabilities. Up-front payment in the early stages of technology development can be more useful to a company than future revenue streams or delayed

sale revenues. Patent securitization basically gives IPR owners access to better funding conditions than corporate alternatives in terms of both duration and flexibility of funding contracts (Kirsh 2005).

Patent Exchanges

The incredible growth in the value of IP assets globally has not been adequately matched with increased levels of funding for R&D in the developing world. Developing countries encounter two challenges: they must manage risks associated with innovation and they are largely unable to tap the full range of institutional investors because of their relatively undeveloped capital markets. Firms around the globe are missing out on valuable capital resources as a result of the inability to properly value and exchange their IPRs. Patents remain a highly illiquid asset and there is substantial difficulty in exploiting IPRs to generate greater cash flow. The development of a liquid and robust exchange for IPRs is a vital step to ensure that firms gain alternative forms of finance for innovation (Ughetto and Odasso 2010). Financial exchanges for patents enable non- or under-utilized patents to be traded in a transparent marketplace. An exchange is valuable because it makes patents available to those that are in the best position to monetize them. Firms in the developing world may own valuable product and service patents but have insufficient complementary assets to monetize them. The complementary assets of large multinational firms results in high barriers to entry for innovators in the developing world, who do not benefit from the same economies of scale and scope. An effective exchange mechanism for patents reduces the need for complementary assets to commercialize a product. Exchanges thus enable innovating firms to monetize their rights without the considerable capital outlays traditionally associated with this (Serrano 2006; Chesbrough 2006). Formal secondary markets for patents are believed to level the competitive playing field by lowering entry barriers and undermining privileged access to technology (Arora, Fosfuri, and Gambardella 2001). As such, they are a powerful tool for actors in the developing world to monetize their patent rights.

Patent exchanges encounter a number of difficulties that the exchange of other commodities does not because of the nature of the rights being traded. Patent rights are by definition a claim to unique and novel technologies. The rights traded are thus extremely heterogeneous. Trading patents is not like trading sacks of rice or bars of gold. A lack of common valuation standards and a multitude of different types of rights complicate the process of turning patents into a standardized and tradable commodity. IP rights cannot be efficiently traded in a transparent market space until there are adequate standards for valuing them (Hagelin 2002). The valuation of intangible assets is an extensive subject of research and is elaborated on by Lanjouw et al, 1998, Mard et al. 2000, Hagelin 2002, and Reilly and Schweihs 2004. Efficient patent exchanges rely on adequate information about the underlying rights traded and necessitate substantial due diligence in order to vet the traded assets. This process can result in significant information asymmetries that benefit larger actors during the bargaining process. The importance of some patent assets to firm performance also suggests that companies may only selectively exchange patents of minor value rather than engage in deals relating to their core business strategies.

The Intellectual Property Exchange International (IPXI) is one intermediary that has attempted to establish such an exchange platform for patent rights. A subsidiary of Ocean Tomo LLC, IPXI implements a number of mechanisms to ensure that the problems associated with the exchange of

patents can be overcome. Creating a standardized Unit License Right (ULR) contract enables patent owners to license their technology in a non-discriminatory way to a variety of interested parties. The pricing mechanisms of ULR contracts are complex and described by Malackowski 2010. The contracts provide potential buyers with a host of important purchasing information relating to the technology offered, the initial target price, and the quantity of contract units offered. Buyers of ULRs must report consumption behaviour to IPXI, which acts as the central monitoring and enforcement agency for the marketplace. The administrative responsibilities of IPXI, and the exchange platform facilitating the sale of patent rights commoditized through the ULR contract, reduce inefficiencies in bilateral technology transfer resulting from time, financial costs, redundancy problems and uncertainty of outcomes. ULRs may become an important liquidity alternative to normal equity and thus aid the monetization of patent rights.

Firms in the developing world are in a strong position to use such an exchange platform to monetize their patent portfolios. The exchange permits them to interact with potential licensees that they may never have encountered within their own operating markets. This allows them to efficiently monetize their patents while the independent arbitration of the exchange by IPXI means firms benefit from reduced legal costs, avoid forced cross-licensing, outsourced marketing, auditing and enforcement capacities and regular audits on licensee behavior. Innovating firms in the developing world can rely on the expertise of IPXI and its affiliates and focus their energies on innovation. This distribution of labour improves patent monetization and expands the market for new technologies. While the success of IPXI's exchange platform cannot be assessed yet because it is still in the process of being established, various exchange models are being introduced all over the world. The experience of other exchanges should serve as a learning experience for these initiatives. While online portals may be currently headquartered in developed economies, there is nothing stopping actors in the developing world from leveraging these digital platforms to their own benefit. The recent founding of the Shanghai Silicon IP Exchange (SSIPEX) in China and the TAEUS patent book project – albeit slightly different from IPXI - suggests that this model is gaining popularity and could be a valuable means for patent owners to monetize their rights through a secondary market.

SSIPEX offers a range of IP consulting services and analytics software but its main offering is to act as a center for the transfer of IP related to semiconductors. It serves as a distribution channel for semiconductor technology owners and a demonstration center for local firms in order to help them assess which, if any, technology is suitable for their next product (Chesbrough 2011). It works with owners of semiconductor technologies in order to aggregate databases of manufacturing design tools, reference designs and other information. Foreign companies own 70% of the IP made available through SSIPEX and domestic firms own the remaining 30% (Chesbrough 2011). Chinese companies are invited to assess the technology and SSIPEX brokers a license agreement if the Chinese firm wishes to integrate the technologies into new products. Crucially, SSIPEX is open to all members and does not discriminate according to which foundry is eventually used in the manufacturing process. Revenue comes from membership fees charged for access to the IP databases, fees charged for displaying IP on the exchange, and fees for transaction brokerage between members and IP owners. A laboratory was established in 2006 inside SSIPEX to manufacture prototypes based on design brought by members. Functioning as a type of innovation black box, it prevents members from seeing exactly how the output was manufactured and it prevents them from reverse-engineering it. This enables prospective buyers

to get more information relating to the IP while still protecting owners' rights (Chesbrough 2011).

SSIPEX is a very interesting experiment that aims to facilitate technology transfer and commercialization in China. It may be a valuable means of communicating to Chinese entrepreneurs that monetizing external IP can be more efficient than developing their own technologies in isolation. Yet, the attempt to establish the center has encountered many challenges. It is difficult to judge their exact origins but these challenges may stem from inadequate data protection and insufficient participation. With only 2752 patents focusing on integrated circuit technologies from 87 vendors and manufacturers in its core database[4], the SSIPEX has not achieved the critical mass needed to make an exchange platform particularly efficient. While it is certainly an important center for technology transfer, its IP database may not be sufficiently developed to stimulate participation. There is a typical chicken/egg problem in this aspect of any exchange. An efficient market will stimulate participation, but an efficient market relies on adequate levels of participation. Another important challenge is the need for anonymity. The publication of patent details and the desire to exchange them can be used as competitive intelligence in many industries. Anonymity is required to maintain competitive strategies and avoid risks of litigation (Arora, Fosfuri, and Gambardella 2001). Companies may be seeking patents to protect product lines from infringement lawsuits. An unsuccessful bid for a patent license could turn a firm into a litigation target. Participants must be assured that the exchange intermediary adequately protects sensitive data while making enough information accessible to attract potential buyers. These are difficult tradeoffs, since any exchange of patent rights relies on effective and comprehensive due diligence procedures and compliance monitoring mechanisms. SSIPEX unfortunately does not possess the resources necessary to monitor the compliance of its small Chinese members with relevant IP laws. A member could gain access to a valuable technology and then transfer it to others without proper authorization, thus inhibiting the development of SSIPEX as uncertainty about enforcement stops IP owners from making their technologies available (Chesbrough 2011). The lack of transparency in the Chinese IP system and insufficient evidence of past performance based on legal cases may deter IP owners from participating. Strengthening the institutional context in which these actors operate may go a long way in fostering security and certainty for IP owners willing to license their technologies.

Technology Transfer and Commercialization Infrastructure

Successful technology commercialization relies on coordinated action between research universities, technology transfer offices (TTOs), and industry. It requires a mix of human, financial, and institutional resources. Industry is usually the primary channel for commercialization and universities lack direct control over the amount of license revenue generated. The success of licensees, and thus the license income generated, depends on market factors such as timing, funding, and marketing (AUTM 2007). In the USA, while some licensing income naturally goes to developers and research units, federal law often dictates that a large proportion be channelled back to research at the campus level. Licensing income helps universities invest in infrastructure to support students and capital projects, and also directly funds both student and faculty researchers. 'Absent this licensing income, a research institution's

[4] http://www.ssipex.com/ssipex/index.asp?language=English#

ability to create the impact, through the new innovation disclosures, new licenses, and new patent, copyright and trademark filings, would diminish' (AUTM 2007). Most importantly, technology commercialization relies on a robust innovation ecosystem. Factors that help stimulate licensing revenue in the USA include the combined investment of university, federal and corporate R&D programs and grants, the prevalence of technology parks and incubators, venture capital and seed-expansion, as well as support services for start-ups in accounting, law, and marketing. The diversity of actors and support services results in thick markets for technology commercialization, enabling individuals to leverage the multiple institutional, financial and human resources in which they are embedded. Actors can rely on this ecosystem to seek help in negotiating flexible license terms, developing business models, recruiting talent, securing funds, and partnering with developers. The role of government support should not be underestimated. In 2010 alone, there was $39.1 billion in federally funded sponsored research expenditures in the USA (AUTM 2010). In contrast, the use of licensing in the developing world is frustrated by thin markets for technology. First and foremost, adequate IP enforcement is necessary in order for the IP system to act as an enabling environment for generating more licensing revenue. Companies must be assured that, if they pay for licenses, others will not simply steal technology, putting them at a competitive disadvantage. Yet, enforcement must be pursued in tandem with a more comprehensive approach to technology transfer, which recognizes the importance of technology parks, venture capital and monetization support services.

The existence of professional associations that collect information relating to technology transfer and reflect on the process and impact of commercialization is tremendously valuable. The Association of University Technology Managers, initially founded in 1974 in order to address concerns that US federally-funded inventions were not commercialized effectively, is now a global network of technology transfer professionals from over 350 universities, research institutions, teaching hospitals, government agencies and companies. It has been at the forefront of funding, compiling, and publishing academic technology transfer data, particularly in North America. The AUTM STATT database is a statistical resource for policy makers to understand the extent and impact of licensing programs so far. In the USA in 2010, AUTM member organisations executed 4,284 licenses, resulting in a total of 38,528 active licenses and options (AUTM 2010). 651 start-ups were formed, and 3,657 continued to operate in total. 20,642 inventions were disclosed, 12,281 new US patent applications were filed, and over $2.4 billion in total licensing income was generated (AUTM 2010). This type of impact assessment is vital in order to understand the role of TTOs and other organizations in patent monetization. AUTM has developed a universal licensing survey in order to support technology transfer globally through accurate impact measurement. The Association of European Science and Technology Transfer Professionals (ASTP) adopted this framework in 2009. Policymakers in developing countries should help domestic actors access these resources. Professional technology transfer associations are a valuable resource for TTOs in the developing world. International bodies such as AUTM, ASTP, the South African Research and Innovation Management Association (SARIMA) and the International Federation of Technology Transfer Organizations (IFTTO) should be leveraged to increase the efficacy of TTOs in the developing world. The Society for Technology Management (STEM), a non-profit organization recently created in Hyderabad, India to promote best practices in technology transfer and foster commercialization ecosystems is one of the initiatives that has been jointly funded by SARIMA, AUTM and IFTTO. The global network of IFTTO members is a particularly useful starting point for policy makers in developing nations to familiarize themselves with the practice of technology transfer and patent monetization.

TTOs play an important role in supporting the monetization of IP while simultaneously fostering knowledge spillovers. They are particularly valuable in nations that have thinner technology markets. When nations lack adequate market-driven processes to spur licensing revenue, technology transfer offices should step in to foster stronger innovation ecosystems. Many developing countries have established TTOs to provide financial support, training, identify potential alliances, brokerage services, and legal advice during licensing and equipment purchases. It is common for these offices to provide FDI-related technology transfer incentives to multinational corporations in an effort to increase the flow of technology into their borders. FDI incentive programs often include mandatory provisions for the training of local actors and the establishment of long-term business partnerships (UNCTAD 2004). This is necessary because, although FDI is an important channel for the transfer of technology, it does not guarantee efficient transfer unless it guarantees a level of commitment to local capacity building. Dedicated financing services in technology transfer offices can also provide venture capital support to local actors. Studies suggest that the rate of successful technology transfer can vary greatly depending on the level of socio-economic development within a country (Jafarieh 2001). As experience with technology transfer grows, many offices are implementing a range of sophisticated mechanisms to ensure TTOs act as an enabler of IP commercialization in their home countries. The Industrial Technology Research Institute is a strong example of a successful technology transfer office.

The Industrial Technology Research Institute (ITRI) was founded in Taiwan in 1973 and tasked with conducting and promoting research and development with the aim of increasing economic value in a number of important technology fields. Originally government-funded, the institute has been so successful that it is now entirely financially independent (Lee et al. 2009). It has been an integral component of facilitating the transfer of technology from developed economies and multinational corporations to Taiwanese SMEs and research institutes. The ITRI is a valuable example of the important role that research institutes and technology transfer offices can play in leveraging IP-based growth. In 1976 the ITRI signed the 'CMOS IC Technology Transfer Licensing Agreement' with RCA. Engineers were sent to the USA for training and returned with in-depth technical knowledge of semiconductor manufacturing[5]. By 1977, the first IC demonstration foundry was built and Taiwan was already on its way to becoming a major player in the semiconductor manufacturing industry. This government support for the semiconductor manufacturing industry enabled domestic actors to overcome significant barriers to entry posed by Japanese and South Korean firms.

The strategic management of IP by ITRI has also fuelled the transference of patents from publically-funded research bodies to local firms who then commercialized the technology. ITRI staff were pivotal in early spin-off efforts in semiconductor manufacturing. UMC and TSMC, the largest semiconductor firms in Taiwan, were established as 'spin-in' companies. 'Spin-in' was the label used because these firms continued a close relationship with the ITRI, which had been so integral to the start up. Staff turnover with the private sector has been significant, with turnover rates reaching 15-20% in recent years (Lee et al. 2009). This staff turnover between the ITRI and firms that commercialize R&D in the private sector is an effective way of supporting the commercialization process since the transfer of know-how, skills and technical knowledge is an integral part of effective technology transfer (Arora 1995; Gertler 2003). Staff are even

[5] http://www.itri.org.tw/eng/about/article.asp?RootNodeId=010&NodeId=0103

encouraged to test the commercialization of their research through 'virtual ventures'. The ITRI funds these activities in the short term in order to help staff develop their products and establish spin-off companies.

Today, the ITRI and its affiliates conduct various R&D services and aid the process of technology transfer to industries in Taiwan. Its core responsibilities entail conducting advanced technological R&D, the provision of industrial services, as well as IP business and new venture support. It has helped small businesses gain access to over NT$ 245 million of government funding by helping them apply to the Small Business Innovation Research program.[6] The ITRI has held over 163 training courses for over 8,000 participants in the last eight years and developed numerous multi-lateral technology cooperation agreements with major international firms. In 2009 alone, it conducted over 15,300 cases of R&D services and facilitated technology transfer to Taiwan's private sector in over 1,100 cases; ITRI helps produce an incredible 5 patents a day on average and in 2009 the institute applied for over 2,300 patents and registered over 1,300 (Lee et al. 2009). Most important, in terms of monetizing these patents through their commercial development, the ITRI classifies all patents according to three grades: A (high utilization potential), B (defensive patents), and C (low utilization value) (Lee et al. 2009). Such a classification demonstrates explicitly that the ITRI recognizes that patents have different uses and that their strategic value is inherently related to what they cover and the ways in which they are deployed.

IP management and monetization is a key component of what ITRI does. Aiding the process of patent aggregation or patent pools among firms is one strategy ITRI uses to help monetize IP assets more efficiently in Taiwan (Shih 2005). The TFT-LCD (thin film transistor - liquid crystal display) alliance is a strong example of this monetization model. In 1990, ITRI aligned with the Taiwan TFT-LCD Association and seven of its subsidiaries to form a pooled patent portfolio of over 200 patents relating to flat-panel displays (Lee et al. 2009). The patent pool enabled local Taiwanese companies to enter the flat-panel display industry quite late, despite the significant barriers to entry posed by Japanese and South Korean competitors. By facilitating cross-licensing deals with these competitors using the patent pool created through the alliance, ITRI was integral to the development of this now lucrative industry in Taiwan (Shih 2005). The activities of the ITRI show the multiple strategies that can be implemented to facilitate domestic R&D and commercialization capacity. It has won countless innovation awards for its critical support. The ITRI is a valuable proto-type for technology transfer that could be widely replicated across emerging economies.

Technology transfer offices have proliferated around the globe rapidly since the TRIPS Agreement. As developing countries continue to consolidate their IP regimes, technology transfer offices play an important role in attracting foreign companies with valuable IP into their borders and supporting domestic innovation processes by fostering extensive working relationships. Yet, simply attracting FDI and licensing IP assets is insufficient. A number of coordinated mechanisms can help to aid this process. Technology transfer offices should learn from the experiences of successful initiatives like the ITRI in pursuing their goal of helping local firms to access new technologies and monetize them. Policy makers must appreciate the value of TTOs and recognize the different roles that they can achieve. A TTO can limit its focus to helping

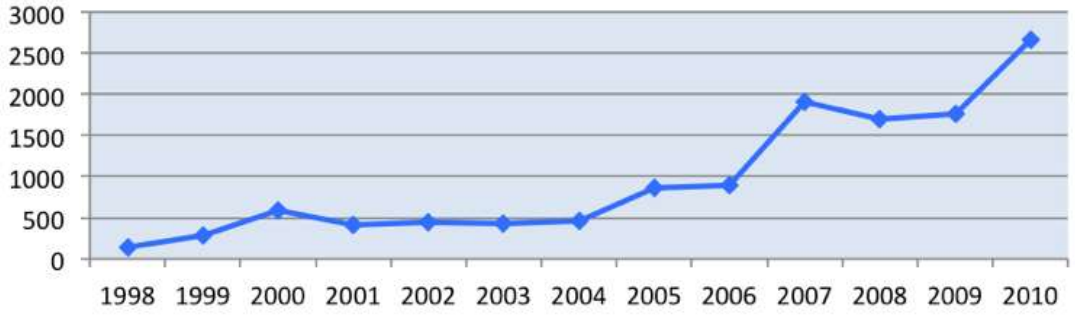
[6] http://www.itri.org.tw/eng/about/article.asp?RootNodeId=010&NodeId=0103

researchers negotiate flexible licensing terms and setting suitable research commercialization policies. It could extend this role to help form a licensee by supporting business plan development, securing funding and recruiting talent. It could even go a step further and participate directly in business operations and investment. The ITRI approach represents the latter, where research, development and monetization processes have been rolled into a single entity in order to promote technology transfer and licensing revenue in a specific industry. Establishing TTOs in developing nations and integrating them into the global network of technology transfer associations is a powerful instrument to support commercialization processes domestically by systematically sharing experiences, information and practices relating to licensing. It will increase awareness among start-ups and research institutions of the role and practice of licensing in promoting active markets for technology.

Patent Litigation Support

The rise of non-practicing entities (NPE) that accumulate large patent portfolios in order to monetize these assets through litigation procedures has been a controversial development in recent years. These pejoratively-labelled 'patent trolls' accumulate patent portfolios solely for the purposes of infringement lawsuits and license fees. They do not produce any product or innovation themselves. Their primary income thus derives from the enforcement of patent rights. Major international NPEs such as Intellectual Ventures are estimated to own between 10,000 - 15,000 patents.[7] Estimates of the loss in market capitalization resulting from NPE lawsuits in software alone over the past twenty years put the cost at $0.5 trillion.[8] PatentFreedom, a company that charts the emergence of NPEs, has compiled a significant amount of data about litigation procedures originating from NPEs.

Figure 6. Operating Company Counterparties in NPE Suits



(Source: PatentFreedom, https://www.patentfreedom.com/research-lot.html)

Figure 6 shows the rapid rise of NPE infringement litigation proceedings. In 1998, there were less than 250 companies that were engaged in litigation with an NPE. By 2010, that number has skyrocketed to 2,600, an increase of 48% over the average of the previous three years. NPEs can

[7] https://www.patentfreedom.com/research-phl.html
[8] http://opensource.com/law/11/9/ginormous-losses-npe-software-patent-lawsuits

be a major burden to MNCs and SMEs alike. As patent infringement lawsuits create significant operating uncertainty in technology markets, the threat of lawsuits can stop innovating firms from commercializing potentially valuable technologies. While multinational firms with large patent portfolios and defensive patent pools have some strategies available to defend themselves against NPE litigation, SMEs, particularly in the developing world, are more at risk. Limited financial, legal and human resources means SMEs cannot respond to these threats as effectively and thus face significant barriers to entry in global technology markets. In a context where firm capacity to respond is weaker, there is a strong case for more active support from government departments or other public agencies (Lee et al. 2009).

The Korean government has experimented with multiple types of support to aid Korean SMEs in their IPR disputes with international firms. Initially, this was in the form of direct cost-sharing initiatives between SMEs and the government regarding IPR disputes. The substantial cost of legal proceedings in IPR disputes would have meant that Korean SMEs seeking to commercialize a technology would encounter significant barriers to monetizing their IP. By distributing the cost, this initiative provided critical support to SMEs at the early stage of technology commercialization. The Korean government has helped fund the creation and sale of commercial IP insurance that covers the cost of potential infringement lawsuits. This enables start-ups to operate with reduced uncertainty and increased cash flows at the early stages of development. The Korean government pays 70% or more of the premium for IP insurance, thus reducing the burden for SMEs and stimulating domestic innovation in Korea. The government also supports SMEs in the process of market and export investigations to determine the probability of lawsuits when these companies wish to export their products to new markets.

IPR disputes between Korean SMEs and foreign entities within the domestic market are also supported. Over 42 SMEs employed this service in 2009 (Lee et al. 2009). Help is provided in terms of analysis of legal patent documents, infringement claims, counterclaims and continuous support during legal processes. The government also supports SMEs in deciding on how to monetize their IP by providing consultancy on alternative licensing arrangements and patent pools. It has also fostered the development of a patent angel – a public-private consortium fund – that manages a set of IPRs for a group of SMEs. These SMEs pay membership fees or invest capital to become equity holders in the group, whose patent umbrella effectively defends SMEs in their proceedings with patent trolls and other infringement lawsuits (Lee et al. 2009). The Korean Presidential Council on National Competitiveness recently reviewed the fact that Korea's Balance of Payments for trading technologies was at negative $2.9 billion, despite ranking fourth globally in terms of patent ownership. To promote funding for domestic innovation, the Council announced it would create a W20 billion fund to launch a management company for IP and will jointly invest with private actors up to W500 billion to start a Korean-based NPE.[9] The budget for commercializing homegrown technologies will also be raised from 0.7% to 3% of total R&D spending.[10] These initiatives serve as an important model for the developing world, which must support the commercialization of IP in order to progress from being mere patent owners to patent monetizers.

[9] http://english.chosun.com/site/data/html_dir/2009/07/30/2009073000563.html
[10] http://english.chosun.com/site/data/html_dir/2009/07/30/2009073000563.html

Conclusions

The global diffusion of IPR regimes since the TRIPS agreement has been a controversial and costly process. Criticized as a strategic move by developed economies to secure competitive advantages in the global economy, the implementation process of IP systems has received significant attention. This debate initially focused on the impact of strong vs. weak IP regimes on economic growth and the ability of developing nations to take ownership of the IP system. While improving domestic ownership of IP in developing countries is a critical step towards a more equitable IP system, the monetization of IP is equally important. The value of IP is determined by the ways in which it is used, not the mere fact of its existence. The data surveyed suggests that the much-lamented IP ownership divide is starting to close for technologically sophisticated developing countries. This is particularly true in large emerging economies such as China, Russia, India and Brazil. The proportion of resident to non-resident patent applications is also improving in favour of resident applications, an important indicator of the development of domestic innovation capacity. The initiatives undertaken to foster domestic R&D and IP institutions should continue. The large emerging economies serve as an important example of the ability of the developing world to appropriate IP regimes to their own ends. Patent applications in low-income countries included in our sample remain disproportionately in favour of non-residents. Policy makers in these nations may need to focus on increasing IP ownership before implementing policies targeting commercialization. Yet these realms are not mutually exclusive and it is important to develop capacity in both simultaneously in order to benefit from the global IP system. Significantly, the experience of China suggests that incentives to promote the use of IP should be balanced with a focus on the quality of resulting assets in order to generate greater licensing revenue. Emerging economies that have consolidated ownership over IP assets serve as a valuable model to low-income countries and it is important that policymakers understand the market dynamics and policies that have helped achieve this transformation.

However, despite this closing gap in IP ownership in technologically sophisticated developing countries, a significant gap in IP commercialization remains. The same economies that are becoming global leaders in terms of the size of their patent portfolios suffer from a lack of corresponding increase in their financial returns from innovation. While traditional bilateral licensing remains an important mechanism to monetize IP, there are a number of other mechanisms available to generate value from IP. This paper has briefly outlined a few of these mechanisms, by reference to several case studies, and discussed the ways in which patent monetization can be improved in the developing world. Significantly, patent monetization can be stimulated using both market mechanisms and carefully structured government support. It is this combination of a positive institutional environment for patent commercialization and an awareness of the market mechanisms available to innovators that will promote stronger technology markets and generate more financial returns from IP in the developing world.

Patent exchanges and patent securitization are two market-driven monetization processes that present valuable opportunities for actors in developing countries. Although exchanges and securitization deals occur primarily in developed economies, there is no reason that developing countries cannot leverage these mechanisms to access crucial funding opportunities to commercialize their technology. As firms in developing countries begin utilizing these platforms, they will gain direct access to investment and simultaneously bolster their IP monetization capacity. Experience with these mechanisms will be an important step in establishing functioning

markets for technology at home. The point is not to continue relying on institutions in the developed world, but to gradually develop capacity while still gaining direct access to important capital markets and monetization strategies. Public-private initiatives, such as the Industrial Technology Research Institute in Taiwan and the coordinated litigation support and defensive patent pools evident in South Korea, are also integral to closing the patent monetization divide. By promoting domestic technology markets, fostering knowledge spillovers, and implementing a range of tools to lower barriers to entry to international markets for actors in the developing world, these initiatives represent some of the ways to foster a more equitable global patent system. Policy makers should leverage existing networks of technology transfer professionals, such as AUTM or the IFTTO, to facilitate this process and share experiences, practices and information relating to technology transfer.

IP owners in the developing world are not just passive recipients of proprietary innovation developed elsewhere. The evidence suggests that they are active participants in the global system who are beginning to increase their ownership of IP assets. As IP owners, they now face the challenge of how to exploit and monetize their assets. While recognizing that developing countries face distinct institutional challenges, it is equally true that they have ample opportunities to leverage the international IP system to promote economic growth at home. Alternative patent monetization methods - like exchanges, securitizations and defensive pools - are still a relatively new phenomenon. Though developing countries are at different stages of consolidating the ecosystem of institutional, legislative and market infrastructure that helps stimulate ownership and commercialization of IP, greater awareness of emerging patent monetization techniques will expand the range of options available to domestic actors. Naturally, a minimum level of IP enforcement, institutional development, and market sophistication is needed to fuel patent commercialization. Developing nations are certainly not homogeneous in this respect. Identifying the threshold for IP commercialization and understanding how to help countries attain it is an important avenue of research. However, policy makers in all developing countries can already begin to help innovators leverage the IP system to their advantage by implementing targeted public support programs and raising awareness about the market mechanisms at their disposal to monetize IP more effectively.

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