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The Global Economy

New Knowledge Creation Regimes 2009

The Challenges

To promote the creation and dissemination of knowledge in a globalizing world, public finance of R&D and the patent system must be helped work together. The traditional public finance provision of knowledge is often inhibited by financial restrictions. The traditional patent system, on the other hand, may restrict the flow of knowledge and thereby impede economic growth in developed and less developed countries.



In this context, intermediate institutional regimes – such as open source technology, general public licenses, soft patents, public private partnerships and private philanthropy – have come to play an increasingly important role.

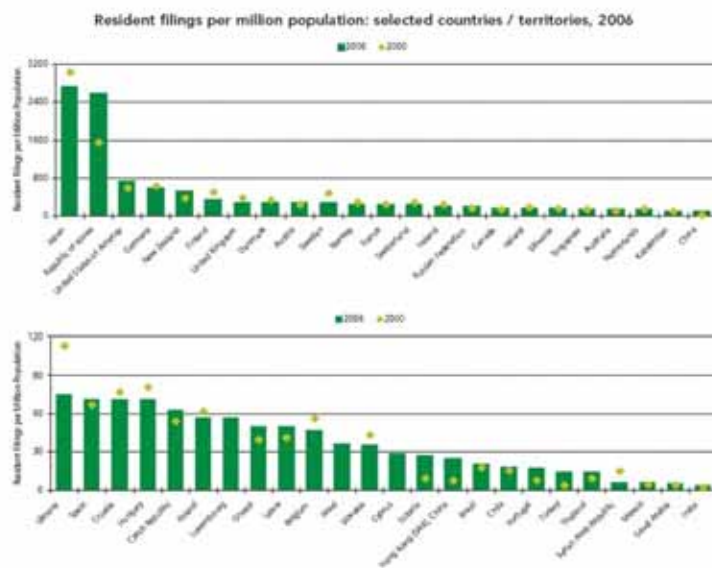
What is the appropriate legal and institutional environment to generate the most productive and equitable combinations of these regimes?

What set of concerted international regulations is likely to create enough room for country and sector specific solutions, while giving special attention to the needs of SMEs and less developed countries?

What is the desirable division of labor between basic research funded by governments and applied research funded by business? How can private philanthropy be strengthened, in order to bridge gaps between needs and capacities for research and development? Should the width and duration of patents be restricted? What is the desirable role of guarantee funds (like AMC) equipped by governments or by sponsors, that frame well-defined research objectives, and guarantee for the future returns to it? Should compulsory licensing of patented productions, in matters of life and death, be introduced to allow free access for poor countries?



Descartes. Source: Robert B. Laughlin, (2008). *The Crime of Reason*. Basic Books, New York. <http://large.stanford.edu/courses/2010/image/descartesbig.gif>



Source: WIPO Statistical Database and World Bank (World Development Indicators). http://www.wipo.int/patstat/en/statistics/patents/wipo_pub_931.html#b1



Proposed Solutions

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New knowledge creation regimes: issues concerning “the rules of the game,” “the play of the game” and the market place for knowledge based assets

Focusing on the “rules of the game” embedded in the new knowledge creation regimes (mostly based upon IPR law and IPR enforcement) and the “play of the game” of firms and individuals within the alternative (proprietary and non-proprietary) institutions of knowledge creation (or Intellectual Property (IP) governance), this entry aims to contribute to the critical debate on the performance of our knowledge creation regimes at various levels (nations, sectors, firms, etc.). The importance of a high quality IP market place to reach both societal and corporate benefits is also highlighted to be a matter of concern for wealth creation.

(1) The era of the knowledge economy and inequality: How knowledge capitalism sets “the rules of the game” for our knowledge creation regimes

Knowledge creation regimes in the era of the knowledge economy are based upon an increasing privatization of knowledge based asset, in terms of strong IPR protection. Thus, IPR regimes have been tightened world wide, e.g., via the TRIPS agreement and other IPR rules.

Based upon mainstream theories or models which have informed the belief systems regarding the operation as well as the predicted social and economic effects of IPR systems, this increased privatization of knowledge based assets is believed to solve a range of economic problems. The originally intended objectives of IPR systems include

- stimulating incentives to invest in invention and innovation;
- stimulating innovation-based competition;
- facilitating spill-over and expansion of knowledge based ideas and creative expressions of ideas;
- rewarding inventiveness and creativity throughout the economic system; and
- facilitating sustainable development of firms, industries, and societies world-wide.

In this context, IPR systems are also expected to close income and technology gaps across firms, sectors and nations. However, mainstream beliefs arguing all the perceived benefits of IPR rights should be treated with caution due to its theoretical underpinning in the form of unrealistic assumptions such as the non-existence of various factors as: technological interdependence, a social origin of invention and innovation, strategic interaction inside or outside the IPR market place, knowledge and institutional capability asymmetries, power asymmetries (e.g., in IPR related bargaining situations), and more. Also, mainstream beliefs do not take into account the specifications or practical applications of IPR system which have a huge impact on the performance of the knowledge creation regime. Thus, there is an increased concern within academia that the IPR system generates different performance results and varying potential for growth across the firms, sectors and nations participating in the IPR system and that the IPR system does not seem to close technology and income gaps.

Furthermore, the economic debate on capitalism is now also taking place in a political context. Economists who believe that the spirit of capitalism, or free private enterprise and free market economies, is the key to sustained technological progress and knowledge creation and that it is weakened by socialist economic policies seem to carry more conviction that they use to do. However, capitalism’s apparent emphasis on individual and corporate self-interest over community, on hedonism over charity, and on expansion or growth over equality remains a bitter



pill for many to swallow. Especially, the increased commoditisation of knowledge based assets and symbolic material, and the departure of central ownership or command of such assets, which has led to a decrease of the public domain, should be a subject of concern. The new face of contemporary knowledge capitalism is also reflected in the new knowledge creation regimes (of stronger IPR systems) and there are critical (and sometimes unfavourable) consequences in the context of innovation, competition, markets, globalization, fair trade, protection of traditional knowledge, access to medicine and education, role of universities, corporate dominance, and other.

Towards a solution:

- Policy makers need to recognize that IPR systems do not work automatic as in text book economics and they have limitations even if we get the best organization in place. Also, IPR systems create their own problems.
- When designing knowledge creation regimes, policy makers should recognize the asymmetric ability of the IPR system in meeting its originally intended objectives, and that this knowledge creating regime may therefore not be able close income and technology gaps or generate wealth to all societies in all regions of the world.
- What really matters for performance is not the assumptions underpinning the belief systems of IPR regimes, but it is the nature of the play of the game (or stakeholder interaction for value creation).

(2) Value creation, strategic benefits from Intellectual Property (IP) and alternative appropriation models: Understanding “the play of the game” of firms and individuals within alternative knowledge creation regimes

It seems paradoxical that while micro-electronics and the new information and communication technology support the dynamics of sharing information, knowledge, ideas and (cultural) expressions in new more “open innovation” spheres, this is made more difficult, and sometimes impossible, by the IPR legislation in its current form of providing very exclusive and strong protection (e.g., via broader patents, increased period of protection of patents and copyrights, lower requirement of “inventive step,” new areas of protection, increased enforcement worldwide, etc.).

It is also a paradox that, while government has made IPRs more exclusive and stronger the way in which IPRs have been managed by firms and industry in “open innovation” systems has made them less exclusive and less strong (see, e.g. EU 6th Framework Project, U-KNOW, 2005–2009 that studies the sectors of software, pharmaceuticals, and the university sector) That is, a movement towards using the IPR system in support of “open innovation” has been led by the very nature of the “play of the game” (reflected in strategic interaction) by firms and industries, rather than the “rules of the games” (reflected in IPR legislation) set up by government policy. The crucial factor is the way firms and industries govern IPRs, in both proprietary and non-proprietary appropriation models, in their efforts to foster innovation and to increase value creation from their innovations.

A related concern is that the very exclusive and strong IP rights stimulate anti-competitive behaviour and abuse of IP rights. Basically, the “rules of the game” can encourage efforts to secure as large a share of the knowledge creation and innovation value-pie as possible rather than behaviour that contribute to increasing the size of the value-pie creative by the collective. In other words, it can encourage (or outbalance) rentseeking rather than welfare enhancing behaviour.

The growth, widespread use, and establishment of alternative (e.g., open source, non-protected technology) knowledge creation and appropriation models raise the intriguing possibility that innovation and other strategic benefits from knowledge creation might successfully be incubated under far more open conditions, often associated with non-proprietary IP. Thus, the use of an open source development methodology for knowledge creation has raised in profile,



and the use of General Public License (GPL), Creative Commons license, other licensing forms and non-IPR protected technology are not unfamiliar alternatives to the use of exclusive IPRs. Especially the software sector has experimented with such alternatives, but it is increasingly adopted in other sectors.

Thus, firms use various types of IP non-exclusively and their choice of protection is related to the strategic benefits they are seeking and the operational aspects of their knowledge creation processes (including the characteristics of the firms and sectors in question). These aspects include:

- Innovation processes: being able to use the best inventions, innovations, creative expressions; Innovation methodology for developing better technology or creative expressions; Benefiting from user or supplier involvement as a development strategy (e.g., through learning and feedback); Setting common standards / making or using compatible technology or creative expressions.
- Building networks, corporate relationships and the community: increasing ability to enter collaborative agreements (e.g., joint ventures, strategic alliances, etc.); building informal relationships with industry networks; giving something to the community.
- Market positioning: increasing market share (e.g., building broader user base or securing market protection); professional recognition or brand recognition; competitive signalling.
- Finance: direct income from market transactions (e.g., to cover R&D or for profit); increasing ability to raise venture capital; and cost cutting.

It should be noted that open innovation processes does not by default mean the use of non-proprietary IP, as such open appropriation processes or more open knowledge creation regimes can be led by both proprietary and non-proprietary IP. Basically, IPRs (conventionally associated with monopolistic market structures) and “open innovation” are not knowledge creation regimes which are necessarily contradictory in terms. Rather, the movement towards “open Innovation” can be (and has been in many cases) supported and even underpinned by the IPR system in many different ways, using both proprietary and non-proprietary strategies regarding IPR protection and associated innovation management. However, this does not imply that IPRs cannot be (or are not sometimes) used as a weapon to destroy an “open innovation” process, so appropriate policy and management is essential.

Towards a solution:

- Policy and management should be concerned with the actual interaction between the design and implementation of the “rules of the game” and the “play of the game”.
- There is a need for knowledge creation policy and regulation to move beyond the conventional assumption that patents are always best placed to reach strategic aims of firms. Indeed, most firms use a mixture of proprietary and non-proprietary IP approaches.
- The increasing use of non-proprietary IP by firms and sectors indicate that knowledge creation regimes are not necessarily better for firms and sectors the more exclusive or rival they are. (This is in addition to the failure of IPR systems in closing income and technology gaps at the level of nations and societies, as discussed above). We need a knowledge creation infrastructure with softer IP, which support the use of non-proprietary IP, as well as more flexible proprietary systems by, e.g., introducing compulsory licensing.

(3) The quality of the Intellectual Property (IP) market place: An ignored institution in the heart of our knowledge creation regimes

It is widely accepted that knowledge creation and innovation processes is a social process to which we all contribute so firms, sectors and societies have become inter-dependent in their knowledge bases. Thus, the functioning and efficiency of the IP market place in which knowledge based ideas and creative expressions are exchanged is key to the performance of any knowledge creation regime. Furthermore, as various IP market places are enforced by different institutional infrastructures, norms and bargaining forms, the performance or



efficiency of IP markets depends on the nature of stakeholder interaction and other qualities in the market place.

However, several institutional problems, or market obstacles, are not uncommonly experienced when trading IP in the market place (evidence from EU funded 6th framework project UKNOW 2005–2009). E.g., in the case of patents, they are related to

- search problems: difficulty in locating the owners of the IP; difficulty in locating the users of the IP; difficulty in finding the best IP; the description or drawing in the patent document is not clear;
- IP assessment/transparency problems: difficulty in assessing the degree of novelty/originality of the IP; difficulty in assessing the economic value of the IP;
- contract and enforcement problems: difficulty in negotiating a price for the IP; difficulty in negotiating the terms (not related to price) of the contract; excessive cost of enforcing the contract; problems (not related to cost) with enforcing the contract; trust issues (e.g., opportunistic behaviour, free-riding, or similar);
- regulation and practices: regulations allow too exclusive rights; international IP regulations do not fit the needs of different local markets; differences in practices of firms.

Similar, there are problems related to the functioning of markets for open source solutions, non-patented technology and copyright. These obstacles faced in the IP market place and which may inhibit firms, sectors and societies to reach their strategic aims are important to minimize in order to facilitate knowledge creation processes.

Towards a solution:

- IP markets (as any other market) cannot be reduced to simple institutions where supply and demand meet, but they need to be properly enforced and regulated. If policy makers do not recognize that there are conflicts embedded in social relations within IP market places and other market obstacles, this may inhibit the effectiveness of the functioning of these markets, and therefore reduce the wealth produced by our knowledge creation regimes.

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The general task is to find the appropriate rules of the game in order to bring about the best combinations of various knowledge appropriation systems: the traditional antagonistic systems of public financing of R&D and of the patent system as well as the more recent, intermediate systems, such as open source technology, general public licenses, soft (or weak) patents, public private partnerships and private philanthropy. Creating an internationally recognized regulatory regime that allows a greater variety of knowledge appropriation systems to coexist might prove to be a positive-sum game promoting innovation and growth.

Appropriate policy action regulating these knowledge appropriation systems requires meeting some general conditions: It should build on concerted international regulations, with enough room for country and sector specific solutions, and with special attention to the needs of SMEs and less developed countries. More specifically, possible solutions might include (following suggestions made by Stiglitz and others):

- restrictions to the patent regime, in particular regarding the width and duration of patents, as well as the exploitation of traditional knowledge,
- guarantee funds (like AMC) equipped by governments or by sponsors, that frame well-defined research objectives, and guarantee for the future returns to it,



- compulsory licensing of patented productions, in matters of life and death, and to allow for free-riding of less-developed countries,
- continuation of providing basic research as a public good by public research,
- strengthening of private philanthropy (e.g., by respective international legislation and guarantee systems), in order to bridge gaps between needs and capacities of public research.

One starting point could be the existing TRIPs agreement (Trade-Related Aspects of Intellectual Property Rights) from 1995. It should, however, be put under the reign of the World Intellectual Property Organization (WIPO), which should in turn be made more influential, and it should be modified significantly to better meet the above requirements.

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Extending open source to commercial biology

Forty years ago, many publicly-financed R&D programs required grant recipients to immediately deposit their discoveries in the public domain. This amounted to a judgment that grant support was already sufficient – i.e., that the inventors' patent rights should have zero breadth and zero duration. Today, on the other hand, policymakers have gone to the other extreme by reflexively encouraging researchers to seek full-width, full-duration patents. But why limit ourselves to this all-or-nothing choice? Full breath/duration rights are surely necessary where R&D is expensive or the expected social benefits are very large. But there are other instances where more moderate rights would suffice while yielding greater access.

In principle, then, policymakers should tailor breadth/duration to each individual R&D project. Legally, this is straightforward: Authorities would simply tell grant recipients to waive some or all of their patent rights as a condition of receiving support. The problem is information. Policymakers hardly ever know how much reward inventors “need” to develop an invention. And while the inventors clearly do know, they have every incentive to lie. Why admit that moderate width and duration provide sufficient incentives when bigger rewards are there for the asking?

But if legal solutions won't work, perhaps there is another way. Can we design institutions that moderate patent duration/width automatically? Surprisingly, at least one such institution already exists in an obscure branch of open source called “Embedded LINUX.” (Embedded LINUX is a kind of software typically found in DVD players, cell phones, and other consumer electronics.) While the legal details are complex, the bottom line is that “Embedded LINUX” licenses let firms keep their code secret for 18 months or so. This limits access much more than the usual zero-duration open source license, but also far less than, say, the full 20 year envisaged by patent law. Even better, surveys show that most contributors voluntarily divulge about 50 percent their code *before* the license requires them too. The reason: Shared code is often cheaper and faster to develop.

Of course, Embedded LINUX is hardly more than a footnote in the global economy. On the other hand, similar schemes should make economic sense wherever shared development matters. And this includes the biggest public/private research topic of all: Biology. Consider the case of stem cells: If you are going to use a cell line, you want one that has already been widely described in the published literature and for which commercial support products exist. So even though there are now more than a thousand cell lines in the world, most of today's front-running products are based on the first six lines that James Thompson isolated in 1997. Thompson, of course, was allowed to patent the lines and will receive massive royalties for any products made from them. On the other hand, many companies complain that these same licenses have driven them from the market. At least in hindsight, consumers might have gotten a better deal by demanding Embedded-LINUX style sharing of lines.



Similar cell line stories exist throughout biology. In terms of economic importance, however, one example towers over the rest. Tomorrow's genetic engineering ("synthetic biology") will almost certainly depend on assembling designer organisms from uniform DNA sequences called "standard biological parts." Ten years from now synthetic biologists will probably be making everything from drug compounds to carbon-neutral jet fuels from these parts. And that will be very good news for the owners. But will those owners be grant recipients or taxpayers?

Like any reform, not everyone will like the open parts idea. If you ask them, there are many groups in favor – consumers, companies using parts to make therapies, and commercial DNA providers to name a few. But these groups will not be at the table when government decides what patent breadth/duration grant recipients should receive. And the grant recipients themselves will always be able to make more money by demanding full breadth and duration. The open parts idea won't go anywhere unless government funding agencies are prepared to stand up for it.