The impact of IPR on the rates and directions of knowledge accumulation

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More in :

- Dosi, Marengo and Pasquali(2006), *How much should society fuel the greed of innovators?: On the relations between appropriability, opportunities and rates of innovation*, Research Policy, 35, pp 1110-1121.
- Cimoli, Dosi, Mazzoleni and Sampat(2011), *Innovation, technical change and patents in the development process: A long term view*, LEM WP 2011/06, Scuola Sant'Anna, Pisa.
- Dosi and Nelson(2010), *Technical Change and Industrial Dynamics as Evolutionary Processes*, in Hall and Rosemberg (eds.), Handbook of Innovation.

Themes

1. The role of IPR in general, within the “capitalist machine” of innovation
2. The impact of IPR in catching-up processes
3. Specifically, the effects of the current international IPR regime

A birdeye view since the industrial revolution

(*i*) Some, *expected*, appropriability as necessary condition for private, profit-motivated, expensive efforts of innovative search

but

(*ii*) Hardly any evidence of monotonicity in the relation between intensity of efforts and appropriability conditions

and, even stronger,

(*iii*) No evidences of any robust relationship between strength of IPR and rates of innovation

Some archetypical examples

- From the Cornish pump engine to blast furnaces, to open innovation dynamics . . .
- The anti-innovation effect of too much IPR protection (Wright brothers on the airplane; Selden patents on cars . . .)

Two general properties

1. Rates of innovation fundamentally depend on technological opportunities specific of each paradigm, rather than on appropriability conditions (above a minimal threshold)

2. IPR are only one of the mechanisms of appropriation, and in many activities NOT the most important one (drugs being a major exception)

A “quasi-natural experiment” :

the change in US IPR regime since the ’80s

The patent explosion

Year	Pat. applications	Pat. awarded
1963	90,982	48,971
1976	109,580	75,388
1986	132,665	76,862
1996	211,013	121,696
2006	452,633	196,404

Source: United States Patent and Trademark Office (USPTO)

Expansion of the patentability domain

In breath:

- software
- algorithms
- business methods
- output of publicly funded research
- less stringent requirements of novelty, non-obviousness and utility

In depth:

- fragments of genetic code
- fragments of algorithms and software
- fragmentation of property rights

But low patent quality

Industry	**Median value**	**Mean value**
Chemical	33,856	497,200
Comp. & Commun.	21,287	45,247
Drugs & Med.	12,692	120,419
Electrical/onics	11,928	68,459
Mechanical	8,171	86,033
Others	4,573	38,626

Patent values in 1992 *USD* and discounted at 10%.

Source: J. Bessen (2008), *The value of US patents by owner and patent characteristics*, Research Policy, 37, 932-945.

- In general, no evidence of any increase in rates of innovation
- increasing (transaction) costs of the system
  - administrative costs
  - legal costs (estimated around $1/3$ of total $R\&D$)
- increasing discontent in many industries: the tragedy of *anti-commons*
- increasing social resistance against IPR in areas such as genomics, pharmaceuticals, software, copyright in art
- weird useless patents (e.g. www.crazypatents.com)

The paradox is that IPR are not the most important mechanism of appropriation

Mechanism	**1st**		**2nd**		**3rd**		**4th**	
	1983	**1994**	**1983**	**1994**	**1983**	**1994**	**1983**	**1994**
Product innovation								
Patents	4	7	3	5	17	7	9	4
Secrecy	0	13	0	11	11	2	22	5
Lead time	14	10	14	8	5	7	0	7
Sales & service	16	4	16	4	1	7	0	10
Manufacturing	n.a.	3	n.a.	3	n.a.	14	n.a.	7
Process innovation								
Patents	2	1	4	5	3	3	24	16
Secrecy	2	21	10	10	19	1	2	0
Lead time	26	3	5	7	2	16	0	3
Sales & service	4	0	16	0	7	3	6	11
Manufacturing	n.a.	10	n.a.	12	n.a.	10	n.a.	0

Sources: Levin et al.(1987) and Cohen et al.(2000) as presented in Dosi, Marengo, Pasquali (2006).

Often more important:

- secrecy
- lead time
- sheer complexity of products
- complementary assets

However, even in sectors where IPR are important (e.g. drugs), NO evidence that tighter IPR lead to higher rates of innovation

Conversely, patents may inhibit innovation, even in sectors where IPR are not important as appropriation mechanism

The patent thicket:

- problem of contracting when many inputs are necessary – high transaction costs lead to breakdown
- Large numbers of patents in a given area, impossibility of adequate search
- Ex post holdup by patent holder after costs are sunk
- Given litigation costs, even “invalid” patents can be enforced
- Discourages entry (increases sunk costs)

Together, increases in “monopolistic rents” (without innovative payoffs) moderate the Schumpeterian optimism:

“ If one wants to induce firms to undertake R&D one must accept the creation of monopolies as a necessary evil”
(J.A. Schumpeter, *Capitalism, Socialism and Democracy*, 1943)

- In fact, the far excessive emphasis on IPR is grounded into a wrong characterization of technological knowledge as
  - (i) sheer information
  - (ii) quasi-public good

- In turn leading to silly statements like the following :

"The protection of intellectual property is important not only for promoting innovation and creativity, but also for developing employment and improving competitiveness"
(European Directive 2004/48/EC)

What is the role of IPR in the process of catching-up, i.e. in the process of knowledge accumulation by individuals and organizations within the great transformation from largely agricultural to modern economies driven by industry and advanced services

A general “stylized fact”

- IPR as an obstacle to emulation in the most dynamic technological paradigms
- and, more, specifically, an obstacle to the development of domestic firms initially undertaking imitation

All historical episodes of successful catching-up have occurred under conditions of weak or non-existent IPR. Examples are:

- Germany
- US
- Japan
- South Korea
- and also China !!

The current international scenario

- TRIPS and beyond: strong and uniform IPR regime
- and worse: bilateral agreements

Effects on the catching-up process: between the irrelevant and the significantly harmful

Where do we go from here ?

- Yes, exploit much more TRIPS flexibilities, but hardly enough
- Reform (loosen up) both the international and the national (advanced countries) IPR regimes
- Also (especially) where it hurts the most: drugs, etc.

It is going to be good for catching-up, but also for innovation in "frontier" countries