Macchine e capitale (*elementi introduttivi*)

27 Gennaio 2015

Technology and Science (principal references)

- N.Rosenberg
  - **Inside the Black Box of Innovation: Technology and Economics** (1983)
  - **Exploring the Black Box: Technology, Economics, and History** (1994)
- J.Schumpeter
  - **Theory of Economic Development** (1911)
  - **Capitalism, Socialism and Democracy** (1942)
- K.Marx
  - **Das Kapital (I, III)** (1867)
  - **Grundrisse** (1858)
- W.Baumol
  - **The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism** (2003)

Technology and Modes of Production

- Capitalism: Commodities' production has the aim of sell goods and services (*unlimited production*)

- Pre-Capitalists mode of production had the aim of produce goods in order to consume them immediately.

During Capitalism Exchange Value **dominates on** Use Value

Technology and Science in Capitalism (1)

- During Capitalism the use of Technology in production of Commodities and Services is revolutionary;
  - The growth rate of new discoveries and new method applications is incomparable with the past (first and second industrial revolutions).
- Principal reason: by using more advanced machines, capitalists can produce in the same period more commodities with a higher quality.

Technology and Science in Capitalism (2)

- Principal consequences:
  - The impressive growth of the of commodities number existing in the world market (specially in 19th and 20th centuries).
  - In terms of production: the substitution of human labour by machine labour (in the same process)
    - Thus, a reduction of each commodity's value and, consequentially, of its price.

Technology and Competition (1)

- Technology growth implies Competition growth;
- The availability of new technologies give the chance to an increasing number of firms to produce different commodities and to compete on new markets;
- Two principal consequences:
  - Necessity to innovate constantly (to stay on the technological frontier);
  - Necessity to protect the innovation (IPR)

Technology and Competition (2)

- The firm that not use the most advanced technology produce commodities with less quality at higher price;

- The firm that first discovers a new idea can produce commodities with less price and higher quality, winning the competition.

→ The Battle of Weapons (W. Baumol, 2003)

Technology and competition (2)

- The firms that not rapidly adequate their method of production are induced to fail, since they produce not competitive commodities (in theory with higher price and lower quality).
- Firms that rapidly adopt new technology can gain new shares of the market (generating higher capital concentration);
- Organic composition of capital tends to **generally** grow.

The Battle of Weapons (3)

- Specially in a phase of crisis - dued to overproduction of commodities and capital - innovation competition turns to be a Battle of Weapons (Baumol 2003);

- Principal war fields:
  - **Industrial Espionage** (see Cozzi and Schettino, 2005)
  - Use of Patents (**IPR system**)

Industrial Espionage

- L.J.Freeh (FBI director 1993-2001): “industrial espionage is the worst threat against US economy since the fall of USSR”
- Enterprises costs linked to IE:
  - 1mrd $ (1992)
  - 45mrd $ (1999)
  - 59mrd $ (2001)
  - More than 100mrd $ (2011)
- Diffusion of dedicated “Business or competitive intelligence units” (ex. dumpster diving)

IPR System

- A patent system should provide effective protection for valuable inventions, regardless of the features of inventors or patentees.

→However, as stressed by a number of studies concerned with the USA, the costs for enforcing patent rights r**educe the small firms' propensity to invent.** *(see Lerner (1995), Lanjouw and Lerner (2001), Lanjouw and Schankerman (2001))*

Patenting scopes

- **Internal Exploitation** of new discovery

- **Strategic reasons:**

1. blocking competitors
2. avoiding to be blocked by them (Bureth et al. 2005; Blind et al., 2006) [22% of large firms applications, while 10% of SMEs]

IPR Systems: the case of EPO

- A patent application published by the EPO provisionally confers upon the applicant the same protection degree that is conferred to a granted patent
- The examination process at the EPO involves a **long time**: at best, it can last **three years**; however, due to the staggering increase in number and size of patent applications which, in turn, can be mainly ascribed to the mounting recourse of applicants to strategic patenting, the delay in the granting process can be much longer.

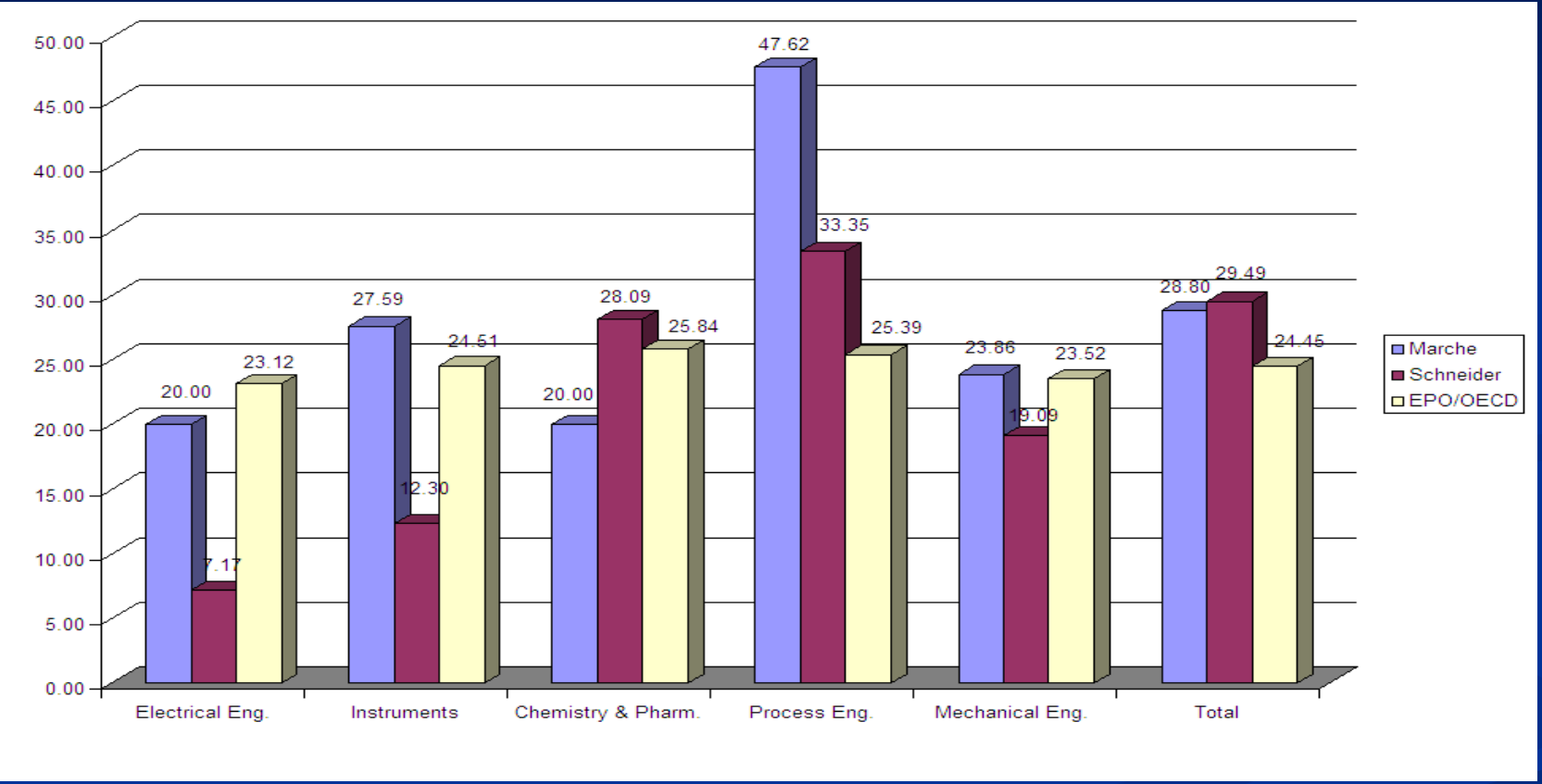
Steps to obtain a granted patent by EPO (1)

1. By 18 months after the priority data of an application, the EPO sends to the applicant a search report which, in particular, describes the state of prior art that might affect the patentability of the invention. At the same time, the application **is published** in the EPO Bulletin as well as in its Web site.
2. In order to advance through the process, the applicant must file the request for the examination and pay the examination fees. If the applicant does not comply with these requirements within 6 months of receipt of the search report, the application is **deemed to be withdrawn**. Alternatively, the applicant can explicitly withdraw the application.

Steps to obtain a granted patent by EPO (2)

1. In the other cases, the applicant requests for the examination and pays the relevant fees. During the examination procedure, the applicant can receive one or more communications from EPO examiners asking for additional information, revisions and/or cancellations of the claims included in the patent application. If the applicant (i.e. patent attorney) does not reply to those letters within 6 months or does not show up when an oral proceeding is fixed, the application is deemed to be withdrawn. Obviously, also in these phases the applicant can **pro-actively withdraw** the application.
2. At the end of the examination process, the EPO informs the applicant whether the patent is **refused or intended to be granted**.

Withdrawals (1)



Withdrawals (2)

- SMEs and individual inventors withdraw more applications than Large enterprises. Why?
  - They tend to overestimate the value of their inventions
  - They are less able to mobilise the complementary assets and funds required to bring the new ideas to the market;
  - They do not have adequate knowledge of the patent system
  - the withdrawals by small applicants could be **due to the litigation threats posed by larger companies.**

(Iversen and Kaloudis, 2006)

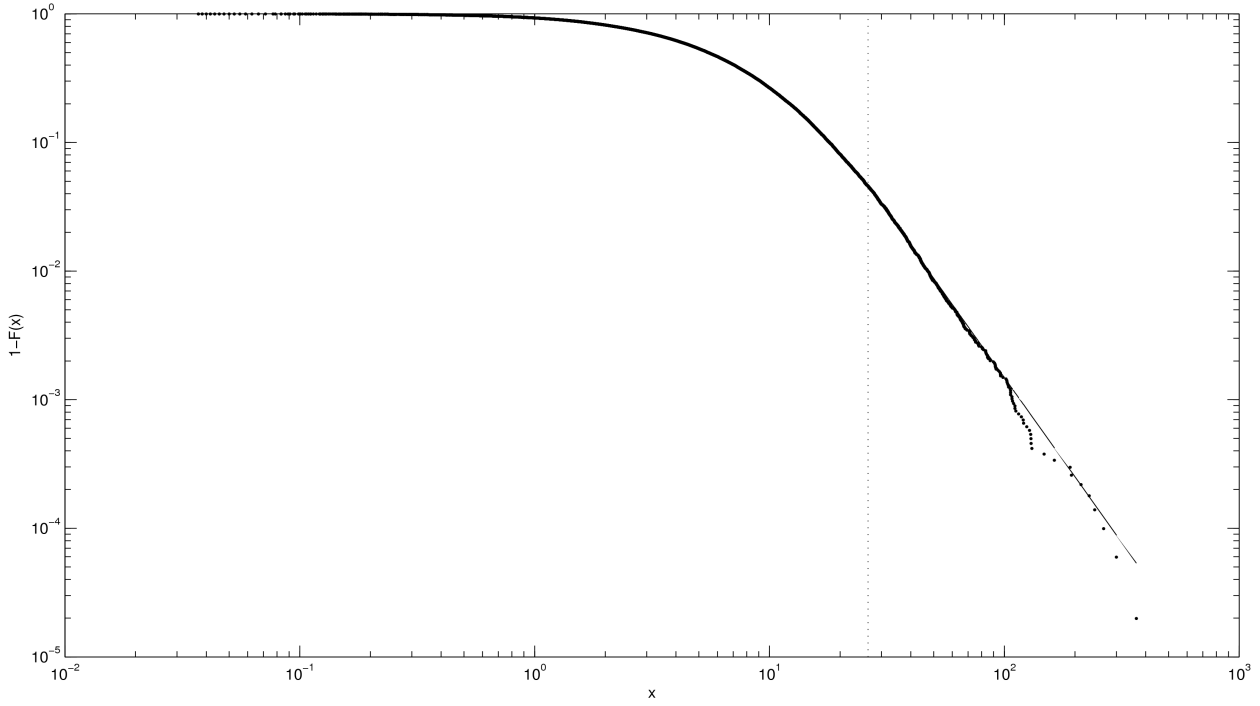
Determinants of Patent Withdrawals

Probit model applied on OECD/EPO data:

- Number of employed workers (*negative*)
- Regional Patent Attorney (*negative*)
- Patent Quality (i.e. the number of forward citations and the patent family) **doesn't affect significantly** the probability of withdraw an application.

Consequences (1)

- Uneven distribution in terms of patent inventors



Consequences (2)

- Uneven distribution by Applicant (IPR owner)

ITALY	total R&D expenditure in 2010	6844,59 *Millions €*	share	cumulative share
Finmeccanica	Aerospace & defence (271)	1967	28,74%	28,74%
Fiat	Automobiles & parts (335)	1936	28,29%	57,02%
Telecom Italia	Fixed line telecommunications (653)	698	10,20%	67,22%
Intesa Sanpaolo	Banks (835)	252	3,68%	70,90%
UniCredit	Banks (835)	233,28	3,41%	74,31%
Eni	Oil & gas producers (53)	221	3,23%	77,54%
Pirelli	Automobiles & parts (335)	150	2,19%	79,73%
Chiesi Farmaceutici	Pharmaceuticals (4577)	146	2,13%	81,86%

Conclusions

- Innovation is a *fetish* for each capitalist but, contradictory – by means of increasing the general capital organic composition (i.e. substitution of human labour by means of machines) – it generally **accelerates the "natural" fall of profit rate;**
- The IPR system is not equalitarian since SMEs and individual inventors significantly **don´t have the same legal protection degree** of largest enterprises; by means of their both economic and legal power they can induce small subjects to renounce to grant patents, increasing the **capital concentration** in the hands of a couple of owners.
- Both these facts (concentration and fall of profit) **accelerate the capitalistic economic crisis**.

References

- On Industrial Espionage:
  - Schettino, 2005 - **"The Role of Anti-Spying Acts on R&D Patents Dynamics**," *Rivista di Politica Economica*, SIPI Spa, vol. 95(5), pages 125-142, September.
- On Patent activity (SMEs vs. Large Enterprises)
  - Schettino & Sterlacchini, 2009. "**Reaping the Benefits of Patenting Activities: Does the Size of Patentees Matter?**," *Industry & Innovation*, Taylor and Francis Journals, vol. 16(6), pages 613-633.
- On Patent Withdrawals
  - Schettino & Sterlacchini 2009. "**Determinants of patent withdrawals: Evidence from a sample of Italian applications with the EPO**," *World Patent Information*, Elsevier, vol. 31(4), pages 308-314, December
- On Patent Distribution
  - Rota, Schettino & Spinesi 2011: "**Power Law Tails in Inventive Productivity: Their Implications for Growth**", pending to *Research Policy,* Elsevier

In the spirit of Schumpeter, we develop both an empirical and theoretical evaluation of the Black Box of innovation. Especially in last two decades, there have been more theoretical than empirical contributions. Thus, we have firstly preferred analyze different aspects of the innovation process: in particular we have studied the espionage problem, its law of motion and complexity and the inter- industrial knowledge flows, basing the analysis on last three decades US patents data set. First, we show the role of the UTSA (Uniform Trade Secret Act) and the EEA (Economic Espionage Act), issued in 1985 and 1996 respectively, on the contemporary U.S. innovation activity. Moreover, we inquire on the existence of a innovation process law of motion by observing the patent potential applications after its publication founding a common "law" that follows an independent Poisson process. Finally we empirically evaluate the U.S. interindustrial knowledge spillover using the NBER patents data file (1963-1999) by means of patent backward citations showing the relevance of high-tech industries in this process.

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