

The patent international extension, nevertheless, didn't become cross border licensing with a similar to public patenting intensity. A recent analysis of the Italian public patent commercialisation, through direct patent sale and (temporary) licenses, (Abramo and Pugini, 2004), in 44 universities and at Cnr, showed that the geographical proximity and, linked with that, the characteristics of the local environment, are predominant in the Public research system's technology transfer. The (1999-2003) technology transfer was concentrated in the North of Italy regions. Neither the South of the country nor the international market and MNEs were the final buyers/licensees of the public patents. Other two interesting empirical results (even if on a more restricted number of examined cases) are that the main users of the technology transfer are national incumbent firms of medium-large size and that exclusive licenses predominate.

3. Institutional changes and motivation of public inventors

3.1 Institutional factors

Empirical study on the determinants of patenting in the public research system devoted attention to institutional factors that can affect the propensity to patent in the public research institutions:

- the disciplinary field
- the institutional diversity (institution more or less research oriented)
- TTO strategy
- institution's patent history
- the source of funding (contract funding and within it the industrial contract funding)

Patent activity is related to the field of specialization: in life science and engineering it is more frequent to apply for intellectual property right protection. Meyer Krahmer and Schmoch (1998) find out that some technological areas give higher opportunities to patent and innovate.

The TTO is the administrative service created to manage and support the university inventions. The presence and role of a technology transfer office is fundamental, given the low awareness of patenting among public researchers. The effect can be different: it can encourage the disclosure of invention and the patent activity, but also, if highly selective in accepting inventions or conservative in contracting licenses, have a counter productive effect (Siegel *et al.*, 1999). Some authors find that the size of the TTO matters positively (Folz *et al.*, 2000). Carlsson and Fridh (2002) explore the role of TTO in patenting and licensing in 12 US universities. They find that inventions depend on the year of creation of TTO and the number of staff, along with the total research expenditure.

The institution's experience in patenting has an effect on aggregated and individual higher propensity to patent (Stephan *et al.*, 2004).

Azagra-Caro, Carayol and Llerena (2003) have studied the effect of contractual funding by source on public patents (university owned and university invented but owned by industry) in a large University (Louis Pasteur) at laboratory level. Relation with industry and research funded by industry can support patent activities in the public research system. The authors find that contractual funding (public and private) has a positive influence on the generation of institutional patent, even after controlling by laboratory differences (size, discipline, institutional type). But when distinguishing contract fund by public and industrial source, university owned patent is less responsive to industrial fund, than university invented patent (owned by industry).

3.2 Individual factors

The analysis on patenting in public institutions in the socio-economic literature is mainly focused on institutional aspects, while the relation with individual researcher characteristics or the interplay between personal and institutional factors has been less explored. It has been studied mainly in relation to scientific publications. A different path has been