



Networks of inventors and the role of academia: an exploration of Italian patent data[☆]

Margherita Balconi^a, Stefano Breschi^c, Francesco Lissoni^{b,c,*}

^a *Università degli studi di Pavia, Pavia, Italy*

^b *Università degli studi di Brescia, Brescia, Italy*

^c *CESPRI-Università Bocconi, via Sarfatti 25, 20136 Milano, Italy*

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Abstract

This paper proposes a quantitative analysis of social distance between Open Science and Proprietary Technology. A few general properties of social networks within both realms are discussed, as they emerge from the new economics of science and recent applied work on “small worlds”. A new data-set on patent inventors is explored, in order to show that social networks within Proprietary Technology are much more fragmented than Open Science ones, except for science-based technologies. Two propositions are then put forward on the “open” behaviour expected from *academic inventors*, namely university scientists getting involved in Proprietary Technology networks by signing patents. Both propositions are confirmed by data, which show academic inventors to be more central and better connected than non-academic ones. The database and methodology produced for this paper are suggested to be relevant for the more general debate on the role of geographical and cognitive distance in university–industry technology transfer.

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1. Introduction

University–industry knowledge transfer is nowadays a key research subject both in economics and management studies, as well as a top entry in the

science and technology policy agenda of a number of developed and developing countries.

“Distance” between the two realms of academic and industrial research has been increasingly called in to explain whether the former may, or may not, benefit

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* Corresponding author. Tel.: +39-02-5836-3376; fax: +39-02-5836-3399.

E-mail address: lissoni@ing.unibs.it (F. Lissoni).

the latter. Two concepts have attracted most of the attention: *geographical* and *cognitive* distance.

Within the geographical realm, it is usually suggested that both scientific and technical knowledge are largely “tacit” and “non-codifiable”, and require distance-sensitive transmission means such as frequent face-to-face clarifying discussions and on-site demonstrations (Feldman, 1999).

As for cognitive distance, patent citations have been exploited to measure the impact of university patents and scientific publications for innovations in industry, and differences in the relevance of different research fields (Jaffe, 1989; Tijssen, 2001). Data from innovation surveys have provided useful additional evidence on the impact of other academic activities, such as meetings and informal contacts with university researchers (Mansfield, 1995).

These remarks suggest that both geographical and cognitive distance matter in so far as they contribute to reduce a more fundamental kind of distance between the academic and industrial realms, namely *social distance*. The exchange of tacit knowledge between university and corporate researchers requires the two social groups to share some acquaintances and/or a few codes of behaviour in terms of reciprocity and fairness (both in case of market transactions and in case of free sharing). Similarly, academic researchers’ mobility to and from industrial labs (either in the position of employees or entrepreneurs) requires a web of personal contacts for exchanging information on job and financing opportunities, and again some codes of behaviour that do not punish such mobility by portraying it as free-riding.

While case studies on the theme of social distance abound, large-scale quantitative research on the same subject is more of a rare breed, limited as it is by highly demanding data requirements. The present paper summarizes the early results of a research program that aims at producing and exploiting a large data set for Italy, with information on individual inventors’ location, activity, and social ties. To date, the chief output of that program is the EPO-INV data-set on the social ties of Italian inventors, as measured by their participation to patents registered at the European Patent Office, from 1978 to 2000. A nested data-set, named EPO-INV-DOC, identifies those inventors who in 2000 were employed as full and associate professors or researchers by Italian universities.

In Section 2, we discuss our choice of individuals as the key observational units. We first recall the theoretical debate on the role assigned by the ‘New Economics of Science’ to social networks as knowledge diffusion vehicles. Then we illustrate how the EPO-INV database can serve the purpose of exploring the expected general properties of those networks.

In Section 3, we introduce the EPO-INV-DOC database and notion of “academic inventor”, which help moving the measurement of universities’ contribution to patenting away from the institutional to the individual level. The move may be of crucial importance for studying countries such as Italy, where universities are not organized to manage Intellectual Property Rights.

In Section 4 we provide a few exploratory statistics on both the EPO-INV and the EPO-INV-DOC databases, which help identifying the structure of the Italian social network of inventors, and the role played by academic inventors.

In Section 5 we conclude by sketching our future research plans.

2. The new economics of science and the role of social networks

2.1. Describing social networks in S&T: the new economics of science

Recent changes in the economic and sociological conceptualisation of scientific knowledge have forced researchers in the economics of innovation to question, if not to abandon, the treatment of scientific knowledge as a public good, as derived by textbook economics.

Re-thinking of the issue ranges from relatively timid attempts to re-qualify university research advancements as a *local* public good (as in the geographical literature surveyed by Breschi and Lissoni, 2001a, b), to the outright refusal to consider scientific knowledge anything different from a private good (Callon, 1994).

A sort of intermediate position is taken by the self-styled “New Economics of Science”, pioneered by Dasgupta and David (1994). Authors in this tradition share with economic historians such as Rosenberg (1976, 1982) and sociologists of science as Callon (1994) the view that science and technology do not differ in terms of contents or enquiry procedures: both scientific and technological knowledge are described

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