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Title

Multi-Industry Labour Force Skills: Structure and Dynamics

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Extended Abstract

The field of innovation studies contributes significantly to our understanding of the extent to which knowledge drives economic development. The main tenet contemplates three articulations: the multiplicity of forms of knowledge that are generated within evolving economic systems; the variety of processes by which knowledge is organized and diffused; and, the contexts in which different kinds of knowledge are put to use. Ample empirical evidence demonstrates that the most salient mark of knowledge growth is persistent diversity at various levels of aggregation including firms (Bottazzi, et al 2002; Bottazzi and Secchi, 2003; Dosi et al, 2008), industries and sectors (Pavitt, 1984; Mowery and Nelson, 1999; Malerba, 2002), regional (Cooke et al, 1997) and national systems of innovation (Nelson, 1993; Carlsson et al, 2002). The causes of this diversity cannot be reduced to a single factor but, rather, are ascribed to complementary transformations in the knowledge base, the networks of actors and institutional infrastructures (Nelson, 1994; Malerba, 2005). In turn these changes trigger a selection of organizational problem-solving routines that, eventually, accentuates the particular pattern of resource commitment within the innovation system (Amable, 2003; Hall and Soskice, 2001; Whitley, 2007). All the above contributes to the view of cross-industry heterogeneity as autocatalytic engine of capitalistic development (Metcalfe, 2003).

Existing empirical studies on the subject matter take an indirect route to the analysis of knowledge dynamics, and focus on how particular organizational forms associate to "output" such as e.g. productivity, number of patents, profits growth rates, et cetera. This paper proposes an alternative perspective on cross-industry heterogeneity by using a "throughput" measure of knowledge organization, namely the skills that are embodied in the labour force. Drawing on Richardson's (1972) view of industry as a collection of activities we propose that occupations are institutional vehicles for the coordination of knowledge, and that the configuration of industry-specific knowledge is determined by a mutual adaptation of the workforce's skills and tasks. Akin to a DNA code, the mapping of knowledge structures is useful to the effect of detecting specificities and commonalities across industrial sectors. This framework is probed empirically by analysing data on 290 industrial sectors in the United States (US) over the period 2002-2011 to address two specific questions:

(1) How do skill configurations associate to industry groups?

(2) What is the dynamic behaviour within and across industry groups over time?

The present paper contributes various strands of previous literature. First, the notion that the structure of the workforce is an indicator of the organization of industry-specific knowledge highlights a gap, since the relation between labour and technical change is arguably underdeveloped in the area of innovation studies. In relation to this Rosenberg (1976: 86) called attention to the importance of exploring how patterns of resource development and use trigger 'qualitative changes in the human agent as a factor of production'. Our paper operationalizes this thread by identifying specific categories of practical know-how that resonate with recent works on skills (Giuri et al, 2010; Neffke and Henning, 2013). Second, the focus on cross-industry differences adds an important nuance to the prevalently macro approach to the dynamics of occupations (e.g. Howell and Wolff, 1992; Autor et al, 2003) by yielding a novel landscape of industry groups based on the cognitive contents of their activities. Lastly, the paper builds on and moves forward previous exercises of industry classification (e.g. Pavitt, 1984; Castellacci, 2008; Peneder, 2010) by offering a dynamic view that goes beyond the traditional taxonomy of 'sectoral types' and that is instead based on the types of transformative processes that industrial sectors undergo over time.

The paper is structured as follows. Section 2 prepares the ground by connecting industry dynamics with occupational structures as vehicles to apply specific knowledge. The empirical analysis of Section 3 uncovers the association between skill structures and industry types. Section 4 concludes and summarizes.

Keywords: Industry dynamics; Skills; Taxonomy

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