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S.J. Herstad, T.V. Sandven, B. Ebersberger

LABOR MOBILITY AND SCHUMPETERIAN INNOVATION

This text summarizes the presentation by Bernd Ebersberger delivered at the Schumpeterian Lectures 2013 in Perm, Russia. The presentation summarizes joint work of Sverre J. Herstad, Tore V. Sandven and Bernd Ebersberger.

The analysis shows that mobility of human resources fosters diffusion of competences and knowledge, of work practices, routines and work ethics, and of inter-personal networks. These networks provide linkages between organizations from different technological and institutional domains. In this presentation we summarize our analysis of how recruiting, that is the past inflow of human resources, into firms affects the receiving firms' innovation performance.

We use large scale Norwegian data on firm level innovation and labor mobility. In the econometric analysis we find that labor mobility from different sources affect innovation differently.

Keywords: *labor mobility, mobility of human resources, Schumpeterian Innovation.*

Conceptual Framework

Innovation System

The innovation system is conceptualizes as a network of heterogeneous actors such as firms, education organizations, research organizations, the government and other organizations or institutions. These actors are connected through various types of links, they interact in different form on different levels. The concept of the innovation system highlights that this heterogeneous set of actors jointly generates, accumulates and diffuses knowledge, competences and artifacts. This gives rise to the overall target of the innovation system: to facilitate the development, diffusion and utilization of new technologies and innovations (e.g. Edquist, 2005)

On the micro-level firms recognize that competitiveness depends on a firm‘s access to resources and capabilities as captured by the so-called resource based view of the firm (e.g. Wernerfelt, 1984). Reality shows that resources and capabilities are heterogeneous across firms (Peteraf, 1993). In particular knowledge as a core determinant of competitiveness is not evenly distributed across all firms or actors in the innovation system. This is acknowledged in knowledge-based view (e.g. Grant, 1996). Yet a firm’s competitiveness hinges on its ability to combine and recombine old and new knowledge through routines (e.g. Nelson & Winter,

Герстад Сверре Дж. – старший научный сотрудник Северного института исследований в области инноваций, науки и образования (NIFU), докторант Университета Агдера (Норвегия, Осло, Кристиансáнд), e-mail: sverre.herstad@nifu.no.

Сандвен Торе Ванг – старший научный сотрудник NIFU, e-mail: tore.sandven@nifu.no.

Еберсбергер Бернд – профессор Центра менеджмента Университета Инсбрука (Австрия, Инсбрук), e-mail: Bernd.Ebersberger@mci.edu.

1982), where we are to realize that one single actor cannot keep abreast of all relevant knowledge domains that might represent valuable opportunities. If this is the case, competitiveness depends on a firm's ability to compose, establish and maintain internal processes for knowledge generation with the external interfaces for knowledge transfer (Nicholls-Nixon & Woo, 2003). The internal processes can take two forms: first, internal innovation activities and R&D or second experience based learning through doing, using and interacting. Those external interfaces are necessary as the internal capacity of knowledge generation and learning is not sufficient. The external interface activities connect the internal activities to external inputs or stimuli through knowledge transfer. We differentiate between four types of external interfaces: Recruiting, Search, Collaboration, Sourcing. These external interfaces represent the core of interactive learning and knowledge development in an innovation system (Guiliani & Bell, 2005; Graf, 2010).

Recruiting

In the analysis to follow we focus on the first in the above list of external interfaces: recruiting. New employees enter a firm with ideas, information, interpersonal network linkages (Agrawal, et al., 2006) and work routines. These are acquired during the previous career path of the employees. Hence they reflect the organizational, technological and institutional domains of their prior work places. Under certain conditions the inflow of new employees may increase the diversity of the firm’s knowledge bases and it may hence support innovation. The external interfaces are not mutually exclusive and independent as for instance recruitment may be conducive to extending the firm's the search space (Katila 2002)

Generally recruiting (HR) is a generic support process that supplies the general workforce to the firm. We have to emphasize here that generally recruitment is not targeted explicitly to affect the innovation capacity of a firm. Firms hire employees for production, for sales, for management etc. It is reasonable to assume that labor mobility *per se* into the firm does probably not exert a significant effect. For the analysis of mobility effects on innovation activities different categories of mobility must be distinguished (Boschma et al., 2009).

We differentiate mobility types based on cognitive distance and relative absorptive capacity, on the absorptive capacity contingent on characteristics of source and recipient, where the cognitive distance is determined by the similarity of knowledge bases and experience. In particular we differentiate labor mobility by the sector of the previous employment and strongly build on concept of relatedness of sectors as discussed in Frenken et al. (2007) and in Boschma et al. (2009).

Hence we distinguish four different types of mobility: mobility from the same sector, mobility from related sectors, mobility from unrelated sectors, mobility from science system.

Research Question

The general research question that we tackle in this analysis is whether aggregate labor mobility inflows affect the innovation performance of the firms. Additionally we try to identify different effects on different stages in the innovation process that are caused by different types of mobility flows.

This research fills a distinct gap as previous research finds strong evidence for labor mobility effects on firm or plant productivity performance (Moens, 2003; Balsvik, 2011; Maliranta; 2009). The literature also documents strong evidence for inventor and scientist mobility effects on the inventive capacity of firms (Agrawal, Cockburn, & McHale, 2006; Herrera, Munoz-Doyague, & Nieto, 2010; Oettl & Agrawal, 2008; Singh & Agrawal, 2011; Tzabbar, 2009). However, currently the literature says little about labor mobility effects on commercial innovation.

Approach

As mentioned above recruiting is a generic core support process supplying the general workforce to the firm. We base our labor mobility flows on all of the firm's employees with a tertiary degree. Our approach to operationalize the labor mobility flows differs from some of the literature. The mobility flows that we use are not directly targeted to innovation activities (as in Ahlin, Andersson & Schubert, 2013), to high potential or star scientists (as in Singh & Agrawal, 2011), to inventors in general (as in Agrawal, Cockburn, & McHale, 2006), and not intended to facilitate radical change and technological repositioning (Tzabbar, 2009).

Empirical Analysis

Our empirical analysis bases on Norwegian data.

Data

The mobility flows are constructed using the annual linked employer-employee data (2001-2005) which links the employer to each employee in Norway. Each employer and each employee can be identified by unique ID-numbers. We identify labor mobility by a change of the company ID attached to an employee. Additional characteristics of the employer and of the employee can be merged to the mobility flows. Samples from similar data sources have been used for the analysis of firm demography in Nas et al. (2003) for DK, FI, NO, SE; in Ebersberger, (2011) for FI, for the analysis of knowledge spillover effects on firm productivity in Balsvik (2011) for NO; in Eriksson & Lindgren (2009) and in Boschma et al. (2009) for SE; and in Maliranta et al. (2009) for FI. Innovation activities and innovation performance are derived from Innovation Survey Data (2006-08) which can also be merged to the employer data.

Measures

We capture Schumpeterian innovation through three different dependent variables: Innovation activities (dummy), technological invention – patent applied (dummy), commercialized a new product / implemented a new process (dummy). These innovation activities and successes relate to the time period of 2006-2008.

As independent variables we use the aggregated mobility (2001-05) distinguishing between mobility from same NACE 5-digit sector, mobility from related sectors, mobility from unrelated sectors, and mobility from the science system. Our definition of related and unrelated sectors are as in Frenken et al. (2007) or Boschma et al. (2009). As control variables we use Innovation activities, firm demography, market access, and sector.

Results

Figure 1 reports the regression results. For innovation activity, technical invention and product or process innovation.

Dep. Var.	Innovation active		Technical invention		Product/process	
	All firms (N=3,197)		Innovation active firms (N=1,818)			
	m.e.	s.e.	m.e.	s.e.	m.e.	s.e.
Mobility from						
Same sector	-0.984	0.332 ***	-0.018	0.291	-0.705	0.419 *
Related sectors	0.165	0.562	0.239	0.477	1.238	0.683 *
Unrelated sectors	0.927	0.177 ***	0.378	0.157 **	-0.037	0.225
Science system	2.307	1.172 **	2.247	0.778 ***	0.441	1.245
Controls						
Innovation activities	No		Yes		Yes	
Firm demography	Yes		Yes		Yes	
Market access	Yes		Yes		Yes	
Sector	Yes		Yes		Yes	
LL	-1800.23		-1663.12			
df	25		54			
Chi2	627.67 ***		445.66***			
Method	Probit		Bivar. Probit			

Figure 1. Regression results

We find that mobility from science sector increases systematic development work and it increases technological invention. Mobility from related sectors increases new product launch / process implementation. Mobility from unrelated sectors increases systematic development work, increases technological innovation.

Mobility from same sectors reduce systematic development work. Figure 2 illustrates our findings.

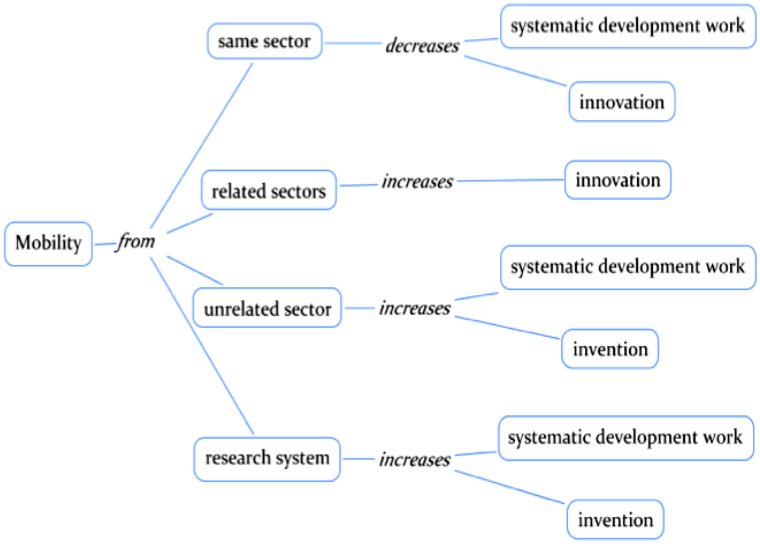

Figure 2. Summary of the findings

Findings

Our results suggest that recruiting from related sectors is a means to employ boundary-spanning individuals for the product and process development process. Recruiting from unrelated sectors and the science sector is a means to employ boundary-spanning individuals to facilitate technical invention. These boundary spanners bridge the knowledge gap between the source and the recipient (Majchrzak et al., 2004). Recruiting from the same sector reduces the likelihood of systematic development work. Comparable results are found in Boschma et al. (2009).

Literature

1. Agrawal A., Cockburn I., McHale J. Gone but not forgotten: knowledge flows, labor mobility, and enduring social relationships // Journal of Economic Geography, 2006. – No. 6(5). – P. 571–591. – doi:10.1093/jeg/lbl016

2. Ahlin L., Andersson M., Torben S. Implementing an R&D strategy without prior R&D-experience: Recruitment as a source of R&D-related routines and capabilities? – Oslo, 2013.

3. Balsvik R. Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing // Review of Economics and Statistics. – 2011. – No. 93(1). – P. 285–297.

4. Boschma R., Eriksson R., Lindgren U. How does labour mobility affect the performance of plants? The importance of relatedness and geographical proximity // Journal of Economic Geography. – 2008. – No. 9(2). – P. 169–190. – doi:10.1093/jeg/lbn041

5. Edquist C. Systems of innovation – Perspectives and challenges. J. Fagerberg, D.C. Mowery, R.R. Nelson (Eds.) // The Oxford handbook of innovation. Oxford: Oxford Universtiy Press, 2005. – P. 181–208.

6. Frenken K., Van Oort F., Verburg T. Related variety, unrelated variety and regional economic growth // Regional Studies. – 2007. – No. 41(5). – P. 685–697. – doi: 10.1080/00343400601120296

7. Giuliani E., Bell M. The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster // Research Policy. – 2005. – No. 34(1). – P. 47–68. – doi:10.1016/j.respol.2004.10.008

8. Graf H. Gatekeepers in regional networks of innovators // Cambridge Journal of Economics. – 2010. – No. 35(1). – P. 173–198. – doi:10.1093/cje/beq001

9. Grant R.M. The resource-based theory of competitive advantage: Implications for strategy formulation // California Management Review. – 1991. – No. 33. – P. 114–135.

10. Herrera L., Munoz-Doyague M.F., Nieto M. Mobility of public researchers, scientific knowledge transfer, and the firm's innovation process // Journal of Business Research. – 2010. – No. 63(5). – P. 510–518.

11. Katila R. New product search over time: past ideas in their prime // Academy of Management Journal. – 2002. – No. 55(5). – P. 995–1010.

12. Majchrzak A., Cooper L.P., Neece O.E. Knowledge Reuse for Innovation // Management Science. – 2004. – No. 50(2). – P. 174–188. – doi: 10.1287/mnsc.1030.0116

13. Møen J. Is Mobility of Technical Personnel a Source of R&D Spillovers? // Journal of Labor Economics. – 2005. – No. 23(1). – P. 81–114.

14. Nås S.O., Sandven T.V., Eriksson T., Andersson J., Tegsjö B., Lehtoranta O. High-Tech Spin-Offs in the Nordic Countries Main report. Survival, STEP Report. – Oslo, 2003.

15. Nelson R.R., Winter S.G. An evolutionary theory of economic change. – Cambridge MA: Belknap Press of Harvard University Press, 1982.

16. Nicholls-Nixon C.L., Woo C.Y. Technology sourcing and output of established firms in a regime of encompassing technological change // Strategic Management Journal. – 2003. – 24(7). – P. 651–666. – doi:10.1002/smj.329

17. Oettl A., Agrawal A. International Labor Mobility and Knowledge Flow Externalities // Journal of international Business Studies. – 2008. – No. 39(8). – P. 1242–1260.

18. Peteraf M.A. The cornerstones of competitive advantage: A resource-based view // Strategic Janagement journal. – 1993. – No. 14(3). – P. 179–191.

19. Singh J., Agrawal A. Recruiting for ideas: How firms exploit the prior inventions of new hires // Management Science. – 2011. – No. 57(1). – P. 129–150.

20. Tzabbar D. When does scientist recruitment affect technological repositioning? // Academy of Management Journal. – 2009. – No. 52(5). – P. 873–896.

21. Wernerfelt B. A Resource based view of the firm // Strategic Management Journal. – 1984. – No. 5(2). – P. 171–180.

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С.Д. Герстад, Т.В. Сандвен, Б. Еберсбергер

ТРУДОВАЯ МОБИЛЬНОСТЬ И ИННОВАЦИИ ПО ШУМПЕТЕРУ

В результате анализа установлено, что мобильность трудовых ресурсов усиливает диффузию компетенций и знаний, практики и опыта, трудовой этики и межличностных отношений. Все эти контакты обеспечивали тесные связи между организациями из разных технологических и институциональных образований. Исследовано, как набор персонала, являвшийся в прошлом притоком труда в компании, влияет на получение компаниями инновационного вида деятельности. Использована огромная информация по Норвегии о соотношении уровня мобильности рабочей силы и инновационности компаний. В части эконометрического анализа делается вывод о различном влиянии мобильности рабочей силы на инновационное развитие предприятия.

Ключевые слова: *трудовая мобильность, мобильность людских ресурсов, инновации*.

Herstad Sverre Johan – PhD, Senior Researcher, Nordic Institute for Studies in Innovation, Research and Education (NIFU) / Postdoctoral research fellow, University of Agder (Norway, Oslo, Kristiansand), e-mail: sverre.herstad@nifu.no.

Sandven Tore Vang – Senior Researcher NIFU (Norway, Oslo), e-mail: tore.sandven@nifu.no.

Ebersberger Bernd – Professor of Management Center Innsbruck (Austria, Innsbruck), e-mail: Bernd.Ebersberger@mci.edu.