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# Mobility and innovation: A cross-country comparison in the video games industry

Cornelia Storz<sup>a,\*</sup>, Federico Riboldazzi<sup>b</sup>, Moritz John<sup>a</sup><sup>a</sup> University of Frankfurt, Germany<sup>b</sup> University of Bologna, Italy

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## ABSTRACT

Open labour markets are often seen as a precondition for innovation, particularly for new industries. However, this view ignores two core findings of the economic systems literature: first, that mobility patterns are institutional microsystems that need to be complementary to other institutions in the labour market; and second, that new industries may be characterised by incremental and complex innovation. Based on these considerations, we ask how mobility affects innovation in the video games industry in the US and Japan. We find that inter-firm mobility is beneficial for innovation in the US, but has negative effects in Japan. We further find that inter-functional mobility is beneficial for innovation in both countries. Our analysis is based on career histories from the video games industry in the US and Japan. We present an empirical study based on the game development of 815 video games and the careers of 28,426 video game developers who were involved in the development of games released between 1999 and 2009.

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## 1. Introduction

Innovation is critical to competitiveness and growth. This is why most countries orient their innovation systems towards a “growth regime” (Audretsch and Thurik, 2000) that includes developed venture-capital markets, well-defined intellectual property rights, dense science–industry relations, market-based industrial organisations, and open labour markets (Audretsch and Fritsch, 2002; Jaffe, 2000; Lerner, 2009). The OECD’s (1994) *Jobs Study*, the European Council’s (2000) *Lisbon Agenda*, and Keidanren’s (1996) policy statements all follow the idea that increased labour mobility not only helps to reduce unemployment, but also enhances innovation, including facilitating the rise of new industries. In this view, a labour market design that allows for a high degree of labour mobility (that is, inter-firm mobility) is beneficial for innovation.

However, although research on the design of capital markets, intellectual property rights, science–industry linkages and their impact on innovation is well developed (for example, Angel, 1991;

Aoki, 2002; Audretsch and Thurik, 2001; Jaffe, 2000; Lerner, 2009), several scholars (Acharya et al., 2010; Zhou et al., 2011) have highlighted a lack of research on the relation between labour mobility and innovation. Research on labour markets so far has mostly focused on allocation efficiency and unemployment (Boulhol, 2009; Hall et al., 2006; Nickell and Layard, 1997; Nickell and Layard, 1999; Nicoletti and Scarpetta, 2003).

The existing literature on labour mobility and innovation presents polar views. On the one hand, some authors argue that inter-firm mobility is beneficial for innovation (Kaiser et al., 2011; Söllner, 2010). This literature is motivated by the success of high-tech clusters, for which empirical evidence has, with few exceptions (Schankerman et al., 2006), shown that job changes enhance knowledge spillovers through social-network effects (Almeida and Kogut, 1999; Angel, 1991; Breschi and Lissoni, 2003; Owen-Smith and Powell, 2004), so that also the prior location of the inventor benefits from the move (Aime et al., 2010; Agrarwal et al., 2006). On the individual level, inter-firm mobility helps to avoid cognitive “lock-ins” due to sunk costs of past investment decisions into education. This facilitates knowledge creation, which is often linked to the destruction of existing knowledge stocks (Ichniowski and Shaw, 1995, see also Hoisl, 2007). Hence, the underlying mechanism

\* Corresponding author. Tel.: +49 (0)69 798 34809; fax: +49 (0)69 798 35019.  
E-mail address: [storz@wiwi.uni-frankfurt.de](mailto:storz@wiwi.uni-frankfurt.de) (C. Storz).

that links mobility and innovation is the individuals' cognitive flexibility.

Other researchers claim the opposite; namely, that long-term employment is beneficial for innovation. Long-term employment encourages firms to invest into firm-specific knowledge, and reduces management bureaucracies needed for monitoring and control (Acharya et al., 2010; Naastepad and Storm, 2006). Longer tenures are also beneficial for developing a historical memory of the "learning organisation" (Zhou et al., 2011). Too-frequent job changes may reduce commitment and loyalty, and thereby an employees' readiness to share knowledge (Zhou et al., 2011; Harcourt and Wood, 2007). In short, firm-specific investments are identified as the main mechanism in relation to why less inter-firm mobility is beneficial for innovation.

Within the research on labour mobility and innovation, few academics have taken into consideration the different institutional environments in which inter-firm mobility takes place. Given the rich literature on the diversity of economic systems (Cohen, 2009; Hall and Soskice, 2001; Whitley, 1999), the lack of research regarding this link is surprising, especially since Casper and Whitley (2004) emphasised the importance of the economic system for new industries. A core finding of the literature is that institutional complementarities within economic systems are crucial for positive performance, and that a lack of such complementarities leads to negative performance (Amable, 2004; Hall and Gingerich, 2009; House et al., 2004). Therefore, complementarities have an important level-effect on performance. As labour markets can be perceived as a system of interconnected institutional microsystems (that is, inter-firm mobility patterns), this study looks at the role of complementarities between these institutional microsystems within different labour markets, and differentiates between two economic systems with opposing mobility patterns; that is, those of the US and Japan.

Also relevant here is the fact that few scholars have captured the different innovation properties among new industries, and how these properties relate to other forms of mobility. Despite the established differentiation of innovation into radical and incremental (Garcia and Calantone, 2002), new industries are mostly associated with radical innovation, such as information communication technology, or biotechnology (Almeida and Kogut, 1999; Breschi and Lissoni, 2003; Casper, 2007; Corredoira and Rosenkopf, 2010; Frederiksen and Sedita, 2005). However, new industries may also adopt incremental forms of innovation. Given the long-established differentiation of innovation, the lack of research regarding this link is surprising, especially since Subramaniam and Youndt (2005) emphasised the link between different forms of innovation and different forms of capabilities. In contrast to radical innovation, incremental innovation tends to exploit and extend given knowledge stocks, and therefore requires capabilities that combine and integrate new knowledge with existing knowledge (Casper and Kettler, 2001; Casper and Whitley, 2004; Whitley, 1999). These capabilities are typically acquired by inter-functional mobility, as knowledge-flows across functional boundaries enable individuals to revisit the ways in which old and new knowledge components are combined (Jansen et al., 2005). This study therefore also looks at the role of inter-functional mobility for innovation.

In this paper, we aim to analyse the link between mobility and innovation in different national business systems. We address the question how mobility affects innovation in different national business systems. We refer to two different types of mobility; that is, individual moves between firms (inter-firm mobility) and between functions (inter-functional mobility). The data used for this study was obtained from MobyGames, which is the largest video game database in the world. Based on this data, we analyse the inter-firm and inter-functional mobility of 28,426 video game developers in the US and Japan, and the effect of their mobility on the

innovativeness of video games.<sup>1</sup> Our main finding is that the effect of inter-firm mobility on innovation depends on complementarities between mobility patterns within a national business system. To put this differently, complementarities between mobility patterns have a performance-level effect: their existence leverages performance, while their absence lowers performance. We further find that inter-functional mobility positively affects innovation, independently from the national business system.

Our paper makes several contributions. First, using economic systems theory (Amable, 2000, 2004; Hall and Soskice, 2001; Whitley, 1999), we discuss the mechanisms that cause different forms of mobility to shape innovation. Second, we provide specific hypotheses concerning the effect of inter-firm mobility on innovation. We test these hypotheses using a two-country sample, wherein the two countries – the US and Japan – have opposing institutional properties. We show that matching mobility patterns have important level effects. Third, we analyse inter-functional mobility in a new industry with incremental properties. Previous research has confined itself to new industries that contain more radical properties (Almeida and Kogut, 1999; Breschi and Lissoni, 2003; Casper, 2007; Corredoira and Rosenkopf, 2010; Frederiksen and Sedita, 2005). We demonstrate that knowledge-flows across functional boundaries positively affect innovation, independently from the national business system.

## 2. Theoretical framework and literature review

The economic literature has long recognised that performance depends on resources and capabilities (Barney, 1991, 2001), and that human capital such as skills and abilities (Becker and Tomes, 1986) provides the basis for a firm's innovativeness (Brynjolfsson and Hitt, 2000). The conventional wisdom is that a firm's stock of knowledge is embodied in its human capital resources (Bartel, 1989; Laursen et al., 2005). While this general stance is well accepted, less is known about how human capital should be composed in order to positively affect innovation in different economic systems. This paper aims to fill this gap and provide an empirical contribution to the literature.

### 2.1. Diversity of economic systems and institutional complementarities

Many policy-related initiatives suggest that inter-firm mobility triggers innovation (OECD, 1994; Lisbon European Council, 2000; Keidanren, 1996). In addition, boundaryless career theories that postulate a new "status quo" in modern career-building (Arthur and Rousseau, 1996; Inkson et al., 2012), have become increasingly prominent. The few empirical works on inter-firm mobility and innovation (that is, on how job changes between firms and innovation are interrelated) either argue that labour markets characterised by a high degree of mobility are supportive for innovation because they enhance knowledge creation (Møen, 2000; Söllner, 2010; Kaiser et al., 2011), or assert that a low degree of mobility is supportive of innovation because only then are firm-specific skills acquired (Acharya et al., 2010; Lucidi and Kleinknecht, 2010; Zhou et al., 2011).<sup>2</sup>

Arguments in favour of mobility are inspired by works on high-technology clusters and creative industries, both of which have

<sup>1</sup> Because the indicator for a game's innovativeness (MobyRank) is only available for teams, we calculated the average individual mobility per development team and used this value as the explanatory variable of interest in our regression. For the remainder of the paper we use the term "individual mobility".

<sup>2</sup> However, the effect of innovation and technological progress on employment has long been a topical issue in economics (for an overview, see Pianta, 2003).

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