

Effect of technological innovation and diffusion on the interindustry mobility of Brazilian workers[☆]

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Available online 20 November 2014

Abstract

This paper aims to investigate the effects of investment in industrial R & D on the mobility of workers between firms and/or industrial sectors in Brazil, considering that the technological gap between the sectors can reduce the propensity for interindustrial labor mobility. Using panel data for the period 2003–2008, constructed from microdata RAIS-Migra and industry data from the Brazilian Technological Innovation Survey (PINTEC), the Annual Industrial Survey (PIA) and input–output matrices, we estimate a multinomial logit model with random intercepts (GLLAMM – Generalized Linear Latent and Mixed Models). The main results show that the technological diffusion increases the chances of changing jobs, the technological variables have greater importance for unskilled workers than for skilled, and among non-intensive technology industries, the technological innovation can have positive impact on interindustrial mobility.

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Keywords: Technological innovation; Technological diffusion; Mobility of workers; Multinomial logit; GLLAMM

Resumo

Esse artigo tem por objetivo investigar os efeitos do investimento em P&D industrial sobre a mobilidade de trabalhadores entre firmas e setores industriais brasileiros, considerando que a distância tecnológica entre os setores pode reduzir a propensão à mobilidade intersetorial de trabalhadores. Com o uso de um painel de dados para o período de 2003–2008, construído a partir de microdados da RAIS-Migra e de dados setoriais provenientes da Pesquisa de Inovação Tecnológica (PINTEC), da Pesquisa Industrial Anual (PIA) e de matrizes de insumo-produto estimou-se o modelo logit multinomial com interceptos aleatórios (GLLAMM - Generalized Linear Latent and Mixed Models). Os principais resultados obtidos mostram que: a difusão tecnológica aumenta as

[☆] Article award at the Category Industrial Economy, of the CNI Prize in Economics in 2012. The authors also acknowledge the support from CNPq (the Brazilian agency for research support) and from FAPEMIG (the Minas Gerais Research Support Foundation) for financial support to carry out this work. The authors are also grateful to the Brazilian Ministry of Labor and Employment (MTE), who provided data access. We wish to thank the anonymous referee for many helpful suggestions.

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Peer review under responsibility of National Association of Postgraduate Centers in Economics, ANPEC.

chances de mudança de emprego; variáveis tecnológicas possuem maior importância para os trabalhadores não qualificados do que para os qualificados; e, entre os setores não intensivos em tecnologia, uma inovação pode ter impacto positivo sobre a mobilidade intersetorial.

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Palavras-chave: Inovação tecnológica; Difusão tecnológica; Mobilidade de trabalhadores; Logit multinomial; GLLAMM

1. Introduction

The mobility of labor is a means of acquiring technological knowledge to the recipient firm (Song et al., 2003). As part of technological knowledge is tacit in nature, lying embodied in the individual, labor mobility is also a channel of knowledge spillover, from which the receiving firm takes advantage of (Feldman, 1999; Hall et al., 2010; Marilanta et al., 2009). From this viewpoint, the mobility of workers influences the activity of R & D.

On the other hand, there is little evidence in the opposite direction, considering the investment in R & D, and technological progress in the sector, as a possible cause of the propensity to mobility of workers between firms, or even between sectors. Based on Magnani (2009), it is assumed the hypothesis that the larger the technological distance between the industries, smaller is the possibility of interindustrial transfer of workers, as the distance of technology between companies and industries is related to the cumulative amount of individual's specific human capital. In this sense, once transferred from one job to another, the individual cannot adapt to the requirements in terms of skills, of the new job.

Magnani (2009) is one of the few empirical studies that investigate this direction of causality, bringing evidence to the United States. Furthermore, the purpose of this article is to extend this body of evidence for cases related to developing countries such as Brazil, which has peculiarities in its sectoral trajectories of technological development, marked by industrialization for the domestic market, technological dependence on developed countries, imports of capital goods and relatively large weight of multinational firms in more technologically advanced sectors (Viotti, 2002; Viotti et al., 2005; Queiroz and Carvalho, 2005; De Negri et al., 2005.).

In this sense, more technologically mature industries have relatively large weight in the industrial structure of countries like Brazil, which is reflected in the indicators of technological effort compared to more developed countries. Thus, the sectors considered as high-tech by OECD¹ classification would present, in emerging countries, lower participation in R & D spending compared to the same sectors in developed countries. At the same time, it is observed in Brazil larger industrial weight and technological efforts in sectors that belong to the metal-mechanical industry (machinery, electrical and automotive equipment, basic metals, metal products) and to the basic chemistry (chemical, refined petroleum products, and rubber and plastics) (Furtado and Carvalho, 2005).

In this article, we intend, specifically: (1) to test whether measures of innovation and technology diffusion affect the patterns of sectoral mobility of Brazilian workers; (2) to evaluate the differences between the outcomes for skilled and unskilled workers and for those in high and low-tech sectors; and (3) to evaluate differences in the determinants of mobility between firms and sectors, in relation to the permanence in the same firm.

For the Brazilian case, we propose a multinomial logit model with random intercepts whose procedure is performed from the Generalized Linear Latent and Mixed Models (GLLAMM). The GLLAMM method has econometric advantages over the standard multinomial logit models, given the restrictive nature of the assumption of independence of irrelevant alternatives (iia) of the latter. Thus, this model appears more appropriate as it dispenses this hypothesis and, further, with the inclusion of random intercepts, allows the control of the sectoral unobservable heterogeneity.

¹ The OECD ranks high technological intensity sectors: aerospace, pharmaceutical, computer, electronics and telecommunications, and instruments; medium-high, electrical material, motor vehicles, chemical industries, excluding pharmaceuticals, and rail transportation equipment industry, and machinery and equipment; medium-low, shipbuilding, rubber and plastic products, coke, refined petroleum products and nuclear fuels, other non-metallic products, basic metal and metal products sectors; Low: other sectors and recycling, wood, pulp and paper, publishing and printing, food, beverages and tobacco, textiles and apparel, and leather and shoes.² This study considers skilled individuals the ones with complete higher education whereas unskilled the ones that have at most incomplete higher education.

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