



Human capital intensity in technology-based firms located in Portugal: Does foreign ownership matter?



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ABSTRACT

This paper contributes to the scarce empirical literature on the impact of foreign ownership on human capital intensity. New evidence is provided, based on a comprehensive, large-scale survey of technology-based firms located in Portugal. The key findings are that: (1) foreign ownership *directly* (and significantly) impacts a firm's *general* human capital (education); (2) foreign ownership *indirectly* (and significantly) impacts a firm's *specific* human capital (skills); (3) the total impact of foreign ownership on a firm's human capital intensity is higher for education- (general) than for skills- (specific) related human capital intensity. Giving the critical importance of both FDI and human capital development for an 'intermediate' economy like Portugal (lagging behind in terms of human capital stock, and seeming to have lost part of its attractiveness as an FDI location), the paper discusses related policy implications. It is believed that our results and conclusions may be useful for other countries facing similar challenges.

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1. Introduction

Human capital and foreign direct investment (FDI) are widely seen as key engines of economic growth and development (Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991; Dunning, 1993; Mah, 2010; Teixeira and Fortuna, 2010; Ahmed et al., 2011).

Human capital represents the knowledge and skills that individuals bring to an organization (Dimov and Shepherd, 2005). It can be acquired and developed through both education ('general' human capital) and professional experience/skill ('specific' human capital), contributing to both the explicit and tacit knowledge of the firm.

While there is considerable literature focusing on either FDI or human capital in isolation, the specific link between the two has been less researched, particularly at the level of the firm. The issue has further interest given a potential two-way causality between human capital and FDI. Human capital has been recognised as an important FDI determinant (Noorbakhsh et al., 2001; Mengistu and Adhikary, 2011). In turn, foreign-owned companies might be relevant contributors to human capital formation, as they affect both the demand and supply of skilled labour (Slaughter, 2002; Bellak, 2004; Krammer, 2010; Belderbos et al., 2013). Most extant work focuses on the first direction of impact. Studies highlighting the impact of FDI on human capital formation are scarce, rather

exploratory (typically opinions and conceptual literature reviews) and mainly based on developing countries. The most comprehensive collection of papers, resulting from a technical meeting on FDI, human capital and education in developing countries, can be found in OECD (2001).

Even though there are very comprehensive and useful literature reviews (e.g. Blomström and Kokko, 2003; Rasiah, 2005; Majeed and Ahmad, 2008), empirical studies are very scarce. An exception is Narula and Marin (2003), a thorough empirical study comparing foreign-owned versus domestic firms in Argentina as regards the quantity and quality of human capital they employ, further linking that to technological spillovers. The present paper contributes to this scarce empirical literature on the relationship between human capital and FDI by investigating the relevance of foreign ownership for the human capital intensity of technology-based firms (TBFs) located in Portugal.

TBFs gained increased attention from governments and scholars owing to their expected highly innovative performance and growth (Czarnitzki and Delanote, 2013), being recognized as responsible for many innovations that can potentially form the basis of a country's future economic and employment growth (Storey and Tether, 1998; Ganotakis, 2012).

Governments increasingly spend huge sums of money to attract research and development (R&D) intensive FDI, with the expectation of creating high quality jobs, further R&D investments, and promoting innovation in various fields (Gelübcke, 2013). Despite the recognition of the importance of TBFs, and albeit a few high quality empirical studies address the role of human capital on

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the performance of such firms (Colombo and Grilli, 2005, 2010; Ganotakis and Love, 2012), to the best of our knowledge no published empirical contributions exist relating TBFs' human capital intensity and FDI.

This paper focuses on an under-researched empirical setting, Portugal, for which no similar study exists. Moreover, the themes of FDI and human capital development are particularly relevant to this 'peripheral' (Benito and Narula, 2008) or 'intermediate' (Molero, 1995) European economy, marked by convergence difficulties *vis-à-vis* the European Union, and with a considerable human capital and technological disadvantage *vis-à-vis* developed countries in general (Soukiazis and Antunes, 2013). Additionally, Portugal embraced recently a proactive FDI attraction policy, recognizing the potential role foreign multinationals could have in upgrading Portugal's industrial fabric and in the accumulation of competences. Therefore, the theme underlying this paper is a critical one, not only for the Portuguese economy, but also for other countries with similar challenges.¹

Given the well documented relevance of human capital for organizations' innovative and economic performance (Unger et al., 2011; Frank and Obloj, 2013; Santarelli and Tran, 2013), especially those characterized by high levels of knowledge-intensity (Bosma et al., 2004), such as TBFs, this paper's main research question is: *Does foreign ownership matter for the ('general' and 'specific') human capital intensity of TBFs located in Portugal?*

The remainder of the paper is structured as follows. Section 2 reviews extant literature on human capital and FDI, highlighting their connection with economic growth and development, and puts forward the hypotheses tested in the paper. Section 3 presents the data, providing descriptive statistics on respondent TBFs located in Portugal, specifically concerning their human capital traits and foreign ownership structure. The following section explains the empirical methodology, presents the econometric models estimated, and discusses the results obtained. The final section concludes and derives policy implications.

2. Human capital, FDI and technology: literature review and hypotheses development

2.1. Some considerations on the key concepts: human capital and foreign ownership

Since the late 1980s, human capital, in particular in its dimension of educational attainment, became increasingly associated with economic performance and international competitiveness (e.g. Aldcroft, 1992; van Hemert and Nijkamp, 2010). Human capital is currently defined by the OECD as the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being (Keeley, 2007). This concept is, however, not recent. Schultz (1961: 2), one of the founders of the Chicago School of human capital analysis, argued that “[b]y investing in themselves [through education in

¹ The so-called 'intermediate' economies (Molero, 1995; Pearce and Papanastassiou, 1999; Fontes, 2001; Bell and Marin, 2004) present considerable human capital and technological disadvantages compared to more developed countries. The attraction of inward FDI may be a promising strategy for narrowing down this human capital (and innovation) gap. In Table A1 (in Appendix), we present a sample of these 'intermediate' economies; these include the BRICS (Brazil, Russia, India, China and South Africa), Argentina and Chile (in Latin America), Turkey, and the so-called 'moderate innovators' from the EU (Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Portugal, Slovakia, Spain). The bulk of these 'intermediate' economies have been recently classified by Castellacci and Archibugi (2008) and Stöllinger (2013) in the 'followers' or 'imitation' clubs, respectively, as they present a considerable innovation gap *vis-à-vis* the economies in the more advanced groups, often not performing their own R&D but being quite capable of adopting foreign technologies.

schools, colleges or apprenticeships, or by on the job experience] people can enlarge the range of choice available to them.” With the emergence of the so-called 'endogenous growth theories', an important role – “the engine of growth” (Ehrlich, 1990) – has been assigned to human capital. The development of both the Lucas (1988) approach (inspired by the work of Becker) and the work of Nelson–Phelps (1966) converge in a positive effect of educational attainment on workers' productivity workers, hence on firms' and countries' growth.

Nowadays, most economists and policy-makers consider human capital, in its distinct attributes (formal education, experience, skills), a key productive asset, highly complementary with technological capital.

At the level of firms, the link between organizational human capital and performance is usually understood in the context of the resource-based view of the firm (Penrose, 1959), which associates superior performance to the possession of resources that are valuable, rare, inimitable, and non-substitutable (Rumelt, 1984; Barney, 1991). Although the basic principle of human capital theory is that the greater is the individual's human capital, the better the performance at a particular task (Becker, 1964), the nature of this proposition needs to be changed in a firm's setting in order to account for the interaction among its collaborators in the context of a particular organizational activity (Spender, 1996). It is useful here to consider the distinction between 'general' and 'specific' human capital. Following Becker (1964) and Acemoglu and Pischke (1999), 'specific' human capital is the one that can be used within the context of a specific job or a specific firm, while 'general' human capital can be used across jobs, firms and industries. In the relevant empirical literature, education levels are taken as good indicators of some form of general human capital, whereas working in a job can lead to the accumulation of specific human capital (Kriechel and Pfann, 2005). Thus, human capital intensity can be proxied by the proportion of firms' employees that possess post-secondary education ('general' human capital intensity) or that perform engineering related tasks ('specific' human capital intensity).

The vast majority of the empirical works on human capital involve country level analyses, generally yielding positive results (e.g., Barro and Lee, 1993; Hanushek, 2013), focusing on issues of economic growth (Wößmann, 2003; Teixeira and Fortuna, 2010) or rate-of-return analysis (Sianesi and van Reenen, 2003; Folloni and Vittadini, 2010). Empirical studies on human capital at firm or establishment level are in much inferior number than those related to more aggregate analyses (Teixeira, 2002; Mendes et al., 2012). Notwithstanding, in extant literature on firms and human capital there is a wide consensus that human capital leads to growth or increased performance of business ventures (Unger et al., 2011).

FDI is nowadays a very topical issue and a particular focus of policy in many countries owing to its sheer scale and importance, as well as to its relevance to policy-makers as it is seen as a fast-track panacea for growth and development (Hanson, 2001; Young, 2004; Young and Tavares, 2004; Girma et al., 2009; Rosell-Martinez and Sanchez-Sellero, 2012). Most countries (developed and developing) scramble to attract FDI projects (Oxelheim and Ghauri, 2003), based on the common wisdom, or the “stylised fact” that multinationals bring positive externalities (“spillovers”) to the domestic economy, stimulating development, growth, employment (quantity and skill upgrading/human capital development), wages, exports, technological and managerial innovation, productivity, domestic entrepreneurship and other impacts. Regarding the latter impacts one may highlight demonstration, agglomeration, competition and linkage effects. Demonstration effects occur when domestic firms observe the behaviour and practices of foreign MNEs and emulate them, and in so doing enhance their efficiency (Wang and Blomström, 1992; Bengoa and Sanchez-Robles, 2003; Zhang, 2001; Glass and Saggi, 2002). Agglomeration effects reflect

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