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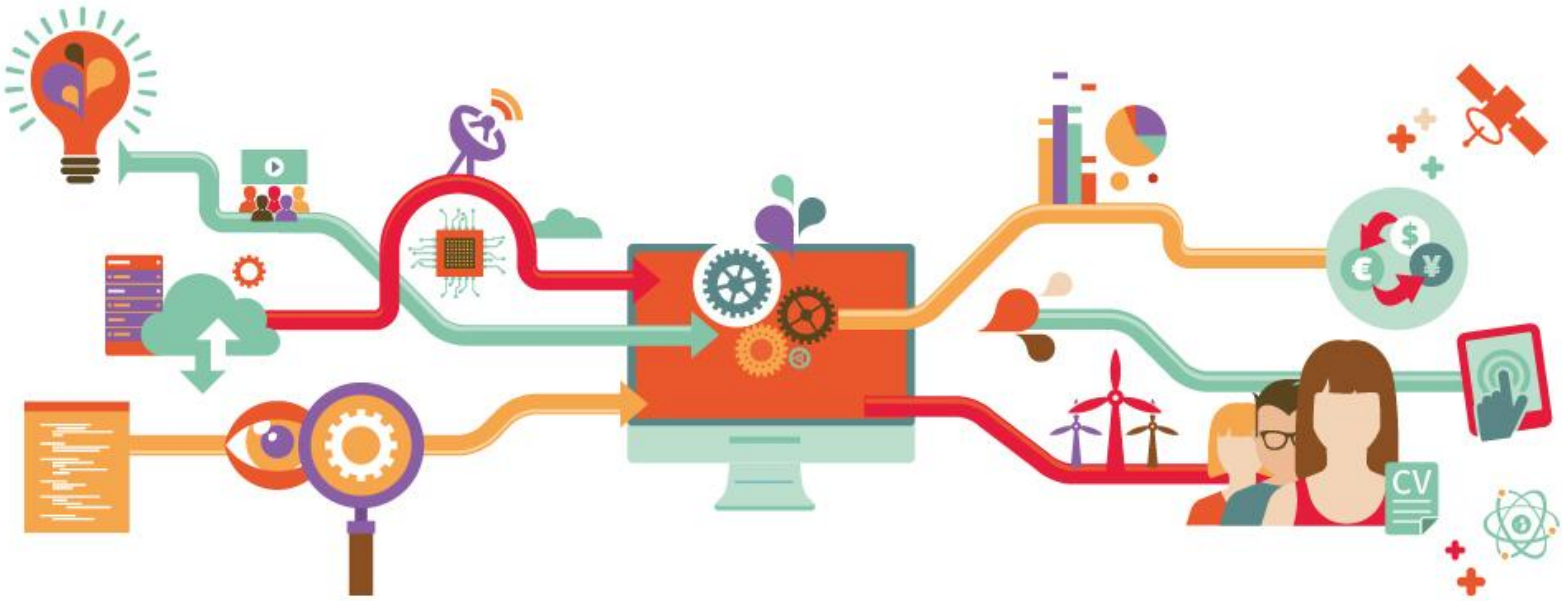

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The impact of skill endowments and collective bargaining on knowledge-intensive greenfield FDI

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Abstract

This paper assesses the contribution of skilled employment and labour market conditions to the ability of attracting knowledge intensive and manufacturing greenfield FDI. We carry out our analysis by controlling for a wide range of labour market features, such as the collective bargaining coverage rate, the non-wage labour costs, and the occupational skills of employment. It departs from the existing literature in two respects. First, it deepens the analysis on the effect of labour market regulations and skills endowments on greenfield FDI inflows. Second, it investigates the extent to which labour market characteristics matter for discriminating among 'resource-seeking' and 'efficiency/strategic asset-seeking' greenfield FDI activities (e.g. manufacturing versus knowledge-intensive foreign investments, respectively).
Our empirical analysis suggests that the quality of employment and the technological knowledge base have different impact on the location of knowledge-intensive and on low-cost labour-intensive manufacturing foreign investments. Further, associating the collective bargaining coverage of unions with the level of regulation in the labour market, our results can provide insights into the effectiveness of labour market policies that aim at attracting knowledge-intensive investments.

The impact of skill endowments and collective bargaining on knowledge-intensive greenfield FDI

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This paper assesses the contribution of skilled employment and labour market conditions to the ability of attracting knowledge intensive and manufacturing greenfield FDI. We carry out our analysis by controlling for a wide range of labour market features, such as the collective bargaining coverage rate, the non-wage labour costs, and the occupational skills of employment. It departs from the existing literature in two respects. First, it deepens the analysis on the effect of labour market regulations and skills endowments on greenfield FDI inflows. Second, it investigates the extent to which labour market characteristics matter for discriminating among 'resource-seeking' and 'efficiency/strategic asset-seeking' greenfield FDI activities (e.g. manufacturing versus knowledge-intensive foreign investments, respectively).

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1 Introduction

The long-term benefits of foreign direct investments (FDI) on productivity growth and employment awakened the interest of policy makers in the mechanisms and factors that could help a country to be an attractive location for multinational enterprises (MNEs) investments. Much of this attention has been dedicated to the role of labour skills and domestic labour market institutions. On the one hand, the knowledge capital model literature (Markusen, 1997; Carr et al., 2001; Yeaple, 2003) points at two main motives for firms to engage in FDI. First, MNEs produce in multiple countries to avoid costs associated with international trade. In this respect, market size plays a critical role in determining the distribution of FDI, since international trade costs are proportional to the size of the market and to the scale of sales. Second, as knowledge-intensive activities such as R&D can be geographically separated from production, the firms locate their R&D activities where skilled labour force is cheap and/or abundant.

The role of high-level human capital as a key determinant of innovation-related foreign investments has also been highlighted by the R&D internationalisation literature (Narula and Zanfei, 2005; Dunning and Lundan, 2009; Moncada-Paternò-Castello et al., 2011; Rilla and Squicciarini, 2011, among others).

With respect to labour market institutions, a strand of international economics literature dealing with labour markets (Zhao, 2001; Naylor and Santoni, 2003; Aloi et al., 2009) suggests that a strong trade unionisation could render a country less attractive for FDI, due to the unions' rent-extraction activities that would limit a firm's profitability. Empirical evidence on this issue is scarce, and both theoretical predictions and empirical findings are often inconclusive (Krzywdzinski, 2014).

In this paper, we investigate the role of labour skills and labour market characteristics, such as collective bargaining, and explore to what extent the domestic labour skills and labour market institutions differ between types of greenfield FDI (gFDI) activities.[1] In particular, we study the heterogeneous impacts of labour market characteristics on knowledge-intensive versus manufacturing gFDI.

Indeed, Dunning's (2000) taxonomy of FDI rationales suggests that the determinants of FDI inflows might depend on (and differ across) firms' motivations. This heterogeneity in motivations behind gFDI activities might in part explain

[1] A greenfield investment is the creation of a subsidiary from scratch by non-resident investors. *Source*: www.imf.com. Such an investment, as compared to mergers and acquisitions, are more likely to yield positive returns in terms of economic growth, employment, productivity, as well as to favour technological spillovers (Falk, 2012).

the non-homogeneous results found in the empirical FDI literature which does not discriminate across different types of FDI. In this respect, while manufacturing gFDI might be seen as 'resource-seeking' activities where enterprises invest abroad to acquire particular and specific resources, such as natural resources or unskilled labour at a lower cost, knowledge-intensive gFDI could be considered as 'efficiency-seeking' or 'strategic asset-seeking' activities, with the objective of generating economic rents through the exploitation of host firm technological assets generated through R&D investments.

Therefore, our paper contributes to the empirical literature of FDI determinants by advancing and testing the hypothesis that along with country and industry-specific factors, the skills of the domestic workforce and the labour market institutions influence the gFDI inflows, and that the impact of these labour market characteristics differ between knowledge-intensive and traditional industrial activities. Moreover, due to the likely existence of an indirect effect of a coordinated wage bargaining system on FDI, we take into account the mediating effect of non-wage labour costs, such as payroll taxes, hiring and firing costs (adjustment costs). Labour taxes, the social security and insurance contribution create a wedge between the cost of a worker to an employer and the wage received. This wedge is measured by the non-wage labour costs. Navaretti et al. (2003) suggest that, in the presence of country-specific regulations concerning employment protection, MNEs are better positioned to by-pass labour market rigidities by simply shifting employees from one subsidiary to another. Countries with a flexible labour market (lower labour adjustment costs), where it is relatively easier to dispose of unwanted employment, would then be a more appealing location for subsidiaries.

The paper employs project-level information on gFDI. To the best of our knowledge, the very few works that have investigated the determinants of gFDI using project-level data include those of Castellani et al. (2011) and Falk (2012). Building on these studies, our paper provides further empirical evidence on the determinants of knowledge-related greenfield foreign projects, and it departs from them in three respects. First, the study of Falk (2012) does not focus on the contrast of determinants of FDI among knowledge-intensive and non knowledge-intensive activities. Second, while the the work of Castellani et al. (2011) reports evidence on the heterogeneity of determinants among the types of gFDI, it does not uncover the effects that different labour market features (e.g. labour skills and labour market institutions) have on a country's gFDI inflows. Lastly, our study considers only the host countries characteristics. Indeed, even though the location of knowledge-intensive

gFDI is driven by the interplay of host country characteristics and parent company strategies, it needs to be acknowledged that the technological strategies of foreign MNEs are outside the scope of influence of national policies.

Additionally, the paper introduces a measure of job-related skills which is novel to the literature of FDI determinants. Using the International Labour Organization (ILO) indicator of employment by country and economic activity, we adopt a skills index derived from the groupings of occupations with similar tasks and duties.

As defined by the ILO, skill levels can be distinguished by the degree of simplicity or complexity in achieving the job-related tasks, which can generally be matched either to some level of education or directly to professions. This index provides a finer measurement of the skills distribution within an economy or a sector, at least when compared to the traditional divide between skilled and unskilled workers. Indeed, employment occupational data allow for a better monitoring and impact analysis of the staffing patterns at the firm level (Eichhorst and Marx, 2015).

The project-level data on greenfield FDIs from the Financial Times is aggregated at the industry level to match data on non-wage labour costs and skills from the Organization for Economic Cooperation and Development (OECD) and the ILO.

The next section presents a brief review of the literature. Section 3 describes the data and the methodological approach. Section 4 discusses the results of the econometric estimations. Section 5 concludes.

2 Review of the existing literature

The economic literature has extensively investigated the factors that may render a country more attractive for international investments. Several studies offer critical discussions of the main factors that influence the magnitude and directions of FDIs in general (Blonigen, 2005; Bénassy-Quéré et al., 2007), or innovation-related FDIs in particular (Narula and Zanfei, 2005; OECD, 2008, 2011). Such factors include the industry- (factor intensity, scale economies, differentiation), technology-,[2] and firm-specific characteristics (e.g. managerial and marketing capabilities, technologies, know-how skills, etc.), the economic and institutional conditions prevailing in the home and host countries (e.g. market size and growth, productivity, science and ICT resources and infrastructure, taxation, legal environment, labour market

[2]See Franco (2012) for a dedicated empirical study.

regulation, etc.), as well as the international institutions reflecting the terms of exchanges between countries.[3]

Within this literature, much of the discussion has been dedicated to the characteristics of domestic labour market and the market size in explaining the FDI location decisions. Prior studies suggest that MNEs will engage into FDI for market access motives, to minimize the costs associated with international trade, for comparative advantage motives to benefit from relatively cheaper and/or abundant skilled-labour (Carr et al., 2001; Yeaple, 2003). Building upon the knowledge capital model (Markusen, 1997, 2004) and using US affiliates data, Carr et al. (2001), and later on Yeaple (2003) on industry level data, find support for the key role of market size in determining the distribution of FDI. In the frame of the knowledge capital model, this is interpreted as a validation of the market access motive. However, evidence on the positive impact of skilled-labour abundance is less straightforward. As pointed out by Yeaple, much of the variance in the level of US affiliates sales is explained by the industry skilled-labour intensity in the host country.

Typically, in the frame of the knowledge capital model, scholars attempt to test whether MNEs would tend to take advantage of the relative skill differences between countries. Up to now, occupational classifications have been mainly used in analyses of the labour market dynamics (e.g. among the most recent works, see Watson, 2012, Eichhorst and Marx, 2015). Occupational data provide a more disaggregated skills composition at the country-sector level, better approximating the distribution of workers' skills, thus allowing human capital formation policies, which may target specific task-related competencies. Further, as argued by Abraham and Spletzer (2009), firms may shift only some tasks abroad, which again may not systematically been captured in the usual skilled-to-unskilled workers ratio.

Another strand of international economics literature deals with the relation between unionized labour markets and globalization (Zhao, 2001; Naylor and Santoni, 2003; Leahy and Montagna, 2005; Aloi et al., 2009). As (Caves, 1996, p.125) points out, "if the MNE maintains capacity to produce the same goods in different national markets, output curtailed by a strike in one market can be replaced from another subsidiary's plant." Hence, MNEs have incentives to invest abroad to improve their local bargaining position, and are able to negotiate lower wages by leveraging the threat to serve local markets from foreign plants (Eckel and Egger,

[3]See for instance Kahouli and Maktouf (2015), for an empirical analysis of the impact of regional trade agreements on FDIs.

2009). Consequently, the literature relating the MNEs choice of location to labour market characteristics and institutions suggests that MNEs prefer decentralised firm-level wage bargaining processes to centralised ones (Leahy and Montagna, 2005).

Relying on different theoretical settings, the literature suggests that the presence of unions may affect MNEs' internationalization decisions and patterns. In a monopolistic setting, Zhao (2001), discusses how the horizontal and/or vertical integration decision of MNEs may be influenced by the presence and preferences of industry unions, which may lead to reduced (expected) payoffs. Particularly, the author briefly considers the possibility of a MNE which bargains with unions located in two countries. Naylor and Santoni (2003) suggest that FDI is less likely to occur, *ceteris paribus*, the greater is union bargaining power, the stronger the weight the union attaches to wages and, the more substitutable are firms products in the potential host country. Leahy and Montagna (2005) adopt a host country policy perspective and address the use of restrictive regulations on unions to attract FDI in an oligopolistic framework. Their paper suggests the existence of threshold effects in the influence of union power on the host country welfare, so that under certain circumstances governments may favour strong unions.

On the one hand, empirical assessment of the direct effect of employment protection and unionization have relied on country or industry studies (Cooke, 1997; Gross and Ryan, 2008; Krzywdzinski, 2014). Cooke (1997) and Gross and Ryan (2008) show that employment protection legislation affects negatively the inflows of FDI from the US and Japan, respectively. In other words, companies are more likely to locate in countries with weaker employment protection. Evidence from German FDI to European countries, in the automotive and chemicals industries, points to less clear results for most of the industrial relations and labour market variables (union density, coordination of wage bargaining, government intervention, working hours, etc.). However, as for the studies of Cooke (1997) and Gross and Ryan (2008), a negative significant effect of the employment protection seems to emerge (Krzywdzinski, 2014).

On the other hand, theoretical and empirical predictions point to the existence of an indirect effect of a coordinated wage bargaining system on FDI (Kucera, 2002). In particular, labour costs appear to be a mediating link. In fact, conventional wisdom supports the view that lower labour standards lead to lower labour costs, and foreign investors prefer to locate their investments where labour costs are lower. However, labour costs might not be the only mediating relationship and

the link between FDI and labour standards is not so straightforward. Stronger rights may be associated with greater political and social stability, that are typically associated with economic growth, which in turn attracts FDI (Bènabou, 1996; Billington, 1999). Non-wage labour costs (NWLC), such as payroll taxes, hiring and firing costs (adjustment costs), account for a very substantial and rising proportion of total labour costs. NWLC and labour adjustment costs could be another important mediating factor in the relationship between labour market flexibility and FDI inflows (**?**). In fact, Navaretti et al. (2003) suggest that, in presence of country-specific regulations concerning employment protection, MNEs are better positioned to by-pass these labour market rigidities by simply shifting employees from one subsidiary to another. Their paper shows that the lower the labour adjustment costs, the faster the MNEs adjust their levels of employment. Countries with a flexible labour market, where it is relatively easier to dispose of unwanted employment, would then be a more appealing location for subsidiaries.

Nevertheless, both theoretical predictions and empirical findings regarding the direct and indirect effects of labour market characteristics appear still inconclusive.

This paper attempts to evaluate the conventional wisdom outlined above in the context of unionised labour markets. The interaction between labour market characteristics and FDI has received surprisingly little attention in the theoretical literature where the two have mostly been studied separately.

Taking stance from the reviewed studies, this paper assesses the contribution of skilled-labour and labour market conditions on the ability to attract specific types of greenfield FDI, taking into account the indirect effect of collective wage bargaining. To the best of our knowledge, only two studies have investigated the determinants of R&D and knowledge-intensive greenfield FDI relying on project level data. Castellani et al. (2011) estimate a gravity model for the number of bilateral investments projects, reporting evidence of heterogeneity in the impact of the key explanatory variable (i.e. geographical distance) across R&D, manufacturing, and other activities. Their gravity model also controls for a number of variables facilitating trade and investments between countries, such as sharing a common frontier, a common language, a colonial relationship, being part of the same Free Trade Area. Falk's (2012) study, building on the greenfield FDI gravity model of Castellani et al. (2011), considers a wider range of determinants to assess the impact of different types of knowledge-intensive FDI activities. Falk's study assesses the impact of an encompassing set of variables (market size, cost-based factors, such as labour costs, corporate and labour taxes, skills, ICT infrastructure

and FDI restrictions), but it does not contrast these effects to those of other, non knowledge-intensive activities.

Our paper departs from these two studies in two respects. First, it deepens the analysis on the effect of labour market regulations and skills endowments on gFDI inflows. Second, it investigates the extent to which labour market characteristics matter for discriminating among 'resource-seeking' and 'efficiency/strategic asset-seeking' gFDI activities (e.g. manufacturing versus knowledge-intensive gFDI, respectively). We carry out our analysis by controlling for a wide range of labour market features, such as the collective bargaining coverage rate, the non-wage labour costs, and the occupational skills of employment. Also, we take into account the knowledge base or technological potential of local industries, proxied by the number of patents, and control for country-level characteristics such as GDP per capita and corporate taxes.

3 Empirical strategy

3.1 Data

To investigate the role of labour market conditions (regulations, cost and quality of labour) in attracting FDIs in knowledge-intensive activities, we matched data from three different data sources. Data on cross-border (greenfield) investment projects announced and validated during the period from January 2003 till December 2012, comes from the *fDi Markets* database.[4] The database contains information on flows of people and capital classified by the investment activities (e.g. R&D, design, development and testing, sales and marketing, etc.). It contains clear information on the source and destination countries, states, regions, and cities, the number of jobs created by the specific project. The database is an ongoing collection of information on the announcements of corporate investment projects from 2003 to date, however, for the purpose of this study we collected data on the destinations of greenfield investments in knowledge-intensive activities from 2003 to 2012. The data are at project level, however we aggregate the total value of the projects per

[4] *fDi Markets* is an on-line database maintained by fDi Intelligence, a division of the Financial Times Ltd. fDi Intelligence collects available information on investments since 2003 and monitors cross-border investments covering all sectors and countries worldwide, relying on company data and media sources. The database is used as the data source in UNCTAD's World Investment Report, in publications by the Economist Intelligence Unit and in recent academic research (Castellani et al., 2011; Falk, 2012).

sector and year, as the other data sources are aggregated at sector- or country-level.

Data on labour skills are extracted from ILOstat annual indicator on employment by economic activity and occupation. The International Standard Classification of Occupations 2008 provides a system for classifying and aggregating occupational information, and to group occupations into skill levels. A skill level is defined as a function of the complexity of tasks to be performed in the corresponding occupation. Given the international character of the classification, the ten major occupational groups are categorised in four broad skill levels. Therefore, occupations range from skill level 1, which corresponds to simple and routine physical or manual tasks, to skill level 4 which matches occupations that require extensive knowledge and involve complex problem-solving, creativity and decision-making. The annual data on employment by skills is collected for each country and organised by main aggregate economic activity.[5]

Data on trade union coverage are from OECD and J.Visser, ICTWSS database[6], and are available at country level. To proxy for the knowledge base or technological potential of local industry which creates knowledge opportunities and potentially attracts knowledge-based investments, we take the number of triadic patents[7] from the OECD patent database. All the other variables such as employees, wages, cost of labour, GDP per capita are extracted from the OECD Stan database.

A summary of the averages across countries, years and sectors and the number of observations per year are reported in Table 1. Table 1 also reports the number of observations for the countries and sectors recipient of gFDI. gFDI in knowledge-intensive activities are more than gFDI in manufacturing for our sample of OECD country-sector pairs.

Tables 7 and 8 report the total numbers of gFDI by sector and country. Both tables report the total number of projects and the percentages of projects in

[5]ISIC Rev.4 at 1 digit, e.g. A - Agriculture, forestry and fishing, B - Mining and quarrying, C - Manufacturing, and so on.

[6]Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts, 1960-2010.

[7]Patents data entail several commonly known drawbacks, which include the difference in the patenting propensity among industries and firms, the partial picture they offer (some inventions are not patented) and the difficulty to value individual patents, as systematic patents value systems do not exist . Nevertheless, they constitute a relevant measure of the level of technological activity (For dedicated works on this issue, see Acs, Z. J. & Audretsch, D. B. (1989). Patents as a measure of innovative activity, Kyklos, 42(2), pp. 171-180; Dernis, H., Guellec, D., van Pottelsberghe de la Potterie, B. (2001). Using patent counts for cross-country comparisons of technology output. Science Technology Industry Review, 27, pp. 128146.)

Variable name	Description	Source
Knowledge-intensive greenfield FDI ($gFDI$)	Knowledge intensive greenfield projects are defined as cross-border greenfield investment projects in research and development (R&D), design, development and testing (DD&T), education and training (E&T), headquarters activities (HQ), information and communication technologies (ICT). The data are at project level, however we aggregate the total value of the projects per sector and year, as the other data sources are aggregated at sector- or country-level.	fDi Markets, Financial Times Ltd.
Collective bargaining coverage ($BargCov$)	It refers to the employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, expressed as percentage, adjusted for the possibility that some sectors or occupations are excluded from the right to bargain (removing such groups from the employment count before dividing the number of covered employees over the total number of dependent workers in employment WSEE; see Traxler, 1994)	Jelle Visser's ICTWSS Database: database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts
Non-wage labour costs (NWLC)	The differences between labour costs and wages. They refer to the social insurance expenditures and other labour taxes. (Adjustment costs, benefits, non-wage compensation)	OECD.stat
Mediating factor ($BargCov_{IE}$)	The mediating role of NWLC is captured by regressing NWLC on the collective bargaining coverage.	Authors' calculations (see Section 3.2)
Skill Index	The index, weighted by the relative employment in sector j of country i, distinguishes four occupational skills groupings aggregated from the employment data by occupation. It takes values of 1, 2, 3 or 4, where the levels are defined according to the simple or complex nature of the related tasks (see the definition of skills levels at www.ilo.org)	International Labour Organization's central statistics database - ILOSTAT
Skill dummy ($skillD$)	Dichotomous variable where each country-sector pair is given a value of 1 if the Skills index is larger than the average of Skills index across OECD countries is positive or of 0 otherwise.	Authors' calculations
Patents ($pats$)	Logarithm of the number of triadic patents filed under the Patent Co-operation Treaty (PCT), at international phase.	OECD.stat
GDP per capita (gdp)	The ratio of the gross domestic product to population	OECD-MSTI database
Corporate tax rate (tax)	The amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits.	World Development Indicators - WDI

knowledge-intensive and manufacturing activities. The ICT sector is attracting by far the largest number of gFDI, 98% of which in knowledge-intensive activities. Other sectors attracting many projects are machinery and equipment, chemicals and plastics, and transport equipment. The sectors with the largest shares of knowledge-intensive gFDI are, aside from ICT, transportation and storage, accommodation and food services, financial, insurance and real estate activities, and social and personal services. As for the countries, United States, Germany, Mexico, Poland and France the five top countries in terms of volume of gFDI, among which Germany and France report the same large share of gFDI inflows in knowledge-related activities (68%), Mexico and Poland receive 78 and 79% of their gFDI inflows in manufacturing investments, and the United States lie somewhere in between with 57% of gFDI in knowledge-related activities.

To test the proposed heterogeneity of cost, quality and other characteristics of the labour markets across the three different types of gFDI, we first present a table comparing the means and testing the differences, we then adopt a multinomial logistic regression framework.

3.2 Methodology

We adopt a count data model to explain both the number and the probability of knowledge-intensive and manufacturing gFDI inflows. In fact, when the number of gFDI projects in activity k, received by country i in sector j at time t follows a Poisson distribution, the regression model takes the form

$$log(E(Y_{ijt}^{k}|x_{ijt},\psi_{ijt})) = \alpha_k + \beta_k' x_{ijt} + \psi_{ijt}, \tag{1}$$

where $x = (skillD, BargCov, BargCov_{IE}, pats, gdp, tax)'$ is the vector of control variables (defined in Section 3.1), and $\psi_{ijt} = \delta_t + \gamma_j + \tau_i$ is a composite error term which includes time, industry and country effects.

To capture a possible causal channel through which unions might influence the gFDI inflows, we hypothesized NWLC to be a mediating link between workers collective bargaining coverage and gFDI. To obtain the mediating factor, we estimated the following relation:

$$nwlc_{ijt} = \alpha + \beta BargCov_{it-1} + FE_{ijt} + \epsilon_{ijt}.$$

Using a heteroskedasticity-consistent estimator, and controlling for year, sector and country fixed effects (FE_{ijt}), the mediating factor is defined as $BargCov_{IE,t} \equiv$

$\hat{\alpha} + \hat{\beta} BargCov_{it-1}$.

Exploiting the equivalence between multinomial and Poisson log-linear models (Baker, 1994), the (log-) odds that a gFDI project in activity k flows in a sector of a country relative to activity k' can be calculated from eqation (1) as

$$log(\mu^k_{ijt}/\mu^{k'}_{ijt}) = (\alpha_k - \alpha_{k'}) + x'_{ijt}(\beta_k - \beta_{k'}). \tag{2}$$

Thus, the parameters of a multinomial logit model may be obtained as differences between the parameters in the corresponding log-linear model. Note that the ψ_{ijt} cancel out because they do not change across type of gFDI.

Many of the independent variables, especially GDP per capita, but also taxes are subject to endogenenity due to omitted or unobserved variables, such as institutional factors (e.g. stability, corruption, security and so on; Blonigen, 2005; Yu and Walsh, 2010).

To handle the endogeneity of these variables, we adopt a two-stage residual inclusion (2SRI) (Terza et al., 2008) that takes into account the heteroskedatic/autocorrelated structure of the error term. The 2SRI approach consists in first estimating the model of endogenous regressors as a function of instruments (in our case, we used different lags of the endogenous variables), like the first-stage of 2SLS (two-stage least squares), and then using the predicted errors from this model as an additional regressor in the main model.

The 2SRI method is not new. It was first proposed by Hausman (1978) as a means of directly testing for endogeneity in linear models. In this cases, since 2SRI is identical to 2SLS (two-stage least squares), it delivers consistent estimates. However, for count data models, Wooldridge (1992, 2010) suggests the use of the 2SRI method.

Additionally, we correct the standard errors for the heteroskedasticity deriving from clustering, since some of our independent variables vary only at the country-level, and there could be correlation among the number of gFDI projects in sectors of the same country.

4 Results and discussion

Testing the differences in the skills across different gFDI types, we find that country-sector pairs that had received knowledge-intensive (KI) gFDI have higher relative skilled labour than those that received investments in manufacturing activities.

More in detail, Table 2 shows that this difference in skills is even more accentuated when taking the skill dummy, *skillD*. Significantly, the difference in the patents mean suggests that on average FDI with a high knowledge content are more likely to be driven towards technology-oriented locations. Overall, this exploratory analysis points to an important role of high-quality human capital and the technological capabilities to attract knowledge-intensive investments (OECD, 2008, 2011; Franco, 2012). Moreover, this is consistent with the asset/knowledge-seeking motive Dunning and Lundan (2009); Cantwell (2009), i.e. MNEs locating abroad in order to access foreign pools of knowledge and technologies.

As for the income level or GDP per capita, we find that the differences are positive and significant when comparing KI to manufacturing investments. This may indicate that gFDI in KI activities will more likely target locations with relatively higher purchasing power, which in our sample of countries (OECD countries) would mostly be well endowed in relatively higher quality infrastructure and human capital. On the contrary, we find that differences in corporate taxes are negative and significant. However, this result is entirely driven by the fact that HQ activities[8] are included as KI gFDI. When excluding this category from the sample of KI gFDI, the test gives a non-significant positive difference.

One less explored institutional determinant of FDI inflows is the labour market flexibility. Labour market regulations and standards on employment impose additional costs on firms. Most likely, any firm would want to locate in countries with more flexible labour markets. We test the differences in three measures of labour market flexibility, namely the collective wage-bargaining rate, the non-wage labour costs (NWLC), and the mediating factor. For all three measures of labour market rigidities, we find a positive difference between KI and manufacturing investments. This confirms that manufacturing activities are located in countries and sectors with less regulated, relatively more flexible labour markets, and thus where there is more room for MNEs to hire at a lower cost.

When considering the impact of labour market quality and flexibility on gFDI inflows, most of the results are consistent with the correlation table 3 and with the tests of differences in means.

Table 4 and 5 report the estimated coefficients of the 2SRI Poisson regres-

[8]Headquarter activities in MNEs are high-skill activities such as R&D, marketing and management. Although the decision to open a headquarter abroad is mainly driven by low corporate taxes, HQs are found to be located in areas with similar industry specialization and with high levels of business services, which are typically knowledge intensive (Falk, 2012)

sions where the dependent variable is the log number of gFDI projects in KI and manufacturing activities, respectively.

While the volume of gFDI projects in manufacturing activities strongly responds to most host country characteristics retained, gFDI projects in KI activities appear to be sensitive only to the proxy for host country's income level, technological knowledge and, to a lesser extent, corporate tax rate. For this latter variable, the effects are negative and significant in the two estimations. This indicates that MNEs' FDI decisions are (potentially) cost-driven also for those investments that carry out important knowledge content, although to a lesser extent than they do for the manufacturing projects. A similar result for the corporate statutory tax has been identified by Falk (2012), whose study focuses on the determinants of bilateral FDI in KI business services to EU countries.

The level of income does not seem to exert a significant influence on the number of gFDI projects in manufacturing activities, whereas higher levels of income increase the number of projects in knowledge intensive activities. These latter types of gFDI are not influenced by any positive deviations from the average skill index of the sample. Nevertheless, this result should not be straightforwardly interpreted as MNEs' gFDI in knowledge intensive sectors being insensitive to the availability of high-skilled labour. In fact, skills are a combination of education, training and experience (Tether et al, 2005), and our measure of skills, based on occupations, may fall short in capturing all these three dimensions. GDP per capita, on the other hand, being strongly related to the workforce educational attainment[9], could reflect the efficiency with which educated human capital is translated into absorptive and innovative capabilities sought by foreign KI investors.

The negative impact of the skills on the manufacturing gFDI projects suggests that MNEs would tend not to opt for locations with an above-average occupational skills level, as it is likely to be associated with higher wages, which would translate into higher costs on investments projects that are typically cost-driven and cost-sensitive.

With respect to the variables standing for the labour market regulations in terms of bargaining coverage, neither the direct nor the associated indirect effects appear to be significant in explaining any variations in the number of projects in KI activities. In other terms, the presence of unions seems not to be relevant for

[9]Falk (2012) uses the percentage of tertiary education as a proxy for skills. National-level data is available at OECD.stat. In other specifications, we also controlled for the education, but the results, not reported in this paper, were consistently not significant.

these types of gFDI activity. Or said differently, there is no clear-cut grounds to believe that high labour market standards would limit the attractiveness for KI international activities. In contrast, labour unions negotiations significantly limit the gFDI activity in manufacturing.

Concerning the indirect effect of unions, in a more regulated environment, NWLC become an important adjustment tool that allows firms to damp the effects of negative demand shock on its employees. In fact, in countries where wages are inflexible, due for instance to the existence of binding wage floors such as collectively-bargained minimum wages, many job losses will fall on low-paid workers, if NWLC do not increase (Chen and Funke, 2005). But increasing NWLC would also tend to encourage substitution from labour- to more capital-intensive methods of production, therefore discouraging foreign manufacturing investments.

These findings contrast with Gross and Ryan (2008) whose work captures the union effect through the union density, which does not always reflect the actual broader scope of collective bargaining. Our estimations support the preference of resource-seeking MNEs for countries with weaker employment representation/protection, generally associated with lower collective bargaining scope.

Finally, an extension of the host country's technological knowledge base attracts more gFDI projects. The positive and significant sign on patents confirms that the commitment of countries into innovative activities, in general, constitute a relevant location advantage for any type of gFDI. In their location search, MNEs do also consider the economy's competitiveness potentially resulting from technological advancement or the availability of technological assets (Dunning, 2006).

When considering the impact of labour market quality and flexibility on the probability to attract gFDI, the effects estimated are consistent with the logistic estimates and the tests of differences in means. Table 6 reports, in the left part, the coefficients of (2) derived from the equivalence between the multinomial and Poisson log-linear models (Baker, 1994). The right part of Table 6 gives the estimates of the binomial logit, used to test the robustness of the results. The baseline category considered in both cases is the gFDI in KI activities, hence the coefficients represent the log-odds that gFDI projects in manufacturing activities flows in a sector of a country relative to KI activities.

Considering the two sets of estimates, we find that skilled human capital can discourage greenfield investment in manufacturing activities. Similarly, the stronger collective negotiations via trade unions may be perceived as a negative signal to MNEs, as it is generally associated with less flexible markets. Alto-

gether, the results suggest that regulations of the OECD countries labour markets are particularly important in determining where MNEs locate their manufacturing investments as compared to their KI investments. This result is also consistent with the cost-driven nature of manufacturing investments. Indeed relatively higher skilled labour, particularly in our sample of OECD countries, is generally associated with higher labour costs. Also, more rigid labour markets imposes additional costs on firms deterring gFDI in manufacturing. However this is not accounting for the potential positive effects that highly regulated labour markets may have on social stability, and further on economic growth. (Cooke and Noble, 1998; Daude et al., 2003).

Additionally, tax rate on commercial profits are found to be a negative factor as it limits the potential inflows of manufacturing investments. In other words, higher tax rate can effectively discourage the location of manufacturing investments, again as compared to gFDI in KI. Finally, the negative effects of patents and GDP per capita on the (log) odds of attracting manufacturing investments lose their significance once the logit estimations are considered.

5 Conclusions

This paper investigates how labour market regulations and the skills of employees affect the greenfield FDI inflows to OECD countries.

In order to address this issue, the paper relies on project-level data over the period 2003-2012. The findings confirm the heterogeneity in the impact of the factors influencing the MNCs location in a given country. Our results also support the view that MNEs do grant attention to the skills endowments and to the labour market features when making the decision to invest in foreign economies.

Taking into account endogeneity, using a 2SRI Poisson/multinomial logistic regression model, we find that labour unions negotiations significantly limit the gFDI activity in manufacturing. Moreover, collective negotiations increase the non-wage labour costs and therefore the overall labour costs, indirectly discouraging foreign manufacturing investments. Further, knowledge-intensive projects appear to be sensitive only to the proxy for host country's income level, technological knowledge and, to a lesser extent, corporate tax rate. Indeed, this type of gFDI is not influenced by any positive deviations from the average skill index of the sample. A cautious interpretation of these results could be found in the limitations of the adopted occupational skill index. As skills are a combination of education, train-

ing and experience (Tether et al, 2005), the occupational skill-based index may fall short in capturing these three dimensions all together. Here, the significant and positive impact of GDP per capita may also signal the ability of a country to translate high level of educational attainment into relevant productive and innovative capabilities typically sought by foreign investors

The negative impact of the skills on the manufacturing gFDI projects suggests that MNEs would tend not to opt for locations with an above-average occupational skills level. Such locations are indeed more likely to be associated with higher wages, which would translate into higher costs on investments projects that are typically cost-driven and cost-sensitive.

Within the unionisation-FDI literature, our paper is the first of which we are aware to: 1) examine whether the degree of labour market regulatory environment matters for MNEs' incentives to locate a greenfield in a host country; 2) study the role of the workers skills as a determinant for attracting different types of gFDI; 3) introduce a skill measure based on workers specific tasks-related competencies.

To the extent that collective bargaining coverage of unions reflects the level of regulation in a labour market, our results provide insights for the effectiveness of labour market policies that aim at attracting knowledge-intensive investments.

In this context, to efficiently promote and attract knowledge-intensive investments, a closer coordination between innovation policies (e.g. human capital development policies) and inward investment promotion is needed, which are two policy areas that have typically operated rather independently. The attractiveness of KI gFDI depends to a great extent on the image of the country as an R&D location, and at the same time on its ability to provide comprehensive aftercare programmes (i.e. post-investment services that an investment promotion agency can offer to existing investors) in order to maximise the positive evolutionary knowledge spillovers. Indeed, the knowledge-base and framework conditions constitute fundamental prerequisites to attract greenfield foreign direct investment, but also signal that public-policy strategies should take well into account the specificities of targeted investments inflows in order to better tailor their possible strategic interventions.

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Table 1: Summary statistics

	mean	sd	N
$gFDI_{KI,ijt}$	2.66	3.93	3230 (8576)
$gFDI_{Manu,ijt}$	4.03	6.26	1676 (6752)
$skillD_{ijt}$	0.86	0.34	4906
$Skill\ index_{ijt}$	2.38	0.14	1584
$BargCov_{it}$	0.50	0.30	1898
$nwlc_{ijt}$	22.02	2.01	2061
$BargCov_{IE,it}$	22.55	0.92	1232
$pats_{it}$	6.28	2.32	2985
gdp_{it}	10.31	0.35	2985
tax_{it}	49.22	11.24	2245

Total number of gFDI projects in parentheses

Table 2: Tests of differences in mean $gFDI_{KI}$ vs $gFDI_{Manu}$

	mean	(std. err.)
$skillD_{ijt}$	0.131***	(0.010)
$Skill\ index_{ijt}$	0.041***	(0.007)
$BargCov_{it}$	0.024**	(0.014)
$nwlc_{ijt}$	0.525***	(0.091)
$BargCov_{IE,it}$	0.395***	(0.052)
$pats_{it}$	0.927***	(0.087)
gdp_{it}	0.152***	(0.013)
tax_{it}	-1.194**	(0.501)

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
t-tests with unequal variances.

Table 3: Cross-correlation table

Variables	FDI_{KI}	$skillD$	$Skillindex$	$BargCov$	$nwlc$	$BargCov_{IE}$	$pats$	gdp	tax
$skillD$	0.18*	1.00							
$Skillindex$	0.15*	0.59*	1.00						
$BargCov$	0.04	-0.14*	0.28*	1.00					
$nwlc$	0.13*	0.02	0.00	-0.45*	1.00				
$BargCov_{IE}$	0.21*	0.52*	0.23*	-0.83*	0.56*	1.00			
$pats$	0.19*	0.40*	0.31*	-0.16*	0.46*	0.61*	1.00		
gdp	0.21*	0.35*	0.40*	0.01	0.03	0.44*	0.70*	1.00	
tax	-0.05*	-0.23*	-0.12*	0.35*	0.26*	-0.26*	0.15*	-0.24*	1.00

Table 4: 2SRI Poisson regression with cluster-adjusted errors

Dependent variable: $gFDI_{KI}$		
Variable	Coefficient	(Robust Std. Err.)
$skillD_{ijt-1}$	0.155	(0.309)
$BargCov_{it-1}$	0.416	(0.391)
$BargCov_{IE,it-1}$	0.091	(0.113)
$pats_{it-1}$	0.292***	(0.070)
gdp_{it-1}	1.930***	(0.740)
tax_{it-1}	-0.031*	(0.018)
α_k	-23.165***	(7.959)
Country FE	✓	
Sector FE	✓	
Year FE	✓	
Log pseudolikelihood = -1195.17 N. obs=285		

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: 2SRI Poisson regression with cluster-adjusted errors

Dependent variable: $gFDI_{Manu}$		
Variable	Coefficient	(Robust Std. Err.)
$skillD_{ijt-1}$	-1.451*	(0.715)
$BargCov_{it-1}$	-7.273***	(1.357)
$BargCov_{IE,it-1}$	-2.751***	(0.446)
$pats_{it-1}$	0.386***	(0.081)
gdp_{it-1}	0.089	(0.639)
tax_{it-1}	-0.141***	(0.036)
α_k	72.683***	(11.367)
Country FE	✓	
Sector FE	✓	
Year FE	✓	
Log pseudolikelihood = -892.97 N. obs=193		

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Cluster-adjusted errors binomial (eq. (2))

	Poisson-derived estimates		Logit estimates	
Variable	Coefficient	(Robust Std. Err.)		
$skillD_{ijt-1}$	-1.606***	(0.584)	-1.763**	(0.691)
$BargCov_{it-1}$	-7.689***	(1.252)	-6.037***	(2.108)
$BargCov_{IE,it-1}$	-2.842***	(0.420)	-2.101**	(0.855)
$pats_{it-1}$	0.094**	(0.042)	-0.100	(0.078)
gdp_{it-1}	-1.841***	(0.408)	-0.024	(0.453)
tax_{it-1}	-0.110***	(0.026)	-0.076**	(0.031)
α	95.848***	(4.027)	56.706**	(23.442)

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: gFDI inflows by sector and by investment type

Sector	% of $gFDI_{Manu}$	% of $gFDI_{KI}$	Tot n. of $gFDI$
Mining and quarrying	53(%)	47(%)	190
Food products, beverages and tobacco	68	32	884
Textiles, wearing apparel, leather	56	44	229
Wood/wood products (except furniture)	87	13	139
Paper and printing	85	15	246
Chemicals, rubber and plastics	58	42	2641
Other non-metallic products	87	13	333
Basic metals/fabricated metal products	85	15	714
Machinery and equipment	48	52	3007
Transport equipment	66	34	2085
Wholesale and retail trade, repair of motor vehicles	52	48	358
Transportation and storage	4	96	665
Accommodation and food services	0	100	19
ICT	2	98	3529
Financial and insurance activities	0	100	194
real estate, renting and business activities	21	79	41
Community, social and personal services	8	92	54
Total	44	55	15328

Table 8: gFDI inflows by Country

Country	% of $gFDI_{Manu}$	% of $gFDI_{KI}$	Tot n. of $gFDI$
Australia	25(%)	75(%)	620
Austria	37	63	200
Belgium	30	70	297
Canada	36	64	684
Chile	49	51	161
Czech Republic	70	30	493
Denmark	11	89	195
Estonia	72	28	111
Finland	28	72	104
France	32	68	917
Germany	32	68	1311
Greece	31	69	35
Hungary	74	26	508
Iceland	50	50	12
Ireland	13	87	596
Italy	40	59	264
Japan	24	76	329
Luxembourg	20	80	35
Mexico	79	21	1110
Netherlands	20	80	417
New Zealand	38	62	65
Norway	37	63	54
Poland	78	22	933
Portugal	64	36	107
Slovenia	66	34	41
Spain	40	60	825
Sweden	27	73	185
Switzerland	16	84	295
Turkey	74	26	328
United States	43	57	4096
Total	44	56	15328

European Commission
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