International Knowledge Spillovers: The Benefits from Employing Immigrants *

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Abstract

This paper explores the role of immigrant employees for a firm's capability to absorb international knowledge. Using matched employer-employee data from Denmark for the years 1999 to 2009, we are able to show that non-Danish employees from technological advanced countries contribute significantly to a firm's economic output through their ability to access international knowledge. The empirical results suggest that the immigrants' impact increases if they come from technological advanced countries, have a high educational level, and are employed in high-skilled positions. However, the latter does not hold for immigrant managers.

Keywords: R&D Spillovers, Absorptive Capacity, Firm-Level Analysis, Foreign Workers, Immigrants

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1 Introduction

Following the seminal paper of Coe and Helpman (1995) a large body of literature has emerged devoted to identifying the channels through which international knowledge spillovers occur and their impact on output and productivity (for reviews of the literature, see Hall et al., 2010 or Keller, 2004). While there has been substantial progress in the identification and analysis of several diffusion channels, the role of employees as a potential diffusion channel for international knowledge spillovers has been vastly neglected. This is rather surprising, because employees are an obvious and crucial factor in the absorption of knowledge and form the absorptive capacity (Cohen and Levinthal, 1989) of economic entities, be it countries, sectors or firms. To absorb foreign knowledge successfully, it is necessary to "evaluate the technological and commercial potential of knowledge in a particular domain, assimilate it, and apply it" (Cohen and Levinthal, 1994, p. 227). Thus, countries, industries, or firms have to incur efforts to accumulate a certain amount of technological capability, to be able to acquire technological knowledge from the external environment. Obviously, employees play an active role in the identification, assimilation, and application of foreign knowledge and are therefore an important channel for knowledge spillovers.

The empirical approximation of an economic entity's absorptive capacity usually closely follows the notion of Cohen and Levinthal (1989) that the absorptive capacity refers to a firm's stock of prior knowledge, which positively depends on its human capital stock and R&D expenditures. The importance of the two latter factors rises as usual with the complexity of external knowledge. For example, Mancusi (2008) shows for a panel of OECD industries that absorptive capacity, approximated by cross-industry patent citations, contributes significantly to innovation activity in laggard countries. Griffith et al. (2004), approximate absorptive capacity by the level of R&D intensity and illustrate, for a panel of industries in twelve OECD countries, that it stimulates TFP growth indirectly through technology transfer, once again, pointing to the importance of absorptive capacity. At the firm level, Poldahl (2012) investigates the impact of various domestic and international R&D intensity measures on firms' TFP growth in a panel of Swedish manufacturing firms. Their results, in accordance to previous studies, uncover the importance of absorptive capacity for firms' TFP growth. The largest number of studies in this branch use human capital as a proxy of absorptive capacity, as analyzed in Fracasso and Marzetti (2014), Ang et al. (2011), Sena and Anon Higon (2014), Kneller (2005), Kneller and Stevens (2006), among others. They all arrive at the conclusion that firms' and sectors' absorptive capacity is essential to reap the gains from international knowledge spillovers.

We build upon this literature but follow a different path by taking up an idea in the less often cited part of Arrow's (1969) paper in which he states that transfer of knowledge takes place via different communication channels exhibiting different costs, "where these costs include the ability of the sender to "code" the information and the recipient to "decode" it." (see p. 33). Arrow later in his paper elucidates that the coding/decoding process includes not only prior technological knowledge but also language, culture, and personal contacts.[1] These non-technical aspects of the process of knowledge absorption, which determine the absorptive capacity of countries, sectors or firms are at the center stage of our analysis. In line with the considerations of Arrow (1969), the authors Cohen and Levinthal (1990) also emphasize the importance of communication systems between organizational structures and the external environment for the firm's absorptive capacity. At the basic level, individual actors equipped with a particular language can act as a gatekeeper to transfer knowledge from the external environment to different subunits of the firm.

Arrows arguments are supported by the recent empirical study of Kerr (2008), who argues in favor of international ethnic scientific networks for the diffusion of knowledge across nations. A striking result of his study is that foreign researchers outside are found to cite U.S. researchers of their own ethnicity more frequently than researchers from other ethnic groups, contributing significantly to technology diffusion between developed and emerging countries. His results suggest that industrial output in less advanced economies rises with co-ethnic patent citations in the United States, highlighting the importance of technology diffusion along ethnic lines. The main argumentation is that ethnic scientific networks increase awareness of recent technological developments and can aid trust in otherwise uncertain legal environments. They matter for more than pure language skills, which by themselves are of importance for international interactions (Melitz and Toubal, 2014; Isphording and Otten, 2013). For example, Rauch (2001) argues that ethnic communities outside a country can foster trade flows as they are considered as trusted intermediaries with strong ties to their home country. The importance of social capital in co-ethnic networks that facilitate knowledge exchange between innovators through enhanced trustworthiness has been analyzed by Coleman (1988) and Kalnins and Chung (2006). Their functioning of reputation intermediaries in industries where tacit knowledge is important has been shown by Kapur (2001). Furthermore, Peri and Requena-Silvente (2010) illustrate that

[1] In this context he gives an example on jet engines: As British authorities decided to transfer the plans for the jet engine to the U.S. during the Second World War, it took U.S. researchers ten months for them to redraw the plans making it suitable for American usage.

migrant networks lower barriers to international trade in particular for differentiated products, where contracts are likely to be incomplete, e.g., when the need for communication is large, because full codification is difficult. In this vein, other studies have mentioned the specific attributes of knowledge for the process of diffusion and absorption. Specifically, Sorenson et al. (2006) emphasize the importance of social proximity when receiving and extending knowledge of moderate complexity. While simple knowledge diffuses equally strong among socially near and distant recipients due to factors of unaided recipients search, the diffusion of moderate knowledge is considerably enhanced by social proximity which requires a certain amount of interpersonal exchange between actors. Pertaining to the sources of technology transfers, Agrawal et al. (2008) have shown that social proximity (e.g., co-ethnic networks) within members of U.S. resident Indian diaspora substitutes for geographical proximity in their role for knowledge diffusion. Their result is particulary relevant for firms recruiting foreign workers to increase their innovation capacities through their access to international knowledge flows: hiring immigrants may – to some extent – remove the need of "incurring the cost of moving teacher and student into the same geographical location" (Keller, 2004, p. 756) to pass on tacit knowledge. Firms' hiring decisions matter for inter-firm knowledge transmission (Poole, 2013; Balsvik, 2011), in particular if moving workers are highly educated or technicians (Parotta and Pozzoli, 2012).[2] Thus, Arrow's (1969) considerations and the mentioned empirical evidence on co-ethnic networks suggest that immigrant employees might be an important channel for the diffusion of international knowledge spillovers.

This paper, therefore, addresses the question whether immigrant employment improves firms' absorptive capacity for foreign knowledge. The contribution of our paper is threefold. First, by using detailed employee data we are able to differentiate the immigrants by origin, educational level, and occupational position enabling us to construct highly detailed proxies of firms' absorptive capacity and with it, to identify the importance of the individual groups of immigrants for the diffusion of foreign knowledge. Thereby, we additionally contribute to the literature on the costs and benefits of ethnic diversity in firms. Second, by combining these proxies with international R&D capital stocks we are able to establish a direct link between foreign knowledge and a firm's immigration-based absorptive capacity. Helping to differentiate between the impact of the immigrants' personal skills on firms' output/productivity from their impact via the absorbtion of foreign knowledge. Third, our estimations uncover whether the immigrants

[2]Other studies have investigated the impact of foreign experts on firm's TFP growth, and value added per worker in domestic firms (Markusen and Trofimenko, 2009; Malchow-Møller et al., 2011).

are an important channel for the diffusion of foreign knowledge thereby extending the literature on international knowledge spillovers.

Based on the findings in Coe and Helpman (1995), and the subsequent literature, we apply a production function approach. For our econometric analysis, we combine a matched employer-employee data set from Denmark during the years 1999 to 2009 with data on international R&D capital stocks for OECD countries. This enables us to control for a broad range of firm-specific variables such as physical capital stock, intermediate goods, size of the labour stock, average firm tenure, and ethnic diversity. In addition, we also account for industry-year, commuting, and time fixed effects to control for unobserved heterogeneity across industry affiliations, regions, and economy-wide effects.

The empirical results show that employing immigrants increases firms' absorptive capacity, resulting in a significantly higher output elasticity with respect to foreign knowledge. However, this effect is identified only if we take the origin, educational level or occupational position of the immigrants into account. Hiring a larger share of immigrants from technological advanced countries increases the output elasticity with respect to international R&D knowledge stocks. Furthermore, we are able to show that foreign knowledge's output elasticity increases with the educational level of the employed immigrants. The same is true for the occupational positions of the immigrants. However, the output elasticity with respect to foreign knowledge of immigrant managers is lower than that of high skilled immigrants without executive functions and becomes insignificant in the fully specified model, controlling for the full range of occupational positions of the employed immigrants. Additionally, we confirm existing findings that workforce ethnic diversity is associated with a negative output elasticity (e.g., Parrotta et al., 2014a). Despite our negative impact of workforce ethnic diversity on firms' gross production, perhaps, through increased communication costs, our findings point to the economic importance of a diverse labour force for the firm's capability to access international knowledge. Finally, our results are robust to the inclusion of a broad range of additional control variables and variations in the estimation specification.

The remaining parts of the paper are organized as follows. In Section 2 we outline the empirical approach that constitutes the basis of the empirical analysis. Section 3 describes the data and methods behind the construction of firm-specific international R&D knowledge stocks. Section 4 presents the empirical results, and Section 5 checks the robustness of the results to various sample sizes and among different specifications. Finally, Section 6 concludes by summarizing the main results.

2 Empirical Approach

2.1 Estimation Set Up

As pointed out by Arrow (1969) the absorption of knowledge reaches beyond the pure technological prior knowledge but also includes aspects like language, culture, personal contacts, and social-ethnic networks. The absorption of knowledge from foreign sources therefore requires the access to foreign language, foreign culture, foreign persons and foreign social networks. Obviously, a simple strategy to acquire such an access is to hire foreigners. The employment of foreigners would therefore increase the absorptive capacity which in turn should increase the benefits from foreign knowledge. Following Coe and Helpman (1995), we estimate a production function to empirically uncover the impact of employing foreign workers on economic performance through the access of international knowledge. However, we refrain from estimating the reduced TFP form because of two econometric reasons. First, by regressing value added on labor and capital to obtain TFP, approximated by the residual of the estimation, it would be implicitly assumed that labor and capital are uncorrelated with technological progress, which is captured in the residuals. If this assumption does not hold, the estimated coefficients are biased and thus the residuals, and with it TFP, are miscalculated. Furthermore, using different measures to explain TFP in the second step of the regression analysis strengthen the doubts about the correct specification of the first stage of the regression to obtain TFP.[3] Second, using value added as variable to preserve TFP also implicitly assumes that changes in value added are solely caused by changes in labor and capital. However, organizational changes in the production structure, e.g., caused by outsourcing, are not taken into account and, therefore, would blur the direct production link between value added and labor and capital. We therefore estimate a fully specified model, using gross production as dependent variable and control for intermediates. The classical set up on the country level is then given by the following regression equation:

$$\log Y_{ct} = \alpha + \beta_1 \log L_{ct} + \beta_2 \log K_{ct} + \beta_3 \log M_{ct} + \beta_4 \log S^d_{ct} + \beta_5 \log S^f_{ct} + \beta_6 \mathcal{X}_{ct} + \alpha_c + \alpha_t + \varepsilon_{ct}, \quad (1)$$

where $\log Y$ is the log of gross production, $\log L$, $\log K$, and $\log M$ are the logs of labour, capital, and materials, respectively. $\log S^d$ is the domestic R&D capital stock and $\log S^f$ is the R&D capital stock of foreign countries. The variable $\mathcal{X}_{ct}$ captures the influence of the foreign R&D capital stock (S^f) via the absorptive capacity of a country. Subscripts c and t refer to the index for the corresponding country and time, respectively. Unfortunately, and somewhat surprisingly,

[3] For a review on the problems to determine TFP see Hulten (2001). For the problem of capital utilization for TFP calculation see Hulten (1986), Burnside et al. (1996), Berndt et al. (1986).

detailed data on employees (e.g., educational level, work experience, and age structure) are not available on the country level, even not for industrialized countries. Therefore, we have to come back to the firm level, where such detailed employee data is available. However, transferring the basic econometric set up in equation 1 to the firm level requires various adjustments. While the control for the traditional inputs can be taken over one to one, the mapping of the different types of knowledge is more sophisticated. Taking the R&D capital stock variable to the firm level would require to split the variable up into own and external domestic R&D capital, to capture the effects of a firm's own R&D efforts and those of other domestic firms via knowledge spillovers. However, the coverage of R&D expenditures in firm level data is usually very limited, preventing the construction of the required R&D capital stocks. For this reason, only a few studies for Danish firms and with a limited number of observations exist to uncover the influence of a firm's R&D capital stock on its economic performance (e.g., Dilling-Hansen et al., 2003; Smith et al., 2004). Therefore, we control for the aggregated Danish R&D capital stock, but refrain from using R&D capital stocks on firm level. This of course comes at the expense of being unable to distinguish between the effects of own R&D capital stock and the effects of domestic knowledge spillovers on output. However, this assumption is sufficient, because the main focus of this paper is on international rather than domestic knowledge spillovers. Since, the total domestic R&D capital stock does not vary between the firms in a given year, its effect is captured by the time fixed effects. The same argumentation applies to the foreign R&D capital stock, which varies over time, but not between firms in a year. Thus, we properly control for both variables $\log S^d$ and $\log S^f$ in our basic set-up; however, their concrete elasticity can not be identified separately from the included time fixed effects. Finally, our variable of interest is a function of the firm specific proxy of its absorptive capacity and the foreign R&D capital stock $\log S^f_{ct}$. Thus, $\mathcal{X}_{ct}$ is a firm specify variable which can be included into the estimation equation without any further troubles.

Extending equation (1) to firm i, industry j, and time t along with additional firm-specific controls results in the following estimation equation:

$$\log Y_{ijt} = \alpha + \beta_1 \log L_{it} + \beta_2 \log K_{it} + \beta_3 \log M_{it} + \beta_4 \mathcal{X}_{it} + \mathbf{X_{it}}\beta + \alpha_{ct} + \alpha_{jt} + \alpha_t + \varepsilon_{it}, \quad (2)$$

where $\log Y_{ijt}$ is the the log of gross production (measured in total sales of goods and services) of firm i belonging to industry j at time t. Furthermore, $\log L_{it}$, $\log K_{it}$, and $\log M_{it}$ are the logs of labour, capital, and materials, respectively. The variable of interest, $\mathcal{X}_{it}$, refers to our measure for the effect of international R&D capital stocks on a firm's gross production outcomes via increased absorptive capacity through the employment of foreign workers. A detailed discussion

regarding the construction of this variable is provided in the next section. In addition, we also take into account a broad range of firm-specific control variables, summarized in the matrix $\mathbf{X_{it}}$. This includes a measure of ethnic diversity, the log of average firm tenure in years, the share of men employees, the share of managers, and a dummy variable indicating whether the firm is foreign-owned or not. Furthermore, we also incorporate firm specific controls indicating the share of employees belonging to each age distribution quartile, the share of employees with low-, mid-, and high-skilled occupations, and the share of employees with basic, secondary, and tertiary education. Thus, we are able to capture differences in firms' absorptive capacity on the employment level and thus control for Cohen and Levinthal's (1989) notion of prior knowledge. Furthermore, the variables α_{ct}, α_{jt} and α_t refer to commuting fixed effects, industry-year fixed effects, and country-wide year fixed effects, respectively, to control for unobserved heterogeneity across industries, regions, and years. These fixed effects specifications warrant some careful discussions. First, the industry-year fixed effects remove all trends specific to the industry under consideration but are common to the firms belonging to that industry. These common trends include such factors as demand shifts and price changes, as well as differences in management skills, and industry-specific technology opportunity conditions. Second, the time fixed effects remove trends common to the firms within Denmark. This variable captures economy-wide influences on the firm level such as the Danish legal system, the general knowledge stock, firms' own R&D knowledge stock, which is incorporated in the Danish total R&D capital stock, and economy-wide measurement errors in deflators common to all firms or industries. Third, we also incorporate commuting fixed effects into the regression equation to control for differences in labour market policies, infrastructure quality, and assistance to industrial sectors across economic regions (Andersen, 2002).

We initially forego the use of firm fixed effects in the empirical analysis for two reasons: Firstly, Griliches and Hausman (1986) highlight that the inclusion of many fixed effects may exacerbate problems that arise from measurement error, for instance attenuation bias. Secondly, Table 2 indicates that much greater variation of ethnic groups from OECD countries exists across firms than across time within firms. To the extent that this small variation within firms is what being captured by the firm fixed effects, this circumstance will make it difficult to disentangle the impact of the ethnic- and education-weighted foreign R&D capital stock variable from the general firm-specific effect. As an additional benefit, this makes our findings more easily comparable with a related study on the direct impact of diversity on firm productivity by Parotta et. al. (2014a). Reassuringly, robustness checks with firm fixed effects comfortingly corroborate our

main results. Finally, ε_{it} refers to a firm-specific error term. Summary statistics and pairwise correlations for the samples used in the empirical analysis are provided in the Appendix.

To a large extent, endogeneity concerns are ameliorated by inclusion of different sets of fixed effects. In particular, our results are not driven by unobserved price or demand shocks at the industry level. Yet, even though the foreign R&D capital stock is likely to be exogenous to the individual Danish firm, it might be that some Danish MNEs conduct R&D activities abroad, thereby contributing to the foreign knowledge stock. Similar to Keller (2002), this concern is addressed by excluding MNEs from the base sample as shown in the robustness tests. A third important source of endogeneity is located at the firm-level: firms with substantial gross output are likely to be more successful in hiring qualified migrants, as they are likely to have more capacities for recruitment of workers. We tackle this problem from three sides: First, systematically better hires in large firms are likely to be driven by organizational advantages of the firm. These features rarely change over time and are consequently purged by firm fixed effects. Secondly, the quality of hires is likely to depend also on the composition of the management, which we control for in our specifications. Thirdly, we provide results where we include all regressors in their first lag. Neither of these modifications changes our main conclusions.

2.2 Approximation of Absorptive Capacity and Knowledge Spillovers

We follow the discussion in Coe and Helpman (1995) to establish a direct link between firms' absorptive capacity based on their immigrants and the international knowledge stock by constructing a weighted sum of foreign R&D capital stocks (s^f), where the weight is a measure of a firm's absorptive capacity provided by the employed immigrants.[4] The robustness of the main results with respect to the used weights are assessed on behalf of three different specifications in the construction of the foreign R&D variable.

In a first step, we account for the origin of the immigrants. For that we follow the procedure of Coe and Helpman (1995) and construct an ethnic-weighted variable, where the weight is the share of immigrants from a certain country. Therefore, $\mathcal{X}_{it}$ becomes then:

$$\log s_{it}^{f,ew} = \log \left(\sum_{c \in S_{it}} \left(\frac{L_{ict}^{For}}{L_{it}^{For}} s_{ct}^{f} \right) \right), \tag{3}$$

where S_{it} is the set of foreign workers in firm i for period t belonging to countries for which data on $R\&D$ capital stocks is available, L_{ict}^{For} is the number of immigrants engaged in firm i

[4]The trade-weighted R&D capital stock suggested by Coe and Helpman (1995), indeed, reflects trade-related spillovers as discussed in Coe and Helpman (1999) after having been questioned by Keller (1998).

from country c and L_{it}^{For} is the total number of immigrants in firm i. Thus, the construction ensures that, ceteris paribus, firms with a higher share of immigrants from technological advanced countries (here approximated by size of the R&D capital stock) have a larger $\log s_{it}^{f,ew}$ and vice versa. Again, we also differentiate the immigrant workforce by educational level, this time by constructing three separate variables for immigrants with basic, secondary, and tertiary education. As an example, the foreign R&D variable $s_{it}^{f,ew,B}$ then includes only immigrants with basic education.

In the next step, we further differentiate the educational aspect of the absorptive capacity by constructing an ethnic-education-weighted measure of foreign $R\&D$ capital stocks for each firm in year t as follows:

$$\log s_{it}^{f,ewedu} = \log \left(\sum_{c \in S_{it}} \left(\frac{L_{ict}^{For,B}}{L_{it}^{For}} s_{ct}^{f} H^{B} + \frac{L_{ict}^{For,S}}{L_{it}^{For}} s_{ct}^{f} H^{S} + \frac{L_{ict}^{For,T}}{L_{it}^{For}} s_{ct}^{f} H^{T} \right) \right), \tag{4}$$

where $L_{ict}^{For,\theta}$ now refers to the number of immigrants engaged in firm i from country c with educational level $\theta = (Basic, Secondary, Tertiary)$, respectively.[5] Moreover, the variable H^{θ} is the theoretical cumulative duration in years for the education level θ. Information on the theoretical duration for each education type is taken from the International Standard Classification of Education (ISCED), as reported by the United Nations Educational, Scientific and Cultural Organization (UNESCO). This time, ceteris paribus, firms with a higher share of immigrants from technological advanced countries (here approximated by size of the R&D capital stock) and higher educational level have a larger $\log s_{it}^{f,ewedu}$ and vice versa. As for the ethnic-weighted measure, we also construct the ethnic-education-weighted measure for each educational level separately (e.g., for basic education then this would correspond to $\log s_{it}^{f,ewedu,B}$).

Finally, particularly for immigrants, the occupational position might not correspond to the educational level, e.g., due to problems with the approval of foreign education certificates. Therefore, we construct an ethnic-occupational-position-weighted measure for each single occupational level (low-skilled, mid-skilled, high-skilled, manager, others). It is again constructed according to the procedure of Coe and Helpman (1995), where the weight this time is the share of immigrants

[5] Unfortunately, a detailed assessment of the educational level of workers revealed that for some workers and years there were gaps in the data. In order to avoid that these workers are treated erroneously as potential hires coming from other firms, we assumed the lowest possible education status in cases where gaps in educational data were present. This adjustment is necessary, otherwise this would introduce an artificial variation in the construction of the ethnic-education-weighted foreign $R\&D$ capital stock measures. Additional information on the classification of the educational levels are provided in the Appendix.

on a certain occupational position:

$$\log s_{it}^{f,ewoccu,\phi} = \log \left(\sum_{c \in S_{it}} \left(\frac{L_{ict}^{For,\phi}}{L_{it}^{For}} s_{ct}^{f} \right) \right), \tag{5}$$

where $L_{ict}^{For,\phi}$ is the number of persons engaged in firm i from country c with occupational level $\phi = (low, mid, high, manager, others)$.[6] According to this definition, ceteris paribus, firms with a higher share of immigrants from technological advanced countries (again approximated by size of the R&D capital stock) and employed in a higher occupational position have a larger $\log s_{it}^{f,ewoccu,\phi}$ and vice versa.

3 Data Description

3.1 Data Sources

In evaluating the impact of immigrants on firm's economic performance through their access to international R&D knowledge stocks, this study utilizes a longitudinal employer-employee data set provided from a variety of statistical registers by Statistics Denmark (henceforth DS). The starting point in data preparation is the Integrated Database for Labour Market Research (henceforth IDA). IDA integrates three databases on the personal, employee, and workplace level for any given year. It provides valuable information on a wide range of individual characteristics, containing, e.g., gender, age, country of origin, educational level, labour market experience, earnings, and current occupation on each individual employed in Danish firms during the entire period 1995 to 2009. The link between individuals and workplaces are uniquely identified each year at the end of November. The extracted information on each individual is then aggregated to obtain firm-specific variables, such as the number of full-time employees, average firm tenure, age distribution, shares of males, managers, highly-skilled workers, and the shares of workers belonging to basic, secondary, and tertiary education. Furthermore, a variable is created that reflects the ethnic composition of each firm based on the data indicating the country of origin for each individual. In addition, business accounts data is provided by the statistical register REGNSKAB, from which we extract such variables as gross production (total sales of goods and services), intermediate goods (purchase as goods, helping materials, and packaging), and the capital stock (total assets). REGNSKAB covers the construction and retail trade industries at the firm level from 1994 onwards, manufacturing industries beginning in 1995, wholesale

[6] Detailed information on the classification of occupational positions are provided in the Appendix.

trade was included from 1998 onwards, and the remaining private industries beginning from 1999 onwards. Finally, we also establish a link to a firm's foreign trade statistics. This statistical register provides detailed information on bilateral import and export sales with information on destination markets, and traded products based on an 8-digit classification scheme. We use this additional data source to construct an import- and export-weighted international R&D knowledge stock, to test the robustness of our main results to trade-related knowledge spillovers.

For the construction of the ethnic-education-weighted measure we use the information on the theoretical duration for each education type from the International Standard Classification of Education (ISCED), as reported by the United Nations Educational, Scientific and Cultural Organization (UNESCO). ISCED acts as an international framework for comparisons of various education statistics across countries. The last Revision of ISCED in the year 2011 is intended to capture recent developments in educational systems worldwide. The Danish education system categorizes each individual in accordance to this classification scheme, from which we derive the theoretical duration of each education level in Denmark as follows: pre-primary education (1 year), primary education (6 years), lower secondary education (3 years), upper secondary education (3 years), post-secondary/non-tertiary education (2 years), short-cycle tertiary education (3 years), Bachelor (3 years), Master (2 years), and Doctoral programmes (3 years).

Finally, the Data for the construction of R&D capital stocks in 27 countries[7] is provided by the OECD's Analytical Business Enterprise Research and Development (ANBERD) database.

3.2 Descriptive Statistics

Table 1 provides descriptive statistics for the main variables utilized in the empirical analysis for firms employing at least ten workers. The last choice was set to ensure a certain degree of variability of foreign workers across firms when constructing firm-specific international R&D knowledge stocks. Table 3 lists the gross production deciles along with information according to the share of foreign workers with basic, secondary, and tertiary education. This table visualizes the relationship between a firm's economic performance and its share of foreign employees. For example, firms belonging to the first gross production decile have on average 4.4799% foreign workers with basic education. It is worth mentioning that the share of foreign workers with basic education seems to be not related to higher gross production deciles. A somewhat different picture emerges when turning to the share of foreign employees with secondary education. Those firms belonging to the higher gross production deciles also employ on average more foreigners

[7] See Table 4 for a list of the countries included in the empirical analysis.

with secondary education. This tendency is further reinforced when focussing on the median values which is positively correlated with the gross production deciles. The same picture holds when looking at those foreign employees with tertiary education. These employees may be of particular interest to firms as they enhance the firm's production possibility frontier, perhaps, through their unique social capabilities to establish a link between different subunits of the firm with the external knowledge environment. Indeed, firms belonging to the top gross production decile employ on average 0.4713% foreign employees with tertiary education. In comparison, firms residing in the fifth gross production decile have on average 0.2860% foreign workers with tertiary education. A full list of descriptive statistics on the variables included in each of the model specifications is given in Tables 5 and 7, respectively.

4 Results

Table 9 provides first results on the relationship between firms' economic performance and international knowledge absorbed by the employed immigrants. The results presented in column (1) refer to the base specification and show the estimated elasticities for the three main input factors. The estimated coefficients associated with labour, capital, and materials are of the expected positive signs and jointly sum up to unity, establishing the assumption of constant returns to scale in production.

From the findings in Coe and Helpman (1995) and the subsequent literature, it is well known that it makes a significant difference from which country technology is sourced. Obviously, countries which are technologically advanced offer more knowledge to be absorbed than countries which are technological laggards. We therefore account for an immigrant's origin and thereby test if it matters for a firm's absorptive capacity improvement. As described above, we therefore follow the procedure of Coe and Helpman (1995) and construct an ethnic-weighted measure of international R&D capital stocks (see equation 3 for additional details). In column (2) the ethnic-weighted measure of international R&D capital stocks is introduced into the regression equation. The coefficient is highly significant and confirms our assumptions that firms benefit from the employment of immigrants through the absorbed international knowledge. Our measure further suggests that employing immigrants from technologically advanced countries increases the benefits to be earned in terms of a higher output with respect to foreign R&D knowledge stocks.

In addition, we assess the impact of the immigrants' education for each educational level separately (as shown in columns 3-6). All immigrants from OECD countries, regardless of their

educational level, offer a positive markup on the output elasticity of international knowledge vis-à-vis firms without and those with non-OECD immigrants. Again, OECD-immigrants with tertiary education offer the highest benefits. The latter result deserves further investigation, as it suggests, in line with Stoyanov and Zubanov (2012), that immigrants with higher education might play a prominent role in the absorption of knowledge. Our measures so far simply split the sample into groups with basic, secondary, and tertiary immigrants, and are therefore a simple count-based weight. To emphasize the differences in accumulated human capital of the education level, we introduce the average duration of education into our measure (see equation 4 for further details).

Therefore, the following Table 10 shows the main results for our preferred measure indicating the extent of a firm's access to international R&D knowledge stocks when employing immigrants, as discussed above. The estimates in column (1) are shown for comparison purposes. Column (2) adds the ethnic-education-weighted foreign R&D capital stock measure (Log $s^{f,ewedu}$) into the base specification. The estimated coefficient associated with Log $s^{f,ewedu}$ is of the expected positive sign and statistically significant at the 1% level. The output elasticity with respect to this measure equals 0.0009. To assess the impact of the different educational level separately, we construct our measure for each of the educational level and introduce them first separately (columns 3-5) and finally together (column 6). Again, the previous result that immigrants from all educational levels increase firms absorptive capacity but immigrants with tertiary education offer the highest benefits from absorbing foreign knowledge, is further confirmed.

Finally, employees might not work in an occupational position in accordance with their educational level. In particular, immigrants might suffer from problems with the approval of their foreign education certificates, resulting in lower occupational position (Pohl Nielsen, 2011). Also, the opposite mismatch may be the case. Furthermore, the educational level approximates the human capital at the beginning of one business career neglecting advances in human capital through training on the job. Additionally, the occupation position provides an accurate assessment of the actual employees' activities within the firm which might be a closer approximation of our convention of absorptive capacity. Thus, we construct an ethnic-occupation-position weighted measure (see equation 5). In each column (1) to (6) of Table 11 we introduce one of the separate measures for the different occupational levels indicating low-skilled, mid-skilled, high-skilled, managers, and others. With exception of the positions not classified (others), all immigrants add to the output elasticity towards foreign knowledge. The highest contribution is generated by high-skilled immigrants without executive functions (0.0016), followed by managers (0.0013),

immigrants with low and medium positions (0.0009 and 0.0008, respectively). Interestingly, the impact of managers is rendered insignificant in the fully specified model (as shown in column 6). As the correlations between the different measures do not exceed 0.1838, multicollinearity seems not to be the reason for that result. This finding is in accordance with a recent contribution by Parrotta and Pozzoli (2012) who emphasize that highly educated technicians are knowledge carriers, and does directly relate back to Arrow's (1969) original idea where both prior technical knowledge and non-technical skills are ingredients for knowledge transmission.

Another notable result of the empirical analysis is the negative sign associated with the ethnic diversity measure which is in line with previous studies. This measure corresponds to the average of workforce ethnic diversity in a particular firm and year, where higher values correspond to a more ethnic diverse labor force. Prior research has shown the negative effect of ethnic diversity on firms' economic performance (Parrotta et al., 2014a). The main argument is that ethnic diversity comes along with costs and benefits for firms' productivity. The negative effect is transmitted through higher communication costs and lower interpersonal trust, whereas the positive effect is transmitted through enhanced innovation activity (Alesina and La Ferrara, 2005). However, the results uncovered in this paper suggest that firms benefit from their increased absorptive capacity to acquire international knowledge - which is fully in line with a positive impact of ethnic diversity on innovative activity as found by Parrotta et al. (2014b).

In sum, firms employing foreign workers have on average higher gross production levels through their increased absorptive capacity to acquire international R&D knowledge stocks. Furthermore, the higher the share of immigrants from technologically advanced countries and the higher the education or the occupational position of the employed immigrants, the higher their contribution is. This relativises the finding that ethnic diversity exhibits a negative impact in all tested model specifications.

5 Robustness Analysis

This section establishes the robustness of the previous results to different sample sizes and among various specifications. The results are shown in Tables 12, 13, and 14. Column (1) of Table 12 shows the main results using the definition in equation 4 for the foreign R&D capital stock variable. This specification corresponds to that in column (2), Table 10, and is shown for comparison purposes. Although we already control through the ethnic diversity measure, the firms education and occupation characteristics for the direct impact of immigrants on output, the specification shown in column (2) adds a dummy variable (Foreigner) indicating if a firm employs

immigrants and zero otherwise. As expected, the dummy is insignificant and the coefficient of the ethnic-education-weighted foreign R&D capital stock variable is unaffected both in terms of its magnitude and statistical significance. The results reported in column (3) of Table 12 restrict the analysis to non-exporting firms. This results in the exclusion of 30,941 observations from the base sample. The exclusion of exporters from the base sample alleviates, to some extent, knowledge spillovers triggered for example by export sales. Reassuringly, the estimates are not sensitive to the exclusion of exporters from the estimation sample. In contrast, the estimated coefficient associated with the foreign R&D capital stock variable increases substantially to about 0.0017 and is statistically significant at the 1% level. This result suggests that non-exporters benefit more from foreign workers than exporting firms. One possible reason for the importance of foreigners for non-exporters could be their functioning as possible substitutes to international technology diffusion by export activity, for example, through co-ethnic networks. Furthermore, column (4) maintains the robustness of the main results to the exclusion of multinational firms which might be particularly good in absorbing international knowledge spillovers due to their international structure and could, therefore, drive the main results in our empirical analysis. The estimated coefficient associated with the foreign R&D capital stock variable, however, retains its positive sign and still is highly statistically significant. This observation suggests that the previous results are not driven by R&D investments of Danish multinational companies abroad. Case studies have shown the importance of technology diffusion for the high-tech pharmaceutical and computer industries. For this reason, Keller (2004) argues that endogeneity concerns are more pronounced in R&D intense industries (p. 761). Column (5), therefore, assesses the robustness of the results excluding the high-tech chemical (which incorporates the pharmaceutical industry) and computer industry from the base sample. The estimated coefficient associated with Log $s^{f,ewedu}$ remains positive and is statistically significant at the 1% level. Thus, the main results in the empirical analysis are not driven by these industries. As a further robustness check, the results shown in column (6) exclude firms employing foreign workers from non-OECD countries. Therefore, the estimated coefficient on the foreign R&D capital stock variable then indicates the impact on gross production for firms employing foreign workers from OECD countries in comparison to firms employing exclusively Danish workers. This criterion restricts the analysis to 30,497 observations. However, the estimated coefficient on the foreign R&D capital stock variable is positive and increases substantially to about 0.0014. This estimated impact is

statistically significant at the 1% level.[8]

Furthermore, to rule out the possibility that the ethnic based R&D capital stock measure captures knowledge spillovers triggered by trade relationships, column (7) includes an import- and export-weighted foreign R&D capital stock variable into the regression equation. Specifically, the two latter variables are constructed according to expression $\sum_{c \in T_{it}} \left(\omega_{ict} s^f_{ct} \right)$, where ω_{ic} refers to the bilateral import- and export-share of a firm's i trading partner countries, respectively. In addition, T_{it} is the set of firm i's trading partners in year t. This specification excludes 18,349 observations from the base sample. However, the qualitative results remain unchanged to the inclusion of trade-weighted foreign R&D capital stocks. Interestingly, the positive coefficient associated with the import-weighted R&D capital stock confirms the findings in Coe and Helpman (1995). Regarding the coefficient associated with the export-weighted foreign R&D capital stock measure, the contributions by Clerides et al. (1998) and Bernard and Jensen (1999), for example, have triggered a number of empirical studies investigating the relationship between export-learning and a wide range of firm characteristics, particularly firm productivity. In general, numerous case studies point to a beneficial effect on firms' productivity when exporting (for a survey of the literature see Wagner, 2007). The learning-by-exporting hypothesis points to knowledge flows coming from foreign buyers when firms are engaged in international trade. However, the export-weighted R&D capital stock measure enters with a negative sign into the regression analysis, suggesting that firms' gross production decreases when they start exporting into high-R&D partner countries. This result would be consistent with the notion that firms' technology diffuses to potential competitors abroad, thus, negatively affecting a firm's own economic success.

Moreover, the main results are not sensitive to possible endogeneity bias. This bias could arise from the fact that economically well-performing firms may respond by hiring foreign workers who are likely to be in the preferred position to absorb international knowledge more effectively, therefore, creating an empirical artifact between a firm's gross production and the education-weighted R&D knowledge stock measure. Therefore, we use one-year lagged variables of our R&D knowledge stocks, as they were predetermined, in a way that consistent estimators for the corresponding R&D elasticities can be derived when they appear as exogenous regressors in the regression equation. Table 13 presents the corresponding results where foreign knowledge stocks

[8] Because data on R&D capital stocks are unequally available across countries, we also restricted the estimation sample to the 2002-2006 time period. The main conclusions of the paper regarding this additional robustness test remain unaffected. These results are available from the authors upon request.

are measured in year $t-1$. Reassuringly, the positive association between firms' gross production and its international R&D knowledge stock measure is further maintained and rather robust, as shown in column (1). The regression analysis shown in columns (2) to (5) is dedicated to maintaining the main results to the inclusion of lagged international R&D knowledge stocks by education types. The qualitative results remain unaffected. Finally, the results remain robust when we further control for international knowledge spillovers triggered by imports and exports, as shown in column (6).

Yet, it may be that firms with a systematically better management or a superior organizational structure are more apt to hire better workers and at the same time benefit from a higher level of gross output. These firm characteristics are not likely to vary strongly over time. Thus, we address this other source of endogeneity by including firm fixed effects into the regression equation. The results are shown in Table 14. In column (1), the base specification is re-estimated. While the coefficients of the traditional inputs remain positive and significant, two of the control variables (Ethnic Diversity and Managers) turn insignificant and the coefficient of the Males dummy changes its sign. These changes remain stable throughout all further estimations in columns (2)-(7). The results of the estimation with the ethnic-education weighted measure are reported in column (2). The coefficient remains significant but is slightly lower than in the previous estimations. In the further estimations differentiating our measure with respect to educational level, only the variable for the immigrants with tertiary education remains significant. As a final robustness test, the analysis shown in column (7) includes a recodification dummy which equals one for firms with zero foreign R&D knowledge stocks. The inclusion of this dummy variable represents a further robustness check, as those firms without foreign workers from OECD countries have, per definition, zero foreign R&D knowledge stocks. Although, the estimated coefficient on this dummy variable is not significant, the estimated coefficient associated with Log $s^{f,ewedu}$ is rather unaffected in magnitude and statistical significance.

6 Conclusion

This paper investigates the question if immigrant employees are an important channel for international knowledge spillovers. Based on Danish firm-level data and aggregated R&D capital stock data for OECD countries, the estimations show that immigrant employees are indeed an important diffusion channel for international knowledge spillovers contributing significantly to firms' output elasticity with respect to foreign knowledge. However, the composition of the foreign staff with respect to origin, education, and occupational position has an important impact

on the size of the effect on output. The higher the share of immigrants from technologically advanced countries and the higher their educational level (or occupational position), the larger the impact on a firm's output elasticity of foreign knowledge is. However, the only exception are immigrant managers for whom we do not find such a significant effect. Through a large number of checks, the robustness of the results is confirmed. Among these checks, a measure of workforce ethnic diversity is included as a control variable and reveals a negative direct impact of workforce ethnic diversity on firms' gross production. Thus, the positive impact of an ethnic-diverse labour force for firms' capability to access international knowledge via culture, language, and social networks might on the other hand increase communication costs and cause a lack of interpersonal trust resulting simultaneously in a negative impact on firms' output. However, an assessment of costs and benefits of ethnic diversity in an unified econometric framework is beyond the scope of the paper and has to be left to future research.

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A Data Description

Table 1: Summary Statistics and Data Description for the Main Variables

Variable	Description	Mean	S.D.	Min.	Max.
Foreigners Pre-Primary	Foreign workers with pre-primary education, as a proportion of total workers employed.	0.0374	0.0673	0.0000	1.0000
Foreigners Primary	Foreign workers with primary education, as a proportion of total workers employed.	0.0093	0.0297	0.0000	1.0000
Foreigners Lower Secondary	Foreign workers with lower secondary education, as a proportion of total workers employed.	0.0005	0.0042	0.0000	0.1250
Foreigners Upper Secondary	Foreign workers with upper secondary education, as a proportion of total workers employed.	0.0001	0.0016	0.0000	0.0909
Foreigners Post-Secondary	Foreign workers with post-secondary/non-tertiary education, as a proportion of total workers employed.	0.0078	0.0206	0.0000	0.5000
Foreigners Short-Cycle Tertiary	Foreign workers with short-cycle tertiary education, as a proportion of total workers employed.	0.0027	0.0127	0.0000	1.0000
Foreigners Bachelor	Foreign workers with Bachelor degree eduction, as a proportion of total workers employed.	0.0001	0.0018	0.0000	0.0909
Foreigners Master	Foreign workers with Master degree eduction, as a proportion of total workers employed.	0.0001	0.0020	0.0000	0.1250
Foreigners Doctoral	Foreign workers with Doctoral degree eduction, as a proportion of total workers employed.	0.0001	0.0017	0.0000	0.1250
Males	Men, as a proportion of total workers employed.	0.7347	0.2079	0.0000	1.0000
Age15_28	Workers aged between 15 and 28, as a proportion of total workers employed.	0.1851	0.1430	0.0000	1.0000
Age29_38	Workers aged between 29 and 38, as a proportion of total workers employed.	0.2565	0.1209	0.0000	1.0000
Age39_48	Workers aged between 39 and 48, as a proportion of total workers employed.	0.2600	0.1172	0.0000	1.0000
Age49_65	Workers aged between 49 and 65, as a proportion of total workers employed.	0.2773	0.1472	0.0000	1.0000
Low-Skilled	Workers with low-skilled occupation according to the definition of ISCO, as a proportion of total workers employed.	0.1505	0.1821	0.0000	1.0000
Mid-Skilled	Workers with mid-skilled occupation according to the definition of ISCO, as a proportion of total workers employed.	0.5997	0.2230	0.0000	1.0000
High-Skilled	Workers with high-skilled occupation according to the definition of ISCO, as a proportion of total workers employed.	0.1277	0.1392	0.0000	1.0000
Managers	Managers, according to Statistics Denmark's definitions based on ISCO, as a proportion of total workers employed.	0.0562	0.0720	0.0000	1.0000
Log Tenure	The log of average firm tenure (in years).	1.5006	0.4750	0.0000	2.7081
Ethnic Diversity	Ethnic worker diversity index, averaged across work places.	0.0990	0.1244	0.0000	0.8471
Log $s^{f,ewedu}$	Education-weighted firm's foreign R&D capital stock based on foreign workers from OECD member countries.	9.4034	12.2213	0.0000	30.9934
Log $s^{f,ewedu,B}$	Education-weighted firm's foreign R&D capital stock based on foreign workers with basic education from OECD member countries.	7.3437	11.1182	0.0000	30.1667
Log $s^{f,ewedu,S}$	Education-weighted firm's foreign R&D capital stock based on foreign workers with secondary education from OECD member countries.	3.3184	8.6936	0.0000	30.9288
Log $s^{f,ewedu,T}$	Education-weighted firm's foreign R&D capital stock based on foreign workers with tertiary education from OECD member countries.	1.6838	6.3270	0.0000	30.9934
Log Gross Production	The log of firm's gross production as total sales of goods and services (in DKK).	17.3068	1.2960	12.8186	24.0804
Log Materials	The log of firm's intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK).	16.2975	1.5165	6.9078	23.7692
Log Capital	The log of firm's total assets (in DKK).	15.7992	1.6970	6.9078	24.0446
Log Labour	The log of firm's fulltime equivalent workers.	3.4633	1.0706	0.0000	9.4122
Multinational	Takes value 1, if the firm is foreign owned.	0.0022	0.0469	0.0000	1.0000
Exporter	Takes value 1, if the firm exports and zero otherwise.	0.7578	0.4284	0.0000	1.0000
Observations			40828		

Notes: Summary statistics are constructed for all manufacturing firms for the time period 1999 to 2009. The industrial sectors utilized in the empirical analysis are as follows: basic metals; beverages; chemicals and chemical products; coke and refined petroleum products; electrical equipment; fabricated metal products, except machinery and equipment; food products; furniture; leather and related products; machinery and equipment n.e.c.; motor vehicles, trailers and semi-trailers; other non-metallic mineral products; other transport equipment; paper and paper products; rubber and plastic products; textiles; tobacco products; wearing apparel; wood products; other manufacturing; printing and reproduction of recorded media; repair and installation of machinery and equipment;

B Construction of the Foreign R&D Capital Stock

Data for the construction of R&D capital stocks in 27 countries[9] is provided by the OECD's Analytical Business Enterprise Research and Development (ANBERD) database. Data on R&D expenditures were first deflated by a country-specific value added price deflator (VALP) provided by the OECD Structural Analysis (STAN) database and then converted into constant 2000 US-Dollar.

The construction of the R&D capital stock for each country is then carried out following the Perpetual Inventory Method (PIM).[10] Specifically, the R&D capital stock evolves according to the following equation:

$$KR\&D_{ct} = (1-\delta)KR\&D_{ct-1} + R\&D_{ct}, \tag{6}$$

where $KR\&D_{ct}$ is the $R\&D$ capital stock of country c in period t and $R\&D_{ct}$ is the flow of real $R\&D$ expenditures of country c in period t. Two apply this equation to data on real $R\&D$ expenditures, two crucial decisions with respect to the depreciation rate δ and the initial capital stock must be set, respectively. The depreciation rate is assumed to be 10%, the same across countries, and constant over time. Furthermore, assuming a constant country-specific growth rate of g_c for the $R\&D$ capital stock before period $t = 1$, the value for the initial $R\&D$ capital stock is computed according to the following expression:

$$\begin{aligned} KR\&D_{c1} &= (1-\delta)R\&D_{c-1} + (1-\delta)^2 R\&D_{c-2} + \cdots \\ &= \sum_{s=0}^{\infty}(1-\delta)^s R\&D_{c-s} = R\&D_{c0}\sum_{s=0}^{\infty}\left[\frac{1-\delta}{1+g_c}\right]^s = \frac{R\&D_{c0}}{\delta+g_c}. \end{aligned} \tag{7}$$

In contrast to other studies, which assume a growth rate (e.g. Hall and Mairesse, 1995) in this study g_c is computed using an average geometric growth rate in years for which data on R&D expenditures is available. Summary statistics on the R&D capital stocks of the different countries is given in Table 4.

[9] See Table 4 for the countries employed in the empirical analysis.

[10] Hulten (1991) provides an extensive discussion of the PIM for the measurement and construction of physical and human capital stocks.

C Descriptive Statistics

Table 2: Summary Statistics for Foreign Workers according to Education Level

		Basic Education						Secondary Education						Tertiary Education					
Country Code		Obs.	Mean	Median	S.D.	Min.	Max.	Obs.	Mean	Median	S.D.	Min.	Max.	Obs.	Mean	Median	S.D.	Min.	Max.
AUS																			
	overall	41.000	0.005	0.002	0.011	0.000	0.056	80.000	0.018	0.007	0.026	0.000	0.100	37.000	0.005	0.002	0.007	0.000	0.033
	between	10.000			0.016	0.000	0.053	28.000			0.023	0.000	0.074	9.000			0.011	0.000	0.033
	within	4.100			0.001	0.002	0.010	2.857			0.005	-0.001	0.044	4.111			0.000	0.004	0.006
AUT																			
	overall	64.000	0.013	0.003	0.020	0.000	0.083	170.000	0.014	0.006	0.018	0.000	0.083	94.000	0.007	0.002	0.014	0.000	0.077
	between	18.000			0.017	0.000	0.074	39.000			0.018	0.000	0.083	26.000			0.020	0.000	0.077
	within	3.556			0.002	0.005	0.022	4.359			0.002	0.003	0.025	3.615			0.001	0.000	0.011
BEL																			
	overall	16.000	0.007	0.001	0.018	0.000	0.071	57.000	0.009	0.008	0.008	0.000	0.029	11.000	0.008	0.007	0.009	0.000	0.030
	between	5.000			0.031	0.000	0.071	22.000			0.008	0.000	0.026	7.000			0.011	0.000	0.030
	within	3.200			0.000	0.006	0.007	2.591			0.002	0.004	0.016	1.571			0.000	0.007	0.009
CAN																			
	overall	74.000	0.008	0.003	0.010	0.000	0.037	155.000	0.011	0.006	0.020	0.000	0.200	52.000	0.004	0.001	0.006	0.000	0.031
	between	24.000			0.011	0.000	0.037	41.000			0.026	0.000	0.114	16.000			0.009	0.000	0.031
	within	3.083			0.001	0.002	0.014	3.780			0.010	-0.075	0.097	3.250			0.001	0.002	0.007
CZE																			
	overall	3.000	0.005	0.005	0.001	0.004	0.005	7.000	0.030	0.002	0.036	0.002	0.083	18.000	0.003	0.001	0.004	0.000	0.015
	between	2.000			0.001	0.004	0.005	2.000			0.047	0.002	0.068	6.000			0.005	0.000	0.014
	within	1.500			0.000	0.004	0.005	3.500			0.008	0.021	0.046	3.000			0.000	0.002	0.003
DEU																			
	overall	989.000	0.014	0.007	0.017	0.000	0.143	2628.000	0.021	0.010	0.030	0.000	0.500	1084.000	0.015	0.005	0.026	0.000	0.333
	between	285.000			0.021	0.000	0.134	634.000			0.025	0.000	0.161	265.000			0.021	0.000	0.125
	within	3.470			0.003	-0.005	0.042	4.145			0.012	-0.099	0.360	4.091			0.013	-0.041	0.280
DNK																			
	overall	39764.000	0.314	0.300	0.151	0.012	1.000	40629.000	0.543	0.538	0.171	0.028	1.000	31338.000	0.124	0.096	0.101	0.007	1.000
	between	4770.000			0.142	0.026	1.000	4778.000			0.161	0.063	1.000	4313.000			0.088	0.010	1.000
	within	8.336			0.067	-0.140	1.005	8.503			0.070	0.117	1.265	7.266			0.048	-0.374	0.971
ESP																			
	overall	54.000	0.008	0.003	0.014	0.000	0.077	87.000	0.008	0.003	0.013	0.000	0.077	108.000	0.011	0.003	0.022	0.000	0.125
	between	21.000			0.020	0.000	0.077	25.000			0.017	0.000	0.077	33.000			0.016	0.000	0.084
	within	2.571			0.000	0.007	0.010	3.480			0.001	0.004	0.015	3.273			0.006	-0.017	0.052
EST																			
	overall	5.000	0.031	0.024	0.025	0.000	0.067	24.000	0.010	0.002	0.017	0.000	0.048	28.000	0.010	0.001	0.022	0.000	0.091
	between	3.000			0.027	0.000	0.053	9.000			0.018	0.000	0.044	11.000			0.025	0.000	0.084
	within	1.667			0.009	0.017	0.044	2.667			0.002	0.004	0.017	2.545			0.002	0.003	0.017
FIN																			
	overall	116.000	0.006	0.001	0.013	0.000	0.077	225.000	0.008	0.004	0.013	0.000	0.077	153.000	0.010	0.003	0.015	0.000	0.077
	between	37.000			0.016	0.000	0.074	68.000			0.015	0.000	0.077	40.000			0.015	0.000	0.068
	within	3.135			0.001	0.003	0.013	3.309			0.002	0.000	0.024	3.825			0.004	-0.007	0.033
FRA																			
	overall	45.000	0.018	0.008	0.024	0.000	0.105	177.000	0.015	0.004	0.021	0.000	0.100	173.000	0.012	0.004	0.025	0.000	0.200
	between	18.000			0.019	0.000	0.069	59.000			0.021	0.000	0.091	50.000			0.022	0.000	0.133
	within	2.500			0.009	-0.015	0.054	3.000			0.003	0.002	0.035	3.460			0.010	-0.059	0.079
GBR																			
	overall	239.000	0.012	0.003	0.019	0.000	0.167	702.000	0.015	0.007	0.020	0.000	0.167	316.000	0.013	0.003	0.022	0.000	0.143
	between	95.000			0.022	0.000	0.125	218.000			0.019	0.000	0.113	82.000			0.023	0.000	0.113
	within	2.516			0.005	-0.038	0.062	3.220			0.005	-0.014	0.090	3.854			0.008	-0.036	0.083
GRC																			
	overall	12.000	0.016	0.018	0.012	0.002	0.034	80.000	0.009	0.004	0.016	0.000	0.091	34.000	0.006	0.003	0.010	0.000	0.032
	between	4.000			0.011	0.002	0.025	18.000			0.024	0.000	0.087	9.000			0.010	0.000	0.031
	within	3.000			0.004	0.007	0.025	4.444			0.002	0.000	0.018	3.778			0.000	0.004	0.007
HUN																			
	overall	96.000	0.014	0.005	0.017	0.000	0.053	216.000	0.011	0.004	0.019	0.000	0.091	88.000	0.011	0.003	0.017	0.000	0.100
	between	35.000			0.014	0.000	0.049	54.000			0.021	0.000	0.088	30.000			0.013	0.000	0.069
	within	2.743			0.001	0.010	0.019	4.000			0.003	-0.009	0.033	2.933			0.004	-0.006	0.042

Notes: Summary statistics are constructed for all manufacturing firms during the time period 1999 to 2009. Obs. refers to the number of observations across firms and years for each country of origin.

Table 2: *Continued*

		Basic Education						Secondary Education						Tertiary Education					
Country Code		Obs.	Mean	Median	S.D.	Min.	Max.	Obs.	Mean	Median	S.D.	Min.	Max.	Obs.	Mean	Median	S.D.	Min.	Max.
ISL																			
	overall	187.000	0.014	0.006	0.021	0.000	0.111	403.000	0.015	0.006	0.021	0.000	0.167	422.000	0.014	0.004	0.035	0.000	0.321
	between	85.000			0.021	0.000	0.100	127.000			0.021	0.000	0.102	138.000			0.027	0.000	0.268
	within	2.200			0.005	-0.014	0.053	3.173			0.006	-0.015	0.080	3.058			0.006	-0.032	0.067
ISR																			
	overall	29.000	0.018	0.014	0.020	0.001	0.077	97.000	0.009	0.004	0.013	0.000	0.067	74.000	0.012	0.006	0.012	0.000	0.043
	between	13.000			0.021	0.001	0.065	38.000			0.015	0.000	0.067	20.000			0.010	0.000	0.034
	within	2.231			0.004	0.003	0.030	2.553			0.003	-0.009	0.032	3.700			0.003	0.005	0.022
ITA																			
	overall	44.000	0.027	0.007	0.033	0.001	0.111	136.000	0.010	0.004	0.013	0.000	0.063	68.000	0.007	0.001	0.014	0.000	0.071
	between	24.000			0.027	0.001	0.081	34.000			0.012	0.000	0.047	29.000			0.015	0.000	0.069
	within	1.833			0.008	0.002	0.057	4.000			0.002	0.001	0.027	2.345			0.001	0.002	0.011
JPN																			
	overall	17.000	0.015	0.009	0.015	0.000	0.050	46.000	0.010	0.009	0.010	0.000	0.056	39.000	0.010	0.011	0.010	0.000	0.043
	between	10.000			0.013	0.000	0.044	13.000			0.018	0.000	0.056	13.000			0.013	0.000	0.043
	within	1.700			0.002	0.009	0.021	3.538			0.003	0.004	0.020	3.000			0.001	0.007	0.013
KOR																			
	overall	15.000	0.016	0.014	0.017	0.000	0.059	28.000	0.014	0.010	0.013	0.000	0.034	13.000	0.012	0.001	0.023	0.000	0.067
	between	7.000			0.019	0.000	0.052	9.000			0.012	0.000	0.029	5.000			0.026	0.000	0.061
	within	2.143			0.003	0.009	0.023	3.111			0.004	0.003	0.022	2.600			0.002	0.006	0.017
MEX																			
	overall	3.000	0.013	0.014	0.002	0.010	0.014	19.000	0.021	0.019	0.019	0.000	0.059	25.000	0.005	0.003	0.006	0.000	0.019
	between	2.000			0.003	0.010	0.014	9.000			0.019	0.000	0.056	10.000			0.005	0.000	0.019
	within	1.500			0.000	0.012	0.013	2.111			0.002	0.018	0.024	2.500			0.000	0.004	0.005
NLD																			
	overall	141.000	0.021	0.005	0.055	0.000	0.500	279.000	0.010	0.004	0.015	0.000	0.091	138.000	0.008	0.003	0.014	0.000	0.100
	between	62.000			0.038	0.000	0.265	75.000			0.018	0.000	0.081	42.000			0.021	0.000	0.100
	within	2.274			0.024	-0.119	0.256	3.720			0.003	-0.007	0.026	3.286			0.001	0.005	0.012
NOR																			
	overall	436.000	0.017	0.006	0.024	0.000	0.125	860.000	0.016	0.008	0.020	0.000	0.167	582.000	0.013	0.005	0.016	0.000	0.083
	between	151.000			0.025	0.000	0.125	243.000			0.020	0.000	0.122	169.000			0.017	0.000	0.071
	within	2.887			0.004	-0.001	0.055	3.539			0.005	-0.029	0.062	3.444			0.004	-0.008	0.053
POL																			
	overall	720.000	0.018	0.007	0.026	0.000	0.214	1053.000	0.016	0.006	0.024	0.000	0.167	670.000	0.016	0.006	0.043	0.000	1.000
	between	273.000			0.026	0.000	0.171	286.000			0.024	0.000	0.159	204.000			0.042	0.000	0.516
	within	2.637			0.007	-0.053	0.111	3.682			0.004	-0.006	0.079	3.284			0.027	-0.468	0.500
PRT																			
	overall	27.000	0.013	0.001	0.017	0.000	0.059	84.000	0.010	0.002	0.020	0.000	0.111	33.000	0.003	0.002	0.005	0.000	0.018
	between	4.000			0.016	0.000	0.032	21.000			0.028	0.000	0.111	7.000			0.006	0.000	0.016
	within	6.750			0.006	0.004	0.040	4.000			0.002	0.005	0.019	4.714			0.001	0.001	0.005
SVK																			
	overall							1.000	0.001	0.001		0.001	0.001	9.000	0.006	0.001	0.015	0.000	0.045
	between							1.000				0.001	0.001	5.000			0.020	0.000	0.045
	within							1.000				0.001	0.001	1.800			0.000	0.005	0.006
SVN																			
	overall	1.000	0.040	0.040		0.040	0.040	6.000	0.007	0.004	0.008	0.003	0.023	7.000	0.004	0.004	0.001	0.002	0.005
	between	1.000				0.040	0.040	2.000			0.013	0.004	0.023	2.000			0.002	0.002	0.005
	within	1.000				0.040	0.040	3.000			0.001	0.006	0.009	3.500			0.000	0.003	0.004
USA																			
	overall	95.000	0.009	0.004	0.015	0.000	0.100	207.000	0.013	0.002	0.021	0.000	0.111	218.000	0.012	0.002	0.022	0.000	0.111
	between	38.000			0.019	0.000	0.100	73.000			0.020	0.000	0.096	64.000			0.018	0.000	0.090
	within	2.500			0.002	0.004	0.016	2.836			0.004	-0.003	0.036	3.406			0.004	-0.007	0.032

Notes: Summary statistics are constructed for all manufacturing firms during the time period 1999 to 2009. Obs. refers to the number of observations across firms and years for each country of origin.

Table 3: Summary Statistics for Firms Employing Foreign Workers According to their Economic Performance

		Basic Education					Secondary Education					Tertiary Education				
Gross Production Deciles	Labour Size	Mean	Median	S.D.	Min.	Max.	Mean	Median	S.D.	Min.	Max.	Mean	Median	S.D.	Min.	Max.
First	12.4541	4.4799	0.7407	8.8201	0	79.3355	0.6685	0.0000	2.2207	0	24.5671	0.1601	0.0000	0.9994	0	11.9683
Second	14.3312	4.4422	1.2527	7.3119	0	71.9569	0.8795	0.0000	2.4311	0	19.9893	0.1349	0.0000	0.7080	0	8.6915
Third	16.2110	4.0450	1.1873	8.1019	0	92.0068	0.8771	0.0000	1.9616	0	13.2558	0.2911	0.0000	1.3746	0	16.1089
Fourth	20.0726	3.9961	1.5152	6.6142	0	64.2520	0.9034	0.0000	2.0957	0	15.3437	0.2095	0.0000	0.7574	0	8.2748
Fifth	23.5248	4.4134	1.6306	7.9799	0	93.5152	0.6717	0.0000	1.3636	0	10.9276	0.2860	0.0000	1.3095	0	19.2055
Sixth	29.2331	4.9171	2.2479	7.6863	0	64.5614	0.8431	0.0000	1.5006	0	11.9653	0.3121	0.0000	0.9291	0	9.3750
Seventh	40.9758	5.0211	2.9524	6.9545	0	66.4562	0.8071	0.1749	1.3084	0	9.0115	0.3532	0.0000	0.9030	0	9.8321
Eighth	56.0916	5.3908	2.9309	7.9095	0	57.7179	0.8382	0.3251	1.2228	0	8.1445	0.3200	0.0000	0.9662	0	17.1875
Ninth	93.9273	5.1965	3.0016	7.1715	0	54.6899	0.8009	0.4366	1.0218	0	6.8783	0.3584	0.0749	0.7454	0	8.0458
Tenth	412.8351	4.5899	3.0325	5.2289	0	46.0161	0.8849	0.6547	0.8674	0	5.6925	0.4713	0.2512	0.7330	0	8.5619

Notes: Summary statistics are constructed for all manufacturing firms for the time period 1999 to 2009. Labour Size corresponds to the average number of fulltime-equivalent employees. The mean and median values are expressed in %, respectively.

Table 4: Descriptive Statistics for the Sampled *R&D* Countries

Country Code	Country	Obs.	Coverage	Mean	Median	S.D.	Min.	Max.
AUS	Australia	18	1989-2006	17201.496	16536.043	7143.181	7627.369	31489.420
AUT	Austria	8	2002-2009	22913.260	22699.828	3613.437	18204.256	28197.736
BEL	Belgium	12	1998-2009	28853.129	28973.688	1575.196	26200.441	31248.355
CAN	Canada	20	1987-2006	45117.004	41924.473	14394.748	26949.480	70907.125
CZE	Czech Republic	17	1993-2009	3489.423	3274.040	794.038	2567.471	5084.386
DEU	Germany	18	1991-2008	255013.719	248473.781	30972.646	215808.141	312100.344
DNK	Denmark	6	2001-2006	24575.367	24631.211	767.462	23498.283	25563.172
ESP	Spain	30	1980-2009	14500.596	13074.151	8934.097	3410.860	34061.348
EST	Estonia	12	1998-2009	105.881	78.737	77.010	26.196	248.403
FIN	Finland	37	1973-2009	9401.680	6771.818	7921.644	1384.660	27438.457
FRA	France	35	1973-2007	108090.961	106073.328	37593.590	55305.691	169559.266
GBR	United Kingdom	22	1987-2008	151379.797	147885.969	9290.854	138059.500	169844.109
GRC	Greece	20	1988-2007	1016.673	885.278	514.151	381.227	1953.248
HUN	Hungary	16	1994-2009	1166.288	1079.830	400.754	689.227	1991.053
ISL	Iceland	23	1987-2009	418.984	240.409	381.488	43.975	1159.778
ISR	Israel	9	2000-2008	34480.141	33819.258	3460.149	29825.244	40453.988
ITA	Italy	37	1973-2009	39275.785	44330.148	13996.295	17809.988	60354.758
JPN	Japan	23	1987-2009	790902.188	772097.125	163205.984	546084.188	1083235.375
KOR	South Korea	15	1995-2009	72619.531	67124.102	24041.914	42983.758	118903.773
MEX	Mexico	13	1995-2007	3682.963	3269.329	1983.757	1319.377	7288.594
NLD	Netherlands	35	1973-2007	24377.344	24415.133	6706.725	15412.286	36682.840
NOR	Norway	14	1995-2008	13775.466	13844.434	841.686	12433.524	14964.194
POL	Poland	14	1995-2008	3383.130	3376.470	139.420	3106.814	3580.878
PRT	Portugal	20	1987-2006	995.597	805.097	573.275	324.639	2348.847
SVK	Slovakia	16	1994-2009	946.094	981.808	83.785	793.463	1045.345
SVN	Slovenia	15	1995-2009	1138.584	1102.479	371.920	647.619	1827.205
USA	United States	22	1987-2008	1348665.500	1300002.250	253918.906	993174.063	1803543.625

Notes: The construction of the R&D capital stocks is based on the Perpetual Inventory Method (PIM) applied to data for R&D expenditures from the OECD's Analytical Business Enterprise Research and Development (ANBERD) database, as outlined in the main text. R&D expenditures by country are first deflated with a country-specific valued added price deflator (VALP) from the OECD Structural Analysis (STAN) database and then converted into constant 2000 US-Dollar. The values in this table are expressed in millions of US-Dollars.

Table 5: Summary Statistics for Regression Analysis in Table (3).

	Obs.	Mean	S. D.	Min.	Max.
Log Gross Production	40828	17.3068	1.2960	12.8186	24.0804
Log Labour	40828	3.4633	1.0706	0.0000	9.4122
Log Capital	40828	15.7992	1.6970	6.9078	24.0446
Log Materials	40828	16.2975	1.5165	6.9078	23.7692
$Dummy_{For}\times$ Log s^f	40828	18.0973	13.9242	0.0000	28.9659
$Dummy_B\times$ Log s^f	40828	16.0348	14.3137	0.0000	28.9659
$Dummy_S\times$ Log s^f	40828	7.6702	12.7342	0.0000	28.9659
$Dummy_T\times$ Log s^f	40828	3.7272	9.6686	0.0000	28.9659
Log $s^{f,ew}$	40828	9.0006	11.6812	0.0000	28.2208
Log $s^{f,ew,B}$	40828	7.2688	11.0025	0.0000	28.2208
Log $s^{f,ew,S}$	40828	2.9755	7.8031	0.0000	28.2208
Log $s^{f,ew,T}$	40828	1.4977	5.6351	0.0000	28.2208
Log $s^{f,ewedu}$	40828	9.4034	12.2213	0.0000	30.9934
Log $s^{f,ewedu,B}$	40828	7.3437	11.1182	0.0000	30.1667
Log $s^{f,ewedu,S}$	40828	3.3184	8.6936	0.0000	30.9288
Log $s^{f,ewedu,T}$	40828	1.6838	6.3270	0.0000	30.9934
Log $s^{f,ewoccu,other}$	40828	0.8584	4.3881	0.0000	28.1568
Log $s^{f,ewoccu,low}$	40828	2.1429	6.6914	0.0000	28.2208
Log $s^{f,ewoccu,mid}$	40828	6.1494	10.4158	0.0000	28.2208
Log $s^{f,ewoccu,high}$	40828	2.5244	7.2703	0.0000	28.2208
Log $s^{f,ewoccu,managers}$	40828	0.8228	4.3028	0.0000	27.9528
Ethnic Diversity	40828	0.0990	0.1244	0.0000	0.8471
Log Tenure	40828	1.5006	0.4750	0.0000	2.7081
Males	40828	0.7347	0.2079	0.0000	1.0000
Age15_28	40828	0.1851	0.1430	0.0000	1.0000
Age29_38	40828	0.2565	0.1209	0.0000	1.0000
Age39_48	40828	0.2600	0.1172	0.0000	1.0000
Age49_65	40828	0.2773	0.1472	0.0000	1.0000
Low-Skilled	40828	0.1505	0.1821	0.0000	1.0000
Mid-Skilled	40828	0.5997	0.2230	0.0000	1.0000
High-Skilled	40828	0.1277	0.1392	0.0000	1.0000
Managers	40828	0.0562	0.0720	0.0000	1.0000
Basic Education	40828	0.3529	0.1745	0.0000	1.0000
Secondary Education	40828	0.5489	0.1751	0.0000	1.0000
Tertiary Education	40828	0.0982	0.1059	0.0000	1.0000
Multinational	40828	0.0022	0.0469	0.0000	1.0000
Exporter	40828	0.7578	0.4284	0.0000	1.0000

Table 6: Pairwise Correlations for Regression Analysis in Table (X).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)
(1) Log Gross Production	1.0000																																					
(2) Log Labour	0.8883	1.0000																																				
(3) Log Capital	0.7805	0.7409	1.0000																																			
(4) Log Materials	0.9200	0.7908	0.6887	1.0000																																		
(5) $Dummy_{For} \times \text{Log } s^f$	0.4165	0.4612	0.3339	0.3770	1.0000																																	
(6) $Dummy_B \times \text{Log } s^f$	0.4211	0.4677	0.3504	0.3820	0.8620	1.0000																																
(7) $Dummy_S \times \text{Log } s^f$	0.4412	0.4836	0.3628	0.3868	0.4635	0.2806	1.0000																															
(8) $Dummy_T \times \text{Log } s^f$	0.4387	0.4451	0.3535	0.3851	0.2965	0.2253	0.2708	1.0000																														
(9) Log $s^{f,ew}$	0.4535	0.4953	0.3639	0.4105	0.5954	0.5430	0.4289	0.3379	1.0000																													
(10) Log $s^{f,ew,B}$	0.4446	0.4875	0.3699	0.4015	0.5106	0.5919	0.2654	0.2475	0.8589	1.0000																												
(11) Log $s^{f,ew,S}$	0.3700	0.4035	0.3011	0.3318	0.2946	0.1763	0.6344	0.2186	0.5051	0.2380	1.0000																											
(12) Log $s^{f,ew,T}$	0.3478	0.3526	0.2845	0.3047	0.2054	0.1517	0.2032	0.6908	0.3466	0.2019	0.1984	1.0000																										
(13) Log $s^{f,ewedu}$	0.4570	0.4989	0.3662	0.4135	0.5945	0.5329	0.4473	0.3523	0.9983	0.8365	0.5364	0.3683	1.0000																									
(14) Log $s^{f,ewedu,B}$	0.4449	0.4884	0.3704	0.4019	0.5104	0.5917	0.2660	0.2484	0.8586	0.9996	0.2383	0.2026	0.8368	1.0000																								
(15) Log $s^{f,ewedu,S}$	0.3715	0.4051	0.3025	0.3330	0.2949	0.1774	0.6351	0.2200	0.5052	0.2391	0.9999	0.1998	0.5365	0.2394	1.0000																								
(16) Log $s^{f,ewedu,T}$	0.3493	0.3543	0.2858	0.3060	0.2057	0.1526	0.2043	0.6918	0.3468	0.2027	0.1995	0.9999	0.3684	0.2034	0.2008	1.0000																						
(17) Log $s^{f,ewoccu,low}$	0.2923	0.3152	0.2540	0.2639	0.2474	0.2659	0.2137	0.2073	0.4150	0.4307	0.2523	0.1963	0.4126	0.4320	0.2529	0.1971	1.0000																					
(18) Log $s^{f,ewoccu,mid}$	0.4137	0.4710	0.3370	0.3732	0.4561	0.4354	0.3929	0.2530	0.7692	0.7020	0.4774	0.2384	0.7678	0.7024	0.4777	0.2390	0.1705	1.0000																				
(19) Log $s^{f,ewoccu,high}$	0.4253	0.4286	0.3515	0.3751	0.2683	0.2447	0.3301	0.4323	0.4592	0.3878	0.3858	0.4786	0.4681	0.3869	0.3869	0.4790	0.1911	0.2279	1.0000																			
(20) Log $s^{f,ewoccu,managers}$	0.2183	0.2303	0.1841	0.1862	0.1478	0.1371	0.1657	0.2125	0.2565	0.2269	0.1982	0.2737	0.2605	0.2268	0.1985	0.2739	0.1005	0.1277	0.1838	1.0000																		
(21) Log $s^{f,ewoccu,other}$	0.1305	0.1383	0.1157	0.1131	0.1520	0.1594	0.1140	0.1039	0.2557	0.2569	0.1424	0.1200	0.2539	0.2565	0.1429	0.1201	0.0251	0.0625	0.0882	0.0438	1.0000																	
(22) Ethnic Diversity	0.0807	0.0926	0.0660	0.0781	0.6122	0.5960	0.3025	0.1951	0.3460	0.3166	0.1390	0.1081	0.3436	0.3166	0.1398	0.1087	0.1923	0.2598	0.1159	0.0841	0.1184	1.0000																
(23) Log Tenure	0.1067	0.0074	0.0799	0.0622	-0.0001	-0.0026	0.0245	0.0203	-0.0235	-0.0190	-0.0165	-0.0010	-0.0239	-0.0197	-0.0164	-0.0010	-0.0350	-0.0262	0.0189	0.0003	0.0135	-0.0356	1.0000															
(24) Males	-0.0455	-0.0719	-0.0597	-0.0276	-0.0954	-0.1243	0.0047	-0.1065	-0.0715	-0.0859	-0.0062	-0.0808	-0.0711	-0.0872	-0.0068	-0.0810	-0.0939	-0.0409	-0.0604	-0.0529	-0.0332	-0.1264	0.0414	1.0000														
(25) Age15_28	-0.2339	-0.0696	-0.1848	-0.2021	-0.0577	-0.0540	-0.0629	-0.0830	-0.0789	-0.0753	-0.0504	-0.0697	-0.0780	-0.0734	-0.0505	-0.0696	-0.0108	-0.0549	-0.1117	-0.0511	-0.0265	0.0163	-0.3716	-0.0235	1.0000													
(26) Age29_38	0.1316	0.1164	0.1068	0.1307	0.0583	0.0463	0.0625	0.0587	0.0728	0.0659	0.0553	0.0524	0.0730	0.0655	0.0554	0.0526	0.0329	0.0693	0.0702	0.0333	0.0066	0.0196	-0.2038	0.0457	-0.1161	1.0000												
(27) Age39_48	0.2197	0.1293	0.1679	0.1928	0.0933	0.0952	0.0685	0.0905	0.0776	0.0804	0.0413	0.0560	0.0765	0.0794	0.0415	0.0562	0.0293	0.0597	0.0872	0.0317	0.0374	0.0247	0.2019	-0.0002	-0.4569	-0.2366	1.0000											
(28) Age49_65	-0.0007	-0.0810	-0.0029	-0.0121	-0.0409	-0.0380	-0.0193	-0.0173	-0.0174	-0.0200	-0.0091	-0.0031	-0.0174	-0.0208	-0.0092	-0.0034	-0.0289	-0.0253	0.0041	0.0109	-0.0073	-0.0455	0.3533	0.0034	-0.5120	-0.4633	-0.1295	1.0000										
(29) Low-Skilled	-0.0765	-0.0705	-0.0485	-0.0671	0.0212	0.0520	-0.0595	-0.0196	-0.0255	-0.0037	-0.0534	-0.0294	-0.0276	-0.0031	-0.0533	-0.0294	0.2519	-0.1060	-0.0591	-0.0295	-0.0846	0.1231	-0.0775	-0.1717	0.1433	-0.0898	-0.0513	-0.0635	1.0000									
(30) Mid-Skilled	-0.0236	0.0687	-0.0011	-0.0128	-0.0425	-0.0469	0.0169	-0.1054	-0.0258	-0.0245	0.0057	-0.0778	-0.0260	-0.0241	0.0055	-0.0777	-0.1522	0.1497	-0.1102	-0.0347	-0.1548	-0.1041	-0.0174	0.2010	0.0790	0.0283	-0.0737	-0.0052	-0.5137	1.0000								
(31) High-Skilled	0.2912	0.1858	0.1739	0.2557	0.0921	0.0534	0.1403	0.2567	0.1328	0.0971	0.1282	0.2085	0.1375	0.0965	0.1286	0.2085	0.0414	0.0457	0.3219	0.0977	0.0099	-0.0334	0.0687	-0.0481	-0.2504	0.1299	0.1700	0.0261	-0.1586	-0.4328	1.0000							
(32) Managers	-0.0678	-0.1466	-0.0630	-0.0693	-0.0562	-0.0757	-0.0443	-0.0377	-0.0646	-0.0764	-0.0377	-0.0276	-0.0639	-0.0770	-0.0380	-0.0278	-0.0669	-0.0711	-0.0266	0.0850	-0.0786	-0.0201	0.1420	0.0015	-0.1667	-0.0388	0.0439	0.1469	-0.1258	-0.1207	0.0390	1.0000						
(33) Other-Skilled	-0.1054	-0.1139	-0.0678	-0.0994	-0.0201	-0.0063	-0.0594	-0.0380	-0.0220	-0.0121	-0.0428	-0.0277	-0.0238	-0.0124	-0.0428	-0.0279	-0.0823	-0.0981	-0.0484	-0.0423	0.3469	0.0442	-0.0117	-0.0446	0.0202	-0.0336	-0.0067	-0.0097	-0.2326	-0.3874	-0.1063	-0.1769	1.0000					
(34) Basic Education	-0.0362	0.0359	0.0357	-0.0132	0.1947	0.2775	-0.0570	-0.0442	0.0732	0.1319	-0.0564	-0.0556	0.0661	0.1329	-0.0559	-0.0552	0.0951	0.0601	-0.0629	0.0070	0.0445	0.3634	-0.1012	-0.3539	0.1717	-0.1840	-0.0659	0.0014	0.2788	-0.0645	-0.3393	-0.0731	0.1032	1.0000				
(35) Secondary Education	-0.1030	-0.1139	-0.1160	-0.1069	-0.2538	-0.3135	-0.0026	-0.1320	-0.1469	-0.1828	-0.0003	-0.0828	-0.1426	-0.1835	-0.0010	-0.0831	-0.1315	-0.0930	-0.0764	-0.0579	-0.0647	-0.3710	0.0884	0.4268	-0.0652	0.1028	-0.0079	0.0109	-0.2432	0.2788	-0.0372	0.0141	-0.0880	-0.8166	1.0000			
(36) Tertiary Education	0.2300	0.1293	0.1330	0.1986	0.0989	0.0611	0.0982	0.2912	0.1222	0.0848	0.0934	0.2285	0.1269	0.0844	0.0938	0.2284	0.0607	0.0547	0.2300	0.0842	0.0338	0.0145	0.0205	-0.1225	-0.1751	0.1333	0.1216	-0.0204	-0.0574	-0.3548	0.6206	0.0972	-0.0245	-0.2978	-0.3079	1.0000		
(37) Multinational	0.0183	-0.0075	-0.0115	0.0239	0.0113	0.0178	-0.0011	-0.0057	0.0297	0.0347	0.0068	-0.0010	0.0284	0.0341	0.0070	-0.0011	0.0233	0.0195	0.0205	0.0023	0.0022	0.0015	-0.0190	0.0096	-0.0280	0.0245	0.0051	0.0065	-0.0183	0.0022	0.0317	-0.0052	-0.0077	-0.0324	0.0312	0.0018	1.0000	
(38) Exporter	0.3297	0.2674	0.2488	0.3242	0.2024	0.1868	0.1542	0.1406	0.1842	0.1657	0.1105	0.1038	0.1844	0.1650	0.1108	0.1040	0.0806	0.1462	0.1472	0.0762	0.0316	0.0832	0.1154	-0.0704	-0.2082	0.0632	0.1378	0.0535	-0.0569	-0.0811	0.2289	0.0779	-0.0578	-0.0540	-0.0724	0.2087	0.0180	1.0000

Table 7: Summary Statistics for Robustness Analysis (Export/Import Spillover Sample).

	Obs.	Mean	S. D.	Min.	Max.
Log Gross Production	22479	17.8886	1.2721	13.2708	24.0804
Log Labour	22479	3.8745	1.1268	0.0000	9.4122
Log Capital	22479	16.3580	1.7384	7.6009	24.0446
Log Materials	22479	16.9574	1.4470	6.9078	23.7692
Log $s^{f,ewedu}$	22479	12.6091	12.6537	0.0000	30.9294
Ethnic Diversity	22479	0.1137	0.1244	0.0000	0.8471
Log Tenure	22479	1.5491	0.4244	0.0000	2.7081
Males	22479	0.7035	0.1989	0.0000	1.0000
Age15_28	22479	0.1545	0.1081	0.0000	1.0000
Age29_38	22479	0.2665	0.1081	0.0000	1.0000
Age39_48	22479	0.2782	0.1026	0.0000	1.0000
Age49_65	22479	0.2826	0.1305	0.0000	1.0000
Low-Skilled	22479	0.1438	0.1680	0.0000	1.0000
Mid-Skilled	22479	0.5720	0.2131	0.0000	1.0000
High-Skilled	22479	0.1639	0.1436	0.0000	1.0000
Managers	22479	0.0590	0.0670	0.0000	1.0000
Basic Education	22479	0.3536	0.1611	0.0000	1.0000
Secondary Education	22479	0.5224	0.1538	0.0000	1.0000
Tertiary Education	22479	0.1240	0.1076	0.0000	1.0000
Multinational	22479	0.0032	0.0561	0.0000	1.0000
Exporter	22479	0.9605	0.1947	0.0000	1.0000
Log import-weighted s^f	22479	23.7007	5.6950	0.0000	28.2208
Log export-weighted s^f	22479	24.5936	2.0235	6.3804	28.2208

Table 8: Pairwise Correlations for Robustness Analysis (Export/Import Spillover Sample).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) Log Gross Production	1.0000																						
(2) Log Labour	0.8981	1.0000																					
(3) Log Capital	0.8020	0.7804	1.0000																				
(4) Log Materials	0.9105	0.7991	0.7046	1.0000																			
(5) Log $FKR\&D$	0.4394	0.4897	0.3645	0.3966	1.0000																		
(6) Ethnic Diversity	0.0129	0.0299	0.0283	0.0116	0.2653	1.0000																	
(7) Log Tenure	0.0617	-0.0093	0.0539	0.0094	-0.0529	-0.0617	1.0000																
(8) Males	-0.0367	-0.0409	-0.0521	-0.0159	-0.0375	-0.1071	0.0371	1.0000															
(9) Age15_28	-0.1096	0.0055	-0.0905	-0.0767	-0.0166	0.0756	-0.3545	0.0716	1.0000														
(10) Age29_38	0.0940	0.1043	0.0734	0.1001	0.0640	0.0150	-0.2408	-0.0045	0.0057	1.0000													
(11) Age39_48	0.1597	0.0851	0.1333	0.1288	0.0414	-0.0032	0.1950	-0.0411	-0.4271	-0.2923	1.0000												
(12) Age49_65	-0.0535	-0.1028	-0.0428	-0.0646	-0.0429	-0.0708	0.3281	-0.0074	-0.4965	-0.5479	-0.1602	1.0000											
(13) Low-Skilled	-0.0568	-0.0639	-0.0372	-0.0522	-0.0293	0.1360	-0.0756	-0.1669	0.1396	-0.0757	-0.0361	-0.0612	1.0000										
(14) Mid-Skilled	0.0447	0.1456	0.0668	0.0680	0.0268	-0.0690	-0.0100	0.1834	0.0755	0.0127	-0.0726	0.0205	-0.4843	1.0000									
(15) High-Skilled	0.1919	0.0964	0.0948	0.1478	0.0814	-0.0945	0.0567	-0.0102	-0.2217	0.1150	0.1485	-0.0083	-0.1765	-0.4622	1.0000								
(16) Managers	-0.1547	-0.2285	-0.1303	-0.1550	-0.1171	-0.0460	0.0931	-0.0232	-0.1270	-0.0382	-0.0002	0.1227	-0.1083	-0.1258	0.0196	1.0000							
(17) Basic Education	-0.0268	0.0372	0.0555	0.0018	0.0556	0.3978	-0.1027	-0.3501	0.1575	-0.1765	-0.0765	0.0492	0.2618	0.0527	-0.4445	-0.0650	1.0000						
(18) Secondary Education	-0.0665	-0.0611	-0.0961	-0.0696	-0.1024	-0.3878	0.1049	0.4437	-0.0582	0.0925	0.0112	-0.0169	-0.2239	0.2236	0.0105	0.0080	-0.7676	1.0000					
(19) Tertiary Education	0.1353	0.0317	0.0542	0.0968	0.0633	-0.0411	0.0038	-0.1102	-0.1527	0.1320	0.0985	-0.0494	-0.0718	-0.3987	0.6506	0.0859	-0.3998	-0.2806	1.0000				
(20) Multinational	0.0043	-0.0206	-0.0263	0.0130	0.0287	-0.0013	-0.0206	0.0256	-0.0216	0.0294	0.0037	-0.0050	-0.0182	0.0136	0.0116	-0.0100	-0.0409	0.0553	-0.0178	1.0000			
(21) Exporter	0.0675	0.0538	0.0575	0.0758	0.0392	0.0075	0.0482	-0.0258	-0.0135	0.0075	0.0146	-0.0023	-0.0265	0.0001	0.0609	0.0219	-0.0278	-0.0198	0.0700	0.0073	1.0000		
(22) Log import-weighted s^f	0.1822	0.1833	0.1216	0.1753	0.1612	0.0104	-0.0501	-0.0277	-0.0449	0.0849	0.0218	-0.0253	-0.0435	0.0022	0.0804	-0.0577	-0.0190	-0.0358	0.0796	0.0221	0.0333	1.0000	
(23) Log export-weighted s^f	0.0977	0.1381	0.0759	0.1100	0.1693	0.0485	-0.0732	-0.0562	0.0167	0.0661	0.0037	-0.0631	-0.0264	0.0068	0.0328	-0.0493	0.0282	-0.0881	0.0837	0.0153	0.1026	0.2270	1.0000

D Summary Tables

Table 9: Firm's Economic Performance and Access to International Knowledge (Assessing Immigrants Structure)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Log of Firm's Gross Production					
Log Labour	0.5135***	0.5091***	0.5094***	0.5116***	0.5110***	0.5050***
	(0.0123)	(0.0124)	(0.0125)	(0.0123)	(0.0124)	(0.0125)
Log Capital	0.0814***	0.0813***	0.0812***	0.0813***	0.0810***	0.0808***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)
Log Materials	0.3995***	0.3992***	0.3993***	0.3993***	0.3992***	0.3989***
	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)
Log $s^{f,ew}$		0.0010***				
		(0.0003)				
Log $s^{f,ew,B}$			0.0010***			0.0010***
			(0.0003)			(0.0003)
Log $s^{f,ew,S}$				0.0007*		0.0007*
				(0.0004)		(0.0004)
Log $s^{f,ew,T}$					0.0018***	0.0017***
					(0.0006)	(0.0006)
Ethnic Diversity	-0.0480*	-0.0773***	-0.0709**	-0.0545**	-0.0555**	-0.0847***
	(0.0265)	(0.0282)	(0.0278)	(0.0268)	(0.0267)	(0.0283)
Log Tenure	0.0532***	0.0533***	0.0532***	0.0534***	0.0536***	0.0537***
	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)
Males	0.1032***	0.1039***	0.1038***	0.1032***	0.1061***	0.1065***
	(0.0261)	(0.0261)	(0.0261)	(0.0261)	(0.0262)	(0.0261)
Managers	0.2081***	0.2082***	0.2097***	0.2068***	0.2077***	0.2080***
	(0.0690)	(0.0688)	(0.0689)	(0.0688)	(0.0688)	(0.0685)
Multinational	0.2582***	0.2515***	0.2500***	0.2578***	0.2589***	0.2503***
	(0.0928)	(0.0916)	(0.0915)	(0.0933)	(0.0927)	(0.0917)
Exporter	0.0385***	0.0383***	0.0385***	0.0387***	0.0395***	0.0398***
	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)
Constant	6.9908***	7.0044***	7.0032***	6.9987***	7.0028***	7.0226***
	(0.1551)	(0.1552)	(0.1550)	(0.1555)	(0.1550)	(0.1554)
Observations	40,828	40,828	40,828	40,828	40,828	40,828
R-squared	0.945	0.945	0.945	0.945	0.945	0.945
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $FKR\&D_{ew}$ is the log of a firm's ethnic-weighted sum of foreign R&D capital stocks of non-Danish employees. Log $FKR\&D^{B}_{ew}$ is the log of a firm's ethnic-weighted sum of foreign R&D capital stocks of non-Danish employees with basic education. Log $FKR\&D^{S}_{ew}$ is the log of a firm's ethnic-weighted sum of foreign R&D capital stocks of non-Danish employees with secondary education. Log $FKR\&D^{T}_{ew}$ is the log of a firm's ethnic-weighted sum of foreign R&D capital stocks of non-Danish employees with tertiary education. *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Multinational* takes value 1 if the firm is foreign-owned and zero otherwise. *Exporter* takes value 1 if the firm exports and zero otherwise. *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education.
Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 10: Firm's Economic Performance and Access to International Knowledge (Assessing Education Structure)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Log of Firm's Gross Production					
Log Labour	0.5135***	0.5090***	0.5094***	0.5116***	0.5110***	0.5050***
	(0.0123)	(0.0124)	(0.0125)	(0.0123)	(0.0124)	(0.0125)
Log Capital	0.0814***	0.0813***	0.0812***	0.0813***	0.0810***	0.0808***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)
Log Materials	0.3995***	0.3992***	0.3993***	0.3993***	0.3992***	0.3989***
	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)
Log $s^{f,ewedu}$		0.0009***				
		(0.0003)				
Log $s^{f,ewedu,B}$			0.0010***			0.0010***
			(0.0003)			(0.0003)
Log $s^{f,ewedu,S}$				0.0007*		0.0006*
				(0.0003)		(0.0003)
Log $s^{f,ewedu,T}$					0.0016***	0.0016***
					(0.0005)	(0.0005)
Ethnic Diversity	-0.0480*	-0.0772***	-0.0705**	-0.0546**	-0.0556**	-0.0844***
	(0.0265)	(0.0282)	(0.0278)	(0.0268)	(0.0267)	(0.0283)
Log Tenure	0.0532***	0.0533***	0.0532***	0.0534***	0.0536***	0.0537***
	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)
Males	0.1032***	0.1040***	0.1038***	0.1032***	0.1061***	0.1065***
	(0.0261)	(0.0261)	(0.0261)	(0.0261)	(0.0262)	(0.0261)
Managers	0.2081***	0.2080***	0.2097***	0.2068***	0.2077***	0.2080***
	(0.0690)	(0.0688)	(0.0689)	(0.0688)	(0.0688)	(0.0685)
Multinational	0.2582***	0.2519***	0.2503***	0.2578***	0.2589***	0.2506***
	(0.0928)	(0.0917)	(0.0915)	(0.0933)	(0.0927)	(0.0918)
Exporter	0.0385***	0.0383***	0.0385***	0.0388***	0.0395***	0.0398***
	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)
Constant	6.9908***	7.0046***	7.0030***	6.9988***	7.0030***	7.0227***
	(0.1551)	(0.1553)	(0.1550)	(0.1555)	(0.1550)	(0.1554)
Observations	40,828	40,828	40,828	40,828	40,828	40,828
R-squared	0.945	0.945	0.945	0.945	0.945	0.945
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $s^{f,ewedu}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees. Log $s^{f,ewedu,B}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with basic education. Log $s^{f,ewedu,S}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with secondary education. Log $s^{f,ewedu,T}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with tertiary education. *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Multinational* takes value 1 if the firm is foreign-owned and zero otherwise. *Exporter* takes value 1 if the firm exports and zero otherwise. *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education. Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 11: Firm's Economic Performance and Access to International Knowledge (Assessing Occupation Structure)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Log of Firm's Gross Production					
Log Labour	0.5120***	0.5102***	0.5101***	0.5123***	0.5133***	0.5044***
	(0.0124)	(0.0124)	(0.0124)	(0.0124)	(0.0124)	(0.0125)
Log Capital	0.0812***	0.0813***	0.0808***	0.0813***	0.0814***	0.0806***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)
Log Materials	0.3994***	0.3993***	0.3991***	0.3995***	0.3994***	0.3990***
	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)
Log $s^{f,ewoccu,low}$	0.0009**					0.0008**
	(0.0004)					(0.0004)
Log $s^{f,ewoccu,mid}$		0.0008***				0.0008***
		(0.0003)				(0.0003)
Log $s^{f,ewoccu,high}$			0.0016***			0.0016***
			(0.0004)			(0.0004)
Log $s^{f,ewoccu,managers}$				0.0013*		0.0011
				(0.0007)		(0.0007)
Log $s^{f,ewoccu,other}$					0.0003	0.0003
					(0.0005)	(0.0005)
Ethnic Diversity	-0.0545**	-0.0649**	-0.0573**	-0.0509*	-0.0491*	-0.0833***
	(0.0267)	(0.0273)	(0.0268)	(0.0267)	(0.0265)	(0.0281)
Log Tenure	0.0532***	0.0535***	0.0532***	0.0533***	0.0532***	0.0535***
	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0074)
Males	0.1038***	0.1034***	0.1054***	0.1041***	0.1033***	0.1068***
	(0.0261)	(0.0261)	(0.0262)	(0.0261)	(0.0261)	(0.0261)
Managers	0.2077***	0.2070***	0.2053***	0.1992***	0.2110***	0.1992***
	(0.0689)	(0.0688)	(0.0688)	(0.0697)	(0.0696)	(0.0698)
Multinational	0.2547***	0.2547***	0.2546***	0.2581***	0.2580***	0.2479***
	(0.0933)	(0.0924)	(0.0916)	(0.0925)	(0.0929)	(0.0913)
Exporter	0.0387***	0.0385***	0.0394***	0.0386***	0.0385***	0.0399***
	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)	(0.0076)
Constant	7.0005***	7.0014***	7.0099***	6.9950***	6.9890***	7.0299***
	(0.1551)	(0.1552)	(0.1550)	(0.1550)	(0.1553)	(0.1552)
Observations	40,828	40,828	40,828	40,828	40,828	40,828
R-squared	0.945	0.945	0.945	0.945	0.945	0.945
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $s^{f,ewoccu,low}$ is the log of a firm's sum of foreign R&D capital stocks of non-Danish employees with low-skilled occupation. Log $s^{f,ewoccu,mid}$ is the log of a firm's sum of foreign R&D capital stocks of non-Danish employees with mid-skilled occupation. Log $s^{f,ewoccu,high}$ is the log of a firm's sum of foreign R&D capital stocks of non-Danish employees with high-skilled occupation. Log $s^{f,ewoccu,managers}$ is the log of a firm's sum of foreign R&D capital stocks of non-Danish employees with a managers position. Log $s^{f,ewoccu,other}$ is the log of a firm's sum of foreign R&D capital stocks of non-Danish employees with other-skilled occupation. *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Multinational* takes value 1 if the firm is foreign-owned and zero otherwise. *Exporter* takes value 1 if the firm exports and zero otherwise. *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education. Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 12: Firm's Economic Performance and Access to International Knowledge (Robustness Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full Sample	Foreigner Dummy	Non-Exporters	Non-Multinationals	Excl. Chemicals and Computers	Control Group: Firms w/o For.	Export/Import Spillovers
	Dependent Variable: Log of Firm's Gross Production						
Log Labour	0.5090***	0.5091***	0.5103***	0.5103***	0.5106***	0.4973***	0.5204***
	(0.0124)	(0.0124)	(0.0189)	(0.0124)	(0.0127)	(0.0117)	(0.0186)
Log Capital	0.0813***	0.0813***	0.0813***	0.0812***	0.0802***	0.0844***	0.0775***
	(0.0037)	(0.0037)	(0.0062)	(0.0037)	(0.0037)	(0.0042)	(0.0051)
Log Materials	0.3992***	0.3992***	0.3791***	0.3983***	0.3983***	0.4040***	0.3839***
	(0.0119)	(0.0119)	(0.0166)	(0.0119)	(0.0122)	(0.0117)	(0.0179)
Log $s^{f,ewedu}$	0.0009***	0.0009***	0.0017***	0.0009***	0.0009***	0.0014***	0.0007**
	(0.0003)	(0.0003)	(0.0005)	(0.0003)	(0.0003)	(0.0004)	(0.0003)
Ethnic Diversity	-0.0772***	-0.0759**	-0.0545	-0.0773***	-0.0725**	-0.1245***	-0.1309***
	(0.0282)	(0.0321)	(0.0452)	(0.0282)	(0.0282)	(0.0377)	(0.0412)
Log Tenure	0.0533***	0.0533***	0.0703***	0.0527***	0.0516***	0.0492***	0.0438***
	(0.0074)	(0.0074)	(0.0122)	(0.0074)	(0.0075)	(0.0084)	(0.0117)
Males	0.1040***	0.1040***	0.1422***	0.1040***	0.0954***	0.0856***	0.1280***
	(0.0261)	(0.0261)	(0.0478)	(0.0262)	(0.0267)	(0.0301)	(0.0363)
Managers	0.2080***	0.2080***	0.0550	0.2104***	0.2056***	0.1850**	0.3002***
	(0.0688)	(0.0688)	(0.0831)	(0.0689)	(0.0720)	(0.0814)	(0.1146)
Multinational	0.2519***	0.2519***	0.3698		0.2987***	0.2494***	0.2607***
	(0.0917)	(0.0917)	(0.2515)		(0.0882)	(0.0955)	(0.1002)
Exporter	0.0383***	0.0383***		0.0386***	0.0384***	0.0347***	-0.0030
	(0.0076)	(0.0076)		(0.0076)	(0.0076)	(0.0083)	(0.0208)
Foreigner		-0.0007					
		(0.0075)					
Log import-weighted s^f							0.0029***
							(0.0006)
Log export-weighted s^f							-0.0076***
							(0.0021)
Constant	7.0046***	7.0046***	7.1341***	7.0168***	7.0397***	6.8886***	7.3556***
	(0.1553)	(0.1553)	(0.2046)	(0.1556)	(0.1592)	(0.1575)	(0.2579)
Observations	40,828	40,828	9,887	40,738	39,682	30,497	22,479
R-squared	0.945	0.945	0.916	0.945	0.945	0.950	0.942
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $s^{f,ewedu}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks (see the main text for further details in the construction of R&D capital stocks). *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Multinational* takes value 1 if the firm is foreign-owned and zero otherwise. *Exporter* takes value 1 if the firm exports and zero otherwise. *Foreigner* takes value 1 if the firm employs foreigners and zero otherwise. *Log import-weighted* s^f is the log of the bilateral import-share weighted R&D capital stocks of a firm's trading partner countries. *Log export-weighted* s^f is the log of the bilateral export-share weighted R&D capital stocks of a firm's trading partner countries. *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education.
Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 13: Firm's Economic Performance and Access to International Knowledge (Robustness to First Lag)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Log of Firm's Gross Production					
Log Labour	0.5142***	0.5149***	0.5178***	0.5178***	0.5094***	0.5084***
	(0.0122)	(0.0124)	(0.0122)	(0.0123)	(0.0123)	(0.0181)
Log Capital	0.0792***	0.0790***	0.0794***	0.0791***	0.0785***	0.0750***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0050)
Log Materials	0.3936***	0.3937***	0.3939***	0.3939***	0.3932***	0.3872***
	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0172)
Log $s_{t-1}^{f,ewedu}$	0.0014***					
	(0.0003)					
Log $s_{t-1}^{f,ewedu,B}$		0.0015***			0.0014***	0.0013***
		(0.0003)			(0.0003)	(0.0004)
Log $s_{t-1}^{f,ewedu,S}$			0.0010***		0.0009***	0.0011***
			(0.0004)		(0.0004)	(0.0004)
Log $s_{t-1}^{f,ewedu,T}$				0.0017***	0.0017***	0.0017***
				(0.0005)	(0.0005)	(0.0005)
Ethnic Diversity	-0.0855***	-0.0769***	-0.0541**	-0.0539**	-0.0911***	-0.1566***
	(0.0279)	(0.0279)	(0.0273)	(0.0273)	(0.0280)	(0.0406)
Log Tenure	0.0367***	0.0365***	0.0374***	0.0376***	0.0364***	0.0412***
	(0.0090)	(0.0090)	(0.0090)	(0.0090)	(0.0089)	(0.0132)
Males	0.1118***	0.1117***	0.1100***	0.1130***	0.1148***	0.1278***
	(0.0273)	(0.0273)	(0.0273)	(0.0274)	(0.0273)	(0.0369)
Managers	0.1804**	0.1826***	0.1793**	0.1808**	0.1816***	0.2521**
	(0.0705)	(0.0707)	(0.0706)	(0.0706)	(0.0702)	(0.1142)
Multinational	0.2743***	0.2721***	0.2844***	0.2863***	0.2719***	0.2436**
	(0.0946)	(0.0942)	(0.0974)	(0.0962)	(0.0949)	(0.0991)
Exporter	0.0371***	0.0376***	0.0381***	0.0387***	0.0390***	-0.0043
	(0.0079)	(0.0079)	(0.0080)	(0.0080)	(0.0080)	(0.0217)
Log import-weighted s^f						0.0030***
						(0.0006)
Log export-weighted s^f						-0.0072***
						(0.0022)
Constant	7.1223***	7.1200***	7.1080***	7.1086***	7.1464***	7.3933***
	(0.1569)	(0.1565)	(0.1570)	(0.1565)	(0.1571)	(0.2568)
Observations	35,835	35,835	35,835	35,835	35,835	20,075
R-squared	0.946	0.946	0.946	0.946	0.946	0.944
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $s^{f,ewedu}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks (see the main text for further details in the construction of R&D capital stocks). Log $s^{f,ewedu,B}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with basic education. Log $s^{f,ewedu,S}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with secondary education. Log $s^{f,ewedu,T}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with tertiary education. *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Multinational* takes value 1 if the firm is foreign-owned and zero otherwise. *Exporter* takes value 1 if the firm exports and zero otherwise. *Log import-weighted* s^f is the log of the bilateral import-share weighted R&D capital stocks of a firm's trading partner countries. *Log export-weighted* s^f is the log of the bilateral export-share weighted R&D capital stocks of a firm's trading partner countries. *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education.
Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.

Table 14: Firm's Economic Performance and Access to International Knowledge (Robustness to FE Regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Log of Firm's Gross Production						
Log Labour	0.4105***	0.4092***	0.4098***	0.4103***	0.4099***	0.4089***	0.4089***
	(0.0113)	(0.0114)	(0.0114)	(0.0113)	(0.0113)	(0.0113)	(0.0113)
Log Capital	0.0797***	0.0796***	0.0797***	0.0797***	0.0796***	0.0796***	0.0796***
	(0.0041)	(0.0040)	(0.0041)	(0.0041)	(0.0040)	(0.0040)	(0.0040)
Log Materials	0.2672***	0.2672***	0.2672***	0.2672***	0.2672***	0.2671***	0.2671***
	(0.0105)	(0.0105)	(0.0105)	(0.0105)	(0.0105)	(0.0105)	(0.0105)
Log $s^{f,ewedu}$		0.0004**					
		(0.0002)					
Log $s^{f,ewedu,B}$			0.0003			0.0003	0.0000
			(0.0002)			(0.0002)	(0.0004)
Log $s^{f,ewedu,S}$				0.0002		0.0002	0.0000
				(0.0003)		(0.0003)	(0.0003)
Log $s^{f,ewedu,T}$					0.0009***	0.0009***	0.0008**
					(0.0003)	(0.0003)	(0.0004)
Ethnic Diversity	0.0168	-0.0003	0.0085	0.0145	0.0111	0.0001	-0.0026
	(0.0324)	(0.0344)	(0.0333)	(0.0331)	(0.0327)	(0.0342)	(0.0345)
Log Tenure	0.0741***	0.0741***	0.0742***	0.0741***	0.0742***	0.0743***	0.0742***
	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)
Males	-0.1276***	-0.1275***	-0.1276***	-0.1275***	-0.1269***	-0.1268***	-0.1269***
	(0.0407)	(0.0407)	(0.0407)	(0.0407)	(0.0406)	(0.0407)	(0.0407)
Managers	0.0325	0.0316	0.0324	0.0321	0.0317	0.0311	0.0311
	(0.0518)	(0.0517)	(0.0518)	(0.0517)	(0.0517)	(0.0516)	(0.0516)
Exporter	0.0398***	0.0399***	0.0398***	0.0398***	0.0398***	0.0398***	0.0398***
	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)
Recode Dummy							-0.0074
							(0.0094)
Observations	40,828	40,828	40,828	40,828	40,828	40,828	40,828
R-squared	0.686	0.686	0.686	0.686	0.686	0.686	0.686
Numbers of Firms	4,784	4,784	4,784	4,784	4,784	4,784	4,784
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Commuting Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Age Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Occupation Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm's Education Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the log of firm's gross production as total sales of goods and services (in DKK).
Independent variables: *Log Labour* refers to full-time equivalent employees. *Log Capital* is the log of total assets (in DKK). *Log Materials* is the log of intermediate goods (purchase of goods, helping materials, and packaging) used in the production process (in DKK). Log $s^{f,ewedu}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks (see the main text for further details in the construction of R&D capital stocks). Log $s^{f,ewedu,B}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with basic education. Log $s^{f,ewedu,S}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with secondary education. Log $s^{f,ewedu,T}$ is the log of a firm's education-weighted sum of foreign R&D capital stocks of non-Danish employees with tertiary education. *Ethnic Diversity* refers to a Herfindahl-based measure of diversity averaged across work places. *Log Tenure* is the log of average firm tenure (in years). *Males* is the fraction of men employees engaged in production. *Managers* refers to the fraction of managers employed, according to Statistics Denmark's definitions of occupations for employment based on ISCO. *Exporter* takes value 1 if the firm exports and zero otherwise. *Recode Dummy* takes value 1 if $s^{f,ewedu} = 0$, and zero otherwise *Firm's Age Characteristics* refers to a full set of shares of employees belonging to each age distribution quartile. *Firm's Occupation Characteristics* refers to a full set of shares of employees belonging to low-skilled, mid-skilled, and high-skilled occupations. *Firm's Education Characteristics* refers to a full set of shares of employees with basic, secondary, and tertiary education.
Standard errors, clustered at the firm-level, are reported in parenthesis.
*: Significant at the 10% level. **: Significant at the 5% level. ***: Significant at the 1% level.