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**KNOWLEDGE TRANSFER FROM
MULTINATIONALS THROUGH LABOUR
MOBILITY: LEARNING FROM EXPORT
EXPERIENCE**

Jaan Masso, Priit Vahter

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Knowledge Transfer from Multinationals through Labour Mobility: Learning from Export Experience

Jaan Masso, Priit Vahter*

Abstract

This paper investigates knowledge spillovers through labour mobility from multinational enterprises (MNEs) to domestic firms. Despite the recent increased interest in this particular channel of MNE spillovers, there is a need to understand how such effects of managerial labour mobility from MNEs function in more detail. Based on employer-employee level data from Estonia, we find that higher firm and individual-level performance associated with hiring MNE-experienced managers and top specialists especially tends to reflect the export experience of these employees. A channel for how these spillovers function appears to be the increase in the propensity to export by domestic firms. The contribution of external international experience is especially strong in the first stages of the internationalisation of a firm and for entry into nearby markets. There is no evidence of the effects of MNE experience on the intensity of exports.

JEL Classification: F10, F23, J62

Keywords: multinational enterprise, knowledge spillovers, export entry, labour mobility

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1. INTRODUCTION

For a long time, the empirical investigation of knowledge spillovers of FDI concentrated mostly on the estimation of the production function based on firm-level panel data, with sector-level proxies of the presence of FDI included among controls (e.g. Aitken and Harrison 1999, Javorcik 2004). Given the sometimes rather mixed results about productivity spillovers from these ‘black box’ type studies, a natural and more recent development has been the increase in attention towards some of the particular channels of learning and spillovers, such as labour mobility and competition.

A key mechanism proposed in the theoretical models of FDI spillovers and knowledge transfer (Fosfuri et al. 2001, Glass and Saggi 2002, Dasgupta 2012) functions through the mobility of employees across firms, whereby the mobility of employees carries knowledge from their previous (multinational) employer to the new (domestic) employer. The increased availability of employer-employee level panel datasets has enabled researchers to follow the movement of managers and employees across firms and investigate its association with firm or individual-level outcomes. The key empirical contributions include the analysis by Görg and Strobl (2005) on Ghana, Balsvik (2011) on Norway, Poole (2013) on Brazil, and Liu et al. (2014) on China. These studies have convincingly shown that hiring managers from MNEs is strongly associated with domestic firm productivity or other performance measures and wages.

However, there is still limited empirical evidence based on representative datasets on the various potential channels for how the mobility of employees from MNEs to domestic firms affects firm performance. Hiring MNE-trained managers and employees can affect productivity through decisions about production and innovation (Liu et al. 2010), application of new technologies, management and work practices, foreign market entry and expansion patterns, among others. This paper aims to contribute to the existing literature and, in particular, to the analysis of Balsvik (2011) and Poole (2013) by examining the export related channels of learning through mobility of MNE-experienced employees.

Prior related analysis in international economics literature on how mobility of export-experienced managers is associated with the export decisions of firms is provided in Mion and Oromolla (2014), Sala and Yalcin (2015), Choquette and Meinen (2015), Love et al. (2016) and Masso et al. (2015). We extend their analysis by investigating the contribution of MNE experience. The prior literature on export spillovers through labour mobility shows the importance of region-specific managerial experience of export market entry and the role of managerial inputs in general in covering export sunk costs. The contribution of the trade experience of managers appears to be comparable in terms of magnitude to the role of the firm’s prior productivity in export entry (Mion and Oromolla 2014, Masso et al. 2015).

As a starting point, we confirm here whether there is a strong association between hiring MNE-experienced employees or high-wage employees and firm performance. This step is similar to the studies by Balsvik (2011) and Poole (2013), and adds to these by estimating an instrumental variables based model. We proceed then to the question of what extent these strong relationships reflect learning from the export experience of MNEs or the transfer of other MNE-specific advantages through labour mobility? Finally, our analysis focuses on one of the potential key mechanisms of these effects: whether hiring MNE-experienced managers and top specialists speeds up a firm’s initial and subsequent export expansion in terms of entry to export, export intensity, number of export product varieties and foreign markets served by the firm. Based on recent analysis in Love et al. (2015) about the role of the commercial experience of

entrepreneurial founding teams, we would expect the effects of hiring external export-experienced managers to be especially evident in the early stages of exporting.

This paper contributes with its empirical analysis primarily to the empirical literature on international economics. However, our study is also significantly related to the rich international business (IB) literature on determinants of internationalisation, and in particular, the resource based understanding of firm internationalisation within IB. One can distinguish between two broad views of internationalisation in IB: the process or stages literature that originated from Johanson and Vahlne (1977), and the ‘born global’ view of rapidly internationalising firms (e.g. Knight and Cavusgil 2004, Oviatt and McDougall 1994). These both stress the role of knowledge as a key determinant of a firm’s internationalisation. Our paper also adds to the extensive literature on the role of experience in internationalisation in IB by showing generalizable and detailed econometric evidence on the central role of export related learning by hiring in the case of MNE spillovers through labour mobility.

The paper focuses especially on the role of high-wage employees; that is, employees and managers who belong to the upper levels in the wage distribution within a given industry (at the two-digit NACE level). We use employer-employee level data from Estonia. Estonia is a good example for investigating the effects of foreign direct investment (FDI), as it has over the years attracted many foreign investments, primarily from nearby Sweden and Finland. In addition, Estonia’s case enables us to use employer-employee level data matched with detailed trade data about firms. Estonia’s flexible labour market and sample period (2006–2011) including the period of the Great Recession ensure that there is substantial movement of employees between firms.

Our employee-level labour mobility data originate from Estonia’s Tax and Customs Office dataset. This dataset is merged with firm-level variables from the Commercial Registry and detailed firm-product-destination market-level export data from Statistics Estonia. This enables us to investigate the association between experience external to the firm and firm-level export entry and subsequent market (i.e. foreign country) and product level expansion. The analysis focuses on the manufacturing industry using a sample of domestic firms. We use the information of the full population of firms and employees from the manufacturing industry. Econometric analysis is performed based on yearly data from the period 2006–2011. We test the robustness of standard fixed effects and probit models by using an instrumental variables (IV) approach to address, to some extent, the endogeneity of the MNE experience of employees.

Our findings show that managers’ prior MNE experience (i.e. acquired at prior workplaces) is strongly associated with a domestic firm’s productivity (and wages). However, the results additionally suggest, as a novel finding, that the productivity premium of MNE experience that we find seems to be driven primarily by the export experience of these high-wage employees. Once the analysis accounts for the mobility of export-experienced high-wage employees, then additional MNE experience effect tends to be not significant in productivity regressions. In the case of trade decisions, a key significant result is that hiring MNE-experienced employees has a positive association with exporting and in particular with entry to nearby destination markets by the recipient firm. These relationships are stronger in the case of sectors with higher export intensity and more labour mobility from MNEs.

2. LITERATURE REVIEW

Internationalisation and the resulting knowledge transfer from foreign environments is considered to be among the central determinants of firm performance (e.g. Keller 2004, Syverson 2011). The key starting point in the analysis of spillovers is that MNEs need to have firm-specific (knowledge) advantages in order to successfully invest abroad (Dunning 1981). Multinational enterprises (MNEs) may transfer their knowledge from abroad to their subsidiaries in the host economy, and this means also potential for spillovers of knowledge to domestic firms in the host economy (Markusen 1995, Blomström and Kokko 1998, Görg and Greenaway 2004).

While there have been many empirical studies investigating the direct or spillover effects of FDI, much less is still known about the actual mechanisms through which these learning and spillover effects occur. Empirical studies of FDI and export spillovers have tended to concentrate on the effects on the productivity of local firms (Aitken et al 1997, Aitken and Harrison 1999, Javorcik 2004, see Görg and Greenaway 2004 for an overview), and have provided mixed results. Both econometric evidence suggesting positive spillovers from FDI on productivity, but also results suggesting a shortage of these effects are commonplace.

Typically, the econometric investigation of FDI spillovers associated the total factor productivity (TFP) of domestic producers to proxies for the share of FDI in the industry. Yet, an important question both for the research field and policy makers is how the knowledge from MNEs and foreign markets spreads and affects the local economy. Does this happen, for example, through imitation, innovation, faster expansion to new markets or changes in work practices? What is the importance of these different channels of knowledge transfer?

Only relatively recently has the attention of the international trade literature started to focus more on some of the particular channels of learning and spillovers, like labour mobility and competition. A key mechanism proposed in the theoretical models (Fosfuri et al. 2001, Glass and Saggi 2002, Dasgupta, 2012) functions through worker mobility across firms, whereby the mobility of employees carries knowledge from their prior employer to the new employer. Arguably, experiential knowledge from working at an MNE is to a large extent tacit and embodied in employees. Therefore, we can expect that a significant proportion of spillovers should function through the labour mobility of managers and other employees between firms. We would also expect that the mobility of managers and top specialists has significantly stronger effects on performance compared to the mobility of other employees (Mion and Oromolla 2014).

The limited number of recent empirical contributions that make use of employer-employee datasets to investigate links between labour mobility from MNEs and its consequences on productivity or wages in local firms include Görg and Strobl (2005) on Ghana, Balsvik (2011) on Norway, and Poole (2013) using data from Brazil. While Görg and Strobl (2005) and Balsvik (2011) concentrate on data from manufacturing, Poole (2013) includes also the services sector in the analysis.

Görg and Strobl (2005) find based on data from Ghana that an entrepreneur's experience of working at an MNE in the same industry as his new venture had a significant effect on the productivity of the new firm. At the same time, experience from some other unrelated industry had no such effects. Balsvik (2011) provides important related estimates of labour mobility as a channel of FDI spillovers. She estimates the private returns for employees from having MNE experience and the effects on firm productivity. Balsvik (2011) also shows that employees with

previous MNE experience contribute significantly more (20 per cent more) to the productivity of domestic firms compared to employees without such external experience. An important result is that the private returns to MNE experience in terms of higher wages are smaller than the effects on productivity. Hence, labour mobility from MNEs to domestic firms includes significant externalities, which are not fully appropriated by the moving employees themselves.

A more recent study by Poole (2013) extends the analysis by Balsvik (2011). She uses Mincerian wage equations to estimate FDI spillovers through labour mobility. The paper shows the regularity that wages of incumbent employees in domestic firms are positively associated with the presence of MNE-experienced colleagues at the firm. This is a type of FDI spillover that had not been explored before. At the aggregate level, these wage spillovers would create wage increases of 0.3 per cent of Brazil's GDP. In conclusion, all these studies point to the likely existence of spillovers through labour mobility from the mobility of employees from MNEs to domestic firms.

Apart from MNEs, the knowledge transfer effects of labour mobility have been studied in a number of other contexts. For example, this includes the effects of the mobility of R&D workers and researchers (Jaffe et al. 1993, Maliranta et al. 2009, Ejsing et al. 2013), foreign specialists and migrants (Markusen and Trofimenko 2009, Hiller 2013), expatriates with experience and networks from working abroad (e.g. based on data from China in Filatotchev et al. 2009 and Liu et al. 2010).

Labour mobility can also transfer export related knowledge between firms, and in this way affect various market and product level decisions about exporting (Mion and Oromolla 2014, Hiller 2013, Sala and Yalcin 2015, Masso et al. 2015). Recent microdata-based papers suggest a significant positive relationship between various types of labour mobility and export decisions by firms. Previous export experience among workers and managers has been found to be among the key determinants of export entry decisions, export status and trade intensity for Portuguese firms (Mion and Oromolla 2014) and in a recent paper using data from Estonia (Masso et al. 2015). Mion and Oromolla (2014) and Masso et al. (2015) endeavour to account to some (limited) extent also for the endogeneity of labour mobility in their econometric analysis by applying instrumental variables models. Additionally, Sala and Yalcin (2015) show that hiring managers with previous export experience is positively associated with a firm's likelihood of foreign market entry, based on micro data from Denmark and probit models. The results from the paper by Mion and Oromolla (2014) suggest that what matters for export decisions is the movement of managers, not the movement of employees in general.

This present study of MNE spillovers focuses primarily on contributing to studies from the field of economics. However, it is also very much related to the abundant international business (IB) literature on determinants of internationalisation, and in particular, the resource based understanding of firm internationalisation within IB. One can distinguish between two broad views in IB on internationalisation. The first is the process or stages literature that originated from Johanson and Vahlne (1977). The second is the 'born global' view of rapidly internationalising firms (Knight and Cavusgil 2004, Oviatt and McDougall 1994). They both stress the role of knowledge as a key determinant of firm internationalisation. The process view of internationalisation (Johanson and Vahlne 1977) has traditionally emphasized the role of 'direct' (within firm) experiential knowledge, making a strong implicit assumption that the knowledge needed for success in foreign markets is gained through experience, through gradual organizational learning within the firm from exposure to the international context. The initial exposure to the international environment of geographically and culturally close countries will then enable incremental entry into increasingly more distant markets.

The ‘born global’ or international new venture view of internationalisation has focused its attention on broader types of knowledge. It includes also the earlier international experience of the entrepreneur (e.g. Ganotakis and Love 2012), ‘grafted’ knowledge gained through hiring new employees or acquiring external businesses (Huber 1991, Fletcher and Harris 2012), knowledge obtained through vicarious learning – through observing and copying the activities of external businesses (including from customers and suppliers, competitors). We concentrate here in particular on the role of acquisition ‘grafted’ knowledge.

The literature cited so far clearly suggests that mobility of employees is associated with trade decisions and performance in recipient firms. Notably, we would also expect that the effect of learning by hiring can vary by industry or recipient firm characteristics. Obviously, firm capabilities shape their ability to learn (including from external sources). This idea goes back to the work by March (1991) and the concept of absorptive capacity from Cohen and Levinthal (1990). The role of capabilities may be reflected in more productive and innovative firms or firms in more productive and innovative industries being able to reap larger effects of the mobility of managers. At the same time, a counterargument may be based on the fact that low productivity firms or sectors start from a low level of own knowledge investments. External sourcing of knowledge (including through grafted knowledge) may yield larger marginal benefits at low levels of initial investments in knowledge assets. Marginal benefits in terms of higher export performance or firm productivity may fall as the distance in terms of productivity between the recipient firms and donors gets smaller; that is, as domestic firms’ innovation investments and productivity increase. This is the opposite of the standard ‘absorptive capacity’ argument in the case of spillovers and is in accordance with the expectation of the positive effect of a technology gap between foreign and domestic firms on the size of FDI spillovers proposed by Findlay (1978).

Furthermore, learning from foreign sources is likely to be conditional on the extent of exposure to the international context of an industry (Tse et al. 2016). For example, one such conditioning factor in our context can be the export intensity of an industry. Another indicator could be the overall extent of labour mobility from MNEs in an industry, as a potential indicator of the availability of knowledge from MNEs.

It is tempting to conclude that there is always a linear relationship, where higher export intensity in the sector or higher labour mobility at the sector level means simply more scope for learning from the international experience of other firms. However, based on well-known studies in organizational learning (Argote 1999, Argote et al. 1990), one can suggest that the role of the sector-level abundance of mobility of employees and export orientation can potentially be more complicated (see also Tse et al. 2016 for a discussion). A known fact about learning is that the positive effects of learning tend to increase at first with the extent of the activity (e.g. extent of output) and then decrease at a decreasing rate (Argote 1999, Tse et al. 2016). This conclusion is likely to hold both at firm and industry level (Argote 1999, Tse et al. 2016). In our context, it may mean that, firstly, firms in industries with little export penetration are likely to demonstrate a limited amount of learning effects through hiring employees from MNEs or exporters. If the external knowledge available is limited, there is less pressure to internationalise, less pressure from successful internationalised domestic competition.

Secondly, as the export intensity of the industry increases, there is more scope for learning as there is increased availability of knowledge and lower search costs for employees with certain market or industry-specific export related knowledge. This effect is, however, likely to be non-linear. In industries that have very high levels of internationalisation and have thus gained a lot of international experience, exporting is a standard operation. The capacity to benefit from the

labour mobility of employees with international experience may have reached a plateau; therefore, industries that have international experience above a certain high level may be less likely to exhibit additional learning via hiring effects compared to industries with an intermediate level of international orientation. Given that, we would expect either i) an inverted U-shaped relationship or ii) ‘initially increasing and then a levelling off’ relationship between sector-level export intensity and the effects of learning by hiring from MNEs (the effect on export performance or productivity).

3. DATA AND DESCRIPTIVE STATISTICS

The investigation of spillovers through labour mobility on firm-level performance outcomes requires the availability of matched employer-employee data. We use the merged dataset here consisting of the following firm and employee-level datasets: i) Statistics Estonia firm-product-destination-market level trade dataset; ii) Estonia’s Commercial Registry dataset of firms’ annual reports; iii) employee-level data from the Tax and Customs Office on employee payroll taxes. The final merged dataset includes yearly data for the period 2006–2011, and enables us to track the mobility of employees between firms and to investigate its consequences on firm productivity and international trade activities. Given our focus on FDI spillovers, we therefore concentrate on the sub-sample of domestic owned firms. Secondly, we concentrate on firms from the manufacturing industry.

The export data for each firm are available by destination market and detailed product category (based on the combined nomenclature (CN) eight-digit code) and covers the period 1995–2011. Using registry numbers of firms, the trade data have been merged with Estonia’s Commercial Registry information from annual reports (balance sheets, profit and loss statements). These data are available for the full population of Estonian firms. During the period 1995–2011, the total number of firms observed with exporting activities of a minimum of one year amounted to 29,880. As Estonia is a small open economy, the share of exporters in the manufacturing industry is relatively high; for example, 49 per cent in 2003 (but varying significantly over time).

The average number of markets (i.e. destination countries) for an exporting firm in our dataset is 4.6 (in 2009). The key export markets are neighbouring countries Sweden, Finland and Latvia. One can observe many entries into export activities every year. New exporters, as expected, enter into exporting with a small product and market portfolio (usually one to two markets only in the first year of exports) and then only gradually widen their export portfolio. It has been shown that exporting firms that expand quickly to multiple markets and product categories have on average superior performance characteristics compared to others (Masso and Vahter 2015).

The central explanatory variable in our empirical analysis is the knowledge and experience attained in the employee’s previous workplaces. We focus on the role of the experience of working at an MNE affiliate(s) in Estonia. The relevance of that kind of experiential knowledge could be compared to the relevance of other kinds of knowledge. These other kinds of knowledge include, for example, the work experience attained when working in a high-productivity firm or the work experience attained at an exporting firm. All these different kinds of knowledge could boost the performance of the new employer. Experience at high-productivity firms can be due to superior technologies and managerial practices in the former employer applied in the new employer to reach a high level of productivity. Experience at an exporting firm can in addition concern product or market specific export knowledge.

To track such knowledge diffusion through labour mobility, it is necessary to track individual employment over time. To that end, we employ the Estonian Tax and Customs Office dataset on all employees (the total number of employees varies annually around 600 thousand) and their social contributions (payroll taxes) paid for the years 2006–2012. The social security tax rate is 33 per cent of the gross wage, and so this information enables us to identify individual's wages. Most importantly, the dataset enables us also to identify individual's employment status and the company where the particular employee is working at that particular time (month and year).

In addition to payroll taxes, the tax dataset includes only limited information on the characteristics of individuals. A shortcoming is that we do not observe the occupation of the employee. This is important as prior research indicates that what matters is the mobility and experience of managers, not blue-collar employees (Mion and Oromolla 2014). In our econometric analysis, we proxy the group of managers and top specialists using employees whose wages belong to the top 20 per cent of the wage distribution in a three-digit NACE industry in a given year. Where there are no such employees in an enterprise, we define the individual with the highest wage at the firm as the 'manager'.

Calculations of previous MNE experience were conducted as follows. In order to have MNE experience, the employee needed to have worked previously in a subsidiary of an MNE in Estonia. We use both dummies for the presence of MNE-experienced employees and their share in the total workforce of the firm. In order to have export experience, it is sufficient to have been working in an exporting enterprise in the past. Similarly, to have experience from a high-productivity firm one needs to have worked in the high-productivity firm in the past. Concerning the latter, we focus on firms belonging to the third or fourth quartile of the productivity distribution in the respective three-digit industry. The experience variables can be calculated from 2007 onwards, as general information at the individual level starts from 2006.

In Table 1 we provide descriptive statistics on domestically owned Estonian manufacturing firms. These cover 2007–2011 and are grouped based on the presence of MNE-experienced employees, high-wage employees ('managers') with MNE experience, employees with MNE experience from the same two-digit NACE sector, high-wage employees with MNE experience from the same two-digit NACE sector. Comparison with the two latter categories captures the role of industry-specific knowledge.

As can be seen from Table 1, average labour productivity is significantly higher in groups with previous MNE experience. There is also a clear ranking of results. Even higher performance can be seen among domestic firms that have managers with prior MNE experience (Column 2). The role of experience is enhanced if it stems from the same two-digit sector (Columns 3 and 4). The ranking of different groups is the same when instead of labour productivity we consider other performance characteristics like total factor productivity (TFP, estimated using GMM, separately for all two-digit NACE sectors), the deviation of the TFP from the two-digit industry average, or wages. Deviation of TFP from the industry average is used in order to account for industry-specific differences and not to confuse these with the potential role of experience.¹ The benefits from MNE experience are also captured in terms of higher wages at the firm, both the wages of MNE-experienced employees themselves and their co-workers.

¹ The rather high average share of managers in the estimation sample (as in Table 1) reflects the large share of micro firms. Note that in each firm at least one employee was defined to be a manager.

A key channel of effects of MNE experience on productivity can be internationalisation of domestic firms through exporting. As evident from Table 1, export propensity and export intensity are the lowest in the ‘without experience’ group and the highest in case of the presence of industry-specific experience (the difference is also statistically significant at the one per cent level). The positive role of experience is evident also in the case of individual destination countries, as shown in the case of Sweden and Finland, the two main destinations of Estonia’s exports. The average number of export markets is again the lowest among firms that do not have high-wage employees with MNE experience and the highest in firms having managers or top specialists with MNE experience.

Table 1. Descriptive statistics by groups of firms: domestic firms with and without MNE-experienced employees

Variable	Firms without MNE-experienced employees	MNE experience of any employees	MNE experience of high-wage employees	MNE experience of any employees, from the same industry	MNE experience of high-wage employees, from the same industry
Log labour productivity	9.309	9.695	9.811	9.718	9.832
Log TFP deviation from 2-digit industry mean	-0.248	0.042	0.152	0.131	0.32
Share of employees with experience from MNEs	0	0.203	0.222	0.212	0.24
Share of high-wage employees (managers and top specialists) at firm	0.572	0.361	0.386	0.345	0.376
Number of employees	5.987	44.156	55.334	74.544	83.653
Annual real wage (EUR)	6407.352	9662.812	10497.34	9928.042	10698.62
Exporting (dummy)	0.138	0.488	0.545	0.617	0.665
Exporting to Finland (dummy)	0.057	0.326	0.378	0.443	0.491
Exporting to Sweden (dummy)	0.036	0.236	0.275	0.309	0.344
Export value ('000 EUR)	8,988.438	65,324.67	83,480.66	107,858.2	127,445.3
Share of exports in turnover (per cent)	12.373	45.148	50.157	57.198	61.12
New market entry (dummy)	0.011	0.034	0.035	0.049	0.05

Variable	Firms without MNE-experienced employees	MNE experience of any employees	MNE experience of high-wage employees	MNE experience of any employees, from the same industry	MNE experience of high-wage employees, from the same industry
New 5-digit product added (dummy)	0.08	0.062	0.061	0.051	0.049
New 8-digit added product (dummy)	0.071	0.049	0.047	0.044	0.041

Notes: firm-level panel data, manufacturing industry. Period: 2007–2011. Sample of domestically owned firms.

However, the share of firms adding new export products to its product portfolio is the highest for the group with no export experience, reflecting the fact that younger and smaller firms are more likely to add new export products compared to larger and older firms with an existing and already more stable export base. In general, we can conclude that the presence of MNE experience, and especially experience embodied in managers and originating from the same industry, is positively correlated with various firm performance measures and propensity to export.

4. EMPIRICAL STRATEGY

4.1. MNE experience and productivity

We estimate here the association between prior MNE experience among all employees or high-waged employees and productivity or export performance at their new workplace. As measures of firm productivity we use both TFP and labour productivity (log of value added per employee) at firm level. TFP is calculated based on the production function with value added as the dependent variable. The production function is estimated separately in each 2-digit sector, using the system GMM approach to account for the likely endogeneity of production inputs. Throughout the analysis, we concentrate on a sample of domestic firms; that is, the contribution of employees with MNE experience to the productivity and export performance of domestically owned firms.

As a first step, we estimate the firm-level TFP based on firm-level panel data from 2006–2011. In this, we assume different production functions in each two-digit industry within manufacturing. The log of TFP is estimated as a residual from the specific production function for industry j that has the log of value added as a dependent variable ($\ln Y_{ijt}$) and includes the log of physical capital ($\ln K_{ijt}$) and the log of number of employees ($\ln L_{ijt}$) as inputs:

$$\ln TFP_{ijt} = \ln Y_{ijt} - \alpha_j \ln K_{ijt} - \beta_j \ln L_{ijt}, \quad (1)$$

where subscript i denotes the firm, j the sector and t the year; α and β denote parameters of capital and labour in the production function for sector j .

As the next step, we estimate the relationship between the firm-level performance indicator π_{ijt} (log of TFP or log of value added per employee) and MNE experience based on the following fixed effects and instrumental variable (hereinafter also IV) specifications:

$$\pi_{it} = \beta_1 \text{MNE experience}_{it} + \beta_2 X_{it} + \lambda_t + \tau_i + \varepsilon_{it} \quad (2)$$

In Equation 2, our main variable of interest is $MNE\ experience_{it}$, which shows the share of high-wage employees with experience from working at an MNE. This variable is calculated as the ratio between the number of high-wage employees with prior MNE experience at firm i and the total number of employees at firm i . In some specifications we also check the results using a dummy variable for the presence of any MNE-experienced employees instead of the ‘share’ variable. X_{it} is a vector of explanatory variables. The choice of explanatory variables includes standard drivers of firm-level productivity.

The explanatory variables in the TFP specification of Equation (2) include the size of the firm (log of employment) and size squared, firm’s age (in years) and age squared, export dummy at firm level $exporter_{it}$, cash to assets ratio, log of capital intensity in the labour productivity specification, share of intangible assets in total assets, and the share of high-wage employees in the total number of employees in firm i (this is also an indirect proxy for skill intensity in the firm). Dummies for different years λ_t and firm-fixed effects τ_i are also included in the model.

ε_{lit} is an error term assumed to be normally distributed with a zero mean and variance σ_1^2 . We expect firm size, liquidity, share of high-wage employees and exporter dummy to be positively associated with firm productivity.

We estimate Equation 2 with firm-fixed effects (FE) model and two stage least squares (2SLS). We check the robustness of the FE results by applying instrumental variables. We use the share of employees whose reason for moving to the particular enterprise was the closure of their previous employer as a firm-level instrumental variable. Firm exit could potentially provide an exogenous reason for labour mobility that is less likely to be dependent on employee performance at their prior firm (Dustmann and Meghir 2005). The analysis is facilitated by increased firm exit due to the financial crisis in the period of the study – from 6.9% in 2007 to 10% in 2008 and 9.7% in 2009 (Statistics Estonia). An increase in the availability of high-wage employees with MNE experience due to firm closure could be an exogenous change in labour supply from the viewpoint of a given recipient firm. However, we note that the IV-analysis is functioning here more as a robustness test of the results.

4.2. MNE experience and exporting

The relationship between the MNE experience of employees and firm productivity or individual-level wages has been estimated in some prior papers (e.g. Poole 2013, Balsvik 2011). We add to their analysis by investigating the channel of these effects on performance through the export activities of the firm. Here, the key empirical relationship of interest is the role of prior MNE experience among all employees or high-waged employees (gained from their previous employer) on export performance at their new firm.

As measures of exports, we use both a dummy indicating exporting, number of export products or markets, a dummy for adding new export products and a dummy for adding new export markets. We endeavour to check the robustness of the results and to account, to some extent, for the endogeneity of MNE experience by applying instrumental variables.

The general model for exporting is as follows:

$$exporter_{it}^* = \delta_0 + \delta_1 MNE\ experience_{it} + \delta_2 H_{it} + \lambda_t + \gamma_j + \varepsilon_{3it} \quad (3)$$

In Equation 3, subscript i denotes firm, t year and j industry. The dependent variable $exporter_{it}^*$ is a firm’s latent (unobserved) propensity to export. The observed variable $exporter_{it}$ equals 1

when firm i is an exporter and 0 otherwise. A firm is going to export to a foreign market if the latent variable is above c ($\exp_{it}^* > c$), here c is a constant threshold level. The latent variable reflects the firm's decision criterion: to engage or not in exports, considering the related costs and expected returns.

The key variable of interest is again the *MNE experience* $_{it}$. H_{it} is a vector of explanatory variables and the choice of explanatory variables is based on previous papers on various drivers of firm-level exporting, as in Bernard and Jensen (2004) or Hiller (2013), among many. The key variable addressed in heterogeneous producer trade theory that makes it possible to cover the sunk costs of export entry is the firm's prior productivity (Melitz 2003). The vector of explanatory variables also includes firm size (log of employment), firm age (years), a dummy for foreign ownership, cash to assets ratio, log of labour productivity (value added per employee) lagged by one year, log of capital intensity lagged by one year, log of wage per employee lagged by one year, and the share of high-wage employees in the total number of employees in firm i . Dummies for different years λ_t and sectors γ_j are also included in the model. The last term, ε_{3it} , is an error term, which is assumed to be normally distributed with a zero mean and variance σ_3^2 . We expect firm size, foreign ownership, liquidity, capital intensity, share of high-wage employees and average wage rate to be positively associated with exporting. An especially clear and strong relationship is expected to exist in the case of prior productivity, as implied by heterogeneous producer models from trade theory.

We apply probit and IV-probit models to estimate the role of MNE experience in export entry, or in adding products or new markets by existing exporters, as in Equation 3. To investigate the 'effects' on 'breadth' of exporting, we estimate a version of the model in Equation 3, using the instrumental variable approach (2SLS) with firm-level fixed effects included. In this case the dependent variables are export intensity, number of export markets or number of products of the firm. The explanatory variables are the same as before.

5. RESULTS

5.1. Baseline estimations: MNE experience and productivity

The following Tables (2–5) describe the relationship between the presence of MNE-experienced employees or high-wage employees at the firm and the firm's TFP or labour productivity. Table 2 estimates a version of Equation 2 with MNE experience measured using dummies indicating whether the domestic owned firm has employees (columns 1 and 3) and managers or other high-wage employees (columns 2 and 4) with experience of working previously at an MNE. The specifications in Table 2 include firm-fixed effects to account for other time invariant firm-specific drivers of productivity.

We find a positive correlation of the presence of any employees with MNE experience in the case of value added per employee, but no such significant correlation in the case of TFP. However, if we concentrate specifically on the role of hiring new high-wage employees with MNE experience, then there is indeed a significant correlation with both higher labour productivity and TFP at the recipient firm. The conditional productivity premium of having MNE-experienced high-wage employees is about 6–7 per cent higher in the case of TFP and labour productivity. As expected, it is clear from our results that hiring MNE-experienced

managers and high-wage employees has stronger positive outcomes on firm performance than hiring other employees (compare estimates in columns 1 and 2 or 3 and 4 in Table 2).

The control variables mostly show the expected results. Exporters among domestically owned firms have significantly higher productivity. Higher cash to assets ratio, share of intangible assets and share of high-wage employees among the workforce are correlated with the higher productivity of the firm. The share of high-wage employees is included here as an indirect proxy for skill intensity. It is a vital control in estimating the productivity equations. Without accounting for the general high share of high-wage employees at the firm, we could overestimate the gains from having managers and top specialists with MNE experience.

Table 2. MNE experience of employees: relationship with firm productivity, FE models

	(1)	(2)	(3)	(4)
Dependent variable:	log of TFP	log of TFP	log of labour productivity	log of labour productivity
Employees with experience from MNEs (dummy)	0.041 (0.027)		0.055 (0.014)***	
Managers and high-wage employees with experience from MNEs (dummy)		0.071 (0.031)**		0.062 (0.016)***
Exporting firm (dummy)	0.180 (0.036)***	0.179 (0.036)***	0.106 (0.018)***	0.105 (0.018)***
Firm size	-0.934 (0.049)***	-0.933 (0.049)***	-0.269 (0.024)***	-0.266 (0.024)***
Firm size squared	0.079 (0.013)***	0.079 (0.013)***	0.003 (0.006)	0.003 (0.006)
Age	0.026 (0.223)	0.019 (0.223)	-0.211 (0.107)**	-0.216 (0.107)**
Age squared	0.067 (0.120)	0.071 (0.120)	0.131 (0.058)**	0.133 (0.058)**
Share of managers at firm	0.145 (0.044)***	0.144 (0.044)***	0.055 (0.022)**	0.052 (0.022)**
Cash to total assets	0.665 (0.064)***	0.664 (0.064)***	0.412 (0.031)***	0.412 (0.031)***
Intangible fixed assets to fixed assets	0.010 (0.072)	0.010 (0.072)	0.102 (0.036)***	0.103 (0.036)***
Constant	2.424 (0.174)***	2.422 (0.174)***	9.635 (0.084)***	9.637 (0.084)***
Number of observations	13378	13378	14333	14333
R-squared	0.122	0.122	0.122	0.122

Notes: *significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Panel data of domestic owned firms from the manufacturing industry. Period: 2007–2011. Labour productivity is measured as value added per employee.

In addition to showing the firm-level productivity premium of MNE experience, in Annex 1 we show additional evidence on the individual level wage premium of MNE-experienced employees and managers. We estimate a standard Mincerian wage equation, based on employee-level wage data (see Annex 1 for more detail), controlling for a set of key determinants of wages. The results confirm that there is a clear wage premium for MNE-experienced employees above others without this experience at the recipient firm. This suggests that local firms value experience from MNEs and that we could indeed expect positive (spillover) effects on the firm.

So far we have investigated the role of the simple presence or absence of MNE experience at the firm. In Table 3 we show specifications with a different MNE experience proxy than the dummy variable in Table 2. Now we employ the share of employees or high-wage employees that have MNE experience in total workforce of the firm. This variable takes values between zero and one. Firstly, it enables us to observe whether the potential effects of MNE experience go beyond simply having or not having MNE-experienced workers: whether adding new experienced workers to the existing ones has additional effects. Secondly, using this variable instead of a dummy enables us in the next tables to apply the 2SLS/IV models in order to try to address the endogeneity of labour mobility.

Table 3. Share of MNE-experienced employees and firm-level TFP, FE models

Dependent variable:	(1) log of TFP	(2) log of TFP	(3) log of TFP	(4) log of TFP
Share of all employees with experience from MNEs	0.157 (0.070)**			
Share of managers and high-wage employees with experience from MNEs		0.163 (0.089)*		
Share of all employees with experience from MNEs from the same industry			0.363 (0.118)***	
Share of managers and high-wage employees with experience from MNEs from the same industry				0.485 (0.324)
Other controls (as in Table 2)	Yes	Yes	Yes	Yes
Number of observations	15821	15821	11176	11176
R-squared	0.117	0.117	0.122	0.121

Notes: *significant at 10%; ** significant at 5%; *** significant at 1%. Fixed effects (FE) model.

Robust standard errors in parentheses. Panel data of domestic owned firms from the manufacturing industry. Period: 2007–2011. Labour productivity is measured as value added per employee.

From the parameter estimates of our key explanatory variables in Tables 2 and 3 we observe that there are additional gains from having a higher share of employees with MNE experience, beyond simply having one employee with such experience. The results in Table 3 in columns 3 and 4 again point out that the role of the experience of managers and other high-wage employees is more important than that of lower ranked employees.

An obvious extension of the analysis is to investigate whether the effects of the mobility of MNE-experienced workers are stronger if they originate from the same industry as the recipient firm. We check here whether these ‘effects’ of experience are stronger if the experienced employees stem from the same two-digit NACE manufacturing sector. Indeed, the magnitude of the sector-specific experience effect in Table 4 of IV results is about 2–3 times higher compared to the more ‘general’ MNE experience. An especially strong difference is evident in the case of managers and top specialists from the same industry (Table 4). The context of prior experience appears to matter a lot in sourcing external competences through hiring. This result is also in accordance with recent findings by Masso et al. (2015) that product and technology proximity between firms and originating from the same sector enhance the effects of the mobility of export-experienced managers on exporting of the firm receiving this new workforce. This is also in accordance with the standard idea of the importance of the absorptive capacity (Cohen and Levinthal 1990, Lane and Lubatkin 1998) of the recipient firm in benefitting from spillovers.

Table 4. Share of MNE-experienced employees and high-wage employees, effects on TFP, 2SLS model

Dependent variable:	(1) log of TFP	(2) log of TFP	(3) log of TFP	(4) log of TFP
Share of all employees with experience from MNEs	1.030 (0.421)**			
Share of managers and high-wage employees with experience from MNEs		2.481 (1.023)***		
Share of all employees with experience from MNEs from the same industry			1.190 (0.487)***	
Share of managers and high-wage employees with experience from MNEs from the same industry				5.886 (2.449)***
Other controls (as in Table 2)	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Number of observations	15821	15821	11176	11176
R-squared	0.117	0.117	0.122	0.121
1st stage of 2SLS				
Instrumental variable:				
Share of current employees that moved because of closure of their prior employer (i.e. exogenous source of movement)	0.3285*** (0.016)	0.136*** (0.010)	0.284*** (0.013)	0.057*** (0.005)
F-test of IV	21.03	13.22	22.36	11.36
p-value	0.000	0.000	0.000	0.000

Notes: *significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Method: 2SLS. Panel data of domestic owned firms from the manufacturing industry. Period: 2007–2011.

We have checked the robustness of our productivity related findings based on a 2SLS IV-model (Table 4). The instrumental variable is based on the share of employees that originate from firms that closed – an arguably exogenous source of workforce from the viewpoint of the hiring firm. The endogeneity problem could reflect here firstly the reverse causality, where more successful firms with high productivity are more likely to attract MNE-experienced managers and employees. Secondly, there might also be other time-varying factors that affect both productivity and the mobility of employees to the firm, and accounting for firm-fixed effects is unlikely to fully resolve this issue. Therefore, the standard OLS with firm-fixed effects is likely to provide biased estimates of the effects of labour mobility in general and also in the case of hiring/mobility of MNE-experienced employees.²

Table 4 shows the first and second stage of the 2SLS model used in our productivity analysis. The model also includes firm-fixed effects. The instrumental variable, share of employees that moved to their current employer because of the exit of their prior firms, has a clear positive and statistically significant correlation with the key endogenous variable in the model – hiring employees with MNE experience. The instrument appears not to be a weak one; the F-statistic of the instrument and the general F-statistic of the first stage are sufficiently high – above the Stock-Yogo critical values and above ten in all cases. The Hausman test between our OLS with

² Previous related studies by Balsvik (2011) and Poole (2013) include unit level (plant or individual level) fixed effects, with Balsvik (2011) also using the lagged share of newly hired MNE experienced employees. Balsvik (2011) additionally reports trying the GMM approach to account for the endogeneity of MNE experience. The system GMM estimator uses lags for inputs and a dependent variable as instruments. However, in her analysis the validity of these (internal) instruments was rejected, leaving potential endogeneity issues still in the estimated relationships. Therefore, the GMM results were not reported.

FE and 2SLS specification suggests that we should reject the H0 of exogeneity of the MNE experience indicator.

We observe from Table 4 that there is a positive relationship between the share of MNE-experienced employees or high-wage employees and the firm's TFP (columns 1 and 2), even after our attempt to address the endogeneity of the key explanatory variable. The estimated 'effect' is much larger than in OLS with fixed effects (see Table 3). This urges caution in interpreting the IV findings. The magnitude of the estimates of the effects is as follows: a ten percentage point increase in the share of employees from MNEs is associated with 10 per cent higher TFP in the domestic owned firm. The estimated effect is significantly larger in the case of the mobility of high-wage employees. Here, a ten percentage point increase in their share in the workforce of the domestic firm would increase the TFP of the recipient firm by 24 per cent.

Table 5. MNE experience: is it accounted for by the effects of experience from high performance firms and experience from export orientation?

	(1)	(2)	(3)	(4)
	Dependent variable: Labour productivity	Dependent variable: TFP	Dependent variable: Labour productivity	Dependent variable: TFP
New managers and high-wage employees from foreign firms (dummy)	0.026 (0.017)	0.031 (0.035)		
New managers from firms in the 4th quartile of productivity (dummy)	0.026 (0.016)*	0.047 (0.031)		
New managers from firms in the 3rd quartile of productivity (dummy)	0.038 (0.016)**	0.009 (0.031)		
New managers from exporting firms (dummy)	0.044 (0.016)***	0.055 (0.032)*		
Share of managers and high-wage employees with experience from MNEs			-0.095 (0.060)	0.023 (0.122)
Share of managers and high-wage employees with experience from firms in the 3rd quartile of productivity			0.023 (0.046)	-0.203 (0.092)**
Share of managers and high-wage employees with experience from firms in the 4th quartile of productivity			0.050 (0.048)	0.099 (0.095)
Share of managers with external export experience			0.080 (0.046)*	0.223 (0.092)**
Other controls (as in Table 3)	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
Number of observations	14333	13378	16980	15821
R-squared	0.124	0.123	0.106	0.118

Notes: *significant at 10%; ** significant at 5%; *** significant at 1%. Fixed effects model. Robust standard errors in parentheses. Panel data of domestic owned firms from the manufacturing industry. Period: 2007–2011. Labour productivity is measured as value added per employee.

A rather important issue to check is what type of knowledge spills over from MNEs to local firms. For that purpose we add further controls for the labour mobility into the recipient firm in Equation 2. We account now (in the specifications shown in Table 5) for the share of newly hired high-wage employees from high-productivity producers (belonging to the upper 50 per cent in the productivity distribution) and from exporters. In this way we can try to disentangle whether there is any additional remaining MNE-related effect left once we account for labour

mobility from firms with high productivity and with export orientation. A clear result from Table 5 is that the multinationality related mobility effect seems to be fully accounted for by the higher trade orientation of MNE subsidiaries. If we account for the share of employees that move to the domestic firm from exporters, then the additional MNE effect disappears.

In general, we can conclude that the evidence is in accordance with a correlation between hiring MNE-experienced employees and higher firm performance. This result is also robust for the IV-based estimation, and therefore, may be likely to point also to the effects of mobility on performance. However, these effects seem to appear due to the stronger export orientation of MNE subsidiaries. Consequently, we could expect the effects of MNEs (i.e. largely export related experience effects) on performance to function especially through the transfer of trade related knowledge.

5.2. MNE experience and exporting

One of the key channels of the effects of MNE experience is likely to work through facilitating easier entry and expansion to export markets. This is similar to the role of the firm's prior productivity in enabling to cover the sunk costs of exporting. Columns 1 and 2 in Table 6 show the relationship between the presence of MNE-experienced employees (column 1) or managers and other high-wage employees (column 2) with the propensity to export by domestically owned firms. We observe from the table that firm size, age, share of high-wage (skilled) employees at the firm and prior productivity are all positively correlated with exporting. Productivity has a strong correlation, as always, with export status.

The marginal effects at sample mean for our two key explanatory variables are positive. In the case of the IV-probit model, an increase in the share of MNE-experienced employees by ten percentage points is associated with about a five per cent higher propensity of the firm to export. The marginal effect of a similar increase in export-experienced managers is substantially higher (a ten percentage point increase is associated with about seven per cent higher propensity to start exporting), again pointing out the importance of managerial experience in shaping export decisions and success. To give further indications of the magnitude of these correlations: a one standard deviation increase in the share of MNE-experienced managers in the workforce of a firm is associated with about 34–35 per cent higher propensity of the firm to start exporting.

Table 6. MNE experience of employees: estimated relationship with exporting

Method:	(1) Probit	(2) Probit	(3) FE Number of export products	(4) FE Number of export markets
Dependent variable	Export dummy	Export dummy		
Firm size	0.656 (0.014)***	0.657 (0.014)***	2.666 (0.336)***	1.082 (0.120)***
Age	0.123 (0.023)***	0.122 (0.023)***	-2.431 (1.019)**	0.234 (0.364)
Cash to total assets	-0.506 (0.064)***	-0.505 (0.064)***	-0.260 (1.014)	-0.375 (0.362)
Share of managers at firm	0.103 (0.052)**	0.099 (0.052)*	0.725 (0.611)	0.222 (0.218)
Log labour productivity (t-1)	0.401 (0.019)***	0.401 (0.019)***	0.253 (0.242)	0.107 (0.086)
Share of all employees with experience from MNEs	0.205 (0.110)*			
Share of managers and high-wage employees with experience from MNEs		0.308 (0.134)**	2.237 (1.457)	0.111 (0.520)
Constant	-6.342 (0.211)***	-6.442 (0.223)***	-1.251 (3.395)	-1.564 (1.213)
Number of observations	15760	15760	3901	3901
R-squared			0.032	0.070
Marginal effects of key explanatory variables:				
Share of all employees with experience from MNEs	0.0448 (0.024)*			
Share of managers and high-wage employees with experience from MNEs		0.0673 (0.0291)**		
Marginal effects from IV-probit:				
Share of all employees with experience from MNEs	0.553 (0.105)***			
Share of managers and high-wage employees with experience from MNEs		0.965 (0.178)***		

Notes: parameter estimates and marginal effects from IV-probit model in columns 1 and 2. * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses. Panel data of domestic owned firms from the manufacturing industry. Period: 2007–2011. FE- fixed effects model. Sector dummies defined at NACE 2-digit level are included in the probit models.

Our further investigation into the propensity to export to different destination regions points to the finding that among existing exporters, MNE experience is correlated with entry to nearby foreign markets and not to more distant ones. The corresponding marginal effect of the variable ‘share of MNE-experienced employees’ in a probit model with a similar specification to these in Table 6, but with a dummy variable for exporting to nearby foreign destination markets as a dependent variable, is 0.128 (significant at the one per cent level). The category of nearby markets, the 1st markets of entry, consists of Finland, Sweden and Latvia. Of these, Sweden and Finland are key foreign investors in Estonia. We do not see a similar significant correlation of MNE experience with entry to CIS countries, the rest of the EU or the rest of the world.

Therefore, it appears, based on these findings and columns 1 and 2 in Table 6, that MNE experience is important for export status in general and in the early internationalisation stages of the firm, when firms expand to their first and nearby foreign destinations.

If we focus on the existing exporters, then their further expansion in terms of number of markets or products is not significantly related to the presence of MNE-experienced workforce (see Columns 3 and 4). This result persists if we estimate these relationships using a IV-model. The parameter estimate of ‘share of managers and high-wage employees’ from the 2SLS estimation (with a firm exit based instrumental variable) of the otherwise similar model as in column (3) in Table 6 is not significant (2.683, with a standard error of 6.927).

The additional estimates in Table 7 study whether the exporting experience is country specific; that is, whether difficulties in starting exporting to a particular country can be overcome by hiring an employee working previously in a company exporting to that particular country. Given the largest destination countries for Estonian exporters, we looked specifically at exporting to Finland, Sweden and other countries. The results indeed reveal a strong country-specificity in the experience: for the propensity of exporting to a particular country, primarily the experience related to that country is significant, while the coefficients for experience from elsewhere are much smaller and mostly statistically insignificant. The final columns in Table 8 report the lack of any significant effect on the shares of exports in turnover, which could be seen as in line with the above results of the lack of an effect on export expansion after initial export entry.

Table 7. MNE experience of employees: relationship with exporting intensity and exporting to particular markets

Method	Probit	Probit	Probit	FE	FE
Dependent variable	Exporting to Finland (dummy)	Exporting to Sweden (dummy)	Exporting to other countries (dummy)	Share of exports in turnover	Share of exports in turnover
Sample	All firms	All firms	All firms	All firms	Exporters
Share of managers from foreign firms				-1.332 (4.035)	-1.645 (8.094)
Share of managers from foreign firm with Finnish owners	0.128 (0.036)***	0.058 (0.038)	-0.012 (0.051)		
Share of managers from foreign firm with Swedish owners	0.100 (0.054)*	0.180 (0.040)***	0.057 (0.067)		
Share of managers from foreign firm with owners from other countries	0.035 (0.039)	0.040 (0.036)	0.089 (0.041)**		

Notes. Marginal effects are presented for probit models together with the standard errors in the parenthesis. Only the results of the experience variables are presented but all the regressions included all the explanatory variables used in the regression presented in Table 7.

We have also investigated whether the benefits of learning by hiring from MNEs differ depending on industry characteristics such as sector-level export intensity, level of labour productivity, and the share of MNE-experienced high-wage employees. In the case of all three variables, we divide 2-digit sectors in the manufacturing industry into 3 groups, with a ‘low’, ‘moderate’ and ‘high’ level of the corresponding indicator. As a next step, we re-estimated the regressions on export performance separately for the samples with a ‘low’, ‘moderate’ or ‘high’ level of the corresponding variable. In the case of export intensity, the marginal effect of the firm’s own share of MNE-experienced high-wage employees is not significant as a determinant of exporting. The corresponding marginal effect in the case of sectors with ‘moderate’ export intensity is statistically significant and equals 0.174. In the case of ‘high’ export intensity

sectors, the marginal effect is again significant (equal 0.19) but notably it is not statistically significantly different from the effect in the ‘moderate’ export intensity group. So, we can confirm that as expected the role of MNE experience is indeed higher in sectors where more export related knowledge is available and where exporting plays a more important role. However, there is also a clear ‘plateau effect’, where an increase in export intensity from ‘moderate’ to ‘high’ is not associated with the further increased effects of the mobility of employees with international experience. The plateau effect means that industries that export more than a certain threshold level have already reached the limits in terms of the capacity to learn from MNE experience. They have already significant access to information beneficial for export entry and additional mobility from MNEs does not result in significantly greater effects compared to sectors with a ‘moderate’ level of exposure to the international environment. These results – the lack of a significant effect in industries with low export intensity and the presence of the plateau effect – are very well in line with the argumentation and results of Tse et al. (2016) on the importance of industry heterogeneity in moderating the multi-mediation mechanism of learning by exporting.

We have further tested industry differences based on the productivity level and sector-level indicator of the abundance of employees with MNE experience. Notably, the estimated ‘effect’ of having high-wage employees with MNE experience in the firm is only significant in sectors that have ‘high’ levels of such employees moving between firms. Here we do not see such a clear plateau effect as in the case of export intensity.

Finally, the results concerning sector-level productivity are somewhat surprising. These do not confirm the importance of the high productivity (and absorptive capacity) of the sector of the firm in benefitting from hiring high-wage employees from MNEs. Instead, lower productivity sectors are reaping larger benefits from the movement of MNE employees. Here, knowledge transferred via labour mobility from MNEs appears not to be a complementary factor of high sector-level productivity for successful entry to export markets.

5. CONCLUSIONS

The results in this paper are consistent with the view that the mobility of high-wage and other employees from MNEs to domestic firms is a significant channel for spillovers of FDI in the host economy, and that the effects of this mobility may function through the export related decisions of firms. Our empirical findings underline the importance of managerial inputs and experience in covering the sunk costs of exporting, in addition to the role of general firm productivity.

We confirm, based on Estonia's matched employer-employee data, that hiring high-wage employees (managers and top specialists) with prior working experience at MNEs is associated with increased performance in their new domestic owned employer. As expected, the estimated contribution of the experience of managers and top specialists is larger than that of all employees with MNE experience. MNE experience has a stronger correlation with increases in domestic firm productivity if it originates from the same industry. Additionally, there exists a wage premium for MNE-experienced employees, and their presence at the domestic firm is correlated with higher wages for the firm's other employees as well, suggesting potential wage spillovers.

Importantly, our empirical results suggest that the estimated relationship between MNE experience and firm performance in Estonia's manufacturing sector is likely to reflect largely the mobility of export-experienced employees. Hence, the transferred knowledge may concern especially trade related information. The mobility of MNE-experienced managers and other employees is positively associated with the propensity for domestic firms to start exporting. A one standard deviation increase in the share of MNE-experienced managers in the workforce of a firm is associated with about 34–35 per cent higher propensity of the firm to start exporting.

Our results point to the fact that the role of MNE (trade) experience for firm-level exporting is stronger: i) in the 1st stages of the internationalisation of a firm, and ii) in the case of export entry to nearby markets (that are also key sources of FDI in Estonia). We find no robust evidence suggesting any strong additional contribution of MNE experience on export intensity, or the subsequent introduction of new export products or the firm's subsequent expansion to markets other than those nearby (once we account for other factors).

The role of international experience is, as expected, also sector specific. The significant benefits appear only in sectors with relatively high levels of labour mobility from MNEs, suggesting the importance of having a larger pool of potential employees with a varied international experience. There is a kind of plateau 'effect' in the case of the export intensity of sectors. There appears to be more learning by hiring in sectors with moderate and high levels of export intensity, compared to sectors with low export intensity. However, the benefits of greater exposure to exporting seem to level off. There is no difference between moderate and high export intensity sectors in terms of benefitting from labour mobility from MNEs. This may reflect the fact that after some certain level of export intensity in the sector, exporting becomes a more standard activity and export related information is available then from a variety of sources other than through direct learning by hiring.

Concerning the wider implications of our study, the results provide evidence suggesting wider benefits – beyond the benefits accrued by foreign-owned firms themselves – from multinational enterprises for the host economy. The usefulness of FDI inflow can be viewed differently in

more and less export oriented sectors. Due to data limitations, we have not gone deeper into the mechanism by which the learning effects occur and how the improved exporting might increase productivity (e.g. via innovation activities). It would be also useful to look more closely at the patterns of mobility – while we considered the presence of at least one employee with MNE experience or their share in the workforce, the importance of work-teams and their movement across firms could also be of significant interest (e.g. Ganco 2013 has studied that in the case of patenting activity, in a different context from ours).

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Appendix 1. MNE experience and wage premium

In addition to showing the firm-level productivity premium of MNE experience, we provide here additional evidence on the individual level wage premium of MNE-experienced employees and managers.

The wage premium of MNE-experienced employees above others at the recipient firm would be evidence suggesting that local firms value experience from MNEs and we could expect positive (spillover) effects on the firm. From Table 1 we observed that there is an unconditionally large difference between wages in Estonian manufacturing firms that have employees with MNE experience and those that do not have. However, this may simply reflect a multitude of other factors correlated with firm performance. An investigation of the conditional wage premium for MNE-experienced employees and employees at firms managed by MNE-experienced managers is performed based on a standard Mincerian type wage equation estimated at employee level. The dependent variable is the log of real monthly wage $\ln W_{ikt}$ in January of each year (as we analyzed mobility from January to January), and a set of individual and firm-level characteristics are included among the controls. The corresponding wage equation is as follows:

$$\ln W_{ikt} = \alpha_1 \text{Individual_MNEexperience}_{ikt} + \alpha_2 \text{Firm_MNEexperience}_{kt} + \alpha_3 \text{Age}_{it} + \alpha_4 \text{Age}_{it}^2 + \alpha_5 R_{it} + \alpha_6 Z_{kt} + \lambda_t + v_i + \varepsilon_{2ikt}, \quad (3)$$

where i denotes individual, t year and k firm; $\text{Individual_MNEexperience}_{ikt}$ is a dummy variable denoting whether the individual herself has the experience of working at an MNE (either indicating experience of all employees or separately for managers/high-wage specialists); $\text{Firm_MNEexperience}_{kt}$ is a variable denoting the share of employees at the firm that have prior experience at an MNE, R_{it} is a vector of other individual-level controls, Z_{kt} is a vector of firm-level controls. Dummies for different years λ_t and firm-fixed effects v_i are also included in the model. The last term, ε_{2ikt} , is an error term, which is assumed to be normally distributed with a zero mean and variance σ_2^2 .

Table A1 shows the key results from estimating the Mincerian wage equations with individual and firm-level (i.e. experience of colleagues) prior working experience at MNEs included among other drivers of individual-level wages. Note that we include individual-level fixed effects in the analysis, the period covered is again 2007–2011, and we concentrate on employees in the manufacturing sector. The positive wage premium for individuals with a career history from MNEs indicates that the recipient firms value this superior experience. If the individual's own MNE working experience is positively associated with his or her wages at the recipient firm, then arguably there could be reason to expect knowledge spillovers as well. Obviously, these estimates, despite taking into account the individual fixed effects, do not necessarily show causal effects.

Table A1. MNE experience of employees and conditional individual wage premium. Individual-level FE models.

	(1) OLS with sector dummies	(2) Individual fixed effects model	(3) Individual fixed effects model	(4) Individual fixed effects model (incumbent employees' sample only)
Individual's own MNE working experience (dummy)	0.114 (0.005)***	0.042 (0.005)***		
Individual's own MNE working experience, among the sample of white-collar employees (dummy)			0.094 (0.029)***	
Share of employees with MNE experience at the firm (a proxy for wage related MNE spillovers)				0.344 (0.024)***
Other individual and firm-level controls in Mincerian wage equation and year dummies	Yes	Yes	Yes	Yes
Observations	245,755	245,755	113,605	191,584

Notes: dependent variable is log of average monthly wage in a year. *significant at 10%; ** significant at 5%; *** significant at 1%. OLS with individual-level fixed effects in columns 2, 3 and 4. Panel data of employees at domestic owned firms in the manufacturing industry. Period: 2007–2011. Sector dummies are defined at NACE 2-digit level. Note that Column 4 concentrates on incumbent employees that do not have own MNE experience from prior workplace.

Both the employee-level wage premium from having experience working at an MNE and the premium from having a larger share of colleagues at the firm with such MNE experience are presented in Table A1. The Mincerian wage equation includes other individual and firm-level controls: incl. a gender dummy and its interaction terms with other variables, individual's age, age squared, region of employment, firm size and size squared and an exporting dummy of the firm, firm age and age squared, share of high-wage employees at the firm, an indicator of recent change of employment at employee level, and depending on specification either sector-level (two-digit) dummies or individual-level fixed effects. Once we account for individual-level fixed effects, the wage premium for an employee who has previous working experience at an MNE amounts to about four per cent higher wages (see column 2 in Table A1). The conditional wage premium of MNE experience is even higher among the sample of white-collar employees (classified based on ISCO) – it amounts to more than 9 per cent compared to other white-collar employees.

Poole (2013) shows in her study from Brazil that the mobility of employees with MNE experience can affect incumbent employees' wages at the domestic firm (a little studied channel of FDI spillovers). In Estonia's dataset, similar correlations are also present, as evident from Column 4 in Table A1, where we limit the sample to incumbent employees without MNE experience. The hiring of MNE-experienced new employees is associated with an increase also in incumbents' wage level. A ten percentage point increase in the share of MNE-experienced employees in total workforce is associated with about 3–4 per cent higher wages also for other incumbent employees at the recipient firm. These correlations are consistent with the view that MNE-experienced employees will not appropriate all the gains from their knowledge in the form of their own wage premium once they move to a domestic firm.

KOKKUVÕTE

Teadmiste ülekandumine hargmaistest ettevõtetest tööjõu mobiilsuse kaudu: õppimine ekspordikogemusest

Käesolevas artiklis uuritakse teadmiste ülekandumist hargmaistest välisosaluselise ettevõtetest kohalikesse ettevõtetesse läbi töötajate liikumise ettevõtete vahel. Antud konkreetne teadmiste ülekandumise kanal on empiirilises välisinvesteeringute alases teaduskirjanduses leidnud seni veel suhteliselt vähest käsitlemist. Tarvilik on täiendav uurimistöö mõistmaks detailsemalt neid mehhanisme, kuidas selline mobiilsus välisosaluselise ettevõtetest tegelikult aset leiab ja ettevõtete tegevustulemusi mõjutab. Käesolevas artikli kasutatakse Eesti töötleva tööstuse ühendatud töötajate ja tööandjate andmeid perioodist 2006-2011. Antud eesmärgil on omavahel ühendatud Eesti Äriregistri ettevõtete finantsandmed, Eesti Statistikaameti detailsed ettevõtete ekspordi ja impordi andmed ning maksuameti andmed töötajate makstud sotsiaalmaksu kohta tööandjate loikes. Niimoodi konstrueeritud andmestik võimaldab uurida seoseid töötajate tööandjate-vahelise mobiilsuse ja ettevõtete tegevuse, seahulgas tootlikkuse ja eksportimise, vahel. Analüüsis on eelkõige keskendunud kõrgepalgalistele töötajatele, nimelt iga konkreetse haru palgajaotuse ülemisse viiendikku kuuluva palgaga töötajatele. Eeldatavalt on just nemad - juhid ja tippspetsialistid - ettevõtte võtmetöötajad, kelle liikumisega kaasnevad ka eeldatavalt mõjud töötajat palkavale ettevõttele.

Analüüsi tulemused näitasid, et töötajate ning eriti kõrgepalgaliste töötajate liikumine hargmaistest kohalikesse ettevõtetesse on seotud kohalike ettevõtete tegevustulemuste ja sh tootlikkuse kasvuga, suurendab eksportimise tõenäosust, samuti kaasneb töökoha vahetusega töötajatel palgatõus seoses nende välisettevõttes töötamise kogemuse väärtustamisega uue tööandja poolt. Töö tulemused viitavad ka sellele, et positiivsed seosed tootlikkusega tulenevad eriti just ekspordikogemuse ülekandumisest hargmaistest ettevõtetest kohalikesse.

Töötajate mobiilsusega kaasnev positiivne panus nende uue tööandja eksporditegevusse ilmneb seejuures eriti kodumaiste ettevõtete eksporditegevusega alustamise puhul ja sisenemisel lähedastele välisturgudele. Samuti oleneb väliskapitaliga ettevõtetest kohalikesse liikumise mõjuhinnangute tugevus konkreetse tööstusharu kontekstist. Hargmaistest ettevõtetest tulnud töötajatel on positiivne panus keskmise ja kõrge ekspordiintensiivsusega sektorites: kui madala ekspordiintensiivsusega sektorites on võimalused eksportimisest teadmiste ülekandumiseks piiratud, siis kõrge ekspordiintensiivsusega sektorites on täiendava kogemuse kasu piiratud nn platooeffektiga. Tulemused näitavad kokkuvõttes välisinvesteeringute laiemat kasu sihtriigi majandusele lisaks investeeringut saanud ettevõttele, kuid need kasud tunduvad toimuvat suuresti läbi ekspordikogemuse ülekandumise. Eksporditegevuse puhul on hargmaistest ettevõtetest pärinevate töötajate positiivne panus keskmiselt piiratud esialgse eksporditurule sisenemisega ja lisaks ka varieeruv üle tegevusharude.