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

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Abstract

Labour mobility is considered to be one of the key channels of multinational firms' (MNE) effects on productivity of domestic firms in the host economy. This paper investigates one of the channels through which these spillovers of labour mobility on firm performance can operate. We focus on the relationship with export entry and export market expansion, as lot of knowledge transferred through FDI is likely to be related to trade. We use employer-employee level data from Estonia. The findings confirm that hiring especially managers or top specialists—proxied by high-wage employees—with experience from MNEs is associated with higher firm performance. Also, hiring MNE-experience employees is associated with a wage premium both for the hired and incumbent employees at the domestic firm. However, we show that the estimated relationship appears to be reflecting in particular the mobility of export-experienced employees. Our evidence suggests that an important channel of the effects is the increase in propensity of export entry by domestic firms. The results imply that the effects of external experience may be stronger especially in the 1st stage of internationalisation of a firm. We do not find evidence about additional effects on later introduction of new export products or firm's later expansion in terms of number of markets.

JEL Classification: F10, F23

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

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1. Introduction

For a long time, 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 FDI presence included among controls (e.g. Aitken et al. 1999, Javorcik 2004). Given the sometimes rather mixed results about the productivity spillovers from these 'black box' type of studies, a natural and more recent development has been increase in attention to some of the particular channels of learning and spillovers, like labour mobility and competition. A key mechanism proposed in the theoretical models of FDI spillovers and knowledge transfer (Fosfuri et al., 2001; Markusen 2001; Glass and Saggi, 2002; Dasgupta, 2012) functions through mobility of employees across-firms, whereby the mobility of employees carries knowledge from their prior (multinational) to new (domestic) employer. The empirical evidence on this channel is not limited any more to only survey data and case studies. The availability of employer-employee level panel datasets has enabled the researchers to follow managers' and employees' movement across firms and investigate its association with firm or individual level outcomes. The key empirical contributions include investigations of links between labour mobility from MNEs and its consequences on productivity or wages at local firms in Görg and Strobl (2005) on Ghana, Balsvik (2011) on Norway, and Poole (2013) on Brazil. These prior studies have convincingly showed that hiring managers from MNEs is strongly associated with domestic firms' productivity and wages.

However, there is still limited evidence on the various potential channels how the mobility of employees from MNEs to domestic firms affects firm performance. Hiring of MNE-trained managers and employees can affect productivity through decisions about production and innovation, 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 Balsvik (2011) and Poole (2013) by examining the export related channels of learning through mobility of MNE experienced employees.

Prior related analysis how mobility of export experienced managers is associated with export decisions of firms is provided in Mion and Opromolla (2014), Sala and Yalcin (2014) and Masso et al. (2015). We extend their analysis by investigating the contribution of MNE experience, apart from other types of external experience available at the firm. The literature on export spillovers through labour mobility shows the importance of region-specific managerial experience in export market entry and the role of managerial inputs in general in covering export sunk costs. The contribution of trade experience of managers appears to be

comparable in terms of magnitude to the role of firm's prior productivity (Mion and Opromolla 2013, Masso et al. 2015).

Firstly, we study whether there are significant correlations between hiring of MNE experienced employees or high wage employees and firm productivity and employee's own wages and other employee's wages at the firm. This step is similar to studies by Balsvik (2011) and Poole (2013), and adds to these by IV-model estimation. We proceed then to analyse whether the hiring and presence of MNE-experienced managers and top specialists speeds up firm's initial and subsequent export expansion, in terms of introduction of new export product varieties, and number of varieties and foreign markets served by the firm.

The paper focuses especially on the role of high wage employees, i.e. employees and managers who belong to the upper levels in the wage distribution within a given industry (2-digit NACE level). We use employer-employee level data from Estonia. Estonia is a good example for investigating the effects of FDI, as it has over years attracted a lot of foreign investments, primarily from nearby Sweden and Finland. Also, Estonia's case enables us to use employer-employee level data matched with detailed trade data of firms. Due to flexible labour market and the Great Recession period covered in our analysis, there is substantial movement of employees between firms available for study.

Our employee-level labour mobility data comes from the Estonia's Tax and Customs Office dataset. This 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 external experience and firm level export entry and subsequent market (i.e. foreign country) and product level expansion. The analysis focuses on manufacturing industry and the sample of domestic firms. We use the information of full population of firms and employees from manufacturing industry. Econometric analysis is performed based on yearly data of the period 2006–2011. We test the robustness of standard fixed effects and probit models by using instrumental variables (IV) approach to allow for the endogeneity of MNE experience of employees. The key instrumental variable is based on firm exit as an arguably exogenous source of the availability of potential employees for the hiring firm.

Our findings show that employees' prior MNE experience (i.e. acquired at a prior workplaces) is strongly associated with firm productivity and employees' wages, both the wages of the hired MNE experienced employee herself and other employees at the same domestic firm. What matters more for productivity, wages and exports is the experience of managers and other high-wage employees than experience of lower ranked employees. Similarly to Görg and Strobl

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(2005), the role of prior MNE experience is stronger if the experience originates from the same industry (in our case measured at the 2-digit level).

However, our results also suggest that the MNE experience 'effect' that we find seems to be driven by transfer of export experience. Once the analysis accounts for the mobility of export experienced high-wage employees, then additional MNE experience effect is not significant in productivity regressions anymore. In the case of analysis of trade decisions a significant result is that hiring MNE experienced employees has positive association with early export entry and entry to the nearby destination markets by the recipient firm.

The rest of the paper is structured as follows. Section 2 gives an overview of the literature, Section 3 discusses the data and presents descriptive statistics, Section 4 presents our empirical approach, Section 5 shows and discusses the results of the econometric analysis and Section 6 concludes.

2. Literature Review

Internationalisation and the resulting knowledge transfer from foreign environments is considered to be among central determinants of firm performance (e.g. Keller 2004, Syverson 2011). The key starting point of 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 the knowledge to domestic firms of the host economy (Markusen 1995, Blomström and Kokko 1998, Görg and Greenaway 2004).

Whereas 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 about FDI and export spillovers have tended to concentrate on effects on the outcome, 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 a mixed picture in terms of results. Both econometric evidence suggesting positive spillovers of FDI on productivity, but also results suggesting shortage of these effects are commonplace.

A typical econometric investigation on FDI spillovers associated the total factor productivity (TFP) of domestic producers to proxies for FDI share in the industry. Yet, an important question both for the research field and policy makers is how does the knowledge from MNEs and foreign markets spread and affect the local economy: incl. through imitation, innovation, faster

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expansion to new markets, changes in work practices? What is the importance of different channels of this 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; Markusen 2001; Glass and Saggi, 2002; Dasgupta, 2012) functions through worker mobility across-firms, whereby the mobility of employees carries knowledge from their prior to new employer.

Arguably, the experiencial knowledge from working at an MNE is to large extent tacit and embodied in employees. Thus, we can expect that significant proportion of spillovers should function through labour mobility of managers and other employees between firms. We would expect that the mobility of managers and top specialists has significantly stronger effects on performance compared to other employees (Mion and Opromolla 2014).

The limited number of recent empirical contributions that make use of employer-employee datasets investigate links between labour mobility from MNEs and its consequences on productivity or wages at local firms include Görg and Strobl (2005) on Ghana, Balsvik (2011) on Norway, and Poole (2013) using data from Brazil. Whereas Görg and Strobl (2005) and Balsvik (2011) concentrate on data from manufacturing, Poole (2013) includes also 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 of the same industry as his new venture had a significant effects on 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's productivity. The wage premium for workers with a minimum of 3-year experience at some MNE amounts to 5 per cent higher wages of the individual at the hiring firm.[2] This suggests that external experience is significantly valued by domestic firms and we could also expect knowledge transfer effects. Balsvik (2011) shows also that employees with previous MNE experience contribute significantly more (by 20 per cent more) to the productivity of domestic firms compared to employees without such external

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[2] Also, Martins (2005) shows using data from Portugal that workers with prior MNE experience have wage preimum. Their wage premium was persistent and depended on tenure at the MNE. Using matched employer-employee data from Finland, Pesola (2011) shows that highly educated employees earn a wage premium for their experience of working in a foreign-owned firm.

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, the labour mobility from MNEs to domestic firms includes significant externalities, which are not fully appropriated by the moving employees themselves.

A 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 at domestic firms are positively associated with the presence of MNE-experienced colleagues at the firm. This is a type of spillovers of FDI 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 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 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).

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 Opromolla 2014, Hiller 2013, Sala and Yalcin 2014, Masso et al. 2015). Recent microdata based papers suggest a significant positive relationship between various forms 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 Opromolla 2014) and in recent paper using data from Estonia in Masso et al. (2015). Mion and Opromolla (2014) and Masso et al. (2015) endeavour to account to some extent also for the endeogeneity of labour mobility in their econometric analysis, by applying instrumental variables models. Additionally, Sala and Yalcin (2014) 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. Mion and Opromolla (2014) results suggest that what matters for export decisions is the movement of managers, not the movement of employees in general.

3. Data and Descriptive Statistics

Investigation of spill-overs through labour mobility on firm-level performance outcomes requires availability of matched employer-employee data. We use here the dataset created by Masso et al. (2015) for Estonia by merging the following firm-level datasets: i) Statistics Estonia firm-product-destination-market level trade dataset; ii) Estonia's Commercial Registry dataset of firms' annual reports, with iii) employee-level data of the Tax and Customs Office on the employees' payroll taxes. The final merged dataset covers the period 2006–2011, enables 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 concentrate hereby on the sub-sample of domestic owned firms only.

The trade dataset includes export data disaggregated by destination market and detailed product level (as described by the combined nomenclature (CN) 8-digit code) for each firm in Estonia from 1995 to 2011. Using registry numbers, the detailed trade data from Estonia has been merged with Estonian Commercial Registry information on firm financial statistics from annual reports (balance sheets, profit and loss statement). The data are at the level of firms (legal entities) and available for the full population of firms. During the period 1995–2011 there were altogether 29,880 unique firms with exporting activities in at least one year. Owing to the small size of the country, the share of exporters in the manufacturing industry is rather high, e.g. 49 per cent in 2003 (but varying significantly over time). It is quite typical that firms start exporting in the first year of their activity, while in larger countries it is more common to start exporting after a period of activity at the home market.

The average number of markets (destination countries) per exporting firms in our dataset is 4.6 in 2009. The most common export destinations are neighbouring countries: Sweden, Finland, Latvia. One can observe a lot of dynamics in the dataset at the firm, market and product level. Lots of entry into export activities takes place every year. New exporters typically start with a smaller number of products and markets and then often only gradually expand their market and product portfolio (in 2003, 3.6 markets for continuing exporters and 1.6. for new exporters). Among different types of exporters, multi-market and multi-product exporters have superior performance characteristics, as shown in Masso and Vahter (2014).

The key variable in our empirical analysis is knowledge and experience attained in the employee's previous workplaces. We focus on the role of experience of working at a 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 the superior technologies and managerial practices applied there that enable to reach the high level of productivity. Experience at an exporting firm can in addition concern the product-or market specific export knowledge.

For tracking such knowledge diffusion through labour mobility, it is necessary to track individual employment over time. We have used the Estonian Tax and Customs Office dataset on all employees (the employees total number varies annually around 600 thousand) social contributions (payroll taxes) paid for the years 2006–2012 for that purpose. Social security tax is applied to all employees at the rate of 33 per cent of the gross wage and its payments enable us also to identify individual's employment status at a particular firm.

We have introduced the following adjustments to the data. Firstly, similarly to Mion and Opromolla (2014), we allowed each employee to have only one job in a given period (month) – for those with multiple jobs in the same period we kept only the main job, proxied as the one with the largest wage in that period. Secondly, we focused on year-to-year mobility: changes in employment from January of a particular year to January of the next year. Third, we interpolated away short (1-3 months) breaks in the payment of wages; that is, employees with wage payments in January and March but not February of a given year were assumed to have a stable (without breaks) employment relationship with the firm in that period.

In addition to payroll taxes, the tax dataset includes only the age and gender of the employee. One potentially significant concern is that we do not observe the occupation of the employee. Previous studies have shown especially the mobility and experience of managers to be important (Mion and Opromolla 2014). We have proxied the group of managers and top specialists (professionals) using employees whose wages belong to the top 20 per cent or top 10 per cent (the first one is used in the reported estimations) of the wage distribution in a given year and 3-digit NACE industry. If there are no such employees in a firm, then we define the employee with the highest wage as the manager. Naturally, income differs considerably from occupation to occupation and managers are typically at the top of the ranking of broad occupational groups (e.g. as defined by 1-digit ISCO codes) in terms of wages.[3]

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[3] This classification will result in some errors as some non-managers are likely to earn more than some managers. However, in the Estonian data such an approximation should result in a relatively low error rate given the relatively high wage inequality and high relative returns to managerial occupations (as compared to countries like Sweden with much more compressed wage distribution). For example, in 2010 according to the structure of earnings survey

The calculations of the previous MNE experience were conducted as follows. In order to have MNE experience, the employee need to have worked previously in a subsidiary of a MNE in Estonia. We use both dummies of the presence of MNE-experienced employees and their share in total workforce of the firm. The variables on experience start with 2007, as we have individual-level employment data since 2006. For 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 at firms belonging to the 3rd or 4th quartile of the productivity distribution in the respective 3-digit industry.

In Table 1 we provide some key descriptive statistics of the domestically owned Estonian manufacturing firms. These cover 2007-2011 and are grouped according to the presence of MNE experienced employees, high-wage employees ('managers') with MNE experience, employees with MNE experience from the same 2-digit NACE sector, high wage employees with MNE experience from the same 2-digit NACE sector. Comparison with the two latter categories captures the role 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 is among domestic firms that have managers with prior MNE experience (Column 2). The role of experience is enhanced if its stems from the same 2-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 with GMM, separately for all 2-digit NACE sectors), the deviation of the TFP from the 2-digit industry average or wages. Deviation of TFP from industry average is used in order to account for industry specific differences and not to confuse these with the potential role of experience.[4]

Further, in Figure 1 and 2 the differences in the distribution of TFP are depicted. These figures show the kernel density of the log of the TFP in the groups of firms that have or have not employees or high-wage employees with working experience at MNEs. Figure 1 and 2 show

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in Estonia, the ratio of the 90th to the 10th wage percentile was 4.1 versus 3.7 in the old EU members (EU15). Concerning occupations, while in Estonia managers (ISCO category 1) earned 3.1 times more than the lowest paid occupational group, in the UK (which does not have a low level of wage inequality) just 2.4 times more and in Ireland 1.9 times more (based on Eurostat data). Therefore, in the case of Estonia, wages differ relatively more across occupations, and that should provide some support to our wage-based proxy for occupation.

[4] Further descriptive statistics: the average age of the firms in our estimation sample is 1.7 years, reflecting the high entry-exit dynamics at level of individual firms. The average firm size is 14 employees. The relatively high average share of managers (0.502) in the estimation sample is due to the many micro firms – recall that in each firm at least one employee with the highest wage was defined to be manager.

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that there is TFP-premium for firms with MNE-experienced employees and managers. The difference is reflected in the mean of the distribution, but also in most of other quantiles of the distribution.[5]

**Table 1.** Descriptive statistics by group: domestic firms that have and that do not have MNE experienced employees

Variable	Without experience	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	9.694	9.81	9.718	9.833
Labour productivity (value added per employee, EUR)	15,239	20,386	22,391	20,770	22,810
Share of employees with experience from MNEs	0.277	0.453	0.477	0.472	0.502
Share of managers at firm	0.572	0.36	0.385	0.344	0.374
Firm size	1.252	2.907	3.113	3.424	3.536
Number of employees	5.987	45.173	56.696	76.347	85.744
Real wage (EUR per year)	6407	9648	10489	9931	10711
Cash to total assets	0.242	0.154	0.147	0.137	0.129
TFP deviation from 2-digit industry mean	-0.248	0.036	0.144	0.124	0.31
Exporting firm (dummy)	0.138	0.488	0.545	0.617	0.666
Export value (EUR)	8988438	64770204	82910480	1.07E+08	1.27E+08
New 5-digit product added (dummy)	0.08	0.061	0.06	0.05	0.048
New 8-digit added product (dummy)	0.071	0.047	0.045	0.043	0.04
New market entry (dummy)	0.011	0.034	0.035	0.049	0.05

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

One key channel of effects of experience on productivity can be internationalization 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 1 per cent level). The average number of export markets is again the lowest among firms that do not have high-wage

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[5] The Kolmogorov-Smirnov test confirms that the distributions of two groups of firms are statistically significantly different at 1 per cent level in both Figure 1 and 2.

employees with MNE experience, and the highest in firms having managers or top specialists with MNE experience.
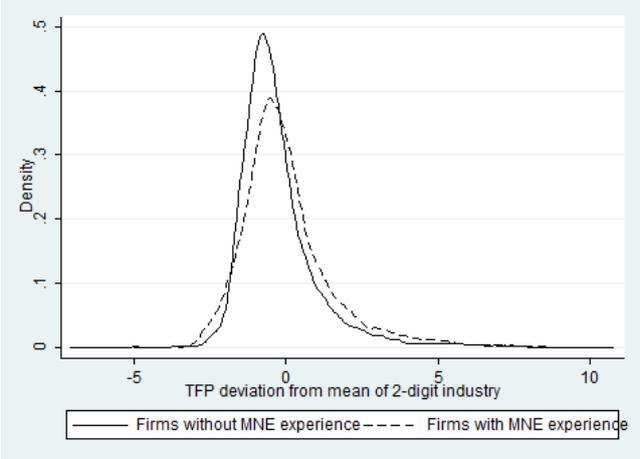
Figure 1. TFP distributions, firms with and without employees with MNE experience. Period: 2007-2011, manufacturing industry.
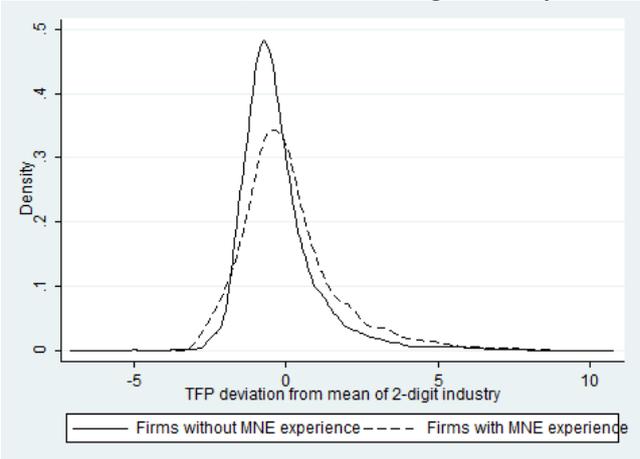
Figure 2. TFP distributions, firms with and without managers with MNE experience. Period: 2007-2011, manufacturing industry.

However, the share of firms adding new export products to its product portfolio are 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

MNE experience and productivity

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

As a first step we estimate the firm level TFP, based on firm level panel data from 2006-2011 assuming different production function in each 2-digit industry within manufacturing. Log of TFP is estimated as a residual from the industry j specific production function that has log of value added as dependent variable (lnY_{it}) and includes log of physical capital (lnK_{it}) and log of number of employees (lnL_{it}) as inputs:

$$lnTFP_{ijt} = lnY_{ijt} - \alpha_j lnK_{ijt} - \beta_j lnL_{ijt} , \tag{1}$$

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

As the next step, we estimate the relationship between 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 IV specification:

$$\pi_{it} = \beta_1 MNE \exp erience_{it} + \beta_2 X_{it} + \lambda_t + \tau_i + \varepsilon_{1it} \tag{2}$$

In Equation 2, our main variable of interest is *MNE* exp*erience*$_{ijt}$, 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 the dummy variable of 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 vector of explanatory variables in the TFP specification of Equation (2) consists of firm size (log of employment) and size squared, firm age (years) and age squared, export dummy at firm level exp$orter_{it}$, 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 of the firm). Dummies for different years λ_t and firm fixed effects τ_i are also included in the model. The last term, ε_{1it}, is an error term, which is 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 2SLS. We check the robustness of the FE results and try to account for endogeneity of MNE experience by application of instrumental variables. To endeavour to identify the effects of prior MNE experience we use as an instrument in 2SLS the share of employees that have moved to the firm because of the closure of their previous employer (i.e. an exogenous reason for labour mobility). This variable is calculated at firm level. The reasoning behind using firm closure for identifying returns to experience stems from Dustmann and Meghir (2005). They argue that firm exit can be seen as an exogenous event because the following mobility of workers is not directly due to their performance in their previous workplace. Therefore, an increase in the supply of high-wage employees with MNE experience due to firm closure could be considered an exogenous labour supply for a given firm.

MNE experience and wages

In addition to investigating the productivity effect and premium of MNE experience, our second research topic concerns the wage premium of MNE-experienced employees and managers, and correlation between the presence of MNE-experienced high wage employees and incumbent employees' wage level. This last relationship is similar to the one estimated in Poole (2013) and describes whether there is potential for wage-spillovers through labour mobility from MNEs.

Wage premium of MNE-experienced employees above others at the recipient firm would be an evidence suggesting that local firms value experience from MNEs and we could expect positive (spillover) effects on the firm. From Table 1 we observe that there is unconditional large difference between wages at the Estonian manufacturing firms that have employees with MNE experience and that do not have. However, this may simply reflect multitude of other factors

correlated with firm performance. Investigation of the conditional wage premium for MNE-experienced employees and employees at firms managed by MNE-experienced managers is performed based on standard Mincerian type wage equation, estimated at employee level, with a log of real monthly wage lnW_{kt} in January of each year (as we analyzed mobility from January to January)year as the dependent variable and a set of individual and firm level characteristics included among controls. The corresponding wage equation is as follows:

$$lnW_{ikt} = \alpha_1 Individual\_MNEexperience_{ikt} + \alpha_2 Firm\_MNEexperience_{kt} +$$

$$\alpha_3 Age_{it} + \alpha_4 Age_{it}^2 + \alpha_5 R_{it} + \alpha_6 Z_{kt} + \lambda_t + v_i + \varepsilon_{2ikt}, \tag{3}$$

where i denotes individual, t year and k firm; $Individual\_MNEexperience_{ikt}$ is a dummy variable denoting whether the individual herself has the experience of working at MNE (either indicating experience of all employees or separately for managers/high-wage specialists); $Firm\_MNEexperience_{kt}$ is a variable denoting the share of employees at the firm that have prior working 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.

MNE experience and exporting

The relationship between MNE-experience of employees and firm productivity or individual level wages has been estimated in some recent papers (incl. Poole 2013, Balsvik 2011). We add to their analysis by investigating the channel of these effects on performance through export activities of the firm. Here, the 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, dummy for adding new export products, dummy for adding new export markets. We endeavour to check the robustness of the results and to account to an extent for the endogeneity of MNE experience by application of instrumental variables.

The general model of exporting is as follows:

$$exporter_{it}^* = \delta_0 + \delta_1 MNE\,experience_{it} + \delta_2 H_{it} + \lambda_t + \gamma_{indt} + \varepsilon_{3it} \tag{4}$$

In Equation 4, subscript i denotes firm, t year and ind 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 foreign market if the latent variable is above c ($exp_{it}^* > c$), while c is a constant threshold level. The latent variable reflects the decision criterion, whether to engage in export activities, considering the related costs and expected returns.

The main 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 about 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 enables to cover sunk costs of export entry is firm's prior productivity (Melitz 2003), The vector of explanatory variables consists of firm size (log of employment), firm age (years), a dummy indicating 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_{indt} 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 in the case of prior productivity, as implied by heterogeneous producer models from trade theory.

We use standard probit and IV probit models to estimate the role of MNE experience in export entry, or in adding products or new markets by the existing exporters, as in Equation 4. To investigate the effects on 'breadth' of exporting, we estimate a version of the model in Equation 4, using the instrumental variable approach (two stage least squares, 2SLS) with firm-level fixed effects included. In this case the dependent variable is the number of export markets or products of the firm. The explanatory variables are the same as before.

5. Results

The following Tables 2-5 describe the relationship between the presence of MNE experienced employees or high-wage employees at the firm and firm's TFP or labour productivity. Table 2 estimates a version of Equation 2 with MNE experience measured with 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 a MNE. The specifications in Table 2 include firm fixed effects, to account for other time invariant firm specific drivers of productivity.

We find 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 presence, then there is indeed a significant correlation with both higher labour productivity and TFP at the recipient firm. The conditional TFP premium of having MNE experienced high-wage employees is about 6-7 per cent higher 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 lower ranked employees (compare estimates in columns 1 and 2 or 3 and 4 in Table 2).

The control variables show mostly the expected results. Exporters among domestic owned firms have significantly higher productivity. Higher cash to assets ratio, share of intangible assets, share of high-wage employees among the workforce are correlated with higher productivity of the firm. 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.

In Table 3 we show specifications with a different MNE experience proxy than the dummy variable in Table 2, i.e. the share of employees or high-wage employees that have MNE experience in total workforce of the firm. This variable takes values between 0 and 1. Firstly, this 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 others has additional effects. Secondly, using this variable instead of a dummy enables us in next tables to apply the 2SLS/IV models, in order to try to address the endogeneity of labour mobility.

From the parameter estimates of our key explanatory variables in Tables 2 and 3 we observe that there are additional gains of 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 managers' and other high wage employees' experience is more important than that of lower ranked employees.

An obvious extension of the analysis is to investigate whether the effects of 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 2-digit NACE manufacturing sector. Indeed, the magnitude of the sector-specific experience effect is in Table 4 of IV results about 2-3 times higher compared to the more 'general' MNE experience. 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 matters a lot in sourcing in external competences through hiring. This result is in accordance also 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 mobility of export-experienced managers on exporting by the recipient firm of this movement of workforce. This is also in accordance with the standard idea of importance of absorptive capacity (Cohen and Levinthal 1990, Lane and Lubatkin 1998) of the recipient firm in benefitting from spillovers. The learning from and integration of externally sourced knowledge can function better in a relatively similar context, as it is easier for the firm to "recognize the value of new, external knowledge, assimilate it and apply it to commercial ends" (Cohen and Levinthal, 1990).

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 closed firms, an arguably exogenous source of workforce from the viewpoint of the hiring firm. The endogeneity problem can reflect here firstly the reverse causality, as more successful firms with high productivity are more likely to attract for MNE-experienced managers and employees (who can command a wage premium for their experience). Secondly, there might be also other time varying factors that affect both productivity and mobility of employees to the firm; accounting for firm fixed effects is unlikely to fully solve 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. 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.[6]

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[6] Balsvik (2011) additionally reports trying the GMM approach to account for endogeneity of MNE experience. The system GMM estimator uses lags of inputs and 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.

Table 4 shows the first and second stage of 2SLS model used in our productivity analysis. The model includes also firm fixed effects. The instrumental variable, share of employees that moved to their current employer because of exit of their prior firms, has clear positive and statistically significant correlation with the key endogenous variable in the model, hiring of employees with MNE experience. The variation in this variable is unlikely itself to be caused by firm performance. The instrument appears also to be not a weak one, the F-statistic of the instrument and the general F-statistic of 1st stage are sufficiently high, above the Stock-Yogo critical values and above 10 in all cases. The Hausman test between our OLS with FE and 2 SLS specification suggests that we should reject the H0 of exogeneity of MNE experience indicator. A further extension of this analysis will include estimation of sys-GMM specification to check the robustness of our findings based on internal instruments. This is omitted yet in this draft version of the paper.

We observe from Table 4 that that there is a positive relationship between share of MNE experienced employees or high-wage employees and firm's TFP (columns 1 and 2), even after our attempt to account for 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 interpretation of the IV findings. The magnitude of estimates of effects is the following: a 10 percentage point increase in the share of employees from MNEs is associated with 10 per cent higher TFP of the domestic owned firm. The estimated effect is significantly larger in the case of mobility of high-wage employees. Here, a 10 percentage point increase in their share in workforce of the domestic firm would increase TFP of the recipient firm by 24 per cent.

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 about the labour mobility into the recipient firm into 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. This way we can try to disentangle whether there is any additional remaining MNE-related effect left, once we account for labour mobility form firms with high productivity and trade orientation. 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 correlation between hiring MNE experienced employees and higher firm performance. This result is robust also to the IV-based estimation, thus may be likely to point also to the effects of mobility on performance.

However, these effects seem to appear due to 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 transfer of trade related knowledge.

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

Dependent variable:	(1) log of TFP	(2) log of TFP	(3) log of labour productivity	(4) 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.

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)
Exporting firm (dummy)	0.163 (0.031)***	0.164 (0.031)***	0.166 (0.040)***	0.167 (0.040)***
Firm size	-0.902 (0.042)***	-0.904 (0.042)***	-0.924 (0.054)***	-0.930 (0.054)***
Firm size squared	0.085 (0.011)***	0.085 (0.011)***	0.085 (0.014)***	0.085 (0.014)***
Age	-0.126 (0.186)	-0.129 (0.186)	0.304 (0.259)	0.301 (0.260)
Age squared	0.136 (0.100)	0.137 (0.100)	-0.088 (0.144)	-0.089 (0.144)
Share of managers at firm	0.101 (0.039)***	0.097 (0.039)**	0.169 (0.049)***	0.155 (0.049)***
Cash to total assets	0.624 (0.056)***	0.623 (0.056)***	0.714 (0.072)***	0.714 (0.072)***
Ratio of intangible fixed assets to fixed assets	0.022 (0.069)	0.021 (0.069)	0.028 (0.072)	0.025 (0.073)
Constant	2.194 (14.31)*** (0.153)***	2.196 (13.51)*** (0.163)***	2.444 (10.88)*** (0.225)***	2.483 (11.07)*** (0.224)***
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.

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 3)	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.

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

	(1)	(2)	(3)	(4)
	Dependent variable: Labour productivity	Dependent variable: TFP	Dependent variable: Labour productivity	Dependent variable: TFP
Share of managers and high-wage employees with experience from MNEs			-0.095	0.023
			(0.060)	(0.122)
New managers and high-wage employees s from foreign firms (dummy)	0.026	0.031		
	(0.017)	(0.035)		
New managers from firms in the 4th quartile of productivity (dummy)	0.026	0.047		
	(0.016)*	(0.031)		
New managers from firms in the 3rd quartile of productivity (dummy)	0.038	0.009		
	(0.016)**	(0.031)		
New managers from exporting firms (dummy)	0.044	0.055		
	(0.016)***	(0.032)*		
Share of managers and high-wage employees with experience from firms in the 3rd quartile of productivity			0.023	-0.203
			(0.046)	(0.092)**
Share of managers and high-wage employees with experience from firms in the 4th quartile of productivity			0.050	0.099
			(0.048)	(0.095)
Share of managers with external export experience			0.080	0.223
			(0.046)*	(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.

MNE experience and wage premium <u>(NOTE: unfinished section)</u>

Further evidence in accordance with potential for spillovers is presented here below in Table 6. Here we show some 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 into the analysis, the period covered is again 2007-2011 and we concentrate on employees in the manufacturing sector. Positive wage premium of individuals with career history from MNEs indicates that recipient firms value this superior experience. If the individual's own MNE working experience is positively associated with his wages at the recipient firm, then arguably there could be reason to expect also knowledge spillovers as well. Of course, these estimates,

despite taking into account the individual fixed effects, do not necessarily show the causal effects.

Table 6. 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 own experience with 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 6. The Mincerian wage equation includes other individual and firm level controls: incl. gender dummy and its interaction terms with other variables, individual's age, age squared, region of employment, firm size and size squared and 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 (2-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 4 per cent higher wages (see column 2 in Table 6). 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 mobility of employees with MNE experience can affect incumbent employees' wages at the domestic firm (a little studied channel of FDI spillovers). Also in Estonia's dataset similar correlations are present, as evident from Column 4 in Table 6. There 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 10 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.

As a side issue, we note that the correlation between the share of MNE-experienced employees and wages of incumbent employees, as in column 4 of Table 6, is different for men and women. For men the 10 percentage point increase in the share of MNE experienced high-wage colleagues in total workforce of the firm is associated with 4 per cent higher wages, for women with only 2.5 per cent higher wages. Interestingly, here the higher presence of MNE experience at the firm is contributing a bit to the rise in male-female wage gap within the firm. [7]

MNE experience and exporting (NOTE: incomplete section)
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 firm's prior productivity in enabling to cover the sunk costs of exporting. Columns 1 and 2 in Table 7 show the relationship of presence of MNE experienced employees (column 1) or managers and other high wage employees (column 2) with propensity of exporting by domestic owned firms. We observe from the table that firm size, age, share of high-wage (skilled) employees at the firm and productivity are all positively correlated with exporting. Productivity has a strong correlation, as always, with export status.

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[7] Bøler et al. (2015) is one of the rather limited number of papers that discusses the effects of globalization on within-firm gender wage gap, and finds after accounting for unobserved worker heterogeneity that exporters in Norway tend to have higher gender wage gap than non-exporters. In our case, we observe that larger inflow of MNE experienced managers and employees is associated with a higher gender wage gap at the firm. So, there is no evidence suggesting the transfer of more egalitarian human resource practices from MNEs (largely Swedish and Finnish firms in Estonia) to Estonia's domestic firms.

Table 7. Share of MNE experienced 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	0.657	2.666	1.082
	(0.014)***	(0.014)***	(0.336)***	(0.120)***
Age	0.123	0.122	-2.431	0.234
	(0.023)***	(0.023)***	(1.019)**	(0.364)
Cash to total assets	-0.506	-0.505	-0.260	-0.375
	(0.064)***	(0.064)***	(1.014)	(0.362)
Share of managers at firm	0.103	0.099	0.725	0.222
	(0.052)**	(0.052)*	(0.611)	(0.218)
Log labour productivity (t-1)	0.401	0.401	0.253	0.107
	(0.019)***	(0.019)***	(0.242)	(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	2.237	0.111
		(0.134)**	(1.457)	(0.520)
Constant	-6.342	-6.442	-1.251	-1.564
	(0.211)***	(0.223)***	(3.395)	(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.

The marginal effects at sample means of our two key explanatory variables are positive. In the case of IV-probit model the increase in the share of MNE experienced employees by 10 percentage points is associated with 5 per cent higher propensity of the firm to export. The effect of similar increase in export-experienced managers is almost twice as high, again pointing out the importance of managerial experience in shaping export decisions and success. Our further investigation into the propensity to export to different destination regions points to the

finding that among existing exporters, the MNE experience is correlated with entry to nearby foreign markets and not to the more distant ones (note that the tables of these results are still omitted from this 1st draft). The corresponding marginal effect of variable 'share of MNE-experienced employees' in a probit model with a similar specification as these in Table 7, but with a dummy variable for exporting to nearby foreign destination markets as dependent variable, is 0.128 (significant at 1 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 similar significant correlation of MNE experience with entry to CIS countries, rest of the EU or rest of the world destinations. So, it appears, based on these findings and columns 1 and 2 in Table 7 that MNE experience is important for export status in general and in the early internationalisation stages of the firm, when firms expand to their 1st 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 with an IV model. The parametre estimate of 'share of managers and high-wage employees' from the 2SLS estimation (with firm exit based instrumental variable) of the otherwise similar model as in column (3) in Table is not significant (2.683, with a standard error of 6.927).

6. Conclusions

In general, the results in this paper are consistent with the view that mobility of high-wage and other employees from MNEs to domestic firms is a significant channel of spillovers of FDI in its host economy and that the effects of this mobility may function through 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 of their new domestically owned employer. These results are also robust to application of an IV-model with firm exit based instrumental variable (firm exit as arguably an exogenous source of availability of potential new employees for a firm). As expected, the estimated contribution of managers' and top specialists' experience is larger than that of all employees with MNE experience. MNE experience has a stronger correlation with

increase 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 of firm's other employees as well, suggesting potential wage spillovers.

Importantly, our results suggest that the estimated relationship between the MNE experience and firm performance in Estonia's manufacturing sector may reflect largely the mobility of export-experienced employees and thus the transferred knowledge may concern especially trade related information. The mobility of MNE-experienced managers and other employees is positively associated with the propensity of export entry by domestic firms. We find that the role of MNE (trade) experience for firm level exporting appears to be stronger: i) in the 1st stages of the internationalisation of a firm and ii) in the case of export entry to the nearby markets (that are also key sources of FDI in Estonia). We find no evidence suggesting strong additional contribution of MNE experience on subsequent introduction of new export products or firm's later expansion in terms of number of markets.

References

Aitken, B., Hanson, G. H. and Harrison, A. E. (1997). Spillovers, foreign investment, and export behavior. *Journal of International Economics*, 43(1–2), 103-132.

Albornoz, F., Calvo Pardo, H., Corcos, G. and Ornelas, E. (2012). Sequential exporting. *Journal of International Economics*, 88(1), 17–31.

Balsvik, R. (2011). Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing, *Review of Economics and Statistics*, 93(1), 285–297.

Bernard, A. and Jensen, J. B. (2004). Why do firms export. *The Review of Economics and Statistics*, 86(2), 561–569.

Blomström, M. and Kokko, A. (1998). Multinational Corporations and Spillovers. *Journal of Economic Surveys*, 12 (3), 247-277.

Bøler, E.A., Javorcik, B. and Ulltveit-Moe K-H. (2015). "Globalization: A Woman's Best Friend? Exporters and the Gender Wage Gap", CEPR Discussion Paper 10475.

Cohen, W. M. and Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.

Dasgupta, K. (2012). Learning and knowledge diffusion in a global economy. *Journal of International Economics*, 87, 323-336.

Dunning John H. (1981). International Production and the Multinational Enterprise

(London: Allen and Unwin, 1981).

Dustmann, C. and Meghir, C. (2005). Wages, experience and seniority. *Review of Economic Studies*, 72(1), 77–108.

Ejsing, A-K., Kaiser, U., Kongsted, H. C., and Laursen, K. (2013). The Role of University Scientist Mobility for Industrial Innovation. Zürich: IZA. (IZA Discussion Paper; No. 7470).

Fosfuri, A., Motta, M. and Ronde, T. (2001). Foreign Direct Investment and Spillovers through Workers' Mobility. *Journal of International Economics*, 53, 205–222.

Glass, A. and Saggi, K. (1998). International Technology Transfer and the Technology Gap. *Journal of Development Economics*, 55, 369–398.

Görg, H. and D. Greenaway (2004), Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment? *World Bank Research Observer*, 19, 2, 171–97.

Görg, H. and Strobl, E. (2005). Spillovers from Foreign Firms through Workers Mobility: An Empirical Investigation. *Scandinavian Journal of Economics*, 107(4), 693–709.

Hiller, S. (2013). Does Immigrant Employment Matter for Exports? Evidence from Denmark. *Review of World Economics*, 149(2), 369–394.

Jaffe, A.B., Trajtenberg, M. and Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *Quarterly Journal of Economics*, 108(3), 577–598.

Javorcik, B. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages. *American Economic Review*, 94(3), 605–627.

Keller, W. (2004). International technology diffusion. *Journal of Economic Literature* 3, 752–782.

Lane, P. J. and Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, 19(5), 461-477.

Maliranta, M., Mohnen P. and Rouvinen P. (2009). Is Inter-Firm Labor Mobility a Channel of Knowledge Spillovers? Evidence from a Linked Employer-Employee Panel. *Industrial and Corporate Change*, 18, 1161-1191.

Markusen, J. R. (1995). The Boundaries of Multinational Enterprises and the Theory of International Trade. *Journal of Economic Perspectives*, 9, 169–189.

Markusen, J. R. and Trofimenko, N. (2009). Teaching locals new tricks: Foreign experts as a channel of knowledge transfers. *Journal of Development Economics*, 88(1), 120–131.

Martins, P. S. (2005). Inter-Firm Employee Mobility, Displacement, and Foreign Direct Investment Spillovers, Queen Mary: University of London (mimeo), 52 p.

Masso, J. and Vahter, P. (2014). Exporting and Productivity: The Effects of Multi-market and Multi-product Export Entry. *Scottish Journal of Political Economy*, 62(4), 325–350.

Masso, J.; Rõigas, K.; Vahter, P. (2015). Foreign Market Experience, Learning by Hiring and Firm Export Performance. *Review of World Economics/Weltwirtschaftsarchiv*, 151(4), 659-686.

Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, *Econometrica*, 71(6), 1695–1725.

Mion, G. and Opromolla, L. D. (2014). Managers' Mobility, Trade Status, and Wages, *Journal of International Economics*, 94(1), 85-101.

Molina, D. and Muendler, M. (2013). Preparing to Export. NBER Working Papers 18962, National Bureau of Economic Research, Inc.

Pesola, H. (2011). Labour Mobility and Returns to Experience in Foreign Firms. *Scandinavian Journal of Economics*, 113(3), 637–664.

Poole, J. P. (2013). Knowledge Transfers from Multinational to Domestic Firms: Evidence from Worker Mobility. *Review of Economics and Statistics*, 95(2), 393–406.

Sala, D. and Yalcin, E. (2014). Export Experience of Managers and the Internationalization of Firms. *The World Economy*.

Stock, J., J. Wright and Yogo, M. (2002). A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments. *Journal of Business and Economic Statistics*, 20(4), 518–529.

Stoyanov, A. and Zubanov, N. (2012). Productivity Spillovers across Firms through Worker Mobility. *American Economic Journal: Applied Economics*, 4(2), 168–198.

Syverson C. (2011). What determines productivity? *Journal of Economic Literature*, 49(2): 326–365.