

# THE CONTRIBUTION OF MULTINATIONAL ENTERPRISES TO LABOR PRODUCTIVITY: THE CASE OF ISRAEL

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## OECD PRODUCTIVITY WORKING PAPERS

February 2018 **No. 11**



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Series: [OECD Productivity Working Paper Series](#)

ISSN 2413-9424

Please cite this paper as:

Slobodnitsky, T., L. Drucker and A. Geva, "The Contribution of Multinational Enterprises to Labor Productivity: The Case of Israel ", OECD Productivity Working Papers, 2018-11, OECD Publishing, Paris.

This paper has been authorised for publication by Luiz de Mello, Director, Policy Studies Branch.

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## ABSTRACT/RESUMÉ

### **The Contribution of Multinational Enterprises to Labor Productivity: The Case of Israel**

We examine the impact of multinational enterprises (MNEs) on labor productivity in two ways: 1) creating high-paying jobs; and 2) improving employees' human capital. Our analysis is based on a unique database that matches workers to companies, for the 450 largest companies in Israel, during the years 2005-2010. The main challenge in identifying the impact of MNEs on labor productivity stems from their tendency to cherry-pick workers. This study offers an innovative solution to this selection bias by constructing a sample of employees who have all worked at MNEs at some point. We find that, on average, current employment at a MNE is associated with a wage premium of 8.3%. Moreover, past work experience at a MNE has a positive 1.6% impact on wages. Although economically significant, the results are relatively modest compared to those reported in the literature. In addition, we differentiate MNEs according to size and brand recognition, and find that the impact on wages is larger for leading MNEs. These results were found to be stable with respect to changes in the sample and in specifications.

*JEL Classification codes:* F23, J24

*Keywords:* Multinational enterprises, labor productivity, human capital

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### **La contribution des entreprises multinationales à la productivité du travail :**

#### **Étude de cas d'Israël**

Nous examinons l'influence exercée par les entreprises multinationales sur la productivité du travail, qui passe par : 1) la création d'emplois à la rémunération élevée, et 2) l'amélioration du capital humain des salariés. Notre analyse s'appuie sur une base de données unique en son genre, qui fait correspondre les travailleurs et les entreprises parmi les 450 plus importantes d'Israël sur la période 2005-2010. La principale difficulté pour analyser l'impact des multinationales sur la productivité du travail tient au fait que ces entreprises tendent à sélectionner soigneusement leurs collaborateurs. Cette étude propose une solution inédite pour remédier à ce biais de sélection, en constituant un échantillon de salariés ayant tous travaillé, à un moment ou à un autre, dans une multinationale. Selon nos estimations, les salariés qui travaillent actuellement dans une multinationale en Israël bénéficient d'un avantage salarial de 8.3 % en moyenne. Par ailleurs, le fait d'avoir travaillé par le passé dans une multinationale a un effet positif de l'ordre de 1.6 % sur le salaire. Même s'ils sont significatifs sur le plan économique, ces résultats sont relativement modestes par rapport à ceux publiés dans les travaux antérieurs. Par ailleurs, nous établissons une distinction entre les multinationales selon leur taille et la notoriété de leur marque : il en ressort que l'impact sur les salaires est plus marqué pour les multinationales occupant une position de leader sur leur marché. Ces résultats restent stables indépendamment des changements opérés dans l'échantillon et dans les spécifications.

*Classification JEL :* F23, J24

*Mots clés :* Entreprises multinationales, Productivité du travail, Capital humain.

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# **THE CONTRIBUTION OF MULTINATIONAL ENTERPRISES TO LABOR PRODUCTIVITY: THE CASE OF ISRAEL<sup>1</sup>**

By Tatiana Slobodnitsky, Lev Drucker and Assaf Geva

## **1. Introduction**

1. In 2013, Israel considered granting Intel a subsidy to encourage this multinational enterprise (MNE) to upgrade its local facility. The government focused on three possible benefits for the Israeli economy: creating high-paying jobs, raising aggregate profits and increasing local procurement. The conclusion was that the upgrade would have a large positive impact – both directly, by raising the labour productivity and wages of Intel employees, and indirectly, by raising the productivity of local companies. Potential positive externalities were also identified, although not quantified. Consequently, the government granted Intel a USD 300 million subsidy, contingent on the company investing approximately USD 6 billion in upgrading its Israeli plant. This decision-making process, which resulted in significant public expenditure, underscored the importance of more rigorously examining the economic impacts of MNEs on host markets, and especially of analyzing externalities that are harder to quantify.

2. MNEs have gained importance in recent decades. Since the 1980s, most developed economies have eased or removed regulatory barriers to foreign investments, prioritizing the positive effect on accumulation of capital, employment, productivity and exports over concerns about foreign entities controlling means of production. This trend is supported by evidence of growing productivity gaps between MNEs and domestic firms (OECD, 2015).

3. Several studies have attempted to examine the relationship between MNEs and domestic labour productivity. These studies have been constrained by the fact that MNEs tend to recruit high-quality workers and pay higher wages than the sector average. For policy-making, it is crucial to identify the reason for this wage premium. If the sole reason is cherry-picking, then MNEs do not necessarily contribute to higher labor productivity. Yet, if these higher wages are also due to increased productivity and superior employee training, then MNEs generate positive externalities that increase productivity. If this is the case, potential policy intervention could be worthwhile.

4. This study examines whether multinational enterprises contribute to labor productivity in two ways: (1) creating high-paid jobs; and (2) improving human capital through accumulated work

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1. Corresponding authors are: Tatiana Slobodnitsky and Lev Drucker from the Israeli Ministry of Finance, Chief Economist Division and Assaf Geva from the OECD Economics Department. We are grateful for comments and suggestions made by colleagues in the Ministry of Finance, seminar participants in the OECD and the Bank of Israel, and to Jonathan Timmis from the OECD Directorate for Science, Technology and Innovation for his valuable comments. We would like to thank Oren Epstein, Tslil Aloni, Sharon Band, Ido Sofer, Yuval Fisher, Shahar Rubin, Katya Mazirov and Naama Feldman, from the Israeli Ministry of Finance, for excellent research assistance. We are also very grateful to Michelle Bubis for her help editing the paper and to Sarah Michelson, from the OECD Economics Department, for providing editorial support.

experience at MNEs. Our empirical analysis is based on Israeli Tax Authority data that match workers to employers over time. We estimate the effect of current employment at a MNE and of past experience at a MNE on average monthly wages.<sup>2</sup> Due to the competitive nature of the sectors where MNEs operate and the flexibility of the Israeli labour market, these effects on employees' wages indicate positive productivity effects.

5. Selection bias is addressed by constructing a sample of employees who have all worked at a MNE at some point. That is to say, all workers in our estimation sample passed MNEs' meticulous screening process at some point. Despite lacking information on worker education, we tightly control for unobservable worker properties by combining a fixed-sample population with individual fixed effects.

6. The study provides two significant innovations with respect to the literature. First, we control for cherry-picking bias by creating a sample that includes only persons who were employed by MNE at some point during the sample period. Without this control, we show that the estimated impact of MNEs on labour productivity could be upwardly biased, as indeed is frequently the case in the literature. Second, we differentiate the impact of leading MNEs from that of smaller, lesser-known ones, by using brand recognition, as identified by Google Trends.<sup>3</sup>

7. The results show that current employment at MNE is associated with a wage premium of 8.3% (compared to the wages at a similar position in a domestic company). Also, prior work experience at a MNE increases labor productivity by 1.6%. Among leading MNEs (as defined by brand recognition and number of employees), the estimated impact is significantly larger: a wage premium of 17.5% for current employment and an increase of 12.6% for past work experience. These results are robust to changes in the sample and in estimation specifications.

8. In the following, Section 2 presents a review of existing literature; Section 3 presents the data and descriptive statistics; Section 4 explains the estimation methodology used; Section 5 presents and discusses empirical results; Section 6 presents a sensitivity analysis; and Section 7 provides a summary.

## **2. Literature Review**

9. Several studies have found evidence for a multinational wage premium – i.e., employees of multinational enterprises (MNEs) tend to receive higher wages than similar employees in local companies. The survey of the literature by Heyman et al. (2007) found that this wage premium ranges from 10% to 70% depending on host country characteristics. For instance, Balsvik (2011) reported a 20% wage premium for workers with MNE-experience<sup>4</sup>, Aitken et al. (1996) estimate was 30%, and Hakkala & Sembenelli (2012) presented an estimate of 41.4%.

10. Several theoretical explanations have been suggested for the existence of wage premium associated with MNE employment. One is that MNEs' productivity is higher, which is reflected in higher wages. The supposed productivity advantage of MNEs over domestic companies could result from superior technology and better organizational and administrative capacities, or from their ability to create global value chains that lead to specialization and exploitation of relative advantages in different countries (Criscuolo et al., 2016). Alternately, multinational firms may pay higher wages to retain skilled workers and prevent knowledge spillovers to local firms (Fosfuri et al., 2001). The multinational wage premium may also be a form of compensation for relatively low employment stability (Bernard & Sjöholm, 2003).

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2. We implicitly assume that in a competitive environment, wages are directly linked to productivity.

3. A Google Trends score reflects the popularity of an online search item.

4. However, after introducing worker fixed effects the estimated contribution is only 0.3%.

Another possible reason is differences in working hours. Van Klaveren et al. (2014) find that MNE employees work marginally longer hours than employees of domestic companies (half an hour more per working week, on average). Finally, the wage premium could result from cherry-picking high-quality workers, as reported by (Balsvik, 2011). The wage premium appears to vary according to the type of MNE presence in the host country. For example, although Hijzen et al. (2013) find a positive wage effect for local firms purchased by foreign firms in emerging economies, other studies have found that transferring a local company to foreign ownership did not result in higher wages (Heyman et al., 2007; Girma & Gorg, 2007).

11. Most empirical literature on the impact of MNEs and foreign direct investments focuses on estimating externalities. The results vary in size, direction and even in the very existence of externalities (Smeets, 2008; Balsvik, 2011; Pesola, 2011; Gorg & Greenway, 2004; Blomstrom et al., 2001). There seems to be great difficulty in estimating the consequences of knowledge spillovers; as Krugman (1991) noted, “[k]nowledge flows are invisible; they leave no paper trail by which they may be measured and tracked.”

12. One form of knowledge spillover occurs when workers move between companies. It is reasonable to assume that in many cases MNEs provide local employees with better knowledge, expertise and professional experience than the average domestic firm. Therefore, the presence of MNEs can lead to enhanced productivity in local firms through worker turnover. The flow of knowledge to local firms can include, for example, organizational and technological knowledge (Balsvik, 2011; Kokko & Blomstrom, 1998). There is also evidence that MNEs invest more resources in training workers than domestic firms (Filer et al., 1995; World Bank, 1997). This form of spillover may be particularly effective due to the tacit nature of industrial information (Arrow, 1994). It is important to note that worker mobility can also have a negative effect on local firms, as MNEs attract high-quality workers by paying higher wages (Sinani & Meyer, 2004).

13. In the empirical literature, two main approaches have been employed to measure externalities through worker mobility (Smeets, 2008). The first estimates the effect of worker mobility on the output of domestic firms as follows:

$$(1) \quad Y_{ijt} = \beta_0 + \beta_1 F_{it}^M + \beta_2 X_{it} + \beta_3 Z_{jt} + \varepsilon_{ijt}$$

where  $Y_{ijt}$  is an index of firms  $i$  output in sector  $j$  at time  $t$ ,  $F_{it}^M$  represents an index for the presence of employees with past work experience at a MNE,  $X_{it}$  is a vector of firm properties (e.g., investment in R&D and in human capital),  $Z_{jt}$  is a vector of variables at sector level, and  $\beta_1$  measures the treatment effect, which is expected to be positive if knowledge spillovers occur via worker mobility.

14. Hakkala and Sembenelli (2012) conducted a comprehensive study on a Finnish plant-level panel dataset and found that worker mobility from multinational to domestic firms had a significant positive impact on the output of the latter. Employees who were recruited from multinational firms contributed, on average, 41.4% more to the productivity than their colleagues. Similar conclusions were obtained from studies conducted on Chinese (Hale & Long, 2006) and Colombian (Markusen & Trofimenko, 2009) data.

15. The second approach to measuring externalities is to examine the impact on wages as follows:

$$(2) \quad w_{ijt} = \beta_0 + \beta_1 S_{it}^M + \beta_2 X_{it} + \beta_3 Z_{jt} + \varepsilon_{ijt}$$

where  $w_{ijt}$  represents the log wage of individual  $i$  at firm  $j$  at time  $t$ , and  $S^M$  represents past work experience at a multinational firm. The assumption is that the wages reflect the employee's marginal output and therefore labour productivity.

16. Evidence from Finland (Pesola, 2011) and Portugal (Martins, 2005) suggests a positive impact of MNE work experience on wages in a domestic company. Poole (2008) used administrative data from Brazil and found that in domestic firms a higher presence of workers previously employed at a MNE increases wages. While most papers mentioned above used worker mobility between local firms and MNEs to estimate the wage impacts of employment by MNEs, Hijzen et al. (2013) examined foreign acquisitions of local firms and found a positive impact on the wages of incumbent workers in emerging economies and insignificant effects for rich countries such as the United Kingdom and Germany.

17. Overall, most studies have found that MNEs have a significant positive impact on wages or on productivity. However, due to data limitations, these studies did not control for worker quality (at least, not for unobservable characteristics). Therefore, the positive impact that was found could result from selection bias due to MNEs cherry-picking workers. Some of the studies included variables that relate to workers' observable characteristics, such as their level of education. However, such partial attempts cannot capture idiosyncratic personal qualities, especially those that affect screening processes at MNEs (such as ambition and social skills), which are unavailable to researchers. Some of these studies also include individual fixed effects to control for unobserved characteristics, but, as we show later on, this offers only a partial solution for the cherry-picking bias.

### 3. Data and Descriptive Statistics

#### 3.1 Data sources

18. This empirical analysis relies on a database created using administrative records of the Israel Tax Authority. The main data sources were:

1. Company statements for 2005-2010
2. Employee data for 2005-2010

19. The database was constructed in three stages (see Fig. 1): defining a sample of companies, establishing a fixed sample of relevant workers, and defining an estimation sample.

20. First, the largest 450 companies that were active in Israel in the last year of the sample (2010) were identified, based on two criteria: revenue and number of employees.<sup>5</sup> These companies were then classified into four categories: domestic, multinational, acquired by a foreign entity (including a merger of an Israeli company with a foreign one), or a franchise of a foreign company.

21. Israel's Central Bureau of Statistics defines a multinational enterprise as a company whose share of foreign ownership exceeds 50%. However, as mentioned above, several studies have found that in domestic firms that transitioned to foreign ownership, employee wages did not increase (Heyman et al., 2007; Girma & Gorg, 2007). Therefore, as this study aims to quantify the contribution of multinational enterprises to labour productivity, MNEs are defined here according to country of origin (i.e., the country in which the company was founded). The brand recognition of each MNE was calculated using Google

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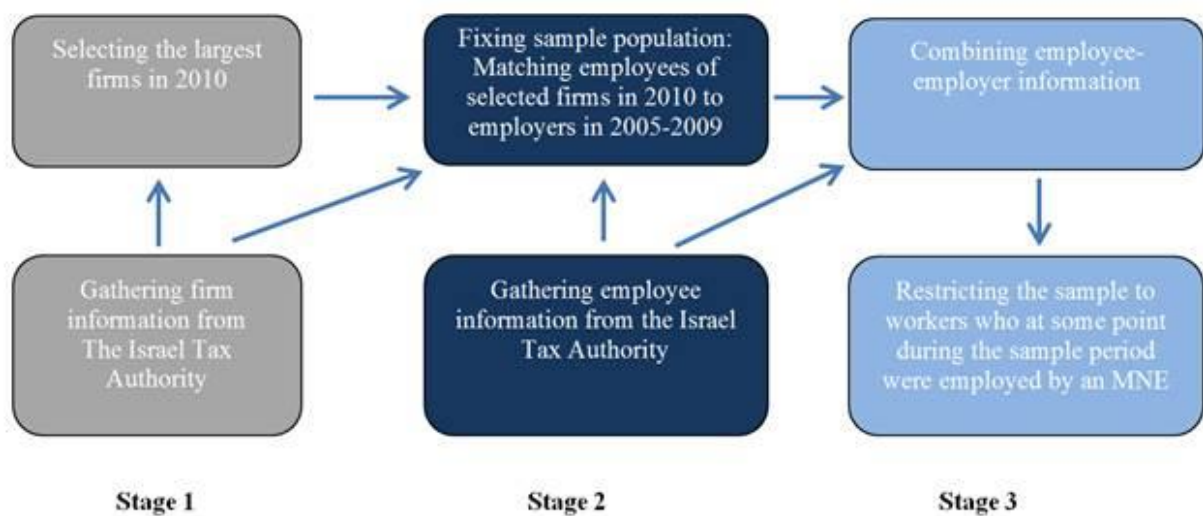
5. Large companies were chosen due to computational restrictions, and also in order to ensure relevance to current policy discussions.



Trends.<sup>6</sup> This enabled us to control for the effect of brand in the estimation of MNEs impact on productivity, as brand recognition serves as a proxy for market prominence as well as for technological leadership.

22. We then identified all employees in the selected companies in the last year of the sample (2010) and obtained their employment history for the entire sample period (2005-2010). This included properties of past employers (such as size of firm and sales), wages throughout the sample period and personal details (year of birth, marital status, number of children). It should be noted that only individuals who were employed both at the beginning (2005) and end (2010) of the sample were included<sup>7</sup>. In addition, employees who worked part time (as reported to the Tax Authority) or less than six months in a given year were also excluded.

**Figure 1. Process of database construction**



Source: Data source: Israel Tax Authority

23. Finally, the sample was constrained to include only workers who were employed by a MNE at some point in the sample period. As explained in the next sub-section, this helps to control for MNEs' cherry-picking. The following table lists the key variables used in the empirical analysis and describes the construction of each one.

6. A Google Trends score represents the popularity of a certain online search item by year and country. The popularity of different items is measured relative to the most popular item. Since it was technically impossible to compare all firms at once, in order to choose the most popular firm in the sample we conducted a "tournament", comparing nine companies at a time and then comparing the "winners" of every batch. At the end of the process, Microsoft's score was the highest, and the index value for other multinational firms in the sample was calculated relative to Microsoft.

7. That is, the sample excludes those that were not listed in the tax records in the years 2005 and 2010. The rationale is to restrict entry and exit of individuals to and from the labour market during the sample period (such as retirement).

**Table 1. List of variables**

Variable	Description
<u>Employee characteristics:</u>	
MNE experience	A dummy variable that equals 1 if the company in which the individual worked in the previous two years was a MNE, regardless of whether the worker currently works for a MNE.
Monthly wages	The natural logarithm of the individual's average monthly wages in his main work place. The average was calculated as yearly wages divided by months of employment. If the number of months worked was less than six, the observation was omitted.
Number of children	The individual's number of children.
Immigrated to Israel (as of 1989 <sup>8</sup> )	A dummy variable that equals 1 if the individual immigrated to Israel after 1989.
Mover	A dummy variable that equals 1 if the individual switched jobs in the past year.
<u>Company characteristics:</u>	
Multinational enterprise (MNE)	A dummy variable that equals 1 if the company is a MNE.
Hi-tech company	A dummy variable that equals 1 if the company belongs to the hi-tech sector. According to the Central Bureau of Statistics, hi-tech sectors are 63, 62, 61, 26, or 21 (classification 2011).
Large (by number of workers)	A dummy variable that equals 1 if the natural logarithm of the number of employees in the firm in the previous year is greater than 8.7 (i.e., 6000 workers). The critical value was set as one standard deviation above average <sup>9</sup> .
Located in Israel's periphery	A dummy variable that equals 1 if the company is located in Israel's geographical periphery (north, south).
Average wages	The natural logarithm of the average monthly wages at firm level in the relevant year. The average monthly wages at the firm were calculated as a weighted average, with weights determined by the number of months worked.
Google Trends brand recognition	An index constructed for multinational enterprises only, for every year in the sample. The index represents the firm's relative popularity (compared to the most popular firm) in Google searches according to Google Trends in a particular year.
Leading company	A firm that is both large and has a high Google Trends rating.
Number of workers in previous year	The natural logarithm of the number of workers in the firm in the previous year.

### 3.2 Data description

24. The database consists of matched information on employees and employers among the 450 largest companies in Israel over a period of six consecutive years from 2005 through 2010. After adjustments (as described in Figure 1), it includes about 1.8 million worker-level observations. Table 2 reports the distribution of employees in the sample according to employment history at MNEs and at

8. The year 1989 was chosen as the cut-off point as the 1990s saw mass immigration to Israel from the former USSR.

9. If the worker was employed at his present workplace less than 6 months in a given year, the observation attributed to this year refers to the previous year (and hence to the previous employer).

domestic companies. For example, the upper left cell refers to the number of workers that were employed only at MNEs during the sample period. The upper right cell represents the number of workers who moved from a MNE to a domestic firm at least once during the sample period.

25. The majority of workers in the database were employed exclusively in domestic firms. However, most of the econometric analysis was conducted on an estimation sample (sub-sample) that includes 88 710 observations of employees who all worked in a multinational firm at some point during the sample period.<sup>10</sup>

**Table 2. Types of employees in the full database according to employer classification**

Final Initial	<i>MNE</i>	Domestic firm
<i>MNE</i>	17 109	1825
Domestic firm	2627	330 212

Note: The table lists unique cases (every worker is counted once, and *not* for every year) and categorizes observations according to the first change of workplace type (domestic or MNE).

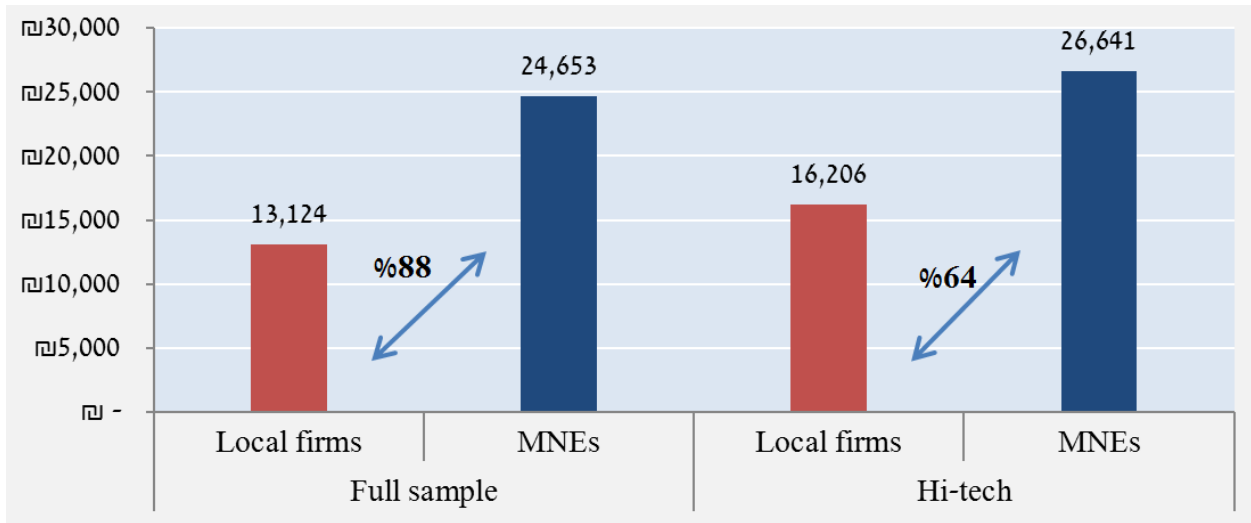
26. This estimation sample differs significantly from the full database and includes workers who were employed by a MNE at some point in the sample period. For example, it is characterized by a sizable presence of hi-tech companies. Thus, about 80% of the workers in the estimation sample were employed in hi-tech companies<sup>11</sup>, compared to about 9% of the workers in the full sample (see Figure 3). Comparing wages in the estimation sample and in the full sample (see Figure 2) provides two important insights. First, wages in local firms are higher in the estimation sample than in the full sample. This also holds true when examining the hi-tech sector – a clear indication that MNEs tend to choose higher-quality workers. Therefore, it is important to control for the unobserved qualities of workers in order to examine the contribution of MNEs to labour productivity. Second, there are sizable wage differences between MNEs and local firms in the estimation sample, even when focusing on hi-tech sectors only (see Fig. 2b). As explained above, this wage difference is not affected by MNE cherry-picking, as the estimation sample includes only workers who were employed by a MNE at some time during the sample period. Therefore, the wage difference indicates a significant wage premium for MNE employees. We examine the second statement in more depth in the following sections.

10. The variable of MNE experience indicates two years of past work experience at an MNE. Therefore, the first year in the sample, 2005, was omitted from the estimation and from the descriptive statistics presented in this chapter.

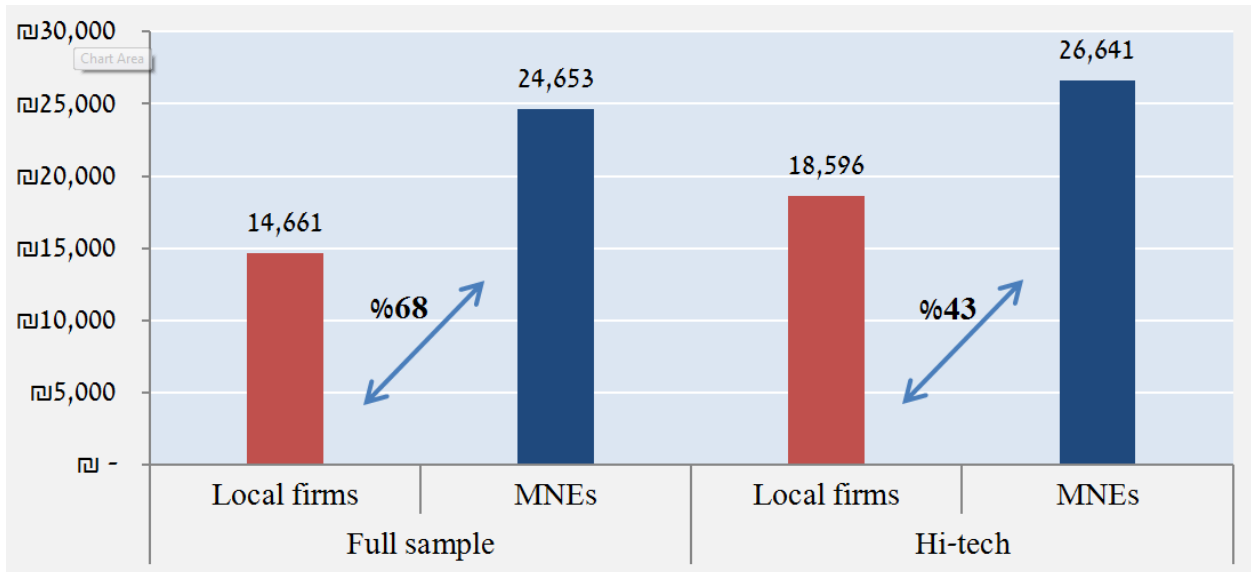
11. Due to large share of workers in the estimation sample in the hi-tech sector, the data availability restricts estimation of impact of different industries. In this paper we include a dummy variable for all hi-tech industries combined.

**Figure 2a. Average monthly wages, full sample**

(in NIS, differences in %)



**Figure 2b. Average monthly wages, estimation sample**



27. Tables 3a and 3b present descriptive statistics of a wider range of variables for the estimation sample and the full sample, respectively. MNEs employ the majority of workers in the estimation sample (90%), whereas their employment share in the full sample is only 5.5%. Also, the average firm size, as measured by size of workforce, is smaller in the estimation sample (although still relatively large, with some 3000 workers on average). Approximately 22% of the workers in the estimation sample immigrated to Israel in the last two decades, a high percentage compared to the full sample. It is important to note that, as the database is based on large companies in terms of workforce size or revenue, the estimation sample includes a limited number of firms (3) that had less than 20 workers (but a large revenue). However, omitting the observations of these firms' employees does not change the estimation results (see section 6

for further discussion). Finally, the MNE brand recognition indices fluctuate quite broadly, suggesting large differences between the various MNEs operating in Israel.

**Table 3a. Descriptive statistics – estimation sample**

<i>Variables</i>	Average	Standard deviation	Maximum	Minimum	Number of observations
MNE work experience	0.867	0.340	1	0	88,710
Number of children	0.457	0.918	10	0	88,710
Immigrant (as of 1989)	0.218	0.413	1	0	88,710
Firm is part of hi-tech sector	0.793	0.405	1	0	88,710
Firm located in periphery	0.051	0.220	1	0	88,710
Indicator for significant decrease in firm workforce	0.041	0.198	1	0	88,710
Percentage of decrease in firm workforce	0.017	0.083	2	0	88,710
Average wages in firm	23,491	9,126	34,727 <sup>a</sup>	9,993 <sup>a</sup>	88,705
MNE	0.905	0.294	1	0	88,710
Monthly wages	23,844	19,999	42,504 <sup>a</sup>	7,135 <sup>a</sup>	81,080
Leading firm (by size of workforce )	0.156	0.363	1	0	88,710
Brand recognition according to Google Trends	17.558	16.271	61	0	80,256
Leading firm (by brand recognition)	0.256	0.437	1	0	88,710
Switched from MNE to local firm	0.016	0.127	1	0	88,710
Number of employees in previous year	3,617	5,847	49,137	3 <sup>12</sup>	88,710

Note: The table was calculated for the years 2006-2010. The maximum and minimum values for the variables representing the firm's average and monthly wages are those in the top and bottom deciles of these variables' distribution, respectively. The estimation sample comprises individuals who worked at a MNE at some point during the sample period.

**Table 3b. Descriptive statistics –full sample**

<i>Variables</i>	Average	Standard deviation	Maximum	Minimum	Number of observations
MNE work experience	0.053	0.224	1	0	1,456,085
Number of children	0.419	0.959	16	0	1,456,085
Immigrant (as of 1989)	0.164	0.370	1	0	1,456,085
Firm is part of hi-tech sector	0.135	0.341	1	0	1,456,085
Firm located in periphery	0.117	0.322	1	0	1,456,085
Indicator for significant negative change in number of workers at the firm	0.027	0.163	1	0	1,456,085

12. The sample includes a negligible number of workers of "holding companies" which were included due to high revenues.

Percentage of negative change in the number of workers at the firm	0.011	0.060	10	0	1,456,085
Average wages in the firm	13,679	6,860	22,922 <sup>a</sup>	7,401 <sup>a</sup>	1,448,794
MNE	0.055	0.228	1	0	1,456,085
Monthly wages	13,873	14,134	26,269 <sup>a</sup>	4,585 <sup>a</sup>	1,363,237
Leading company (by number of workers )	0.515	0.500	1	0	1,456,085
Brand recognition according to Google Trends	17.558	16.271	61	0	80,256
Leading company (by brand recognition)	0.016	0.124	1	0	1,456,085
Switched from MNE to local firm	0.001	0.032	1	0	1,456,085
Number of workers in previous year	2,758	4,914	47,760	2	1,456,085

Note: The table was calculated for years 2006-2010. The maximum and minimum values for the variables representing the firm's average and monthly wages are those of the top and bottom deciles of these variables' distribution, respectively.

#### 4. Empirical Methodology

28. Our methodology corrects for two important biases that exist in the literature regarding estimation of MNEs impact on labour productivity. First, as MNEs tend to hire higher-quality personnel (cherry-picking), this may create an upward bias. We control for this phenomenon by creating a sample that consists entirely of workers who worked at a MNE at some point from 2005 to 2010.<sup>13</sup>

29. Table 4 describes the initial database, the estimation sample and the treatment and control groups analyzed in the paper. As previously mentioned, the initial database included approximately 1.8 million observations. The grey area represents observations excluded from the estimation (workers that were never employed by a MNE). The estimation sample (which includes 88 710 observations) can be divided into control and treatment groups. The first treatment refers to current employment at a MNE. This treatment measures the wage premium which indicates productivity improvements stemming from employment in a MNE. The relevant control group includes workers that are currently not employment at a MNE, but were employed previously or will be employed in the future in one of the MNE companies. The second treatment is defined as prior work experience in a MNE (for at least two years), representing a potential productivity enhancing externality. As in previous case, the relevant treatment group includes those with no MNE experience (worked for less than two years at MNE or has been employed in MNE later in the sample). The upper left cell in the inner table represents the combined treatment (workers that are currently employed in a MNE firm and have prior MNE experience). The introduction of an interaction variable which combines both treatments allows us to effectively estimate the impact of treatment on several possible reference groups (e.g. workers at MNEs who have been recently hired, veteran workers at MNEs etc.).

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13. And hence comply with the strict screening criteria. Some studies have tried to address this issue by including observed worker characteristics, such as age, seniority and education. However, unobserved characteristics have a significant impact on wages (see, for example, Nyhus & Pons, 2005).

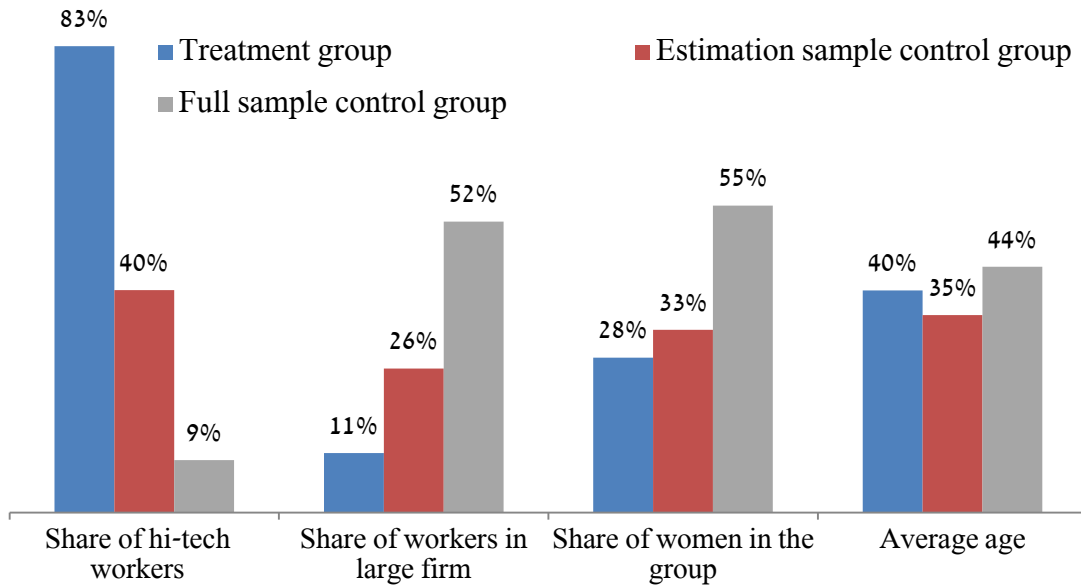
**Table 4. Initial database, estimation sample, treatment and control groups 2006-2010 (Obs)**

Estimation sample		
MNE experience Current work in MNE	Treatment 2	Control 2
Treatment 1	<i>Combined treatment</i> 74,968	5,288
Control 1	1,948	6,506

Employees that were never employed in MNE - excluded from the estimation sample (1,695,232 observations)

Figure 3 compares the characteristics of the first treatment group in this study, i.e., current workers at a MNE, with the two alternative control groups. The comparison allows us to examine whether the construction of estimation sample, which was intended to address the selection problem, helps to create a control group with characteristics similar to the treatment group. As shown in the figure, the control group in the estimation sample is more similar to the treatment group, compared to the control group in the full sample (which includes the grey area in Table 4). For example, the share of hi-tech workers in the estimation sample control group (40%) is closer to the percentage of hi-tech workers in the treatment group (83%) compared to the share in the control group of the full sample (9%). Other examined characteristics, such as the share of female workers and the share of employees in large firms, also show that the sub-sample control group is much more similar to the treatment group – again, compared to the control group in the full sample. Regarding age, the treatment group ranges between the average age of the control group in the full sample and that of the control group in the estimation sample.

**Figure 3. Comparison between treatment 1 and possible control groups**



30. Although some studies have included variables to control for worker quality, the researchers did not have all the relevant information (Nyhus & Pons (2005) provide evidence for the impact of unobserved characteristics on wages). Other papers have tried to resolve the issue by including fixed effects at worker level (e.g. Balsvik, 2011; Pesola, 2011). However, fixed-effect models relate only to the impact of the unobserved characteristics on the intercept and assume that the impact of the treatment on wages is fixed. These unobserved characteristics may also affect the estimate of the impact of a MNE employment on wages and thus bias it. This would be the case, for example, if MNEs are interested in a different set of skills compared to the average local company. As mentioned before, MNEs in Israel operate mainly in the hi-tech sector and thus probably do require a specific skill-set from their workers. While fixed effects at worker level have also been included in this study, we later show that relying only on fixed effects and on observed variables is not enough to avoid the potential bias created by cherry-picking.

31. Second, previous studies did not control for brand recognition, which may affect MNEs impact. Omitting this variable may bias the estimation, as past work experience at a well-known MNE may yield higher returns. We correct this by controlling for MNE brand or recognition in the domestic labor market.

32. In most specifications, we also include a worker-level variable indicating the number of children. Other than a direct income effect, this variable may also help to identify the worker's social sector, since Israeli Arab and Ultra-Orthodox households are generally characterized by a large number of children per household and lower incomes.

33. The estimation is performed using panel LS regression that includes various individual- and firm-level control variables as well as fixed effects for workers and years.

$$(3) \quad w_{it} = \beta_0 + \beta_1 S_{it}^M + \beta_2 mn_{it} + X_{it}'\beta_3 + Z_{it}'\beta_4 + \varepsilon_{it}$$

where  $w_{it}$  represents the log of an average monthly wage of individual  $i$  in period  $t$ ,  $S_{it}^M$  reflects whether individual  $i$  has work experience in the recent 2 years in a multinational firm at period  $t$ , and  $mn_{it}$  indicates whether the company in which individual  $i$  worked during period  $t$  is a MNE.  $X$  represents a vector of



variables at the worker level, and  $Z$  represents a vector of variables at firm level, in the company in which individual  $i$  worked during period  $t$ .

34. In this specification, coefficient  $\beta_2$  represents the direct impact of MNEs on wages (MNE wage premium) and coefficient  $\beta_1$  represents the indirect effect on wages due to an increase in workers' human capital as a result of working at a MNE. In both cases, the estimation examines whether coefficients  $\beta_1$  and  $\beta_2$  attain a positive value that is significantly different from 0, which could suggest that employment at a MNE has a positive effect on labor productivity.

## 5. Results

35. Table 5 presents the main results of our estimations: the calculated value of MNEs' impact on labour productivity. These estimated impacts also take into account the relevant interaction variables, are calculated using only statistically significant coefficients and use the sample averages of the variables.

36. Specification (1) presents a naïve estimation that includes only the treatment variables: identifying the company as a MNE and past work experience in MNEs. This does not include other control variables for company or worker characteristics, nor a control for worker level fixed effects. The results show that employment in MNEs has a positive and significant impact on wages, raising them by 21.0%, and that MNE past work experience has an additional impact of 4.2%. However, these estimates likely suffer from an upward bias due to omission of relevant variables. When worker fixed effects are added in specification (2), the estimated MNE wage premium decreases to 17.9%, while past experience working at a MNE does not have a significant additional impact.

37. However, this estimate is also likely to be biased due to the absence of worker and company-level variables. For example, wages are higher in high-tech than in other industries in Israel, and there are many more MNEs than domestic companies in this sector. Therefore, not controlling for sector is likely to have an upward bias on the wage premium estimate. When control variables are added in specification (3) to (5), the estimated MNE wage premium drops to 7.1%. At the same time, the estimated impact of past work experience at a MNE becomes positive and statistically significant.<sup>14</sup> These results are relatively modest compared to those reported in the literature, which show positive and significant impacts for current employment and past work experience at a MNE (e.g. Balsvik, 2011; Pesola, 2011).<sup>15</sup>

38. In specification (6), which will be referred below as the benchmark, we add a control for brand recognition, according to Google Trends ranking of the employer for each year. This addition increases MNE wage premium as well as contribution of MNE past work experience. Results show that the estimated wage premium of an "average" MNE is 8.3%, while MNE past work experience increases wages by 1.6%<sup>16</sup>.

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14. In the shift between specifications (4) and (5), 5256 observations were omitted due to lack of data availability. To ensure consistent comparison, we performed an estimation of specification (4) based on the sample used for the estimation of specifications (5) and (6). The reduction in sample size does not significantly alter the results, yet does somewhat reduce the impact of previous work experience in an MNE from 2.4% to 2.1%. The estimate for the wage premium in a MNE remains the same.

15. Note that these studies define MNEs according to the share of foreign holdings – unlike our definition (see section 3).

16. These estimates were calculated using mean values for the explanatory variables according to the relevant derivative from the estimated equation. For example, the effect of MNE work experience was calculated using coefficients and mean values for all variables including "Worked at MNE in past two years" (rows 2, 4, 6 and 8). Below is an example for treatment (2) in specification (6): "Worked at MNE in past two years" from row 2 is not statistically significant thus its coefficient is equal to 0; "Indicator for employee who

39. Moreover, specification (6) enables us to compare the impact of leading, world-renowned MNEs with that of "average" MNEs. We define a leading MNE as a company ranked at or above the 95th percentile of MNEs' distribution in Google Trends, as well as having a workforce exceeding 6000 people. Estimates suggest a significantly larger impact of leading MNEs: their contribution to the wage premium is estimated at 17.5%, while experience in any MNE in general, increases wages by 12.6%.

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changed workplace \* Worked for the past two years in a MNE” from the row 4 is -0.088, multiplied by the mean of the “Indicator for employee who changed workplace” which is 0.048; “Employed in large company\* Worked for the past two years in a MNE” from the row 6 is 0.110, multiplied by the mean of the “Employed in large company” which is 0.132; “Popularity \* Worked for the past two years in a MNE” from the row 6 is 0.0004 and significant at the level of 16%, multiplied by the mean of the “Popularity” which is 15.476; Sum of the products from 1) to 4) is  $0 - 0.088 * 0.048 + 0.110 * 0.132 + 0.0004 * 15.476 = 0.016$  that is equally to 1.6% in the “work experience” impact estimation.

**Table 5. Impact of MNEs on average monthly wages**

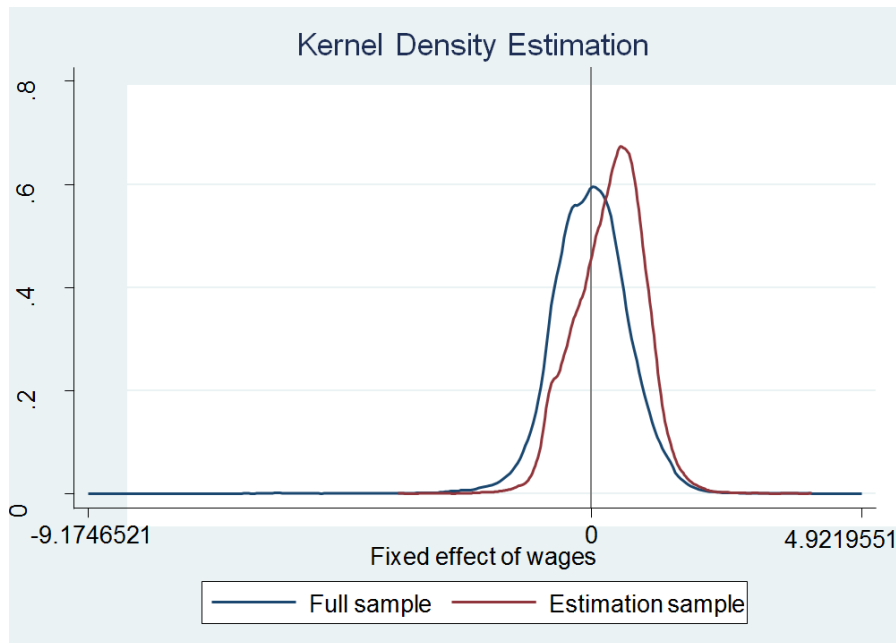
The dependent variable is the log of the gross wage (monthly average) at present workplace in current year

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)	(6)
Employed at MNE in current year	0.210*** (0.015)	0.179*** (0.016)	0.089*** (0.015)	0.074*** (0.015)	0.071*** (0.016)	0.046*** (0.018)
Worked at MNE in past two years	0.042*** (0.007)	0.007 (0.007)	0.005 (0.007)	0.026*** (0.007)	0.008 (0.007)	0.004 (0.008)
Indicator for employee who changed workplace				-0.037*** (0.011)	-0.030*** (0.011)	-0.028*** (0.011)
Indicator for employee who changed workplace * Worked for the past two years in a MNE				-0.068*** (0.017)	-0.084*** (0.017)	-0.088*** (0.017)
Employed in large company					-0.077*** (0.018)	-0.076*** (0.018)
Employed in large company* Worked for the past two years in a MNE					0.105*** (0.018)	0.110*** (0.018)
Firm Popularity (according to Google Trends)						0.002*** (0.000)
Popularity * Worked for the past two years in a MNE						0.000 (0.000)
Number of children			0.011*** (0.001)	0.011*** (0.001)	0.009*** (0.001)	0.009*** (0.001)
Company in hi-tech sector			0.309*** (0.028)	0.298*** (0.028)	0.293*** (0.029)	0.276*** (0.029)
Company located in Israeli periphery			-0.296*** (0.025)	-0.277*** (0.025)	-0.281*** (0.027)	-0.272*** (0.027)
Decrease in company's workforce [in %]			0.026 (0.037)	0.034 (0.037)	-0.035 (0.037)	-0.031 (0.037)
(Decrease in company's workforce [in %]) <sup>2</sup>			0.004 (0.028)	0.007 (0.028)	0.053** (0.027)	0.053** (0.027)
<b><u>Estimated MNE impact on wages</u></b>						
<b>Wage premium</b>	<b>21.0%</b>	<b>17.9%</b>	<b>8.9%</b>	<b>7.5%</b>	<b>7.1%</b>	<b>8.3%</b>
<b>Work experience</b>	<b>4.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.3%</b>	<b>1.0%</b>	<b>1.6%</b>
<i>Overall R<sup>2</sup></i>	0.066	0.055	0.228	0.231	0.234	0.231
<i>N</i>	61,316	61,316	61,316	61,316	58,563	58,563

Comments: All the regressions include period fixed effects; regressions (2)-(6) also include fixed effects at worker level. The dummy variable for a large company receives a value of 1 when the natural logarithm of the number of workers in the past year is greater than 8.7 (about 6,000 workers). The variable for the (negative) change in the firm's workforce refers to the present year if the number of work months was smaller than 6, and to the previous year if the number of work months was greater than 6. Specifications (1) and (2) are "naïve" regressions that include only an indicator of working at an MNE in the current year and in the past two years, respectively. Specification (3) adds personal [worker/individual] and company characteristics. Specifications (4)-(6) add control variables, and particularly the company's brand recognition. Specification (6) is the final specification. The sample includes panel data on who that worked at least once at an MNE during the sampling period, i.e., between 2007 and 2010. The premiums for wages and work experience were calculated according to the regression coefficients and the average values in the sample. Clustered (by individuals) standard errors appear in parentheses. Levels of significance: 10%\*, 5%\*\*  
1%\*\*\*.

## 6. Robustness and further discussion

Figure 4. Distribution of fixed effects in full sample and estimation sample



40. To validate the empirical results presented in the previous section, we performed several robustness tests. First, we examined whether our estimation sample is more appropriate than using other samples. Specification (2) in Table 6 includes only the two treatments (previous work experience at a MNE and currently working at a MNE). As explained before, the results presented at Table 5 are based on a restricted sample that includes only persons with current or previous work experience at a MNE, in order to avoid a possible cherry-picking bias. As explained in section 3, estimating MNE impact based on a full sample, i.e. one that also includes workers which have never been employed by a MNE, would likely produce an upward bias. Specification (3) in Table 6 reports estimation results based on an unrestricted sample. The results reported in specification (2) and specification (3) support the hypothesis of an upward bias when using this unrestricted sample, with an average multinationals' estimated wage premium increasing from 8.3% to 33.7% and 11.4% in specification (2) and (3) respectively. Further evidence of this bias can be found in the distribution of the fixed effects presented in Fig. 4. Comparing the distribution of fixed effects for the full sample and restricted sample estimations reveals clear differences. This indicates a fundamental difference between the samples, supporting our use of the restricted estimation sample. This bias illustrates the inadequacy of using only fixed effects to control for unobserved, time-invariant individual qualities, as is customary in the literature.

41. Specification (4) in Table 6 re-estimates the benchmark specification (specification (6) in Table 5) using an estimation sample that includes only workers who switched workplace during the sampled period. Since a sizable share of workers in the estimation sample did not switch workplace throughout the sampling period, there is a need to verify whether the results are applicable to the estimation sample of workers who changed workplace. The results regarding MNE impact are similar to the benchmark results reported in the study.

42. Table 7 presents another robustness test. In this table, specification (2) is similar to the benchmark results with the addition of combined treatment (both treatments apply) examined in the paper:

current work in a MNE and prior MNE work experience. The estimated combined treatment effect is 3.7% in addition to wage premium of 11.5% and contribution of MNE experience to wages of 1.9%. This may indicate that work experience in MNE has complementarity with continued employment in MNEs and thus, the productivity gain for MNE work experience when working in such companies, is higher. However, an alternative interpretation is that it indicates superior bargaining power for incumbent workers (Cahuc et al., 2006).

**Table 6. Robustness for sample changes**

The dependent variable is the gross Log-wages (monthly average) at the present workplace in the current year

<i>Variables</i>	(1) Benchmark	(2) Sample change naive	(3) Sample change	(4) Moving
Works in a multinational firm	0.046*** (0.018)	0.337*** (0.012)	0.110*** (0.015)	0.071*** (0.020)
Worked for the past two years in a multinational firm	0.004 (0.008)	0.105*** (0.007)	-0.011 (0.008)	-0.015 (0.010)
Indicator for worker who changed workplace	-0.028*** (0.011)		-0.084*** (0.003)	-0.015 (0.012)
Indicator for worker who changed workplace * Worked for the past 2 years in a multinational firm	-0.088*** (0.017)		-0.020 (0.013)	-0.076*** (0.018)
Large firm	-0.076*** (0.018)		-0.008*** (0.002)	-0.084*** (0.018)
Large firm * Worked for the past two years in a multinational firm	0.110*** (0.018)		0.039*** (0.004)	0.108*** (0.022)
Firm's popularity ( according to Google Trends)	0.002*** (0.000)		0.003*** (0.000)	-0.001 (0.001)
Popularity * Worked for the past two years in a multinational firm	0.000 (0.000)		0.001*** (0.000)	0.000 (0.000)
Number of children	0.009*** (0.001)		-0.001*** (0.000)	0.016*** (0.004)
Firm is part of hi-tech sector	0.276*** (0.029)		0.132*** (0.013)	0.310*** (0.030)
Firm is located in the periphery	-0.272*** (0.027)		-0.268*** (0.016)	-0.324*** (0.029)
Percentage of negative change in the firm's workforce	-0.031 (0.037)		-0.037*** (0.011)	0.022 (0.057)
(Percentage of negative change in the firm's workforce) <sup>2</sup>	0.053** (0.027)		0.008*** (0.002)	0.026 (0.083)
Correction for likelihood of changing workplace	✗	✗	✗	✗
Only individuals who changed workplace at least once	✗	✗	✗	✓
Only individuals who worked at a MNE at least 1 year	✓	✗	✗	✓
<b>Average MNE impact</b>				
<b>Wage premium</b>	<b>8.3%</b>	<b>33.7%</b>	<b>11.4%</b>	<b>7.1%</b>
<b>Work experience</b>	<b>1.6%</b>	<b>10.5%</b>	<b>2.0%</b>	<b>0.3%</b>
Overall R <sup>2</sup>	0.231	0.051	0.040	0.258
N	58,563	1043746	992,426	12,129

Notes: The dependent variable is the natural logarithm of the average monthly wages. Specifications (1), (3) and (4) include worker and period fixed effects. The variable for a large firm is an indicator that assumes 1 when the natural logarithm of the number of workers in the past year is greater than 8.7 (about 6000 workers). The variable for the negative percentage change in the firm's workforce refers to the change regarding the present year, if the number of work months was smaller than 6, and to the previous year if the number of work months was greater than 6. Specification (1) is identical to specification (6) in Table 5. Specification (2) is the estimation for the full sample controlled only for 2 factors and includes random effect. Robust standard errors appear in parentheses. Levels of significance: 10%\*, 5%\*\*, 1%\*\*\*.

**Table 7. Robustness to changes in specification**

The dependent variable is the gross Log-wages (monthly average) at the present workplace in the current year		
<i>Variables</i>	(1) Benchmark	(2) Combined treatment
Works in a multinational firm	0.046*** (0.018)	0.038** (0.018)
Worked for the past two years in a multinational firm	0.004 (0.008)	-0.042** (0.020)
Treatment interaction (works in MNE and has previous MNE experience)		0.054*** (0.023)
Indicator for worker who changed workplace	-0.028*** (0.011)	-0.023** (0.011)
Indicator for worker who changed workplace * Worked for the past 2 years in a multinational firm	-0.088*** (0.017)	-0.064*** (0.016)
Large firm	-0.076*** (0.018)	-0.080*** (0.018)
Large firm * Worked for the past two years in a multinational firm	0.110*** (0.018)	0.113*** (0.018)
Firm's popularity ( according to Google Trends)	0.002*** (0.000)	0.002*** (0.000)
Popularity * Worked for the past two years in a multinational firm	0.000 (0.000)	0.000** (0.000)
Number of children	0.009*** (0.001)	0.009*** (0.001)
Firm is part of hi-tech sector	0.276*** (0.029)	0.274*** (0.029)
Firm is located in the periphery	-0.272*** (0.027)	-0.270*** (0.027)
Percentage of negative change in the firm's workforce	-0.031 (0.037)	-0.018 (0.038)
(Percentage of negative change in the firm's workforce) <sup>2</sup>	0.053** (0.027)	0.045* (0.027)
Correction for probability of changing workplace	✗	✗
Only individuals who changed workplace at least once	✗	✗
Only individuals who worked in a multinational firm at least 1 year	✓	✓
<b>Average multinational firm contribution</b>		
Wage premium	<b>8.3%</b>	<b>11.5%</b>
Work experience	<b>1.6%</b>	<b>1.9%</b>
Combined treatment effect	<b>✗</b>	<b>3.7%</b>
Overall R <sup>2</sup>	0.231	0.231
N	58,563	58563

Notes: the dependent variable is the natural logarithm of the average monthly wages. All the regressions include worker and period fixed effects. The variable for a large firm is an indicator that assumes 1 when the natural logarithm of the number of workers in the past year is greater than 8.7 (about 6000 workers). The variable for the negative percentage change in the firm's workforce refers to the change regarding the present year, if the number of work months was smaller than 6 and to the previous year if the number of work months was greater than 6. Specification (1) is identical to specification (6) in Table 5. Robust standard errors appear in parentheses. Levels of significance: 10%\*, 5%\*\* , 1%\*\*\*.

43. The last table in this section presents the effect of changing the definition of a multinational enterprise. So far, we have defined MNEs by country of origin, excluding local firms that were purchased or merged with foreign firms, as well as local franchises of foreign firms. Table 8 presents estimates based on alternative definitions of the treatment group. The results are compared to specification (5) in Table 5, which does not include the variable of brand recognition (Google Trends), as most of the domestic firms have a Hebrew name.<sup>17</sup> Specification (2) in Table 8 shows that if MNEs are defined as local firms

17. Determining the Google Trends score of a company with a Hebrew name requires a search in Hebrew, whose results cannot be compared with a search in English.

purchased or merged with foreign firms, their wage premium amounts to 10.5%, above the benchmark estimate. However, this estimate could be affected by the tendency of foreign companies to purchase the best domestic firms, which are characterized by higher productivity. Specification (3) in Table 8 shows that for local firms operating as franchises of foreign firms the wage premium estimate remains positive, although lower than the benchmark. This suggests that franchises only partially adopt the *modus operandi* of multinational enterprises and therefore are associated with just a partial contribution to productivity compared to foreign based MNEs.

**Table 8. Varying definitions of MNEs**

<i>Variables</i>	(1) Multinational	(2) Purchased/merged	(3) Franchise
Works in a multinational firm	0.071*** (0.016)	0.105*** (0.020)	0.054** (0.023)
Worked for the past two years in a multinational firm	0.008 (0.007)	-0.008 (0.009)	0.028** (0.014)
Indicator for worker who changed firm	-0.030*** (0.011)	-0.062*** (0.012)	-0.092*** (0.014)
Indicator for worker who changed firm * Worked for the past 2 years in a multinational firm	-0.084*** (0.017)	0.008 (0.022)	-0.003 (0.024)
Large firm	-0.077*** (0.018)	-0.063*** (0.015)	0.007 (0.020)
Large firm * Worked for the past two years in a multinational firm	0.105*** (0.018)	0.063*** (0.014)	-0.045 (0.056)
Number of children	0.009*** (0.001)	0.004*** (0.001)	0.002 (0.002)
Firm is part of hi-tech sector	0.293*** (0.029)	0.122*** (0.029)	0.002 (0.039)
Firm is located in the periphery	-0.281*** (0.027)	-0.102*** (0.032)	0.040 (0.069)
Negative change in the firm's workforce	-0.035 (0.037)	-0.012 (0.037)	0.000 (0.061)
Negative change in the firm's workforce) <sup>2</sup>	0.053** (0.027)	0.006 (0.048)	-0.018 (0.030)
<u>Average firm</u>			
<b>Wage premium</b>	<b>7.1%</b>	<b>10.5%</b>	<b>5.4%</b>
<b>Work experience</b>	<b>1.0%</b>	<b>2.4%</b>	<b>2.8%</b>
Overall R <sup>2</sup>	0.234	0.191	0.032
N	58,563	42,789	15,058

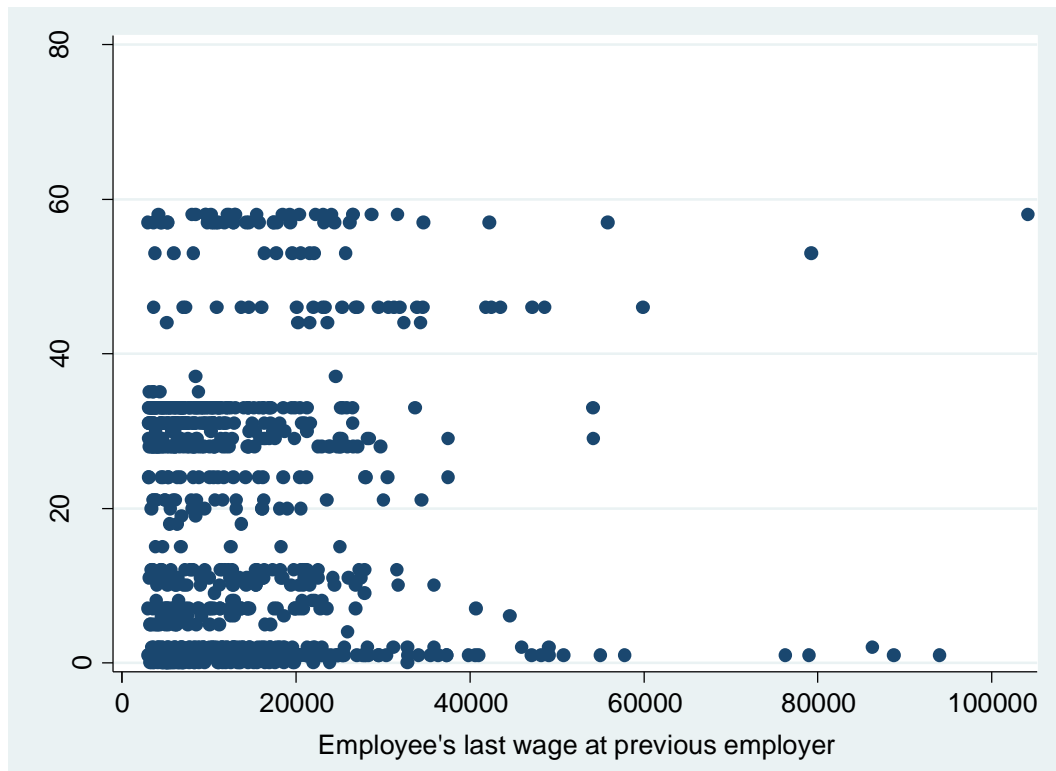
Notes: the dependent variable is the natural logarithm of the monthly wages. All the regressions are regressions include workers and period fixed effects. The variable for a large firm is an indicator that assumes 1 when the natural logarithm of the number of workers in the past year is greater than 8.7 (about 6000 workers). The variable for the negative percentage change in the firm's workforce refers to the change regarding the present year, if the number of work months was smaller than 6, and to the previous year if the number of work months was greater than 6. Specification (1) is identical to specification (5) in Table 5. The wage premiums and work experience were calculated according to the regression coefficients in the average values in the sample. Robust standard errors appear in parentheses. Levels of significance: 10%\*, 5%\*\* , 1%\*\*\*.

44. A last issue that can affect the robustness of the results is possible reverse selection. As MNEs select most capable workers, workers can also select firms. As suggested by Roth and Sotomayor (1992), stable matching is a result of ordering of preferences for both workers and firms. It is possible that workers choose future employers according to the signal associated with the firms. According the Gale–Shapley algorithm, all the workers will seek employment with the best firms, but only the higher-quality ones will



be accepted by those firms. We use "Google Trends" score as the relevant signal about the quality of the firm that is available to the workers. To test for the existence of this reverse selection, we compare worker's last salary in the domestic firm to the Google Trends score on current MNE employer. If there is such selection, there should be positive correlation between workers' salaries in the last workplace and the Google trends score of the current employer. As Fig. 5 shows, the correlation between the two variables is very weak (under 0.1). This suggests that there is no evidence for a selection bias related to the qualities of workers recruited by leading or average MNEs.

**Figure 5. Last salary at previous employer compared to Google Trends score of current MNE firm, for workers who switched workplace, a year after the move**



45. This extensive robustness analysis supports the validity of the empirical results reported in this study. Using alternative specifications and different estimation samples confirms the main findings regarding the impact of multinational enterprises on labor productivity. We also found that using a full sample, as done in other studies, results in an upward bias for this impact.

## 7. Summary

46. This study was motivated by the significant rise in prominence of multinational enterprises (MNEs), along with the increasing removal of regulatory barriers to foreign ownership in Israel. Many countries are actively pursuing the entry of foreign firms, based on the belief that their presence will positively affect productivity, employment and exports. The paper examined two ways in which MNEs can influence labor productivity: (1) creating high-productivity jobs; and (2) improving employees' human capital. The empirical analysis uses a unique dataset comprising about 1.8 million observations at worker level, based on administrative data that allowed matching workers and companies. On average, the wages of MNE employees are significantly higher than in domestic firms, even within the same industries. Yet

this does not necessarily imply causality, as the wage gap can be the result of MNEs' tendency to recruit the best personnel (cherry-picking) and to pay high wages, accordingly.

47. To correct for this potential bias, we created an estimation sample of workers who were employed at a MNE at some point during the sample period, i.e. had successfully passed the meticulous screening process of these companies. Not properly controlling for this bias may cause an upward bias of the estimate regarding MNE impact. We believe that our treatment is more convincing than different measures previously implemented in the literature.

48. The estimation was performed as a panel regression including fixed effects for workers and years. We found that experience working at a MNE has a positive contribution to future productivity, by 1.6%. Moreover, employment in a MNE is associated with a wage premium of 8.3%. Although economically significant these results are relatively modest compared to those reported in the literature. We also found that the rise in labor productivity is significantly higher when the MNE in question is large and renowned: past experience working in a leading MNE raises wages by 12.6% while currently working at such a MNE raises wages by 17.5%. These results are largely robust to changes in sample and in the methods of estimation.

49. The contribution of this study is in correcting for two biases that recur in the literature. First, we correct for the tendency of MNEs to cherry-pick workers by sampling only within that group. Second, we use brand recognition (measured by Google Trends) to distinguish the impact of leading MNEs from that of smaller, lesser-known ones.

50. It should be noted that MNEs could have additional impacts that are not examined as part of this study. For example, MNEs may have positive impact on productivity through vertical linkages or demonstration effects, as described in Section 1. In addition, some studies have found positive relationship between work experience in MNEs and entrepreneurship, as evident in establishing start-ups. MNEs may also have a negative effect on productivity, due for example to emigration of skilled workers to the parent company.

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