Ghada Tayem*

Does Foreign Ownership Increase Firms' Productivity? Evidence from Firms Listed on Amman Stock Exchange

Abstract: The purpose of this paper is to investigate the impact of foreign ownership on the production efficiency of firms listed on the Amman Stock Exchange using hand-collected, firm-level data. Arab countries have been performing poorly in attracting foreign direct investment (FDI) inflows in comparison to other developing countries, and hence, they may be missing out on growth and development opportunities. Jordan, however, has been one of the most successful Arab countries in attracting FDI inflows relative to its economic size. Therefore, Jordan offers an ideal setting to examine the benefits of foreign ownership in the region. However, this study fails to find evidence supporting the notion that foreign ownership enhances production efficiency. This finding calls into question the economic viability of investment incentives designed to attract foreign investors.

Keywords: foreign ownership, knowledge transfer, FDI motivation, total factor productivity, labour productivity, MENA region

JEL Classification: C42, F21, F23, G32

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1 Introduction

Jordan, as many other Arab countries, adopted structural adjustment programmes (SAPs) under the guidance of the World Bank with the expectations that liberalizing, restructuring and opening the Jordanian economy will bring enormous gains, including updating and improving the country's industrial base and technologies. The implementation of the SAPs accelerated in the late 1990s

¹ For an overview of the history and impact of IMF and World Bank intervention programmes in Jordan, see Harrigan, El-Said, and Wang (2006) and Harrigan and El-Said (2010).

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and prompted the adoption of friendly foreign-ownership legislative environment and the privatization of some of the largest state-owned enterprises.² As a result, foreign ownership of firms listed on the Amman Stock Exchange (ASE) has increased substantially. This paper attempts to evaluate the theoretically anticipated gains of foreign ownership in terms of improving the efficiency of firms' productivity. However, using a production function framework, this study fails to find evidence on improvements of the production efficiency for firms with foreign ownership. Multinational enterprises (MNEs) acquired well-established Jordanian companies, and hence, once the estimation method applied in this study controls for the unobservable firm fixed effects and selection bias, productivity gains from foreign ownership becomes statistically insignificant. This result indicates that multinationals acquired Jordanian firms to exploit these companies' advantages rather than their own technological advantages which resulted in little or no knowledge transfer from the multinationals to their Jordanian affiliates.

Foreign investment can have an important impact on domestic firms' productivity growth and technologies. Multinationals arguably possess a technological advantage (Hymer 1976) and hence their presences in a host market can contribute to knowledge transfer and diffusion in that market directly or through spillover effects. MNEs directly transfer knowledge to their affiliates by providing them with advanced machinery and equipment, by implementing updated production processes and by introducing new products (Konings 2001). In addition, implementing new technologies requires labour training which in turn improves labour skills and enhances efficiency (Greenaway, Upward, and Wright 2002). Also, MNEs bring new and efficient styles of management, marketing, governance and accounting (Fu 2008; Konings 2001). Hence, domestic firms can acquire new knowledge, and consequently improve their productivity, by altering their ownership structures to include foreign investors.

However, the extent and nature of benefits arising from the transfer of knowledge from MNEs to their affiliates depend on a number of important factors, including the host economy's local conditions and the quality and motivation of the foreign investment. The extant literature suggests that positive

² For example, Jordan enacted the "Investment Promotion Law of 1995"; streamlined the procedures of registering new companies under the "Corporate Law of 1997"; enacted property right protection laws such as the "Patent Law of 1999" and "Trade Names Law of 2003"; and enacted competition laws such as the "Unfair Competition and Trade Secrets of 2000" and "Competition Law of 2004". For a review of legislative changes in Jordan see Kanaan and Kardoosh (2005). For a critique of newly-enacted property right protection laws see El-Said and El-Said (2005).

externalities in a host market created by foreign ownership are conditioned on threshold effects such as domestic level of human capital and overall quality of the market's institutions (Girma 2005; Alfaro, Kalemli-Ozcan, and Sayek 2009).³ One relevant aspect of institutional quality to this study is the degree of financial development. Jordan, however, ranks among the top of Arab countries in terms of bank development indicators with good scores in private credit to GDP and size of bank assets (Omran and Bolbol 2003; Krogstrup and Matar 2005). In addition, the ASE is considered a well-developed market compared to other markets in the Middle East and North Africa (MENA) region (Krogstrup and Matar 2005). For example, Lagoarde-Segot (2009) reports that the ASE displays low market volatility and low market illiquidity in comparison to 28 emerging markets.

Another area of research investigates the confounding influences of the quality and motivation of foreign investment on the anticipated productivity gains. For example, technology transfer is viable when a multinational firm sets up an affiliate to take advantage of its unique firm-specific assets while at the same time protecting its propriety knowledge through its ownership of the affiliate (Dunning 1993; Gorg and Greenaway 2004). However, the multinational presence is not expected to induce technology transfer if the foreign investment is driven by the multinational's incentive to have access to new technology in the host market (Driffield and Love 2007). In addition, an observed positive association between foreign presence and high productivity can be explained by the MNE acquiring strategy under which it targets well-performing domestic firms (Evenett and Voicu 2001; Arnold and Javorcik 2009; Karpaty 2007). This paper fits the most into this line of research as it examines the impact of foreign ownership on the productivity of Jordanian firms, with a focus on dealing with the unobserved firm heterogeneity and self-selection bias. MNEs are likely to target Jordanian companies with unique advantages such as control over natural resources, large market shares and access to local and regional markets. These advantages are also likely to be correlated with high production efficiency. If MNEs acquired well-performing Jordanian firms to exploit these companies' advantages, then once the firm's fixed effects and selection bias are controlled for, the positive impact of foreign ownership on productivity becomes insignificant.

Examining the gains of productivity in the Arab region is interesting because Arab countries have been performing poorly in attracting FDI inflows (Sadik and Bolbol 2001; Omran and Bolbol 2003; Krogstrup and Matar 2005). Table 1 reports FDI inflows to developing countries grouped by region.⁴ This table shows that

³ For a review of the literature, see Blomström and Kokko (2003).

⁴ Regions and countries within each region are based on the classification by the World Bank.

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Table 1: Foreign direct investment inflows by region.

Year	East Asia and Pacific	Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa
1995	50.80	8.27	27.05	0.91	2.93	4.41
1996	58.56	7.18	38.82	1.36	3.51	4.12
1997	62.61	11.64	60.29	1.95	4.90	8.50
1998	57.85	11.25	68.87	2.64	3.55	6.88
1999	50.39	9.95	78.98	1.91	3.08	8.95
2000	45.19	9.06	73.68	3.92	4.37	6.58
2001	48.93	14.67	67.24	3.04	6.15	14.04
2002	59.37	12.88	52.59	8.06	6.77	11.16
2003	59.34	17.79	40.38	10.26	5.46	13.65
2004	77.77	30.03	59.27	10.55	7.82	11.31
2005	136.25	49.50	67.28	18.22	10.84	18.74
2006	162.12	86.50	66.16	30.47	25.81	15.92
2007	209.30	158.78	112.92	33.66	32.47	28.73
2008	226.49	165.96	121.65	35.61	50.89	40.22
2009	189.90	51.09	71.88	29.22	39.58	35.22
2010	320.09	23.55	111.05	25.87	31.21	29.61
2011	386.50	74.45	146.13	16.16	40.42	40.90

Note: This table reports FDI inflows to developing countries grouped by region. Countries in each region are classified by the World Bank. Data is obtained from the World Bank Development Indicators. Figures are in thousands of millions of US dollars.

FDI inflows have been increasing steadily in all regions in the past two decades except for the years around the financial crisis. However, the size of FDI inflows varies greatly across the different regions of the world. The MENA region in particular has received the lowest amount of FDI inflows compared to developing countries in all regions in almost all years in the period 1995–2011. Also, the size of FDI inflows received by the MENA region in 2011, the start of the Arab spring, dropped to nearly half the average of the previous five years. Although it is early to conclude that this decrease in FDI inflows will persist, the political unrest in the region suggests that the drop in FDI inflows may continue for the next few years.

Some observers believe that countries in the MENA region are missing out on the anticipated gains of foreign ownership in terms of acquiring new technologies and on improving their firms' production efficiency (Sadik and Bolbol 2001; Omran and Bolbol 2003; Krogstrup and Matar 2005). This is

⁵ This observation is valid even after taking the size of region into account.

especially relevant given that the empirical evidence from an ample number of developing and transition economies indicates that there is a positive impact of foreign participation on a firm's productivity (Aitken and Harrison 1999; Chudnovskya, Lópeza, and Rossia 2008; Damijan et al. 2003; Smarzynska-Javorcik 2004; Fu 2008; Liu and Wang 2003). This evidence is fairly robust to the choice of economic regime, time period, and method of estimation.6

In order to encourage FDI many Arab countries, including Jordan, have adopted investment incentive programmes (IIPs) that offer tax holidays and/ or tax and tariff reductions. However, these investment incentives are costly and are economically justifiable only when the gains of foreign investments exceed the costs of investment incentives. For example, tax holidays and tax reductions result in a substantial decrease in tax revenues (Clark, Cebreiro, and Bohmer 2007). If that decrease in tax revenue is not offset by gains from new capital investments, induced by the incentive programme, the government may cut its expenditures or raise taxes elsewhere. This in turn can have an immediate negative impact on the economic conditions of the public, especially low income households (Chen 2004). In addition, the incentive programme may distort the incentives of non-recipient firms and hence allocate the country's resources inefficiently (Clark, Cebreiro, and Bohmer 2007). Also, investment incentives can redistribute income from host countries to MNEs especially when countries are competing for FDI (Gorg and Greenaway 2004). Therefore, productivity gains of foreign ownership must be large enough to justify these costly incentives. The analysis presented in this paper evaluates empirically the productivity gains resulting from foreign ownership by employing a productivity function with a technological innovation term using a sample of manufacturing and mining companies listed on the ASE. The empirical findings indicate that the productivity of companies with foreign ownership is not significantly different from their domestic counterparts implying that Jordanian firms are not gaining from foreign ownership. Hence, the analysis presented in this paper questions the financial viability of Jordan's investment incentive programme designed to encourage foreign direct investments (FDIs).

⁶ Although the evidence on the impact of foreign participation on the acquired firm's productivity is fairly robust, the evidence on spillover effects resulting from foreign presence is mixed. For a comprehensive review and meta-regression analysis, see Wooster and Diebel (2010).

⁷ An overview of Jordan's investment incentive program is presented in Appendix 1.

In this paper I focus on the case of Jordan because of various reasons. First, Jordan has been receiving large amounts of FDI inflows as a percentage of its GDP compared to other Arab countries as indicated by figures presented in Table 2.

In addition, FDI inflows to Jordan translate into a large contribution of foreign ownership in the number of employment, sales, market values and subscribed shares in listed Jordanian companies. The first four columns in Table 3 indicate that the contribution of firms with foreign ownership to total employment is 61%, to sales is 76%, to market value is 83% and to subscribed shares is 64%. In the next four columns I compute more conservative contributions based on the equity holding of firms with foreign ownership. However, firms with foreign ownership still account for a large contribution of employment, sales, market value and subscribed shares of 25%, 27%, 47% and 30%, respectively.

Second, the results and conclusions of this study are useful in drawing policy implications not only for Jordan but also for other Arab countries. This is because Jordan shares with Arab countries similar market characteristics. The manufacturing sectors in Arab countries are labour-intensive and consumer-oriented with their exports comprising mainly of natural resources. The final motivation for the use of Jordan relates to data availability. Foreign ownership data is publicly available for Jordanian listed companies and hence it allows the study of the impact of FDI on firm's productivity using firm-level data. The use of firm-level data is advantageous since the aggregation of data over economies results in a substantial loss of information (Damijan et al. 2003).

2 Research Design

2.1 Hypothesis Development

It is widely accepted that FDIs as well as trade and international licensing agreements are the main three principal channels of global technology transfer (Eaton and Kortum 1996; Grossman and Helpman 1993; Feenstra, Markusen, and Zeile 1992; Clerides, Lach, and Tybout 1998). However, this paper focuses on FDI since it is potentially the most important international vehicle of technology transfer. FDI in comparison to trade can be more efficient in transferring technology because foreign investors transfer technology directly to the affiliates under their ownership and control (Konings 2001; Hanousek, Kocenda, and Maurel 2011). In addition, the latest and most valuable technologies are not available through international licensing agreements (Damijan et al. 2003).

Table 2: Foreign direct investment inflows to Arab countries.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Panel I: Size of foreign	ign direct investment, net inflows	stment, n	et inflows (BoP, current l	ıt US\$), millions	ions					
Bahrain	80	217	517	865	1,049	2,915	1,756	1,794	257	156	781
Kuwait	-112	4	- 92	24	234	121	112	9-	1,114	1,305	3,259
Oman	2	109	25	111	1,538	1,596	3,332	2,952	1,486	1,243	874
Qatar	296	624	625	1,199	2,500	3,500	4,700	3,779	8,125	4,670	-87
Saudi Arabia	20	-614	-587	-334	12,107	18,318	24,334	39,456	36,458	29,233	16,308
United Arab Emirates	1,184	95	4,256	10,004	10,900	12,806	14,187	13,724	4,003	5,500	7,679
Iraq	9-	-2	0	300	515	383	972	1,856	1,598	1,396	2,082
Libya	-133	145	143	357	1,038	2,064	4,689	4,111	1,371	1,784	ı
Algeria	1,108	1,065	634	882	1,156	1,841	1,687	2,639	2,747	2,300	2,571
Jordan	274	238	247	937	1,984	3,544	2,622	2,827	2,413	1,651	1,474
West Bank and Gaza	19	6	18	49	36	19	20	52	300	154	235
Lebanon	ı	1,336	2,860	1,899	2,624	2,675	3,376	4,333	4,804	4,280	3,490
Syrian Arab Republic	110	115	160	275	200	629	1,242	1,466	2,570	1,469	ı
Yemen	155	114	-89	144	-305	1,121	917	1,555	129	189	-518
Egypt	510	647	237	1,253	5,376	10,043	11,578	9,495	6,712	6,386	-483
Tunisia	452	791	541	594	713	3,240	1,515	2,601	1,525	1,334	433
Morocco	144	79	2,313	787	1,671	2,461	2,826	2,466	1,970	1,241	2,521
Sudan	574	713	1,349	1,511	1,562	1,842	1,504	1,653	1,726	2,064	2,314
Djibouti	ω	3	14	39	22	108	195	228	26	37	79
Somalia	0	0	-1	-5	24	96	141	87	108	112	102
Mauritania	77	29	102	392	814	155	139	343	-3	131	589
Panel II: Foreign direct	ect investment,		net inflows (% of G	DP)							
Bahrain	0.90	2.25	4.67	6.58	6.57	15.75	8.08	6.98	1.12	0.61	2.69
Kuwait	-0.32	0.01	-0.14	0.04	0.29	0.12	0.10	0.00	1.05	1.09	2.03
										,	\ ;

Table 2: (Continued)

Oman 0.03 0.54 0.12 0.45 4.34 7.35 4.86 3.08 3.11 1.25 Qatar 1.68 3.22 2.66 3.78 5.61 5.75 5.90 3.28 8.31 3.73 -0.05 Saudi Arabia 0.01 -0.33 -0.27 -0.13 3.69 4.86 5.85 7.59 8.50 5.55 2.49 United Arabia 0.01 -0.33 -0.27 -0.13 3.69 4.86 5.85 7.59 8.50 5.54 5.70 5.90 3.78 0.09 United Arabia 0.01 -0.27 -0.01 3.69 4.86 5.85 7.59 8.51 1.97 1.99 1.41 1.97 1.99 1.41 1.91 1.99 1.41 1.91 1.99 1.99 1.41 1.91 1.99 1.41 1.91 1.91 1.99 1.41 1.91 1.99 1.41 1.91 1.99 1.41 1.91 1.91 <		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Holitates 1.68 3.22 2.66 3.78 5.61 5.75 5.90 3.28 8.31 3.73 - 1.48 0.01 -0.33 -0.27 -0.13 3.69 4.86 5.85 7.59 8.50 5.55 8.50 5.55 8.00 8.00 9.342 6.77 6.03 5.77 5.50 4.35 7.59 8.50 5.55 8.50 5.55 8.00 9.342 6.77 6.03 5.77 5.50 4.35 7.59 8.50 5.55 7.59 8.50 5.55 8.50 7.59 8.50 5.55 8.50 8.50 8.50 8.50 8.50 8.50	Oman	0.03	0.54	0.12	0.45	4.98	4.34	7.95	4.86	3.08	2.11	1.25
Emirates 1.15 0.09 3.42 6.77 6.03 5.77 5.50 4.35 1.57 1.91 - 0.47 0.73 0.59 1.07 2.36 6.73 5.77 5.50 4.35 1.57 1.91 - 0.47 0.73 0.59 1.07 2.36 3.65 6.53 4.41 2.20 2.39 2.02 1.88 0.93 1.03 1.12 1.57 1.25 1.24 2.00 1.43 3.05 2.49 5.37 8.21 1.57 23.54 15.32 12.87 10.13 6.25 Ind Gaza 0.49 0.27 0.47 1.17 0.78 0.40 0.38 0.82 4.47 11.26 - 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07	Qatar	1.68	3.22	5.66	3.78	5.61	5.75	5.90	3.28	8.31	3.73	-0.05
Emirates 1.15 0.09 3.42 6.77 6.03 5.77 5.50 4.35 1.57 1.91 - 0.47 0.73 0.59 1.07 2.36 3.65 6.53 4.41 1.43 0.98 2.02 1.88 0.93 1.03 1.12 1.57 1.25 1.24 2.00 2.39 3.05 2.49 5.37 8.21 1.57 23.54 15.32 12.87 10.13 6.25 - 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07	Saudi Arabia	0.01	-0.33	-0.27	-0.13	3.69	4.86	5.85	7.59	8.50	5.55	2.44
0.82 1.03 0.59 1.09 1.41 1.43 0.98 -0.47 0.73 0.59 1.07 2.36 3.65 6.53 4.41 2.20 2.39 2.02 1.88 0.93 1.03 1.12 1.57 1.25 1.54 2.00 1.43 3.05 2.49 5.37 8.21 1.57 23.54 15.32 12.87 10.13 6.25 - 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 1.57 0.52 0.53 0.73 1.10 1.73 1.98 3.07	United Arab Emirates	1.15	0.09	3.42	6.77	6.03	5.77	5.50	4.35	1.57	1.91	2.20
-0.47 0.73 0.59 1.07 2.36 3.65 6.53 4,41 2.20 2.39 2.02 1.88 0.93 1.03 1.12 1.57 1.25 1.54 2.00 1.43 3.05 2.49 5.37 8.21 1.57 23.54 15.32 12.87 10.13 6.25 - 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 rab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07 - - - 1.57 1.07 -0.76 1.03 -1.80 5.87 3.58 5.11 0.46 0.59 1.57 1.07 -0.76 1.03 -1.80 5.87 3.58 5.11 0.46 0.59 1.57 1.57 1.59 5.99 9.34 8.87 5.83 3.51 3.03 2.05 4.82 7.64 1.38 2.31	Iraq	ı	ı	ı	0.82	1.03	0.59	1.09	1.41	1.43	0.98	1.09
3.05 1.88 0.93 1.03 1.12 1.57 1.25 1.54 2.00 1.43 3.05 2.49 5.37 8.21 15.77 23.54 15.32 12.87 10.13 6.25 nk and Gaza 0.49 0.27 0.47 1.17 0.78 0.40 0.38 0.82 4.47 1.84 nab Republic 0.52 0.53 0.73 1.10 1.73 1.27 13.74 15.03 13.67 11.26 nab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07	Libya	-0.47	0.73	0.59	1.07	2.36	3.65	6.53	4.41	2.20	2.39	ı
3.05 2.49 5.37 8.21 15.77 23.54 15.32 12.87 10.13 6.25 nk and Gaza 0.49 0.27 0.47 1.17 0.78 0.40 0.38 0.82 4.47 1.84 nab Republic 0.52 0.53 0.73 1.10 1.73 1.27 13.74 15.03 13.67 11.26 nab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07 -	Algeria	2.02	1.88	0.93	1.03	1.12	1.57	1.25	1.54	2.00	1.43	1.29
nk and Gaza 0.49 0.27 0.47 1.17 0.78 0.40 0.38 0.82 4.47 1.84 - 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 rab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07 - - - 0.52 0.54 0.76 1.03 -1.80 5.87 3.58 5.11 0.46 0.59 - <td>Jordan</td> <td>3.05</td> <td>2.49</td> <td>5.37</td> <td>8.21</td> <td>15.77</td> <td>23.54</td> <td>15.32</td> <td>12.87</td> <td>10.13</td> <td>6.25</td> <td>5.11</td>	Jordan	3.05	2.49	5.37	8.21	15.77	23.54	15.32	12.87	10.13	6.25	5.11
- 6.98 14.24 9.06 12.32 12.27 13.74 15.03 13.67 11.26 rab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07	West Bank and Gaza	0.49	0.27	0.47	1.17	0.78	0.40	0.38	0.82	4.47	1.84	2.41
rab Republic 0.52 0.53 0.73 1.10 1.73 1.98 3.07	Lebanon	ı	86.9	14.24	90.6	12.32	12.27	13.74	15.03	13.67	11.26	8.71
1.57 1.07 -0.76 1.03 -1.80 5.87 3.58 5.11 0.46 0.59 -1.80 0.52 0.74 0.29 1.59 5.99 9.34 8.87 5.83 3.55 2.92 2.05 0.74 0.29 1.59 5.99 9.34 8.87 5.83 3.55 2.92 2.05 0.38 0.20 4.64 1.38 2.81 3.75 3.76 2.77 2.17 1.37 4.35 4.82 7.65 7.04 5.89 5.24 3.31 3.06 3.27 3.14 1.37 0.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23 -1		0.52	0.53	0.73	1.10	1.73	1.98	3.07	1	ı	ı	ı
0.52 0.74 0.29 1.59 5.99 9.34 8.87 5.83 3.55 2.92 2.05 2.05 3.42 1.97 1.90 2.21 9.42 3.89 5.80 3.51 3.03 3.03 0.38 0.20 4.64 1.38 2.81 3.75 3.76 2.77 2.17 1.37 4.35 4.82 7.65 7.04 5.89 5.24 3.31 3.06 3.27 2.17 1.37 0.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23 1.4 1.3 14.08 23.04 22.79 8.08 3.23 1.4 1.3 1.4 1.4 1.3 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	Yemen	1.57	1.07	-0.76	1.03	-1.80	5.87	3.58	5.11	0.46	0.59	-1.77
2.05 3.42 1.97 1.90 2.21 9.42 3.89 5.80 3.51 3.03 0.38 0.20 4.64 1.38 2.81 3.75 3.76 2.77 2.17 1.37 4.35 4.82 7.65 7.04 5.89 5.24 3.31 3.06 3.27 3.14 0.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23 - <	Egypt	0.52	0.74	0.29	1.59	5.99	9.34	8.87	5.83	3.55	2.92	-0.20
0.38 0.20 4.64 1.38 2.81 3.75 3.76 2.77 2.17 1.37 4.35 4.82 7.65 7.04 5.89 5.24 3.31 3.06 3.27 3.14 6.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23	Tunisia	2.05	3.42	1.97	1.90	2.21	9.45	3.89	5.80	3.51	3.03	0.94
4.35 4.82 7.64 5.89 5.24 3.31 3.06 3.27 3.14 0.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23 - - - - - - - - - ia 5.92 5.09 6.52 21.36 37.27 5.08 4.15 9.04 -0.10 3.70 3.70	Morocco	0.38	0.20	4.64	1.38	2.81	3.75	3.76	2.77	2.17	1.37	2.54
0.59 0.58 2.29 5.79 3.13 14.08 23.04 22.79 8.08 3.23 3.23	Sudan	4.35	4.82	7.65	7.04	5.89	5.24	3.31	3.06	3.27	3.14	3.44
ia 5.92 5.09 6.52 21.36 37.27 5.08 4.15 9.04 -0.10 3.70	Djibouti	0.59	0.58	2.29	5.79	3.13	14.08	23.04	22.79	8.08	3.23	6.38
a 5.92 5.09 6.52 21.36 37.27 5.08 4.15 9.04 -0.10 3.70 :	Somalia	I	ı	ı	ı	1	ı	ı	1	ı	I	I
	Mauritania	5.92	5.09	6.52	21.36	37.27	5.08	4.15	9.04	-0.10	3.70	14.23

Note: This table reports FDI inflows to Arab countries. Figures reported in Panel I are in millions of US dollars. Data is obtained from the World Bank Development Indicators. Missing data from the original source. Values in bold represent Jordan figures.

Table 3: Contribution of firms with foreign ownership in employment, sales and market value.

	Firms with foreign ownership in employment, %	Firms with foreign ownership in sales, %	firms with Firms with foreign foreign ownership in market value, % sales, %	Firms with foreign ownership in shares, %	Foreign share in employment,	Foreign share in sales, %	Foreign share in market value, %	Foreign share in subscribed shares, %
Full sample	0.607	0.757	0.827	0.638	0.250	0.272	0.467	0.297
Sectors Chemical industries	0.115	0.182	0.126	0.144	0.076	0.099	0.088	0.091
Electrical industries	0.794	0.891	0.903	0.801	0.282	0.334	0.318	0.284
Engineering and	0.657	0.716	0.821	0.750	0.200	0.239	0.267	0.239
construction								
Food and beverages	0.588	0.669	0.692	0.637	0.467	0.475	0.416	0.442
Glass and ceramic	0.237	0.264	0.284	0.434	0.108	0.111	0.111	0.132
industries								
Mining and extraction	0.910	0.899	0.964	0.826	0.397	0.482	0.592	0.435
industries								
Pharmaceutical and	0.617	0.570	0.569	0.718	0.184	0.192	0.177	0.262
medical industries								
Paper and packaging	0.466	0.451	0.383	0.566	0.161	0.160	0.127	0.207
industries								
Textiles, leathers and	0.221	0.105	0.113	0.180	0.070	0.041	0.049	0.056
clothing								
Tobacco and cigarettes	0.139	0.115	0.143	0.117	0.079	0.068	0.079	0.086
Utilities and energy	0.463	0.753	0.539	0.390	0.117	0.167	0.145	0.127

Note: This table reports descriptive statistics of the percentage share of firms with foreign ownership in employment, sales and market value. The percentage contribution of firms with foreign ownership in employment is computed as the total number of employees in firms with foreign ownership divided by the total number of employees in all firms, domestic and with foreign ownership. Similar treatment is applied to compute the percentage contribution of firms with foreign ownership in sales, market value and subscribed shares. Foreign share in employment is computed by the following expression:

reatment is applied to compute the percentage contribution of foreign share in sales, market value and subscribed shares. The sample consists of Jordanian firms in the $\sum (Foreign ownership share_i imployeer of employees_j)/\sum Number of employees_j; where j refers to firms with foreign ownership and j to all firms in the sample. Similar$ industrial, utilities and energy and construction sectors listed in the ASE over the period 2001–2011. Sectors are based on the ASE classification. Finally, FDI results in the transfer of newer technology more quickly compared to international trade and licensing agreements (Mansfield and Romeo 1980).

The theoretical underpinning of the association between foreign ownership and productivity has its roots in Hymer (1976) and is formally theorized in Dunning (1993). Hymer (1976) suggests that foreign investors, represented by MNEs, can be an important source for technology transfer since these investors must possess certain technological advantages that allow them to succeed globally. Dunning (1993) theorizes that it is advantageous for MNEs to sets up affiliates abroad to exploit their unique firm-specific assets while at the same time protecting their propriety knowledge through their ownership of the affiliate. MNEs advantage is often of a technological nature evident by the substantial number of product innovations (Fu 2008). In addition, FDI is advantageous from the financing point of view since the acquisition of the new technology is financed by the parent company and not the affiliate (Hanousek, Kocenda, and Maurel 2011). MNEs advantage is not limited to their technological and financial advantage but also extends to their superior organizational and marketing systems, and connections to international markets (Dunning 1993). In contrast, many firms in emerging markets are characterized by obsolete machinery and outdated production methods (Konings 2001). Hence, domestic firms altering their ownership structures to include foreign investors can benefit from knowledge transfer, which in turn, can lead to an increased productivity.

Based on the theoretical motivation discussed above, one would expect foreign participation to improve the productivity of firms with foreign ownership. However, positive externalities in a host market created by foreign ownership are conditioned on threshold effects such as domestic level of human capital and overall quality of the market's institutions (Girma 2005; Alfaro, Kalemli-Ozcan, and Sayek 2009; Blomström 2002; Bénassy-Quéré, Coupet, and Mayer 2007). In addition, FDI motivations and their linkages to productivity spillovers and competition must be accounted for when investigating FDI costs and benefits (Driffield and Love 2005). In fact, productivity gains in the host economy from FDI can be seen as a function of FDI motivation (Driffield 2001; Driffield and Love 2007). More specifically, Driffield and Love (2007) hypothesize that when FDI is driven by technology sourcing and the receiving economy has lower labour costs relative to the FDI source country, the host economy would experience negative effects due to market stealing effect. Furthermore, and in line with this argument, the evidence indicates that FDI motivations determine the effect of FDI on export intensity in the host economy (Franco 2013). Another motive for MNEs is to acquire well-performing firms in the host country, with unique advantages that allowed them to perform well. Therefore, the positive association between foreign presence and high productivity can be

an outcome of MNEs targeting well-performing domestic firms (Evenett and Voicu 2001; Arnold and Javorcik 2009; Karpaty 2007).

2.2 Economic Model

In order to test the impact of foreign ownership on a firm's productivity I employ two definitions of productivity as follows. First, I specify a production function of domestic firms over time t using a standard growth accounting approach of Solow (1957). This approach has been used extensively for studying the productivity of inputs such as capital and labour. To study the impact of external technology transfer I augment the technology variables directly in the production function (Aitken and Harrison 1999; Damijan et al. 2003). Using the augmented production function enables us to study the various factors that affect productivity growth, including the technological accumulation factor. In this study, I examine the hypothesis that foreign investors facilitate technology transfer. Hence, I augment the model with a foreign ownership variable to test its impact on the technological growth of the firm.

Formally, I assume that the production process of the firm can be represented by the following production function F that relates a firm's gross output to capital stock and labour:

$$Y_{it} = F(A_{it}K_{it}^{\alpha}L_{it}^{\gamma}); i = 1, 2, ..., K; t = 1, 2, ..., T$$
 [1]

where Y_{it} is the output of firm i at time t, K and L are physical capital and labour, respectively. The term A_{it} captures differences in output across firms and over time that are not accounted for by the production inputs. Hence, this term represents the technological change in a firm and is often referred to as the total factor productivity (TFP). In order to account for factors that determine firm's productivity growth, I take logarithms and differentiate with respect to time:

$$y_{it} = \text{TFP}_{it} + \alpha k_{it} + \gamma l_{it}$$
 [2]

where lowercase letters denote logarithm of production inputs and α and γ represent the elasticity of output with respect to K and L, respectively. I assume that TFP is a function of technology transfer that occurs through strategic changes in a firm's ownership structure and of an error term, hence:

$$TFP_{it} = f(Z_{it} + e_{it})$$
 [3]

where Z_{it} , for the purposes of this study, includes the term $FOWN_{it-1}$ which stands for foreign ownership. Equation [3] shows that technology can be

transferred to domestic firms by foreign investors directly through their affiliates. This direct effect will show in affiliates as a growth in their productivity.

The second model I employ in this study utilizes a partial productivity measure, LPROD $_{it}$, in which one factor, labour, is considered. LPROD $_{it}$ is computed by taking the logarithm of the ratio of sales adjusted for the change in inventory deflated by the industrial producer price index and divided by the number of employees. Although this measure is inferior to TFP, it is useful since most industries in Jordan are labour intensive. In addition, I employ a variation of the variable LPROD $_{it}$ in which I use value added instead of output in the numerator (Tomiura 2007). Specifically, ValueAdded $_{it}$ is computed by taking the logarithm of the ratio of sales minus cost of sales deflated by the industrial producer price index and divided by the number of employees.

The final equation estimated in this study is specified as follows:

Productivity_{it} =
$$\beta$$
FOWN_{it-1} + $\sum_{i}^{1} \delta_{ij} X_{jit} + e_{it}$ [4]

where Productivity $_{it}$ is estimated using y_{it} , LPROD $_{it}$ and ValueAdded $_{it}$ respectively, y_{it} is the output of firm i at time t, LPROD $_{it}$ is the logarithm of the ratio between sales of each firm and the number of its total employees, ValueAdded $_{it}$ is the logarithm of the ratio between the firm's sales minus its cost of sales to the number of its total employees; FOWN $_{it}$ is the foreign ownership in the firm's equity capital, X_{it} is a vector comprising a set of control variables. Details on the operational definition of the variables are shown in Appendix 2.

2.3 Estimation Methods

In this study I examine the impact of foreign ownership on a firm's production efficiency using firm-level data over the period 2001–2011 for an unbalanced panel of Jordanian firms. I employ panel data techniques (random or fixed effects model) that take into account the firm specific effects as my base case. Then, I employ a treatment effect procedure and a propensity matching score (PMS) technique to account for the selection bias. I assume that the error term e_{it} in eq. [4] contains both individual firm-specific effects v_i and the usual idiosyncratic error u_{it} . The individual firm-specific effects v_i are assumed to be correlated with other explanatory variables in X_{it} , which renders the OLS estimates of coefficients biased and inconsistent. To get unbiased and consistent estimates of the coefficients, eq. [4] is modified to take into account the firm's specific effects:

Productivity_{it} =
$$\beta$$
FOWN_{it-1} + $\sum_{j}^{1} \delta_{j} X_{jit} + v_{i} + u_{it}$ [5]

However, eq. [4] may be subject to a selection bias. MNEs are likely to target firms and industries that are large and who already have high production efficiency (Djankov and Hoekman 2000; Evenett and Voicu 2001). Hence, foreign investment decisions are not randomly distributed or in other words, the sample is not randomly selected. If selection bias is not modelled productivity shocks may be correlated with foreign ownership leading to inconsistent and biased estimates if OLS is used. In order to correct for the selection bias problem, I apply a treatment effect model which is considered a Heckman-type model.⁸ In the treatment effect procedure, the bias that results from using non-randomly selected samples is dealt with as an omitted variable bias, the selection bias being the omitted variable. To correct for this bias, the selection bias is modelled by estimating the probability of treatment (the probability a firm will receive a foreign ownership conditional on its initial characteristics). Then, based on the probit results, the inverse Mill's ratios, for all observations, are calculated. A vector of the inverse Mill's ratio is then included in the second step estimations as an additional independent variable which controls for the unobserved selection bias of foreign investment decisions. Specifically, the treatment effect model is specified as follows:

Productivity_{it} =
$$\beta$$
FOWN_{it-1} + $\sum_{i}^{1} \delta_{i}X_{jit} + e_{it}$ [6a]

$$\text{FOWN}_{it}^* = \sum_{j}^{1} \theta_j Z_{jit} + \varepsilon_{it}$$
 [6b]

$$FOWN_{it} = 1 \text{ if } FOWN_{it}^* > 0 \text{ and } FOWN_{it} = 0 \text{ otherwise}$$

In addition, I employ another estimation technique to account for the selection bias, namely the propensity score matching (PSM). The propensity score is the conditional probability of receiving treatment, where the treatment of interest is foreign participation in a domestic firm. Let FOWN, be an indicator variable that indicates whether firm i has a foreign ownership. Let Productivity, ibe the productivity of a firm that has a foreign ownership; and Productivity, 0 is the unobservable, counterfactual, productivity assuming that the firm do not have foreign ownership. To estimate the counterfactual, I employ PSM to pair each firm with foreign ownership with another firm that does not. Accordingly, I

⁸ The original Heckman (1979) selection model and treatment effect models use two-step procedure for correcting sample selection bias. However, there is a main difference between the two types. In Heckman-type selection model, the outcome variable is observed only for a group of the population, while in a treatment effect model the outcome variable is observed for both the treated (group of interest) and untreated (control) groups.

estimate the probability of foreign ownership (i.e. the propensity score) using the following logistic regression:

$$FOWN_{it}^* = \sum_{j}^{1} \theta_j Z_{jit} + \varepsilon_{it}$$
 [7]

where Z is a vector of covariates determining the foreign ownership decision. Using kernel matching, I match firms with foreign ownership to non-foreign ownership firms based on the estimated propensity scores. Kernel matching computes the distance of propensity scores of each firm with foreign ownership from all non-foreign ownership firms. Denoting firms without foreign ownership i^* , kernel matching calculates a weighting function, $w(i,i^*)$, for each firmi by assigning a large value of $w(i,i^*)$ to an i^* that has a short distance in terms of propensity score from i, a small value of $w(i,i^*)$ to an i^* that is a long distance in propensity score from i (Guo and Frase 2009). The average treatment effect for the treated, ATT, is then:

$$ATT = \frac{1}{n} \sum \left[Productivity_i^1 - \sum_{i^*} w(i, i^*) Productivity_i^0 \right]$$
 [8]

3 Data and Descriptive Statistics

I use firm-level, hand-collected data from the Corporate Guides published by the ASE and from companies' financial statements. The data covers the period 2001–2011 for an unbalanced panel of Jordanian firms listed on the ASE in the manufacturing, utilities and construction sectors. Private companies (domestic or with foreign ownership) are not required by law to disclose financial information and hence this study is limited to companies with listed shares in the ASE. In addition, this study focuses on manufacturing, utilities and construction companies because companies in these sectors are the ones expected to benefit the most from the technology transfer through acquiring modern equipment, machinery, production processes and employee training to replace their obsolete and outdated technologies (Konings 2001). Finally, the study eliminates companies with a number of employees less than 10 (Damijan et al. 2003).

The characteristics of the sample firms are presented in Table 4. The average foreign ownership is 18.07%, which indicates that foreign investors own on average 18.07% of the sample firms' equity capital. The average foreign ownership is higher than the literature's arbitrary cut-off of 10% which is assumed to represent a foreign controlling interest in the firm. At the 10% cut-off the average ownership of foreign investors increases to 35.4% of the firm's equity capital.

Table 4: Summary statistics.

	Mean	Median	SD	Min.	Max.	Skewness	Kurtosis
Foreign ownership	18.07	8.46	22.45	0.003	99.91	1.78	5.67
Foreign ownership >10%	35.36	26.27	23.50	10.13	99.91	1.11	3.42
Output in sales (million JDs)	37.50	5.31	149	0.02	1,750	7.56	67.74
(In) Output (y)	10.85	10.88	1.90	0.04	16.61	-0.19	5.34
(In) Labour productivity (LPROD)	5.75	5.81	1.22	1.82	10.64	-1.04	11.35
(In) Value added (ValueAdded)	3.44	4.12	2.37	-2.50	8.46	-1.48	4.67
Number of employees	382.80	149	728.99	10	4,583	3.63	16.58
(In) Labour (/)	5.10	5.00	1.20	2.30	8.43	0.44	3.63
Fixed assets (million JDs)	10.70	3.08	23.70	90.0	218	4.34	26.47
(In) Capital stock (k)	15.39	15.29	1.55	1.39	19.87	-0.88	13.28
Market value (million JDs)	48	6.87	191	0.24	2,060	7.68	69.40
(In) Market value (MV/Size)	16.33	16.06	1.56	12.52	22.02	0.82	4.16
Total assets (million JDs)	37.00	8.79	85.70	0.28	643	3.82	18.90
(In) Total assets (TA)	16.57	16.37	1.42	13.22	20.98	0.75	3.58
Dividends yield (DY)	2.08	0.00	3.21	0.00	35.38	2.86	22.09
Market-to-book ratio (MB)	1.38	1.17	0.80	0.34	7.41	2.85	14.68
Current ratio (CR)	2.90	1.97	2.70	0.03	20.14	2.40	10.54
Debt to equity (DE)	0.089	0.00	0.177	0	0.964	2.60	9.92
Return to equity (ROE)	3.62	4.54	12.94	-38.48	57.21	-0.047	5.07
Shares turnover (ST)	0.004	0.001	0.0079	0.00	0.0056	3.31	16.68
		:					

Note: This table reports descriptive statistics for the sample used in this study. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001–2011. A firm with foreign ownership has 10% or above of its equity owned by foreign investors. Variables are defined in Appendix 2.

These figures confirm the earlier observation that foreign participation in Jordanian firms is large. The average deflated output produced by the sample firms during the study period is only 37.5 million JDs. In addition, half of the firm-year observations have less than 5.31 million JDs in sales. Table 4 also reports that the average number of employees, fixed assets, market value and total assets are all moderate. However, these numbers are not surprising given that Jordan's economy is relatively small with, for example, a GDP in 2011 of \$28.84 billion (the World Bank). In terms of labour productivity, the average and median labour productivity in JDs (not reported) are JDs 72,027 and JDs 33,671 per worker.

To examine if there is a significant difference in the output *y*, labour productivity (LPROD) and value added per employee (ValueAdded) between firms with foreign ownership and domestic firms I run tests on the difference in means and the Wilcoxon test. The results are reported in Table 5. Panel I reports the results of the difference in means. The results indicate that firms with foreign participation have significantly larger output *y* and ValueAdded. However, the labour productivity LPROD is not significantly different between firms with foreign ownership and domestic firms. Table 5, Panel II reports the Wilcoxon test. Similar to the previous results, the Wilcoxon test is significant for *y* and ValueAdded but not LPROD.

Table 5: Univariate analysis.

	Y	LPROD	Value Added
Panel I: Difference in means			
Domestic firms	10.626	5.695	3.134
Firms with foreign ownership	11.030	5.743	3.514
Difference	-0.404	-0.048	-0.380
t-Test	-2.706	-0.512	-1.944
p	0.007	0.609	0.052
Panel II: Wilcoxon test			
Z	-2.271	-1.475	-2.069
p	0.023	0.140	0.039

Note: This table reports test results for the equality of means for y, LPROD and ValueAdded between firms with foreign ownership and domestic firms and results for the Wilcoxon test. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001–2011. A firm with foreign ownership has 10% or above of its equity owned by foreign investors. Industries are based on the ASE classification.

Finally, the correlation matrix is reported in Table 6 and indicates that *y*, LPROD and ValueAdded are all significantly correlated with foreign ownership.

Table 6: Correlation matrix.

	FOWN	FOWN_D	X	LPROD	Value Added	1	K	MV	TA	DY	MB	CR	DE	ROE ST
FOWN 1	1													
FOWN_D	-0.71***	1												
^	0.22***	0.18***	1											
LPROD	**60.0-	0.07*	0.79***	1										
ValueAdded	0.08**	0.12***	0.50***	0.62***	7									
1	0.25***	0.20***	0.78***	0.22***	0.18***	1								
k	0.30***	0.23***	0.68***	0.36***	0.20***	0.71***	1							
W/	0.34***	0.27***	0.76***	0.49***	0.48***	0.69***	0.67***	1						
TA	0.31***	0.27***	0.84***	0.54***	0.40***	0.78***	0.79***	0.88***	1					
Dγ	-0.12***	-0.11***	0.28***	0.32***	0.35***	0.12***	*80.0	0.21***	0.18***	1				
MB	0.13***	-0.01	0.02	0.00	0.04	0.04	0.02	0.39***	0.03	-0.02	1			
CR	-0.12***	-0.01	-0.19***	-0.07*	0.14***	-0.24**	-0.35***	-0.07*	-0.22***	0.11***	0.04	1		
DE	-0.04	0.03	0.07*	.008	0.12***	0.03	-00.02	0.04	0.02	0.35***	-0.002	0.07*	7	
ROE	-0.03	-0.01	0.20***	0.19***	0.33***	0.13***	0.11***	0.27***	0.17***	0.24***	0.15***	0.08**	0.07*	1
ST	-0.12***	-0.11**	-0.08**	0.01	90.0-	-0.14***	90.0-	-0.15***	-0.08**	-0.14***	-0.14***	-0.12***	-0.06	-0.03 1

Note: This table presents the correlation between the variables used in the study. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001–2011. A firm with foreign ownership has 10% or above of its equity owned by foreign investors. Variables are defined in Appendix 2. ***, **, *Significance at 1%, 5% and 10%, respectively.

4 Results and Analysis

To test the impact of foreign ownership on a firm's productivity I start by estimating eq. [5]. Table 7 reports the F statistic which tests the joint restriction that v_i are equal. The F statistic for the estimations using y and LPROD, respectively, is significant at the 1% level. Therefore, the null of no individual heterogeneity is rejected and I proceed to use panel data estimators. The fixed effects estimator treats v_i as fixed constants while in random effects estimator v_i are assumed to be drawn randomly. In this study, I do not make assumptions about the correlation between the independent variables and the unobservable effects. Hence, I estimate eq. [5] with fixed and random effects respectively and run the Hausman test and report the test results in Table 7. The Hausman test for the estimations using y is significant at the 1% level and is insignificant LPROD. Therefore, I report the results of fixed and random effects.

Table 7, Panel I, reports the results of the impact of foreign participation on the firm's productivity using fixed and random effects and Tobit regression.9 The standard errors are robust and clustered by industry. The coefficient of the variable FOWN is positive with a small magnitude and statistically insignificant across all specification. This result suggests that firms with foreign ownership are not more productive compared to domestic firms. In another set of results (not reported) I account for the possibility that technology may be transferred through efficiently utilizing labour or capital. I account for this possibility by additionally including interaction terms between foreign ownership and capital $FOWN_{it-1} * k_{it}$ and foreign ownership and labour $FOWN_{it-1} * l_{it}$ into the vector of explanatory variables. The coefficients on these interaction terms are positive but statistically insignificant. This result indicates that foreign ownership does not improve the efficiency of utilizing labour or capital. In relation to the other variables, the results are consistent with the international evidence. The coefficients of the variables *k* and *l* have the expected positive sign and are significant (though to various degrees). These results indicate that capital k and labour lcontribute significantly to the output y.

Panel II of Table 7 reports the results of estimations similar to the ones reported in Panel I but using a subsample of 210 observations. In this subsample I include in a new variable Skilled that captures the human capital quality (Zhao

⁹ Tobit regression censors values at the tails of the dependent variable. I use this estimation method because the left tail of the variable *ValueAdded* is winsorized at an arbitrary value of – 2.5. I apply this adjustment because some firm-year observations have higher cost of sales than sales. In this case, the logarithm of *ValueAdded* cannot be computed and the observation becomes missing unless winsorized.

Table 7: Foreign ownership and firm's productivity.

		y		LPROD	ValueAdded
	Fixed effects	Random effects	Fixed effects	Random effects	Tobit
Panel I: Full sample					
FOWN	0.001 (0.25)	0.002 (0.62)	0.001 (0.40)	0.001 (0.48)	0.003 (0.44)
1	0.330 (1.67)*	0.581 (2.36)**	1	I	1
×	0.109 (2.05)*	0.176 (1.92)*	0.080 (1.95)*	0.113 (1.85)*	0.305 (2.16)**
Time dummies	Yes	Yes	Yes	Yes	Yes
Industry clusters	Yes	Yes	Yes	Yes	Yes
F	31.68 (0.000)		24.65 (0.000)		
Hausman test	78.45 (0.000)		0.2 (1.00)		
Obs.	699	699	699	699	699
Groups	92	92	92	92	92
Panel II: Subsample with skilled labour data	skilled labour data				
FOWN	-0.001 (-0.18)	-0001 (-0.23)	-0.001 (-0.37)	-0.004 (-1.31)	-0039 (-1.37)
Skilled	0.140 (0.72)	0.242 (1.53)	0.210 (1.09)	0.378 (1.92)*	0.007 (3.03)***
1	0.65 (3.80)***	0.538 (2.63)**	ı	ı	ı
k	0.160 (1.95)*	0.62 (5.19)***	0.127 (1.62)	0.39 (4.97)***	0.636 (3.28)***
Time dummies	Yes	Yes	Yes	Yes	Yes
Industry clusters	Yes	Yes	Yes	Yes	Yes
4	11.11 (0.000)		14.28 (0.000)		
Hausman test	10.01 (0.188)		8.02 (0.237)		
Obs.	210	210	210	210	210
Groups	09	09	09	09	09

utilities and energy and construction sectors listed in the ASE over the period 2001-2011. Industries are based on the ASE classification. All specifications include time dummies (coefficients not reported). Models are estimated with robust standard errors clustered by industry. Variables are defined in Appendix 2. t(z)-statistics are in Note: This table reports estimation results for testing the impact of foreign ownership on the firm's productivity. The sample consists of Jordanian firms in the industrial, parentheses. ***, **, *Significance at 1%, 5% and 10%, respectively.

and Zhang 2010). This variable is measured as the logarithm of the ratio of skilled to total labour (Chudnovskya, Lópeza, and Rossia 2008). I collect the data from the companies' annual reports for the period 2008-2011. The purpose of including this variable is to take into account other factors that influence productivity. The main concern is to examine if the coefficients of the base-model variables are stable, especially the main variable of interest, FOWN. The results reported in Panel II indicate that the coefficient of the variable Skilled is insignificant when using y; significant at the 10% level only in random effects when using LPROD; and significant at the 1% level but with a coefficient size close to zero when using ValueAdded. The coefficient of the variable FOWN reversed its sign to negative but still has a small magnitude and is statistically insignificant in all models. The other two variables, l and k, have their expected signs and are significant in all models (except for k in the third column). The mixed results on Skilled and the stability of other factors allow us to proceed using the base model defined in eq. [4].

As discussed in Section 3.3, eq. [5] may be subject to a selection bias. To account for this bias I estimate eq. [6]. In order to estimate eq. [6], I create an indicator variable, FOWN_D, that takes the value of 1 if the foreign participation is above 10% and 0 otherwise. Hence, the treated group contains firms with foreign ownership and the control group contains domestic firms. The results are reported in Table 8. The reported Lambda is statistically significant which indicates that there is a selection bias, that MNEs ownership decision is not random. The decrease in the number of observation is due to missing data on the Companies Guide on some variables in the selection equation.

The main variable of interest, FOWN_D, is positive but statistically insignificant. I obtain this result using y, LPROD and ValueAdded, respectively, as the dependent variable. This result confirms the previous one reported in Table 7 that firms with foreign ownership are not more productive compared to domestic firms. As for the other determinants of output y and labour productivity LPROD, I report similar findings to the ones reported in Table 7. The coefficients of the variables k and l are significant with the expected positive sign (except for k in the third column). In addition, Table 8 reports the results of the selection model (the determinants of foreign ownership). It is useful to look at the significance

¹⁰ Only the annual reports of 2008 and upwards are systematically available from the ASE website.

¹¹ In another set of results (not reported), I include an interaction term *FOWN*Skilled* to account for the effect of foreign investment conditional on the quality of human capital. The coefficient of the interaction term is insignificant in all models. The coefficients of the rest of the variables are qualitatively similar to the ones reported in Table 7, Panel II.

Table 8: Foreign ownership and firm's productivity – treatment effects.

			Treatment effects
	у	LPROD	ValueAdded
FOWN_D	0.013 (0.18)	0.006 (0.07)	0.113 (0.60)
1	0.505 (2.08)**	_	_
k	0.078 (2.00)**	0.049 (1.87)*	0.051 (0.98)
Lambda	-0.290 (-3.35)***	-0.204 (-2.59)***	-0.428 (-2.54)**
Time dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Observations	614	614	614
Selection equation:			
Size		0.865 (5.26)***	
DY		-0.091 (-1.82)*	
MB		-0.965 (-3.52)***	
CR		-0.107 (-2.45)**	
DE		0.002 (0.73)	
ROE		0.001 (0.48)	
ST		0.001 (1.11)	

Note: This table reports estimation results for testing the impact of foreign ownership on the firm's productivity using treatment effects. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001-2011. A firm with foreign ownership has 10% or above of its equity owned by foreign investors. Industries are based on the ASE classification. All specifications include time and industry dummies (coefficients not reported). Models are estimated with robust standard errors. Variables are defined in Appendix 2. z-Statistics are in parentheses. ***, **, *Significance at 1%, 5% and 10%, respectively.

and the signs of the variables determining MNEs decision to participate in domestic firms. 12 The findings indicate that MNEs acquire the equity of domestic firms which are large (positive and significant Size); with low payout ratio (negative and significant DY); and with undervalued assets (negative and significant MB). These results are consistent with the evidence reported by Dahlquist and Robertsson (2001) and the evidence from the Jordanian market reported by Abu-Ghunmi et al. (2013). These findings support the hypothesis that foreign investors "cherry-pick" their target companies by acquiring reputable, value firms with assets that the multinational wants to control.

¹² It is difficult to interpret the coefficient sizes because eq. [6] is estimated as a system of two equations (Guo, and Frase 2009).

As a further test of the impact of foreign ownership on the firm's productivity I use PSM for pairing observations. Table 9 reports the average treatment effect for the treated, ATT. The ATT is insignificant using *y*, LPROD and ValueAdded. This finding confirms the previous results that once the unobserved heterogeneity and selection bias are controlled for, the production efficiency of firms with foreign ownership and domestic firms are not significantly different.

Table 9: Foreign ownership and firm's productivity – average treatment effect for the treated (ATT).

	Sample	Treated	Controls	Difference	<i>t</i> -Statistic
y	Unmatched	11.221	10.604	0.616***	(4.20)
	ATT	11.221	11.277	-0.057	(-0.18)
	Observations	267	347		
LPROD	Unmatched	5.846	5.732	0.114	(1.26)
	ATT	5.846	6.038	-0.192	(-0.97)
	Observations	267	347		
ValueAdded	Unmatched	3.671	3.159	0.512***	(2.61)
	ATT	3.671	3.953	-0.281	(-0.67)
	Observations	267	347		

Note: This table reports estimation results for testing the impact of foreign ownership on the firm's productivity using propensity score matching (PSM) for pairing observations. Matching is based on the estimates of eq. [7] that includes the following variables: size (MV); fixed assets (k); number of employees (l); dividends yield (DY); shares turnover (ST); market-to-book (MB); and current ratio (CR); and industry. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001–2011. A firm with foreign ownership has 10% or above of its equity owned by foreign investors. Industries are based on the ASE classification. Variables are defined in Appendix 2. z-Statistics are in parentheses. ***, **, **Significance at 1%, 5% and 10%, respectively.

Finally, I account for the possible endogeneity between output and inputs in the production function using system-GMM estimation method instrumented with three lags. I report the results in Table 10. The variable of interest FOWN is still of small magnitude and statistically insignificant.

5 Conclusion

Arab countries attract only a small fraction of the total FDI flows to developing countries. Jordan, however, have received substantial FDI flows relative to its GDP and those flows translate into a large contribution of foreign investors in the number of employment, sales, market values and equity capital in listed

Table 10: Foreign ov	wnership and	firm's	productivity -	- system GMM.
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			System GMM
	у	LPROD	ValueAdded
Lagged_y	0.893 (24.64)***	-	_
Lagged_LPROD	-	0.788 (16.77)***	-
Lagged_ValueAdded	-	-	0.747 (18.65)***
FOWN	0.001 (0.90)	0.000 (0.07)	-0.003 (-0.50)
1	0.097 (2.13)**	-	-
k	0.037 (1.81)*	0.061 (3.51)***	0.037 (2.02)**
Time dummies	Yes	Yes	Yes
Observations	656	656	656
AR(1) (z)	(-8.43)***	(-9.55)***	(-7.01)***
AR(2) (z)	(1.38)	(1.06)	(1.04)
Sargan test (χ^2)	(306.34)***	(225.70)***	(185.00)*

Note: This table reports estimation results for testing the impact of foreign ownership on the firm's productivity Using System GMM. The sample consists of Jordanian firms in the industrial, utilities and energy and construction sectors listed in the ASE over the period 2001-2011. Industries are based on the ASE classification. All specifications include time dummies (coefficients not reported). Variables are defined in Appendix 2. z-Statistics are in parentheses. ***, **, *Significance at 1%, 5% and 10%, respectively.

Jordanian companies. Based on the premise that foreign investors can transfer advanced technologies and knowledge to their affiliates in the host market at a low cost one would expect that firms acquired by foreign investors will outperform their domestic counterparts in terms of production efficiency. Using TFP, labour productivity and value added per employee as measures of productivity innovation and efficiency in a sample of Jordanian companies, I fail to find evidence on improvements of production efficiency for firms with foreign ownership. The finding of no-impact is robust using alternative estimation methods. This result contradicts the documented international evidence from other developing countries. However, this finding can be explained by the motivation of ownership of foreign investors who are targeting well-performing companies with valuable assets to be acquired under their control. The noresult finding of this study questions the value of current costly investment incentives designed to attract FDI. In addition, it points out to the complexity of realizing possible gains of foreign ownership especially in the context of a small economy.

Appendix 1: Jordan's Investment Incentives Programme

In this appendix I describe Jordan's current investment incentives programme relevant to manufacturing and mining companies. Then I evaluate the likelihood of this programme to attract technology-based projects.

The major components of the current investment incentives programme are defined under the "Investment Promotion Law of 1995" and in "The Jordan Industrial Estate Corporation Law of 1985". Incentives are based on allowing favourable treatment of income taxes and import duty on capital goods and property taxes in specific locations (zones) and industries for a specific period of time. Manufacturing and mining companies receive favourable tax treatment under the two laws. Under "The Investment Promotion Law of 1995", a company is eligible to receive income tax reductions and import duty exemptions. In terms of incentives related to income taxes, Jordan is divided into three development zones: A, B and C. Industry coverage varies according to zone, however, exemptions for projects in mining and manufacturing are allowed for the three zones. Qualified projects can receive a tax reduction of 25% in zone A, 50% in zone B and 75% in zone C for a period of 10 years. In terms of import duty exemptions, a project is qualified to receive duty exemptions on imported fixed assets for 3 years from the date of approval; on imported spare parts valued at 15% of the value of fixed assets up to 10 years; and on imported fixed assets in case of 25% or more expansion. Under "The Jordan Industrial Estate Corporation Law of 1985", new companies established or relocated in industrial estates receive exemption from income taxes for 2 years; tax reductions of 25%, 50% and 75% if the project is located in an industrial estate in zone A, zone B and zone C, respectively, for a period of 10; and 10% income tax reduction thereafter.

Tax holidays can be ineffective in attracting large-scale, long-term capital investments, which are the type of investments that can result in technology transfers and spill-overs. The Jordanian tax authority prevents qualifying firms who enjoy investment incentives from enjoying other tax benefits, namely acceleration of depreciation and carry forward operating losses (Article 5, Regulation No. 5, 2002; Article 10. C, Income Tax Law). Newly

¹³ In this discussion, I exclude laws specific to independent tax territories.

established manufacturing projects invest heavily in fixed assets and hence can report large depreciation expenses if they are allowed to. In addition, manufacturing companies tend to report large operating losses at the start of their operations implying that the tax holiday may expire by the time they become profitable. Conversely, these companies are not allowed to carry forward their losses as regular businesses. Accordingly, the benefits of tax holidays can be offset by the loss of benefits from accelerated depreciation and carry forward tax provisions allowed for regular businesses. In terms of tariff reductions, the conditions on duty exemptions can be restrictive for manufacturing companies with heavy use of machinery because fixtures and replacements (expansions) are not exempted from duty unless they are valued at 15% (25%) or more of fixed assets. Further, Jordan's duty exemptions on imported fixed assets are not competitive with other countries in the region such as the UAE that imposes no import duty on goods used in capital investment (Chen 2004).

In terms of the Jordanian experience, FDI inflows gained momentum in late 1990s up until mid-2000s and were primarily attributed to the privatization of some of the largest Jordanian companies and, to a lesser degree, to the initiation of qualifying industrial zones (QIZs). Privatized companies are not likely to benefit from tax incentives unless they expand by investing in new large-scale projects. As discussed above, however, the value of tax benefits is not expected to be significant enough to induce investing in large-scale projects. QIZs, on the other hand, have attracted a sizable amount of FDI mainly in the textile industry (Momani 2007). Companies in the textile industry take advantage of tax incentives with little loss from relinquishing regular business tax provisions on accelerated depreciation and operating losses. However, companies in QIZs enjoy duty-free access to the US market in addition to the generous tax incentives which confounds the stand-alone impact of tax incentives. In addition, the prospect of technology transfer in companies in QIZs is questionable, since most of these companies are small scale projects that operate in low-technology, labour-intensive industries. Moreover, since textile companies invest very little in fixed assets they can reallocate to countries with more favourable conditions after the period of income holiday expires (Blomström and Kokko 2003). In conclusion, the investment incentives programme in Jordan is likely to be infective in attracting long-term, large-scale projects and the programme's ability to attract labour-intensive projects is likely to be confounded by other set of incentives.

Appendix 2: Operational Definition of the Variables

Variable	Definition
Foreign ownership (FOWN)	The percentage of foreign participation in the capital of firm i at time $t-1$. This variable is hand collected from the Ownership Statistics included in the Companies Guide issued by the ASE.
Foreign Ownership Dummy (FOWN_D)	An indicator variable taking the value of 1 if the foreign ownership is above 10% for firm i at time $t-1$
Output (y)	The logarithm of sales adjusted for the change in inventory and deflated by the industrial producer price index for firm i at time t . Sales and inventory data are collected from the Companies Guide issued by the ASE. The industrial producer price index is collected from the Department of Statistics.
Labour productivity (LPROD)	The logarithm of the ratio between sales adjusted for the change in inventory and deflated by the industrial producer price index divided by the number of employees. Sales and inventory data are collected from the Companies Guide issued by the ASE. The industrial producer price index is collected from the Department of Statistics. The number of employees is hand collected from three sources: General Statistics included in the Companies Guide issued by the ASE; the ASE's website; and firm's financial statements.
Value added per employee (ValueAdded)	The logarithm of the ratio between sales and cost of sales divided by the number of employees. Sales and cost of sales data are collected from the Companies Guide issued by the ASE. The number of employees is hand collected from three sources: General Statistics included in the Companies Guide issued by the ASE; the ASE's website; and firm's financial statements.
Capital stock (k)	The logarithm of net fixed assets for firm i at time t . Net fixed assets data are collected from the Companies Guide issued by the ASE.
Labour (1)	The logarithm of the number of employees for firm i at time t . Firms included in the analysis are the ones with 10 employees or more. The number of employees is hand collected from three sources: General Statistics included in the Companies Guide issued by the ASE; the ASE's website; and firm's financial statements.
Size of the firm (Size)	The logarithm of the total market value of the firm. This data item is collected from the Companies Guide issued by the ASE.

(continued)

(Continued)

Variable	Definition
Market-to-book ratio (MB)	The ratio between sum of the market value of a firm's equity and the book value of its liabilities divided by the book value of a firm's assets. Relevant data items are collected from the Companies Guide issued by the ASE.
Dividends yield (DY)	The percentage between the dividends per share divided by the price per share. Relevant data items are collected from the Companies Guide issued by the ASE.
Current ratio (CR)	The ratio between current assets to current liabilities. Relevant data items are collected from the Companies Guide issued by the ASE.
Return on equity (ROE)	The ratio between a firm's net income to its total equity. Relevant data items are collected from the Companies Guide issued by the ASE.
Shares turnover (ST)	The number of shares traded divided by the number of subscribed shares. Relevant data items are collected from the Companies Guide and the Statistical Bulletins issued by the ASE.

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