Picking 'lemons' or 'cherries'? Domestic and foreign acquisitions in Norwegian manufacturing*

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Abstract

We compare the performance in employment, wages and productivity for domestic plants acquired by new domestic and foreign owners. Prospective foreign owners pick large, high-wage, high-productivity plants, while new domestic owners choose average performers of above average size. Employment, labour productivity and total factor productivity decline in domestic acquisition targets before acquisitions, only wages recover afterwards. Employment, wages and labour productivity increase after foreign acquisitions. The sample selection introduced by long-term comparisons and a focus on unique events introduces a downward bias into the results for domestic acquisitions and an upward bias for the foreign acquisitions.

Keywords: acquisitions, foreign ownership, employment, wages, productivity

JEL Classification: D24, F23, L10, J24

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1 Introduction

The increase in foreign direct investment in industrialised countries since the mid-1980s has largely come about through mergers and acquisitions (M&As). At the same time the volume of mergers and acquisitions among firms of the same nationality has also increased. An acquisition of another plant offers the new owner the possibility to restructure current operations in such a way that plant performance changes permanently. The new owner may want to change the size and composition of the labour force or employment conditions. The new owner may also bring in new capital, technology or management practises. The literature on mergers and acquisitions suggests different motives for ownership changes; these in turn give rise to different predictions about the effects of an ownership change on the performance of the acquisition target. The possible restructuring following an ownership change may enhance productivity and allow the plant to expand. However, there is no guarantee that a restructuring process always turns out to be successful.

In this paper we investigate the performance of plants around an ownership change, in particular we compare domestic plants that are acquired by a foreign owner to domestic plants that are acquired by a new domestic owner. We look at plant performance in terms of employment, wages and productivity. We show that plants subject to these two types of ownership change differ both before the acquisition and in their post-acquisition performance. Acquisitions may occur close to plant entry or exit and plants may experience more than one ownership change close in time. To take account of these possibly confounding events, we further demonstrate how selecting the sample of plants that experience acquisitions affect our conclusions about the performance in acquired plants relative to a reference group. To examine these questions we use the census of Norwegian manufacturing plants from 1992 to 2004, where we observe on average 167 domestic and 45 foreign acquisitions per year.

Our paper is related to the empirical literature on post-acquisition performance. For example Lichtenberg and Siegel (1987), Maksimovic and Phillips (2001), Schoar (2002) and Maksimovic et al. (2008) all examine the effect of acquisitions on productivity using data from the US. They find that productivity measured as labour productivity or total factor productivity increases in the period after the ownership change. Lichtenberg and Siegel (1987) also find that plants with below industry-average productivity are more likely to change ownership. Gugler and Yurtoglu (2004) and the literature summarised therein look at the impact of mergers and acquisitions on employment; these studies find mostly no effect or a negative effect on employment after acquisitions. The literature on the impact of acquisitions on wages as summarised in Conyon et al. (2004) provides examples of both positive and negative effects.

While the studies mentioned above do not separately address foreign acquisitions, another strand of the literature deals specifically with the effects of foreign acquisitions on the performance of the acquired plants. The motivation in these papers is to establish whether plants acquired by foreign owners are 'cherry-picked' on pre-acquisition performance and/or whether

performance improves with the new foreign owner. The evidence is mainly consistent with foreign owners targeting high productivity firms as well as positive post-acquisition effects on productivity. Examples are McGuckin and Nguyen (1995) for the US, Harris and Robinson (2002), Girma and Görg (2007b) and Criscuolo and Martin (forthc.) for the UK, and Karpaty (2007) for Sweden. Regarding other effects of foreign acquisitions, most of the evidence suggests that employment is unchanged or increases after foreign acquisition, examples are Girma (2005) for the UK and Bandick and Karpaty (2007) for Sweden. Wage increases after foreign acquisitions are documented by Conyon et al. (2002) and Girma and Görg (2007a) for the UK as well as Huttunen (2007) for Sweden.

Only a few papers compare domestic and foreign acquisitions; Conyon et al. (2002) and Hanley and Zervos (2007) do this for the UK, Gioia and Thomsen (2004) for Denmark; Fukao et al. (2006) and Bertrand and Zitouna (2008) study domestic and foreign acquisitions in Japan and France, respectively. While the performance measures used vary between these studies, the general picture is that performance improves by more after foreign acquisitions than after domestic acquisitions. One exception is Hanley and Zervos (2007) who find a dip in post-acquisition labour productivity for UK plants acquired by both domestic and foreign firms, but only plants acquired by domestic owners also show a dip in wages after acquisition. In terms of the selection of acquisition targets, most of these studies find that foreign owners acquire firms that perform better before acquisition than the ones domestic buyers choose. Exceptions are Conyon et al. (2002) who find that foreign owners target firms with below average productivity in the UK. Also Gioia and Thomsen (2004) find that foreign buyers have a propensity to acquire lower performing but bigger targets compared to Danish domestic firms.

While most papers in the literature focus on only one measure of plant performance around acquisitions, we compare plant performance in terms of employment, wages, labour productivity and total factor productivity. A further contribution is that we take account of entry and exit and multiple ownership changes in order to isolate the performance around ownership change from what happens around these competing events. From empirical evidence on plant heterogeneity,[1] we know that plant entry and exit are events where plant performance is known to differ, not only from industry average, but also from their own within-plant average in terms of employment and productivity. As ownership changes may in some cases occur shortly after entry, or may be followed by subsequent plant closure or yet another ownership change, it is important to isolate the performance around ownership changes from developments close to competing events like entry, exit or other ownership changes.

Finally, we look at plant performance for a longer period before acquisition than is usually done in the literature. While it is common to follow plants for some time after the acquisitions based on the argument that the effects of acquisitions may take time to materialise, it could also be the case that a plant's performance prior to acquisition is the trigger for a change in ownership. For instance, Lichtenberg and Siegel (1987) argue that poor plant performance is

[1] For a survey see Bartelsman and Doms (2000).

a signal that the owner does not have a comparative advantage in managing the plant and should therefore sell it on to a new owner. This suggests that in order to fully understand plant performance around ownership change it is not enough to just look at the development in performance after acquisition, the period before acquisition has to be taken into account as well. While most of the above literature reduces the pre-acquisition period to the year before acquisition, we study the performance of acquisition targets starting 3 years before the acquisition. The requirements that allow us to follow an acquisition target from 3 years before until 3 years after the acquisition while the plant is not at the same time close to entry, exit or additional acquisitions, clearly limit the number of acquisition targets that can be used in the analysis. We add to the literature by carefully documenting how different restrictions on the sample of plants that undergo ownership changes introduce selection bias in the results regarding plant performance around acquisition.

Our findings from Norwegian manufacturing suggest that acquisition targets of domestic and foreign owners differ in terms of size, average wages and labour productivity already 3 years before the ownership change. Future foreign acquisition targets perform well above the average of domestic plants that are not acquired, while plants that are to undergo a change between domestic owners only differ in terms of being larger in size. During the 3 years leading up to an ownership change, performance in targets of new domestic owners deteriorate markedly, while there is little evidence of a similar deterioration in performance before foreign acquisitions. In the 3 years after domestic acquisitions employment returns to previous levels, but there are no strong signs of improvements in productivity. In contrast, the post-acquisition performance of plants subject to foreign acquisition improves in terms of employment, wages and productivity. Restrictions on the sample of acquisitions, such as choosing surviving plants and the exclusion of competing events, introduces an upward bias for foreign acquisitions and a downward bias for domestic acquisitions.

In the following, Section 2 provides a short background on theories of mergers and acquisitions and relates them to the existing empirical evidence. In Section 3 we introduce the data set and provide definitions of the events of entry, exit and acquisitions. Section 4 first documents plant performance around entry, exit and acquisitions relative to industry-year mean and relative to within-plant averages (4.1). Then we concentrate on acquisitions and discuss the effects of sample selection and study the change in performance both in the 3 year period prior to ownership change and the 3 year period after acquisition (4.2). Section 5 concludes.

2 Theoretical and Empirical Background

In the theoretical literature several motivations for mergers and acquisitions have been put forward. The different motivations for M&As may have different implications for how plants are expected to perform both before and after the acquisition. We briefly discuss 3 general hypotheses of motivations for M&As.

a) Managerial hybris: Managers may use mergers and acquisitions to fulfill their desire to maximize firm size (e.g. Jensen, 1986) or to build empires (e.g. Baumol, 1959 and Mueller, 1969). If efficiency considerations are of secondary order in such decisions, no clear predictions can be made as to whether the target firms are more likely to be 'lemons' or 'cherries' before the acquisition. Furthermore, plant performance after acquisition may not change, and could even deteriorate if managerial hybris is not coupled with managerial competence.

b) Management's comparative advantage: According to the neoclassical theory of the firm, firms' boundaries shift across industries in response to shocks that alter their and their competitors' comparative advantage (Lucas, 1978, Maksimovic and Phillips, 2001). Here a firm deploys its talent and organisation in industries where it can obtain the greatest marginal payoff. These payoffs are affected by industry shocks which may lead firms to adjust their boundaries in accordance with their comparative advantage by selling or acquiring plants. Hence, acquisitions are a way to improve the match between plants and the comparative advantage of firms (Lichtenberg and Siegel, 1987). This stretches to cases where an acquiring firm expects to improve efficiency by disciplining (or replacing) management. Consequently, if plants are not sold again shortly after a takeover, the acquisition was in line with the comparative advantage of the acquirer and performance should increase after acquisition (Maksimivic et al., 2008), in particular productivity and profitability.

Lichtenberg and Siegel (1987) interpret their evidence from acquisitions in the US as supporting this view, both in terms of the finding that the acquisition targets in their sample are 'lemons' and the observed improvement in productivity after acquisition. Shleifer and Summers (1988) argue similarly that mergers and acquisitions offer an opportunity for a new management team to renegotiate or revoke existing contracts as they may be less committed to upholding past agreements with stakeholders. Gugler and Yurtoglu (2004) investigate this hypothesis and find that employment is reduced by more after acquisitions in Europe than in the US. They argue that the more rigid labour market regulations in Europe create a greater need for revoking contracts with workers there than in the US where it is easier to reduce employment after negative shocks. Conyon et al. (2002) also argue that their finding of a significant wage decrease after domestic acquisitions in the UK is consistent with the Shleifer and Summers argument.

c) Synergy effects: This view argues that acquiring firms are looking to buy targets that have related efficiencies such that synergies between the firms can improve efficiency further. McGuckin and Nguyen (1995) argue that their finding for the US, where high productivity plants are acquired and improved further, is consistent with this view.

The hypotheses mentioned above do not explicitly distinguish between domestic and cross-border M&As. While the nationality of the new owner does not have to play a role, cross-border acquisitions are different from domestic acquisitions in that they are - like greenfield investments - a way of entering a new geographical market. Already Dunning's (1981) OLI paradigm stipulates that a multinational enterprise has to have a specific ownership advantage

in order to overcome the lack of information and extra costs associated with investing in a foreign country. It is indeed well established that subsidiaries of foreign-owned firms outperform their host-country competitors in terms of size, technology intensity, management performance and productivity (Barba Navaretti and Venables, 2004). Therefore, if superior management or technological skills are transferred to the foreign subsidiary upon acquisition this should enhance performance, especially productivity. This is in line with the comparative advantage argument above in that here firms exploit their capabilities beyond national borders.

Technology sourcing or gaining access to other types of foreign knowledge, has been brought forward as an alternative motivation for firms to invest abroad (Keller (2004) provides a survey). This would suggest that foreign owners target high-productivity plants in acquisitions and performance after acquisition is not affected by the new owner.[2]

Nocke and Yeaple (2007) exploit essentially the above two arguments when considering the implications for post-acquisition performance of domestic versus foreign acquisition as part of their analysis of the relationship between firm efficiency and the mode of foreign market access. According to their model acquisition targets of domestic and foreign acquisitions do not differ in industries with internationally mobile capabilities (e.g. technological know-how), but the foreign acquirers are on average more efficient and hence the improvement in post-acquisition establishment performance should be higher. In contrast, in industries where the source of firm heterogeneity is not internationally mobile (e.g. market expertise, advertising) the targets of domestic acquisitions are endowed with a better non-mobile capability and this is where their better post-acquisition performance derives from.

3 Data and definitions

3.1 Data sources

Our main data source is the annual census of all Norwegian manufacturing plants collected by Statistics Norway. The Norwegian Manufacturing Statistics are collected at the plant level, and include detailed information on production, input use, location, and industry classification.[3] As we want to construct measures of total factor productivity we cannot work with plants that have only limited information on capital, i.e. plants classified as 'small'. Consequently, we drop plants that have less than 10 employees all the years they are observed. For the period of analysis, 1992-2004, this procedure drops about two thirds of the plants and about half of the observations in the full census, but the remaining plants still account for almost 90% of total manufacturing employment during this period. We further drop plants that never invest in capital equipment, plants that have missing observations for one or more of the relevant input

[2]Criscuolo and Martin (forthc.) explore the relative importance of the two motivations empirically for the UK.

[3]For more detailed descriptions of the Manufacturing Statistics, see the documentation in Halvorsen et al. (1991) and Møen (2004).

or output variables (employment, wage costs, capital and gross output) in 50% or more of their years in the panel. This procedure drops about 4% of observations between 1992-2004; it has only minor effects on average plant size, industry composition and the share of foreign-owned plants in the panel.[4] The resulting panel contains 65740 observations from 7158 plants.

In order to classify plants as foreign or domestic, we use the register of foreign ownership interests collected by Statistics Norway, the so-called SIFON register. The register can be linked to plants in the Manufacturing Statistics. We classify plants as foreign-owned when either direct or indirect foreign ownership of equity is above the 50% threshold.[5] A foreign-owned plant is by definition part of a foreign multinational (MNE).

We are also able to identify domestic MNEs in manufacturing by using a third source of data; the register of outgoing foreign direct investment (FDI) from Norway. The register of outward FDI contains, among other things, information on shares and votes in operations abroad controlled by Norwegian firms. We define a Norwegian MNE as a firm that is not itself majority owned from abroad, while it has direct or indirect ownership shares of more than 50% in operations abroad.

3.2 Definitions of events

Although the performance of plants around ownership change is our primary interest, we think it is important to isolate what happens to performance around acquisitions from what happens close to entry and exit. Empirical evidence has shown that plant performance close to entry and exit deviate from average; entering plants are small, and if successful increase employment substantially in the first years after entry, while failing plants that are about to close down typically have low productivity and shed labour in the last years before exit, see Bartelsman and Doms (2000) for a survey of the evidence. This is particularly important for our data set since it is a census that is dominated by small plants and large turnover of plants. The nature of our data allows us to identify entry, exit and ownership changes for each plant.

In the Norwegian Manufacturing Statistics each plant is assigned an identification number which it keeps throughout its life. A plant keeps its previous identification number even when it re-enters the market after a time of inactivity as long as production restarts in the same geographic location. Ownership changes at the firm level do not affect the plant identification code. Since our data are from a census, we avoid the problem of possible false entries and exits due to plants not being sampled.

Although the logic of the census would imply that a plant is not in operation if it is not observed for some time, we assume that when a plant is missing from the census for one or two consecutive years, this is due to lack of registration/reporting rather than a temporary closure.

[4]The average domestic plant in our sample has 41 employees, while the average foreign owned plants has 97 employees.

[5]A firm has direct foreign ownership interests if foreigners own part of the equity of the firm. If 50% or more of equity in a plant is owned by another firm based in Norway (mother), and the mother is foreign-owned, this is defined as indirect foreign ownership in the SIFON-register.

When a plant disappears for three or more consecutive years before it reappears in the census, we regard it as (temporarily) closed and count an extra exit and entry for that plant. Thus, we define a plant as an entrant in year t if it appears for the first time in year t, or reappears in the year after a temporary closure. Similarly we define an exit in year t if the plant is present in year t and temporarily closed in $t+1$, $t+2$ and $t+3$, or absent all subsequent years.[6]

In terms of ownership changes, we identify a foreign takeover of a domestic plant by a change in the foreign ownership of assets. We define a foreign acquisition in year t if the share of assets owned by foreigners increases from below 50% in year $t-1$ to above 50% in year t. We define a plant as undergoing a domestic acquisition in year t if it is domestic both in t and $t-1$, but has a new firm identification code in year t. Thus, in this paper we are looking at ownership changes of plants that are domestically owned before the ownership change.[7]

Table 1: Numbers of plants by ownership and type of event

	1992	1996	2000	2004	1992-2004	
					mean	sd.
Domestic plants	5276	4774	4472	3871	4588	422
of which						
- Domestic survivors	4493	4262	3978	3545	4109	355
- Domestic acquisitions	251	201	155	106	167	59
- Domestic entry	121	154	112	51	115	39
- Domestic exit	411	157	227	169	197	70
Foreign plants	346	420	541	560	469	90
of which						
- Foreign survivors	284	337	430	514	392	79
- Foreign acquisitions	29	52	73	24	45	17
- Foreign entry	6	14	14	5	11	4
- Foreign exit	27	17	24	17	21	7

Table 1 gives an overview of the composition of domestic and foreign plants in our sample by type of event in 4 selected years. The last two columns give the mean and the standard deviation of the annual numbers of plants for the whole period. On average during the period from 1992-2004 there are 45 foreign acquisitions per year and 167 domestic acquisitions. In line with many other developed countries, the total number of manufacturing plants declined over the period and the number of foreign-owned manufacturing plants has increased, primarily due to acquisitions. The total share of employment accounted for by foreign firms increased from 12% in 1992 to 25% in 2004.[8] It is important to note that in Norway there are no institutional incentives in place to attract FDI.

[6]Less than 2% of the plants in our final sample are subject to temporary closures.

[7]We briefly discuss the role of ownership changes where the plant is foreign owned before ownership change in Section 4.2.

[8]In Swedish manufacturing the share of employment in foreign-owned firms increased from 17% in 1993 to 38% in 2002 according to Bandick and Karpaty (2007), and Huttunen (2007) documents an increase from 5% to 22% in the same period for Finnish manufacturing.

4 Performance around domestic and foreign acquisitions

4.1 Controlling for entry and exit in the full sample

We examine performance in the years around an ownership change by regressing measures of plant performance, $y_{i,t}$, on the following:

$$\begin{aligned} y_{i,t} \;=\; & \sum_{t=t-2}^{t+2} \alpha_{Dt}\text{Dom acq}_{i,t} + \sum_{t=t-2}^{t+2} \alpha_{Ft}\text{For acq}_{i,t} \\ & + \sum_{t=t}^{t+2} \beta_{Dt}\text{Dom entry}_{i,t} + \sum_{t=t}^{t+2} \beta_{Ft}\text{For entry}_{i,t} \\ & + \sum_{t=t-2}^{t} \gamma_{Dt}\text{Dom exit}_{i,t} + \sum_{t=t-2}^{t} \gamma_{Ft}\text{For exit}_{i,t} + \text{Controls} + \epsilon_{i,t}. \end{aligned} \tag{1}$$

Dom $\text{acq}_{i,t}$ (For $\text{acq}_{i,t}$) is a dummy variable equal to 1 in the year of domestic (foreign) acquisition, we also include separate dummies for the two years before, and the two years after the acquisition. To isolate the effect of the acquisitions from entry and exit, we also include separate entry (exit) dummies for plants in the first (last) year they are observed and the two following (preceding) years. We refer to the full set of entry, exit and acquisition dummies as event dummies. As controls we include plant size (log employment), plant age, and two dummy variables: $\text{domMNE}_{i,t}$ if a plant is part of a domestic MNE, and $\text{forMNE}_{i,t}$ if a plant is part of a foreign MNE. These dummies are set to zero when any of the event dummies are equal to one. This ensures that the control group contains only domestic non-MNEs.[9] We also include industry, year and industry-year interaction dummies. The industry dummies are at the 4-digit ISIC level, corresponding to 78 industries, while the industry-year interactions are at the 3-digit level with 28 manufacturing industries.

Our plant-level performance measures $y_{i,t}$ are employment (in log terms), the average wage in the plant (in log terms), labour productivity (LP) defined as the log of deflated gross output per employee and total factor productivity (TFP). We calculate the log of TFP from the following equation

$$\ln TFP_{it} = \ln Y_{it} - \hat{\alpha}_K \ln K_{it} - \hat{\alpha}_M \ln M_{it} - \hat{\alpha}_L \ln L_{it}, \tag{2}$$

where Y_{it} is deflated gross output, K_{it} is deflated capital, M_{it} is deflated material use, and L_{it} is the number of employees in plant i in period t.[10] $\hat{\alpha}_K$, $\hat{\alpha}_M$, $\hat{\alpha}_L$ are the estimated coefficients from an OLS a regression where the log of output is regressed on the log of the three inputs, year and industry dummies and industry-year interactions. In this way, the TFP measure takes out any systematic differences in input use between sectors, across years, and also removes industry

[9] We discuss the role of Norwegian multinationals in domestic and foreign acquisitions in Section 4.2.

[10] See the Appendix for details on the definitions and construction of all variables.

trends. Our results are robust to using other measures of TFP (cf. Section 4.2).

We estimate equation (1) using both OLS and plant fixed effects. Given that we include industry, year, and industry-year interaction dummies, the OLS coefficients on the event indicators will capture the deviation from the reference group that represents the industry-year averages of domestic non-MNEs that are not experiencing an event. With our fixed effects estimations, we examine whether plants that are close to events deviate from their own average performance over their time in the panel. The interpretation of the fixed effects coefficients is then that a negative (positive) coefficient on an event dummy suggests that the plant is doing worse (better) than 'usual' (their own average over time) that year.

We present the OLS results in the first four columns of Table 2 and the fixed effect results in columns 5-8. The dummies for domestic and foreign MNEs indicate as expected that subsidiaries of multinational firms are much larger, pay higher average wages, and have higher labour productivity than non-MNEs. The OLS results show that foreign entrants outperform the reference group already at start-up, while this is not the case for domestic entrants. And, while domestic exits perform well below average at the time of exit, foreign plants that are about to close down still have wage levels almost 10% above average and productivity levels that do not differ significantly from the reference group. The fixed effects results show similar patterns of within plant deviations for foreign and domestic entrants and exits. Both types of entrants (exis) have a start-up (shut-down) size about half that of their own long-term average. Entrants quickly increase employment after entry; and exits decrease employment and productivity in the years leading up to exit. However, while domestic plants close to exit clearly reduce average wages, foreign exits do not.[11]

Turning to plants that experience ownership changes, the OLS results tell us that plants experiencing a change of domestic owner are around 30% larger than average two years before the acquisition, do not differ from average in terms of wages and labour productivity, and have TFP levels significantly below average before the acquisition. The fixed effects results for employment in column 5 of Table 2 show positive coefficients on the domestic acquisition dummies before the ownership change and negative and significant coefficients after. This suggests that employment decreases from before to after domestic acquisitions. The results for wages and productivity in columns 6-8 also confirm that domestic takeovers seem to occur primarily in troubled plants. Judging by the negative and significant coefficients on the acquisition dummies in years $t-1$ and t, wages and productivity fall before domestic acquisitions. After the ownership change TFP reverts back to normal, labour productivity is still below own average 2 years after the acquisition, and average wages increase.

Plants that are subject to foreign acquisitions are larger (70-80%), pay higher wages (8%) and have higher labour productivity (15%) than the reference group already two years before

[11]The reduction in average wages relative to previous levels in domestic plants prior to exit is likely to be a combination of a curb in nominal wage increases such that the real wage is reduced, a reduction in hours worked and use of overtime, and a change in the composition of the workforce. Schwerdt (2008) finds that the high-skilled workers are the first to leave in 'the shadow of plant death'.

Table 2: Employment, wages and productivity levels around acquisitions, entry and exit

	relative to industry-year-mean (OLS)				relative to plant-mean (Fixed effects)			
	Employment	Avg. wage	Lab. Prod.	TFP	Employment	Avg. wage	Lab. Prod.	TFP
dom acq_{t-2}	.316 (.025)**	-.005 (.006)	.007 (.013)	-.012 (.005)*	.028 (.011)*	-.015 (.005)**	-.015 (.009)	-.004 (.005)
dom acq_{t-1}	.295 (.024)**	-.005 (.007)	-.015 (.013)	-.032 (.006)**	.015 (.013)	-.020 (.007)**	-.045 (.011)**	-.022 (.006)**
dom acq_t	.119 (.024)**	-.011 (.008)	-.009 (.012)	-.025 (.005)**	-.110 (.014)**	-.038 (.008)**	-.068 (.011)**	-.020 (.005)**
dom acq_{t+1}	.180 (.024)**	.017 (.007)*	-.003 (.013)	-.008 (.006)	-.058 (.012)**	-.001 (.007)	-.044 (.011)**	-.003 (.006)
dom acq_{t+2}	.167 (.024)**	.021 (.007)**	-.011 (.013)	-.011 (.006)(*)	-.041 (.011)**	.011 (.007)(*)	-.035 (.010)**	-.007 (.007)
for acq_{t-2}	.711 (.049)**	.080 (.012)**	.159 (.027)**	.011 (.011)	-.017 (.023)	.006 (.011)	-.033 (.020)(*)	-.006 (.009)
for acq_{t-1}	.722 (.048)**	.088 (.012)**	.148 (.030)**	.019 (.018)	-.029 (.024)	.008 (.011)	-.066 (.028)*	-.001 (.019)
for acq_t	.789 (.046)**	.060 (.012)**	.172 (.026)**	-.003 (.014)	.016 (.026)	-.015 (.012)	-.026 (.023)	-.013 (.015)
for acq_{t+1}	.817 (.046)**	.082 (.011)**	.195 (.027)**	.007 (.014)	.039 (.027)	.015 (.010)	.018 (.023)	.002 (.014)
for acq_{t+2}	.884 (.049)**	.095 (.012)**	.193 (.027)**	.027 (.013)*	.058 (.027)*	.028 (.011)*	.041 (.023)(*)	.022 (.013)
dom $entry_t$	-.349 (.032)**	.039 (.013)**	-.001 (.021)	-.012 (.011)	-.549 (.026)**	-.047 (.013)**	-.145 (.019)**	-.012 (.011)
dom $entry_{t+1}$	-.066 (.030)*	.022 (.011)*	-.032 (.020)(*)	-.033 (.012)**	-.253 (.021)**	-.023 (.010)*	-.082 (.016)**	-.021 (.011)(*)
dom $entry_{t+2}$	-.030 (.029)	.002 (.010)	-.018 (.018)	-.013 (.009)	-.164 (.018)**	-.021 (.010)*	-.042 (.014)**	-.004 (.009)
for $entry_t$	.197 (.101)(*)	.118 (.046)**	.191 (.076)*	.041 (.036)	-.471 (.088)**	-.052 (.035)	-.124 (.085)	-.060 (.057)
for $entry_{t+1}$	.438 (.097)**	.102 (.036)**	.289 (.059)**	.041 (.033)	-.190 (.075)*	-.048 (.035)	.024 (.068)	-.055 (.054)
for $entry_{t+2}$	.457 (.110)**	.121 (.029)**	.149 (.062)*	.005 (.033)	-.118 (.061)(*)	.004 (.030)	-.021 (.065)	-.048 (.053)
dom $exit_{t-2}$	-.341 (.023)**	-.020 (.008)**	-.095 (.013)**	-.030 (.006)**	-.115 (.013)**	-.054 (.008)**	-.085 (.011)**	-.017 (.006)**
dom $exit_{t-1}$	-.403 (.023)**	-.049 (.009)**	-.134 (.014)**	-.050 (.008)**	-.208 (.016)**	-.106 (.011)**	-.149 (.014)**	-.035 (.008)**
dom $exit_t$	-.649 (.025)**	-.169 (.012)**	-.293 (.017)**	-.100 (.009)**	-.533 (.020)**	-.254 (.016)**	-.368 (.019)**	-.089 (.011)**
for $exit_{t-2}$	-.111 (.079)	.079 (.025)**	.085 (.045)(*)	-.005 (.026)	-.209 (.045)**	-.007 (.018)	-.064 (.038)(*)	-.014 (.023)
for $exit_{t-1}$	-.109 (.076)	.087 (.024)**	.018 (.048)	-.035 (.030)	-.291 (.049)**	-.003 (.021)	-.146 (.047)**	-.054 (.029)(*)
for $exit_t$	-.193 (.076)*	.093 (.025)**	.045 (.046)	-.039 (.027)	-.537 (.059)**	-.042 (.027)	-.193 (.053)**	-.059 (.031)(*)
domMNE	1.167 (.070)**	.081 (.012)**	.190 (.029)**	.007 (.015)	.042 (.023)(*)	.002 (.010)	-.014 (.021)	-.013 (.013)
forMNE	.936 (.056)**	.133 (.011)**	.270 (.025)**	.018 (.009)*	.062 (.028)*	.027 (.010)**	.033 (.024)	-.013 (.014)
R^2	.26	.29	.30	.16	.13	.10	.15	.07

Notes: In all regressions the number of observations is 65735 and the number of plants is 7158. All regressions include a constant term, controls for age and plant size (we do not control for plant size in the employment regression), year and year- industry (3-digit ISIC) interaction dummies. All OLS regressions also include 4-digit industry dummies. **, *, (*) indicate significance at 1, 5, 10%.

the acquisition. These deviations from average persist in all the years around the acquisition, while TFP levels do not differ significantly from those of the reference group until 2 years after foreign acquisitions, when they are significantly higher (columns 1-4). The fixed effect results show that contrary to what happens in plants subject to domestic acquisitions, employment and labour productivity is higher after foreign acquisitions than before. Similar to domestic acquisitions, average wages in the acquired plants are higher after ownership change, but the effect is stronger in the foreign acquisitions.[12]

4.2 Sample selection

The results in Table 2 are based on using all the observations of domestic and foreign ownership changes in our sample. Some of these plants are close to an acquisition and entry or exit at the same time, or they experience several ownership changes within a few years. As we have seen in Section 4.1, plants that are close to entry and exit differ markedly in performance from more established plants. Therefore, also the performance of plants that are sold to new owners could differ substantially depending on whether or not the new owners close down the plant or sell it on to new owners shortly after the acquisition.[13] For the results in Table 2 to reflect the average performance in acquisition targets relative to the reference group, the underlying assumption is that the effects of multiple events are separable.

To avoid this separability assumption, we drop all observations that have entry (t to $t+2$) or exit ($t-2$ to t) dummies equal to one in Table 2. This affects more than 11000 observations, and reduces the numbers of domestic and foreign ownership changes by around 12% each. By concentrating on plants that are in operation at least 3 years before the acquisition and survive at least 3 years after the acquisition we select plants based on survival. The purpose of this section is to discuss how the results on the performance of plants around acquisitions are affected by different selection criteria for the group of plants that undergo acquisitions. In addition to the survival sample just mentioned (Sample 1), we also use 3 more restrictive samples of acquisition plants. We make sure that our reference group is the same across samples and consists only of non-MNEs at least 3 years from entry and exit.[14] This simplifies the estimating equation (1) to:

[12] Although we do not have information on the skill composition of the workforce, the increase in average wages is likely to be a result of a change in the composition of the workforce towards high-skilled workers, which is also reflected in the increased labour productivity. Bandick and Karpaty (2007) suggest that the positive effect of foreign acquisitions is more immediate for high-skilled employees than for low-skilled employees.

[13] Maksimovic et al., (2008) show that plant exit is common following a change in ownership in their US data. In our sample 5(6)% of plants exit within 2 years of a domestic (foreign) acquisition.

[14] We do this by dropping plants that do not experience any ownership changes, but have MNE status at some point. This makes the domestic and foreign MNE dummies used in equation 1 redundant. We also drop observations of our acquisition plants when they are more than 3 years away from ownership change to make sure that observations of plants subject to ownership change are never in our control group of non-MNEs.

$$\ln y_{i,t} = \sum_{t=t-3}^{t+3} \alpha_{Dt} \text{Dom acq}_{i,t} + \sum_{t=t-3}^{t+3} \alpha_{Ft} \text{For acq}_{i,t} + \text{Controls} + \epsilon_{i,t}. \quad (3)$$

Table 3 shows that we have almost 2400 acquisitions of domestic plants by either new domestic or foreign owners in Sample 1. In Samples 2-4 we address the following concerns: First, plants may experience multiple acquisitions. Second, ownership change may also occur in plants that are foreign owned before the change of foreign ownership (foreign divestures or change from one foreign owner to another).[15] Third, while a foreign acquisition by definition involves a foreign MNE, what role do domestic MNEs play in acquisitions?

In Sample 2 we take account of the issues above by excluding plants with more than one ownership change during our 13 year sample period. In our data, plants with multiple acquisitions are on average more than twice as large as plants with only one acquisition. In addition, multiple acquisitions make the definitions of periods before and after acquisition difficult. Dropping plants with more than one acquisition turns out to remove most of the observations in Sample 1 where plants are foreign-owned before an ownership change.[16] Focusing on plants with only one ownership change also drops most of the observations where plants are classified as domestic MNEs, and we also drop the remaining 118 (41) plants with domestic (foreign) acquisition that are domestic MNEs at some point. Thus with Sample 2 we compare how performance evolves in non-MNEs that are acquired either by foreign owners (145 plants) or by different domestic owners that are not MNEs (1016 plants).

In Samples 1 and 2 we have not worried about missing observations of plants around acquisitions, or about observing each plant both before and after the acquisition. We address this in Sample 3, where we restrict Sample 2 further by requiring that the plants with only one acquisition are observed in years $t-3$, $t-2$, $t+2$, and $t+3$ around the acquisition year. This removes plants with missing observations around acquisition, excludes acquisitions occurring before 1995 and after 2001, and makes the selection on survival more stringent.[17]

Both, Samples 2 and 3 compare non-MNEs that are acquired either by foreign owners (that are MNEs by definition) or by new domestic owners that are not MNEs, but it could be argued that it is more relevant to compare foreign acquisitions of domestic plants to acquisitions of domestic plants by domestic MNEs. This is what we capture in Sample 4. From the plants

[15]Most of the research on foreign acquisitions looks at foreign acquisitions of domestic plants and ignores ownership changes from foreign to domestic. One exception is Sjøholm and Lipsey (2006) who compare domestic-foreign and foreign-domestic takeovers in Indonesia; they do not obtain clear-cut results for foreign to domestic takeovers.

[16]These types of acquisitions are not counted in Table 3, but for the plants in Sample 1 there are 313 ownership changes where plants are foreign-owned before the ownership change. Only 21 of these observations remain after dropping plants with multiple ownership changes, this indicates that most of the foreign divestures occur in plants with multiple ownership changes. Most of these are plants where the foreign ownership share changes back and forth around the 50% threshold.

[17]Given that for Sample 1 we already dropped observations that are within 2 years of entry and exit, the requirement in Sample 3 implies that the acquisition plants enter at least 5 years before acquisition and exit no closer than 5 years after acquisition.

Table 3: Numbers of acquisitions in different samples

		Domestic	Foreign
Sample 1	All acquisitions not close to entry/exit	1894	492
Sample 2	Plants with 1 acq. and never a domestic MNE	1016	145
Sample 3	As Sample 2, and observed 2/3 years before/after acq.	417	57
Sample 4	Plants with 1 acq. and acq. by domestic and foreign MNEs	18	74

with only one acquisition we select plants with acquisitions occurring between 1995 and 2001 where the plant is always a non-MNE before the acquisition and the new owner is either a Norwegian MNE (18) or a foreign MNE (74).[18]

We estimate equation (3) by OLS on the 4 samples of plants that experience acquisitions. Our performance measures $y_{i,t}$ are as before; employment, wages, labour productivity and TFP. Results are presented in Table 5 in the Appendix, and the estimated coefficients for Samples 1-3 are depicted graphically in Figure 1.[19] A glance at Figure 1 is consistent with the main message from using the full sample in Table 2. Domestic plants experiencing foreign acquisitions are larger, pay higher wages and have higher labour productivity than both the reference group and plants subject to domestic acquisitions, already 3 years before the takeover. Plants subject to domestic acquisitions are also significantly larger than the reference group 3 years before the acquisition, but this is not the case for wages and productivity.

The general picture from our TFP results in Figure 1 and Table 5 in the Appendix is that plants subject to foreign acquisitions do not have TFP levels that differ significantly from those of the reference group, while the plants subject to domestic acquisitions tend to have lower levels of TFP (lemons) than the reference group in some of the years around acquisition. The TFP results are robust to a number of different specifications of TFP. First, based on estimating TFP according to equation 2; we have imposed constant returns to scale, experimented with different capital measures, and replaced the number of employees with total hours worked in the plant.[20] Second, while still calculating TFP according to equation 2, instead of using estimated input coefficients from a regression of output on inputs, we take as our input coefficients average factor cost shares at the 3-digit industry-year level. Third, production function estimation has been shown to yield poor results when important unobservables that vary both across plants and over time, such as productivity shocks, are omitted. Levinsohn and Petrin (2003) propose using intermediate inputs rather than investment to address the underlying simultaneity problem. Using the residuals obtained from the Levinsohn-Petrin approach at 2-digit level give results in line with the general pattern reported for TFP.[21]

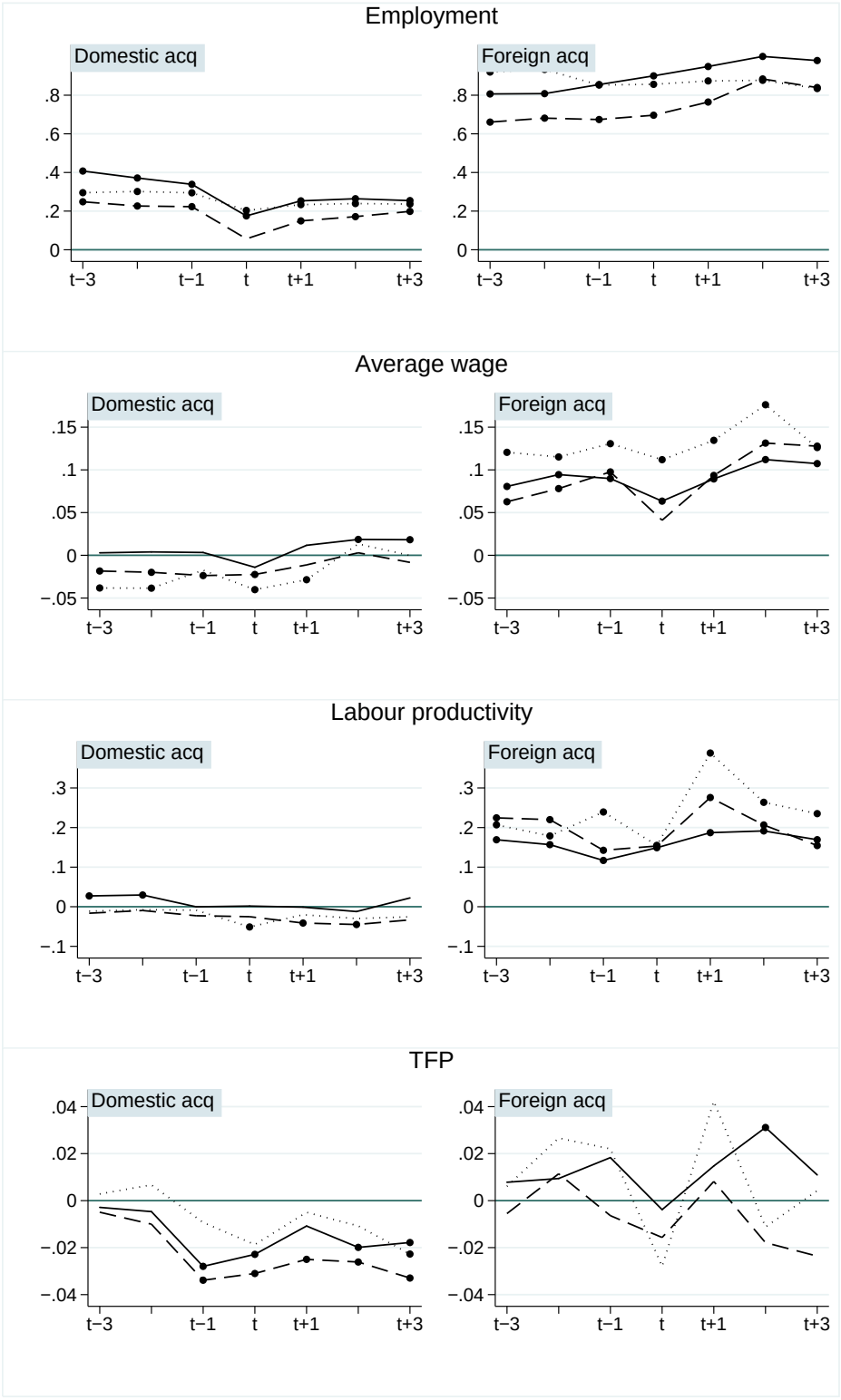
[18]For the foreign acquisitions this sample is between Sample 2 and Sample 3. In order to get more than 10 domestic MNE acquisitions we did not impose the additional restriction of Sample 3 that we can observe the plants in the years $t-3$, $t-2$, $t+2$, and $t+3$ around the acquisition (the restriction on missing observations).

[19]We return to Sample 4 in Figure 2.

[20]The variable definitions in the Appendix contain details on the alternative capital and labour input measures.

[21]Results for different TFP measures can be obtained from the authors on request.

Figure 1: Employment, wages and productivity around acquisitions in year t relative to industry-year mean



Notes: Graphical representation of regression results for Samples 1-3 in Table 5. Sample 1 (solid line) includes all acquisitions not close to entry/exit. Sample 2 (dashed line) includes all plants with 1 one acquisition that are never domestic MNEs. Sample 3 (dotted line) as Sample 2 and plant is observed 2/3 years before/after acquisition. Reference line at zero represents industry-year mean. Dots indicate significance at 10% or better.

Overall, the results show a marked difference in pre-acquisition performance between plants that are targets of foreign and domestic acquisitions. New foreign owners pick better plants than new domestic owners do, and this ordering is not affected by the different selection criteria used in Samples 1-3. The results are consistent with the evidence in Hanley and Zervos (2007), Fukao et al. (2006) and Bertrand and Zitouna (2008) for the UK, Japan and France, respectively. The evidence is also in line with the 'cherry-picking' evidence for foreign acquisitions provided for several other countries.[22]

While the graphs in Figure 1 show broadly similar trends, our different ways of selecting plants do affect the size of the coefficient estimates. As our first sample implies a selection on survival from at least 3 years before the acquisition until at least 3 years after the acquisition, it is reasonable to expect that the results based on Sample 1 will show us that plants subject to acquisition are larger and more productive relative to the reference group than when using the full sample. Comparing the coefficients on the acquisition dummies in columns 1-4 of Table 2 with the results for Sample 1 in Table 5 (columns 1 and 5) in the Appendix confirms this. The largest positive effects of selection on survival are firm size and labour productivity of plants subject to domestic acquisitions.

For plants subject to domestic acquisitions, the main difference between Sample 1 and Sample 2 is that we take out plants that at some point are domestic MNEs and hence are relatively large and productive. This has the expected effect of lowering size, wages and productivity relative to industry-year means, such that the dashed line representing Sample 2 in Figure 1 lies below the solid line of Sample 1. The main difference between Samples 1 and 2 for the plants subject to foreign acquisitions is that we take out foreign acquisitions of domestic MNEs and plants with multiple acquisitions due to the foreign ownership share varying around 50%. This also reduces the size of the plants subject to foreign acquisitions relative to the reference group (the dashed line is below the solid line in Figure 1), increases labour productivity, whereas wages and TFP are more or less the same relative to the reference group in Samples 1 and 2. The additional selection on even longer survival in Sample 3 (the dotted lines in Figure 1) lifts the size of both foreign and domestic acquisitions closer to the results for Sample 1. For wages and labour productivity, the bias introduced by this selection goes in opposite directions for plants subject to domestic and foreign acquisition: it increases the coefficients for plants subject to foreign acquisitions relative to the reference group and biases wages downward for domestic acquisitions such that they are significantly below those of the reference group until 2 years after the domestic ownership change.

The trends in the graphs appear robust to the different sample selections. For foreign acquisitions the graphs are upward sloping for employment, wages and labour productivity. In comparison to the reference group, plants subject to domestic acquisitions show reductions in employment and productivity, but not for wages, around acquisitions. These diverging patterns

[22]See for example Criscuolo and Martin (2009), Karpaty (2007) and Huttunen (2007) for evidence from the UK, Sweden and Finland, respectively.

for foreign and domestic acquisitions are in line with the evidence in the full sample presented in Table 2.

Table 4: Employment, wage and productivity growth from before to after acquisitions relative to domestic plants in Sample 3

	Employment	Avg. wage	Lab. Prod.	TFP
Before to after acquisition $[(((t+3)+(t+2))-((t-2)+(t-3)))/2]$				
dom acq	-.007 (.021)	.024 (.010)*	-.024 (.019)	-.018 (.009)*
for acq	.080 (.047)(*)	.038 (.021)(*)	.066 (.061)	-.010 (.018)
R^2	.22	.21	.22	.31
N/Plants	12503/2529			
Before acquisition $[((t+3)+(t+2))/2-t]$				
dom acq	-.059 (.021)**	-.018 (.018)	-.043 (.022)*	-.024 (.011)*
for acq	-.008 (.050)	.020 (.039)	-.027 (.053)	-.036 (.029)
R^2	.13	.14	.13	.26
N/Plants	13687/2628			
After acquisition $[t-(((t-2)+(t-3))/2)]$				
dom acq	.065 (.020)**	.028 (.013)*	.005 (.020)	-.009 (.009)
for acq	.097 (.056)(*)	.064 (.021)**	.117 (.059)*	.009 (.020)
R^2	.13	.32	.22	.38
N/Plants	13323/2602			

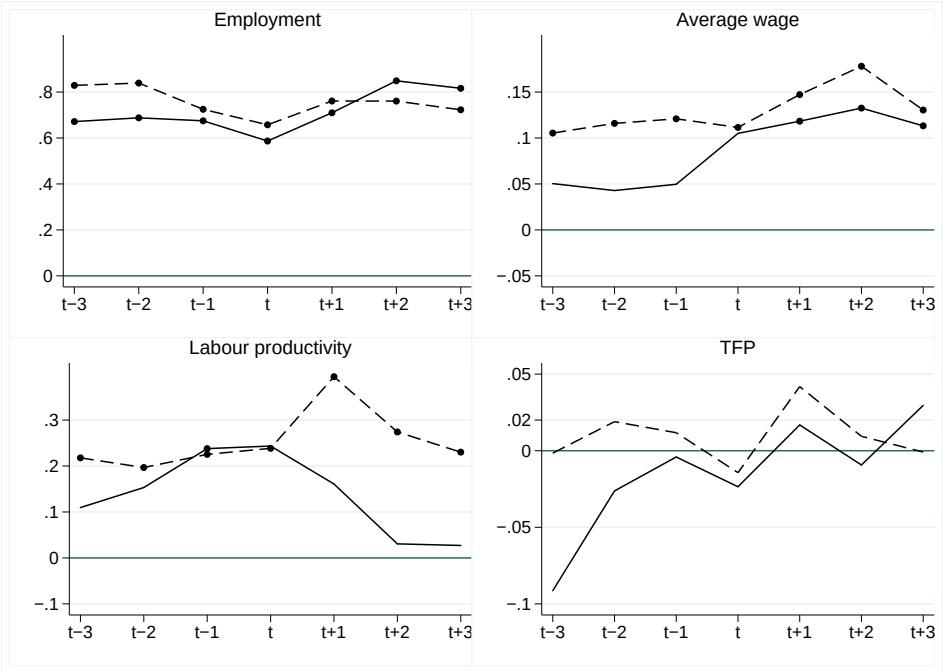
Notes: OLS regressions where the dependent variables are the change in performance over the time periods specified. The 'before to after acquisition' and the 'before acquisition' regressions include controls for the levels of plant age, size and the level of the dependent variable 3 years before acquisition. The 'after acquisition' regressions include controls for the levels of plant age, size and the level of the dependent variable at the time of acquisition. We do not control for size when employment is the dependent variable. All regressions also include a constant term, year, industry (4-digit ISIC) and year-industry (3-digit ISIC) interaction dummies. **, *, (*) indicate significance at 1, 5, 10%.

In order to further investigate the trends around acquisitions, we focus on Sample 3 and regress the plant level change (growth) in performance on our previous controls (year, industry and industry-year interaction dummies, age and size) as well as the level of the dependent variable in the start year for the change. Results from these regressions are presented in Table 4 where we look at the growth over 3 different periods: 1) from 3 years before the acquisition until 3 years after, 2) from 3 years before the acquisition until the acquisition year, and 3) from the acquisition year until 3 years after the acquisition. In order not to make this too year-dependent we use the average of years 2 and 3 before and after acquisition. This shows us whether plants improve on the level of the 4 performance indicators they had 3 years before the acquisition or at the time of acquisition.

The growth result in Table 4 shows that plants subject to domestic acquisitions do not have employment growth significantly different from the reference group over the 7 year period

from 3 years before until 3 years after the acquisition. Splitting this into the period before and after acquisition shows that plants subject to domestic acquisitions reduce their employment before the acquisition and increase employment after, resulting in a zero net change over the 7 years relative to average. In contrast, foreign acquisitions have significantly higher employment growth than the reference group from 3 years before before to 3 years after the acquisition, and there is no evidence of a significant negative development in employment before foreign acquisitions. As in Figure 1, Table 4 shows that plants subject to domestic acquisitions see both their labour productivity and their TFP decline over the 3-year period before the acquisition, and provides no evidence of a positive development in the period after the acquisition. For plants subject to foreign acquisitions labour productivity after the acquisition increases, while there are no significant effects in terms of TFP. Both types of ownership changes in Sample 3 have significantly higher wage growth than the reference group over the acquisition period. This is due to larger wage growth than average in the period after ownership change.

Figure 2: Employment, wages and productivity around acquisitions by domestic and foreign multinationals in year t relative to industry-year mean



Notes: Graphical representation of regression results for Sample 4 in Table 5, i.e. plants with 1 one acquisition and acquisition by domestic (solid line) and foreign (dashed line) MNEs. Reference line at zero represents industry-year mean. Dots indicate significance at 10% or better.

As stated above, Samples 1-3 compare non-MNEs that are acquired by other non-MNEs to those acquired by foreign MNEs. In the fourth columns of Table 5 in the Appendix the domestic acquisitions represent instead acquisitions of non-MNEs by domestic MNEs. Due to the small number of acquisitions these results are mostly not statistically significant, but the

graphical representation in Figure 2 shows foreign acquisitions and acquisitions by domestic multinationals to be much more similar than foreign acquisitions and domestic acquisitions by non-MNEs. This suggests that multinationality versus non-multinationality of the acquirer is more important in determining the choice of acquisition target than the distinction between domestic and foreign.

5 Concluding remarks

In this paper we examine the performance of Norwegian manufacturing plants that are acquired by a new domestic or a new foreign owner around acquisition. We look at employment, wages and productivity and show that plants subject to these two types of ownership change differ both before the acquisition and in their post-acquisition performance. It is not uncommon that acquisitions occur close to plant entry or exit, or that plants may experience several ownership changes close in time. We demonstrate how taking account of these possibly confounding events introduces restrictions on the sample of plants that are subject to acquisitions, and how this affects our results.

Taken together the evidence presented here suggests that domestic and foreign acquisitions occur in very different types of plants. Prospective foreign owners select the 'cherries' and leave the 'lemons' to new domestic owners. This conclusion is robust to different restrictions on the sample of acquisition plants. The sample selection required to be able to follow plants from 3 years before to 3 years after acquisition increases the differences in performance between domestic and foreign acquisition targets by introducing a downward bias for the results on wages and labour productivity in the case of the domestic acquisitions and an upward bias for all performance measures in the case of foreign acquisitions.

When domestic plants are acquired by new domestic owners that are not multinationals, the acquisition is preceded by a period of deteriorating performance in the plants: employment declines and so does labour productivity. Thus, in line with the arguments of Lichtenberg and Siegel (1987) these ownership changes seem to follow lapses of inefficiency, which is consistent with the inefficient management hypothesis. Under the new owner they return to their pre-acquisition employment levels but remain below their pre-acquisition productivity levels. Thus, inefficient management does not seem to be replaced by more efficient management, which could suggest that there is managerial hybris at play in domestic acquisitions.

In contrast to the domestic acquisitions, there is little evidence of performance weakening before acquisitions in plants targeted by foreign owners. Foreign owners looking for an acquisition target choose plants that are in a strong position in terms of size and productivity. Thus, these acquisitions are perhaps less a case of inefficient management, but could be due to synergies. Alternatively, if foreign direct investment is purely about market access or about gaining access to technology, it pays to acquire large and productive local plants. After acquisition, employment, wages and labour productivity increase in these plants. This suggests that MNEs

target plants that complement their own firm-specific assets, and that the benefits of access to superior shared assets such as group-specific knowledge or management practises are what makes these plants thrive. This is confirmed by suggestive evidence for acquisitions by domestic multinationals. Compared to the differences in performance between domestic non-MNE and foreign acquisitions, the performance in plants acquired by domestic multinationals appears to be much more similar to that of the foreign acquisitions.

The simultaneous decline in employment and labour productivity in plants subject to domestic acquisitions as well as the simultaneous increase in employment, wages and labour productivity in plants subject to foreign acquisitions suggests that acquisitions go hand-in-hand with changes in the composition of the labour force. Evidence for Sweden suggests that the positive effect of foreign acquisitions on high-skilled employees is more immediate than for unskilled employees (Bandick and Karpaty, 2007). Our data do not allow us to distinguish between high-skilled and low-skilled employees, thus we leave this issue to future research.

References

[1] Bandick, Roger and Patrik Karpaty (2007), 'Foreign Ownership and the effects on Employment. Evidence from Swedish Manufacturing', University of Nottingham Research Paper No. 2007/35.

[2] Barba Navaretti, Giorgio and Anthony J. Venables (2004) with F. Barry, K. Ekholm, A. Falzoni, J. Haaland, K-H. Midelfart and A. Turrini, Multinational Firms in the World Economy, Princeton University Press: Princeton.

[3] Bartelsman, Eric J. and Mark Doms (2000), 'Understanding Productivity: Lessons from Longitudinal Microdata', Journal of Economic Literature 38(3): 569–94.

[4] Baumol, William (1959), Business Behavior, Value and Growth, New York: Macmillan.

[5] Bertrand, Olivier and Habib Zitouna (2008), 'Domestic versus cross-border acquisitions: which impact on the target firms' performance?', Applied Economics, 40(17): 2221–2238.

[6] Conyon, Martin J.; Girma, Sourafel; Thompson, Steve, Peter W. Wright (2002), 'The productivity and wage effects of foreign acquisition in the United Kingdom', Journal of Industrial Economics 50: 85-102.

[7] Conyon, Martin J.; Girma, Sourafel; Thompson, Steve, Peter W. Wright (2004), 'Do Wages Rise or Fall Following Merger?', Oxford Bulletin of Economics and Statistics 66(5): 847–862.

[8] Criscuolo, Chiara and Ralf Martin (forthc.), 'Multinationals and US Productivity Leadership: Evidence from Great Britain', Review of Economics and Statistics.

[9] Dunning, John H. (1981), International Production and the Multinational Enterprise, London: George Allen and Unwin.

[10] Fukao, Kyoji; Ito, Keiko; Kwon, Hyeog Ug and Miho Takizawa (2006), 'Cross-Border Acquisitions and Target Firms' Performance: Evidence From Japanese Firm-Level Data', National Bureau of Economic Research, NBER Working Papers 12422.

[11] Gioia, Carmine and Steen Thomsen (2004), 'International acquisitions in Denmark 1990-1997: selection and performance', Applied Economics Quarterly 50(1): 61-87.

[12] Girma, Sourafel (2005), 'Safeguarding Jobs? Acquisition FDI and Employment Dynamics in U.K. Manufacturing', Review of World Economics/Weltwirtschaftliches Archiv 141(1): 165–78.

[13] Girma, Sourafel and Holger Görg (2007a), 'Evaluating the Foreign Ownership Wage Premium Using a Difference-in-Differences Matching Approach', Journal of International Economics 72(1): 97–112.

[14] Girma, Sourafel and Holger Görg (2007b), 'Multinationals' Productivity Advantage: Scale or Technology?', Economic Inquiry 45(2): 350–62.

[15] Gugler, Klaus and B. Burcin Yurtoglu (2004), 'The effects of mergers on company employment in the USA and Europe', International Journal of Industrial Organization 22: 481-502.

[16] Halvorsen, Reidunn; Jenssen, Reidar and Frank Foyn (1991), 'Documentation of the Manufacturing Statistics', (in Norwegian) mimeo, Statistics Norway, Oslo.

[17] Hanley, Aoife and Vasilios Zervos (2007), 'The Performance of UK Takeovers: Does the Nationality of Acquirers Matter?', International Journal of the Economics of Business 14(2): 283–97.

[18] Harris, Richard D. and Catherine Robinson (2002), 'The Effect of Foreign Acquisitions on Total Factor Productivity: Plant-Level Evidence from U.K. Manufacturing, 1987-1992', Review of Economics and Statistics 84(3): 562–68.

[19] Huttunen, Kristiina (2007), The Effect of Foreign Acquisition on Employment and Wages: Evidence from Finnish Establishemtns', Review of Economics and Statistics 89(3): 497–507.

[20] Jensen, Michael C. (1986), 'Agency costs of free cashflow, corporate governance, and takeovers', American Economic Review 76: 323–329.

[21] Karpaty, Patrik (2007), 'Productivity Effects of Foreign Acquisitions in Swedish Manufacturing: The FDI Productivity Issue Revisited', International Journal of the Economics of Business 14(2): 241–60.

[22] Keller, Wolfgang (2004), 'International technology diffusion', Journal of Economic Literature 42: 752-782

[23] Levinsohn, James and Amil Petrin (2003), "Estimating Production Functions Using Inputs to Control for Unobservables," Review of Economic Studies 70(2): 317–342.

[24] Lichtenberg, Frank R. and Donald Siegel (1987), 'Productivity and Changes in Ownership of Manufacturing Plants', Brookings Papers on Economic Activity (Special Issue on Microeconomics) 3: 643–683.

[25] Lucas, Robert (1978), 'On the size distribution of business firms', Bell Journal of Economics 9: 508–23.

[26] Maksimovic, Vojislav and Gordon Phillips (2001), The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and are there Gains?', Journal of Finance 56(6): 2019–65.

[27] Maksimovic, Vojislav; Phillips, Gordon and N.R. Prabhala (2008), 'Post-Merger Restructuring and the Boundaries of the Firm', National Bureau of Economic Research, NBER Working Papers 14291.

[28] McGuckin, Robert H. and Sang V. Nguyen (1995), 'On the Productivity and Plant Ownership Change: New Evidence from the Longitudinal Research Database', RAND Journal of Economics 26(2): 257–76.

[29] Møen, Jarle (2004), 'Industristatistikken etter 1995', (in Norwegian) mimeo, Norwegian School of Economics and Business Administration, Bergen.

[30] Mueller, Dennis (1969), 'A Theory of Conglomerate Mergers', Quarterly Journal of Economics 83(4): 643–59.

[31] Nocke, Volker and Stephen Yeaple (2007), 'Cross-Border Mergers and Acquisitions versus Greenfield Foreign Direct Investment: The Role of Firm Heterogeneity', Journal of International Economics 72(2), 336–365.

[32] Petrin, Amil and James Levinson (2005), 'Measuring Aggregate Productivity Growth Using Plant-level Data', NBER Working Paper 11887, National Bureau of Economic Research, Cambridge (Mass.).

[33] Schoar, Antoinette (2002), 'Effects of Corporate Diversification on Productivity', Journal of Finance 57(6): 2379–2403.

[34] Shleifer, Andrei and Lawrence H. Summers (1988), 'Breach of trust in hostile takeovers', in: Auerbach, A. (ed.), Corporate Takeovers: Causes and Consequences. Chicago (Il.): University of Chicago Press.

[35] Schwerdt, Guido (2008), 'Labor Turnover before Plant Closure: 'Leaving the Sinking Ship' vs. 'Captain Throwing Ballast Overboard"', CESifo Working Paper 2252, CESifo, Munich.

[36] Sjøholm, Fredrik and Robert E. Lipsey (2006), 'Foreign Firms and Indonesian Manufacturing Wages: An Analysis with Panel Data', Economic Development and Cultural Change 55(1): 201–21.

A Appendix

Variable definitions

AGE_{it} The age of a plant in year t is counted as the number of years since entry, where the plant is given the age 1 in the entry year. We calculate the age of a plant by using the full panel from the manufacturing statistics from 1972 and defining entry and exit as explained in Section 3.2.

K_{it} Our estimate of capital stock at the plant level is based on information in the Manufacturing Statistics for investment in machinery, transport equipment and buildings. Each of these three investment series are deflated with separate investment price indeces from the National Accounts for 17 manufacturing sectors. Deflated investment is accumulated over time into the capital stock of the plant using the perpetual inventory method. Depreciation rates for machinery, transport equipment and buildings are taken to be 6%, 15% and 2%, respectively. Starting values for capital stock in the entry year are obtained by distributing the aggregate capital stock from 62 manufacturing sectors to the plants based on their share of energy use in the sector. We depreciate the starting value of the capital stock with 6% per year. In addition, we add information from the Manufacturing Statistics on the costs of rented machinery and buildings to our capital measure. We experimented with two other capital stock measures: one where we distributed the aggregate capital stock to the plant level in the entry year using employment shares instead of energy use shares, and one capital measure purely based on accumulated investment using the perpetual inventory method without setting a start value in the entry year of the plant from aggregate capital data. Both capital stock alternatives give more or less the same TFP results for acquisitions as those reported in the paper.

L_{it} The number of employees in the plant. Calculated from information on total number of own employees taken directly from the manufacturing statistics plus a measure for the number of rented employees. This is calculatedfrom the costs of rented labour assuming the same average pay for rented labour as for own employees. We have experimented with replacing the number of employees with the total number of hours worked in the plant when estimating TFP. Total hours worked in the plant during a year is available directly from the Manufacturing Statistics. Our TFP results are not sensitive to whether we define the labour input as number of employees or as total hours worked in the plant.

LP_{it} Labour productivity defined as $log(Y_{it}/L_{it})$.

M_{it} Total real cost of materials used obtained by deflating with input-price deflators available from Statistics Norway at the sector classification used in the National Accounts. In the manufacturing statistics, this variable includes rented labour and capital, we subtract these and allocate them to the labour and capital measures, respectively.

$Wage_{it}$ Average real wages in the plant. Total wage cost from the Manufacturing Statistics deflated using the consumer price index from Statistics Norway divided by the number of employees in the plant.

Y_{it} Real gross production value net of sales taxes and subsidies, obtained by using output deflators from Statistics Norway. The aggregation level for the output deflators is according to the sector classification used in the National Accounts, and lies somewhere in between the 2- and 3-digit ISIC level.

Table 5: Employment, wage and productivity levels around domestic and foreign acquisition, relative to industry-year mean

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 1	Sample 2	Sample 3	Sample 4
	Employment				Labour Productivity			
dom acq_{t-3}	.408 (.031)**	.248 (.039)**	.296 (.053)**	.671 (.225)**	.027 (.016)(*)	-.016 (.020)	-.011 (.026)	.110 (.119)
dom acq_{t-2}	.371 (.030)**	.226 (.037)**	.302 (.052)**	.688 (.223)**	.030 (.015)*	-.010 (.020)	-.007 (.026)	.153 (.141)
dom acq_{t-1}	.339 (.029)**	.223 (.037)**	.295 (.053)**	.675 (.242)**	-.000 (.015)	-.023 (.020)	-.009 (.027)	.238 (.132)(*)
dom acq_t	.175 (.029)**	.057 (.037)	.204 (.053)**	.587 (.208)**	.002 (.014)	-.025 (.020)	-.051 (.029)(*)	.244 (.156)
dom acq_{t+1}	.253 (.030)**	.150 (.037)**	.234 (.052)**	.710 (.249)**	-.001 (.015)	-.041 (.020)*	-.020 (.027)	.161 (.183)
dom acq_{t+2}	.264 (.030)**	.171 (.037)**	.239 (.049)**	.849 (.250)**	-.012 (.016)	-.045 (.020)*	-.030 (.027)	.031 (.118)
dom acq_{t+3}	.255 (.031)**	.199 (.039)**	.236 (.049)**	.816 (.252)**	.022 (.016)	-.033 (.021)	-.025 (.027)	.027 (.114)
for acq_{t-3}	.807 (.059)**	.661 (.097)**	.920 (.146)**	.829 (.139)**	.169 (.030)**	.225 (.055)**	.207 (.073)**	.218 (.068)**
for acq_{t-2}	.808 (.056)**	.681 (.090)**	.933 (.146)**	.839 (.135)**	.157 (.029)**	.220 (.050)**	.179 (.077)*	.197 (.069)**
for acq_{t-1}	.855 (.055)**	.674 (.094)**	.853 (.145)**	.725 (.134)**	.117 (.033)**	.143 (.048)**	.239 (.077)**	.225 (.069)**
for acq_t	.900 (.052)**	.696 (.088)**	.856 (.145)**	.657 (.132)**	.149 (.030)**	.154 (.049)**	.155 (.072)*	.238 (.071)**
for acq_{t+1}	.949 (.053)**	.765 (.090)**	.874 (.147)**	.761 (.136)**	.187 (.030)**	.276 (.051)**	.388 (.079)**	.394 (.074)**
for acq_{t+2}	1.001 (.057)**	.884 (.099)**	.877 (.142)**	.761 (.135)**	.192 (.031)**	.207 (.053)**	.264 (.075)**	.274 (.071)**
for acq_{t+3}	.980 (.061)**	.840 (.121)**	.835 (.141)**	.723 (.143)**	.169 (.034)**	.155 (.058)**	.235 (.073)**	.230 (.073)**
R^2	.24	.18	.18	.18	.32	.33	.32	.32
	Avg. Wage				TFP			
dom acq_{t-3}	.003 (.008)	-.018 (.010)(*)	-.038 (.014)**	.050 (.051)	-.003 (.006)	-.005 (.008)	.003 (.009)	-.091 (.062)
dom acq_{t-2}	.004 (.007)	-.020 (.010)*	-.038 (.014)**	.043 (.045)	-.005 (.006)	-.010 (.008)	.007 (.010)	-.026 (.050)
dom acq_{t-1}	.003 (.008)	-.024 (.012)*	-.017 (.014)	.050 (.047)	-.028 (.007)**	-.034 (.008)**	-.009 (.010)	-.004 (.043)
dom acq_t	-.014 (.009)	-.022 (.012)(*)	-.040 (.020)*	.105 (.075)	-.023 (.006)**	-.031 (.008)**	-.019 (.012)	-.024 (.056)
dom acq_{t+1}	.012 (.007)	-.011 (.011)	-.029 (.016)(*)	.118 (.054)*	-.011 (.007)	-.025 (.009)**	-.005 (.012)	.017 (.064)
dom acq_{t+2}	.019 (.007)**	.003 (.010)	.013 (.013)	.133 (.048)**	-.020 (.007)**	-.026 (.009)**	-.011 (.012)	-.009 (.044)
dom acq_{t+3}	.018 (.008)*	-.008 (.011)	-.000 (.014)	.113 (.057)*	-.018 (.006)**	-.033 (.008)**	-.023 (.009)*	.030 (.070)
for acq_{t-3}	.081 (.013)**	.063 (.024)**	.121 (.031)**	.105 (.029)**	.008 (.012)	-.005 (.017)	.006 (.025)	-.002 (.024)
for acq_{t-2}	.094 (.013)**	.078 (.023)**	.115 (.033)**	.116 (.029)**	.009 (.012)	.011 (.015)	.027 (.024)	.019 (.021)
for acq_{t-1}	.090 (.011)**	.098 (.020)**	.131 (.029)**	.121 (.025)**	.018 (.020)	-.006 (.021)	.022 (.025)	.012 (.024)
for acq_t	.063 (.014)**	.041 (.026)	.112 (.036)**	.112 (.030)**	-.004 (.016)	-.016 (.022)	-.028 (.033)	-.014 (.031)
for acq_{t+1}	.089 (.013)**	.093 (.024)**	.135 (.028)**	.147 (.024)**	.015 (.013)	.008 (.017)	.042 (.029)	.042 (.026)
for acq_{t+2}	.112 (.014)**	.131 (.027)**	.176 (.022)**	.178 (.022)**	.031 (.014)*	-.018 (.017)	-.011 (.019)	.009 (.021)
for acq_{t+3}	.107 (.015)**	.128 (.027)**	.126 (.028)**	.130 (.027)**	.011 (.016)	-.024 (.019)	.004 (.027)	-.001 (.024)
constant	5.385 (.025)**	5.383 (.028)**	5.401 (.030)**	5.393 (.032)**	.116 (.017)**	.109 (.018)**	.100 (.019)**	.089 (.020)**
R^2	.29	.26	.27	.27	.20	.21	.22	.22
N /Plants	37969/4339	32224/3561	28723/2698	26021/2316	37969/4339	32224/3561	28723/2698	26021/2316

Notes: Sample 1 includes all acquisitions not close to entry/exit. Sample 2 includes all plants with 1 one acquisition that are never domestic MNEs. Sample 3 as Sample 2 and plant is observed 2/3 years before/after acquisition. Sample 4 includes plants with 1 one acquisition and acquisition by domestic and foreign MNEs. All regressions include a constant term, controls for age and plant size (we do not control for plant size in the employment regression), year and year- industry (3-digit ISIC) interaction dummies. **, *, (*) indicate significance at 1, 5, 10%.