The contribution of foreign entrants to employment and productivity growth*

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Abstract

We compare employment and productivity dynamics in foreign and domestic entrants, exitors, survivors and acquisitions in Norwegian manufacturing from 1979-2000. All types of foreign plants are on average more productive than their domestic counterparts. There is more gross job reallocation in domestic than in foreign plants. Contrary to common beliefs, foreign owners do not acquire highly productive domestic plants in order to lay off their employees. Instead they manage to reverse a negative trend in productivity and employment in the acquired plants. During the boom from 1992-97 foreign plants taken together, with a market share of 38%, accounted for 61% of productivity growth.

Keywords: employment dynamics, decomposition of productivity growth, mode of foreign entry, foreign acquisition

JEL Classification: D24, F14, F23, L10

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1 Introduction

While it is recognised that the presence of foreign firms in a host country may affect the performance of domestic firms indirectly through knowledge spillovers (see Görg and Greenaway 2004 for a survey), the direct effect foreign entry has by changing the composition of firms in the host country is less studied. As foreign firms tend to be larger and more productive than domestic firms[1], a rise in the share of foreign firms in a host country may increase aggregate productivity even without any spillovers taking place. At the same time, foreign firms also become actors in the local input markets. While they may not rely on the local capital market and intermediate input markets to the same extent as domestic firms, they usually source labour locally. On the one hand, this may increase demand for labour if foreign entrepreneurs set up new plants. On the other hand, however, foreign acquisitions are often associated with fears of job losses as the new foreign owners are expected to review and reorganise existing structures under efficiency considerations. Moreover, jobs in foreign-owned plants are often viewed as less secure as it may be easier for multinationals than for purely domestic firms to shift production or other activities between locations in different countries.[2]

Our goal in this paper is to examine to what extent productivity and employment dynamics go hand in hand in Norwegian manufacturing plants between 1979 and 2000. We distinguish between domestic and foreign exitors, survivors and entrants and focus in particular on foreign entry by acquisition. Our analysis employs tools from two literatures and extends them to include foreign acquisitions and divestures. We look at job reallocation using the methodology pioneered by Davis and Haltiwanger (1992). Their approach counts jobs created and jobs destroyed separately, and also accounts for the role of entry in job creation and the role of exit in job destruction. We examine productivity dynamics using the Haltiwanger (1997) decomposition. This method attributes the contributions to productivity growth to surviving, entering and exiting firms.

While distinguishing between foreign and domestic firms in productivity decompositions has confirmed that the contribution of foreign firms to aggregate productivity growth is substantial (Okamoto and Sjöholm (2005) for Indonesia, De Backer and Sleuwaegen

[1] See Barba Navaretti and Venables (2004) for a survey of the empirical evidence on the performance of foreign versus domestic firms in a host country.

[2] Fabbri et al. (2003) investigate how the increase in multinational presence in the US and the UK affects labour demand elasticities, based on the argument that global production networks make it easier to transfer production activities across borders. They find an increase in demand elasticities for less-skilled labour parallel with an increase in multinational activity in these countries.

(2003) for Belgium and Altomonte and Colantone (2005) for Romania), the productivity-employment-link for foreign and domestic firms has not yet received much attention. Baily et al. (2004) look at the connection between changes in labour productivity and employment levels in US manufacturing plants during the 1980s, and De Loecker and Konings (2004) combine productivity decomposition and employment reallocation methods to examine the net entry process in Slovenia during the transition from a socialist to a market economy. Neither of these studies distinguish between foreign and domestic plants. Görg and Strobl (2005) study employment dynamics in foreign and domestic firms in Ireland, but do not consider the connection to productivity. In addition, they do not account for foreign acquisitions, as most of the foreign entry in Ireland has come through greenfield entry.

As acquisition is the main mode of foreign entry into Norwegian manufacturing, we focus on acquired plants as a separate group in our analysis. This is an interesting exercise because productivity and employment dynamics are likely to develop quite differently in the two types of foreign entrants. While both greenfield and acquisition entrants would be associated with higher levels of productivity than domestic entrants at the time of entry, their employment and productivity growth dynamics may evolve differently. Greenfield entrants will contribute positively to productivity growth just by entering, moreover net job creation is likely to be positive in the first year or two. In turn, it may take time for foreign acquirers to transfer a productivity advantage to the local target firm and this process may be associated with job losses.

We find that on average all types of foreign plants have higher levels of productivity than their domestic counterparts, while gross job reallocation is lower in foreign plants. Foreign entrants perform better than domestic entrants the first four years after entry in terms of both productivity levels and productivity growth. In line with results from other countries, we find that most of the productivity growth in Norwegian manufacturing is generated within surviving plants, both domestic and foreign, with foreign survivors having higher productivity growth than domestic survivors. Our results show that the contribution to productivity growth from foreign plants increased by more than the market share of foreign plants from the expansion period during the 1980s (1982-1987) to the next expansion period in 1992-1997. The market share of foreign plants increased from 8% in 1982-1987 to 38% in the period 1992-1997, while the total share of productivity growth attributed to foreign plants increased from 6% in 82-87 to 61% in 92-97. The process of entry and exit of plants accounted for around 10% of productivity growth in both periods,

while at the same time causing net job destruction, primarily due to domestic exitors, .

Almost half the growth contribution from foreign plants in 1992-97 came from plants acquired by foreign owners during this period. This is surprising, given that our analysis shows that in the two years before domestic plants are subject to foreign takeover, they have on average negative productivity growth and are less productive than other domestic surviving plants. On average these plants also reduce employment before foreign takeover. For the average acquired plant this process is reversed in the year of the ownership change and continues over the next two years. Thus, our analysis suggests that foreign owners do not acquire highly productive domestic plants in order to strip their assets and lay off their employees, but rather turn domestic plants of average performance into highly successful plants in terms of both productivity growth and employment creation.

The remainder of this paper is structured as follows. In section 2 we describe data sources and define entry, exit and foreign ownership. The section also gives an overview of the development of foreign ownership and foreign entry in Norwegian manufacturing. Section 3 gives an overview of productivity differences and employment creation and destruction in domestic and foreign entering, exiting, surviving and acquired plants over the two decades. It also examines the plants' performance around crucial events such as acquisitions, entry and exit. Section 4 presents the decomposition of total factor productivity growth into the contributions from foreign and domestic entrants, survivors and exitors. In addition, it compares the contributions of the different groups of plants to productivity growth and employment creation. Section 5 briefly concludes.

2 Data

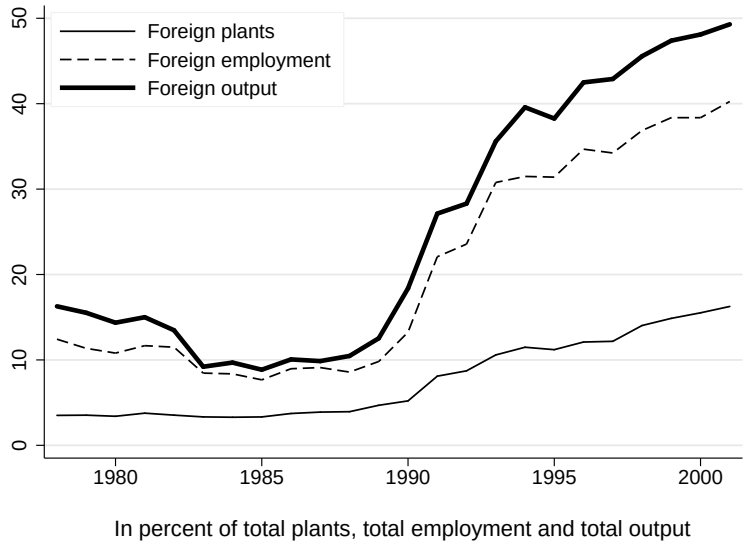
Our main data source is the annual census of all Norwegian manufacturing plants collected by Statistics Norway. The Norwegian Manufacturing Statistics are collected at the plant level, where the plant is defined as a functional unit at a single physical location, engaged mainly in activities within a specific activity group. The plant-level variables include detailed information on production, input use, location, and industry classification.[3]

Plants are classified into three ownership classes; plants that are part of firms where less than 20%, between 20-50%, or more than 50% of equity is foreign owned. Before 1990 only direct foreign ownership is recorded, while from 1990 onwards also indirect

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

foreign ownership is documented.[4] We classify plants as foreign owned when either direct or indirect foreign ownership of equity is above the 20% threshold. As the indirectly foreign-owned plants are more similar to the directly foreign-owned plants than to the domestic plants in terms of mean size, we prefer to include them with the foreign-owned plants. Figure 1 illustrates the development of foreign ownership in our sample. It shows a dramatic increase in foreign presence during the 1990s, which is a combination of a trend increase in foreign ownership as well as a result of the extended definition and recording of foreign ownership. The extended definition of foreign ownership after 1990 means that the share of foreign ownership during the 1980s and early 1990s is underestimated and, hence, also the role of foreign plants in productivity and employment dynamics. It is difficult to assess the extent of underestimation, as the role of indirect ownership relative to direct ownership also increased during the 1990s.

Figure 1: Foreign presence in Norwegian manufacturing



The extent of foreign ownership in Norway is comparable to, if not larger than, in neighbouring Sweden and Finland. In Swedish manufacturing the share of employment in

[4]The foreign ownership variables are obtained from the SIFON register; a register of foreign ownership interests in Norway. For further details see Balsvik and Haller (2006). 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.

foreign-owned firms increased from 17% in 1990 to 27% in 2000 (Karpathy and Lundberg, 2004), while Finland saw an increase from 6% to 22% in the same period (Huttunen, 2005). It is not clear whether the definitions of foreign ownership in the mentioned studies include indirect foreign ownership. The share of employment in foreign-owned firms in Norwegian manufacturing increased from 13 % in 1990 to 38 % in 2000; when excluding indirect foreign ownership the respective shares are 9 % and 16 %.

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. Mergers or buy-outs 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.

When defining entry and exit our main concern is the treatment of plants that are present in the panel for one or more years and then absent for some years before they reappear in the panel again. Although the logic of the census would imply that a plant is not in operation if it is not observed in the census, we assume that when a plant is missing from the census for one or two consecutive years, this is due to lack of registration rather than a temporary closure. When a plant disappears for three or more consecutive years before it reappears in the census, we regard it as temporarily closed and thus count an extra exit and entry for that plant. We also define as temporarily closed those plants that are missing for two consecutive years, but reappear with a new owner (a new firm identification number). Thus we define a plant as an entrant in year t if it appears for the first time in year t, or reappears in that 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 $t+1$, or absent all subsequent years.[5] Plants that in year t have foreign ownership of equity above 20%, while this was below 20% in year $t-k$ are called foreign acquisitions. Instead, foreign divestures are those plants with a decrease in foreign ownership from above 20% in $t-k$ to below 20% in year t.

Plants with less than 8 employees throughout their lives, and observations of plants not in ordinary production (service units or plants under construction) are excluded from the analysis.[6] Further, we drop plants with missing information on inputs or output for

[5]Less than 2.5% of the plants in the sample have what we define as temporary closures.

[6]In addition, we drop plants that in the Norwegian Manufacturing statistics are classified as 'small' (defined as having less than 5 or 10 employees) throughout their life. The information for these plants comes mainly from administrative registers and is therefore less extensive than for large plants.

Table 1: Total employment, plant size and plant numbers by ownership

	1980	1985	1990	1995	2000	Mean
Total empl domestic	293,450	266,345	215,665	163,443	140,272	216,951
Total empl foreign	35,528	22,119	32,932	74,323	87,006	50,593
Mean size domestic	42.4	39.9	36.3	33.1	33.1	36.6
Mean size foreign	145.6	96.2	101.0	120.2	112.0	114.7
Domestic plants	6,925	6,681	5,936	4,949	4,243	5,839
Foreign plants	244	230	326	618	777	437
of which						
-Domestic entry	153	185	174	143	9	157
-Foreign entry	7	1	12	13	1	10
-Domestic exit	169	232	304	251	173	247
-Foreign exit	4	4	13	24	19	16
-Foreign divesture	24	16	36	63	7	27
-Foreign acquisition	14	23	63	59	35	57

80% or more of their life. Our resulting sample contains 138 000 observations from 10,200 plants. The cleaning procedure has only minor effects on average plant size, the share of foreign plants and industry composition.

Table 1 shows the number of foreign and domestic manufacturing plants in our sample for 5-year intervals. Over the period the number of foreign plants more than triples while domestic plants are reduced in numbers. Foreign firms have on average 3-4 times as many employees as domestic firms. While total employment in foreign-owned plants has more than doubled, employment in domestic plants in 2000 is about half of that in 1980. The lower part of Table 1 shows the total number of foreign and domestic entrants each year as well as the number of acquisitions. Acquisition is the main mode of foreign entry into Norwegian manufacturing, with an annual average of 57 acquisitions against 10 greenfield entries per year.

3 Evolution of Employment and Productivity

3.1 Employment

In order to get an overview of the possible differences with respect to job creation and job destruction between domestic and foreign plants, we look at employment dynamics over the

period from 1979 to 2000. We measure job flows following Davis and Haltiwanger (1992). Job creation at time t equals employment gains summed over all plants that expand or start up between $t-1$ and t, with ΔN_{it}^{+} representing the plant level employment gain from $t-1$ to t. Similarly, job destruction at time t equals employment losses summed over all plants that contract or exit between $t-1$ and t, with ΔN_{it}^{-} representing the plant level employment loss from $t-1$ to t. The sum of job creation and job destruction is referred to as gross job reallocation, while the difference gives net employment creation. In order to obtain job creation and job destruction rates, we divide by the size of the group, defined as the average of employment in $t-1$ and t. We consider foreign and domestic survivors, foreign acquisitions and foreign divestures as separate groups. Hence, job creation and destruction rates for group h at time t can be written as

$$JC_{ht} = \frac{\sum_{i \epsilon I_{ht}} \Delta N_{it}^{+}}{N_{ht}} \quad \text{and} \quad JD_{ht} = \frac{\sum_{i \epsilon I_{ht}} \Delta N_{it}^{-}}{N_{ht}},$$

where I is the set of plants in group h at time t, and group size is $N_{ht} = (\sum_{i \epsilon I_{ht}} N_{it} + \sum_{j \epsilon I_{h,t-1}} N_{j,t-1})/2$.

Table 2 presents annual job creation and destruction rates for different groups of foreign and domestic plants. The job creation and job destruction rates include the contributions from entry and exit, respectively. We also report the contribution to job creation by domestic and foreign entrants and the contribution to job destruction by domestic and foreign exit separately. The columns for foreign acquisitions and foreign divestures show job creation and job destruction rates in the year of the ownership change. Overall, the job creation and destruction rates for domestic plants in Table 2 are very similar to what Klette and Mathiassen (1996) found when using the entire Norwegian manufacturing census from 1977 to 1986.[7] This suggests that leaving out the very small plants as we have done does not affect the job reallocation rates much. Gross job reallocation in Norwegian manufacturing is somewhat lower than what Davis and Haltiwanger (1992) find for US manufacturing. In line with previous studies of job reallocation (e.g. Davis and Haltiwanger, 1999), there is a clear business cycle component to gross job reallocation: during the downturn of the economy between 1989 and 1992, job destruction rates in all types of plants are substantially above average.

[7] A related study on job reallocation in Norway is by Salvanes and Førre (2003) who use linked employer-employee data to provide evidence on job creation and destruction for different educational groups in Norwegian manufacturing. In addition, Salvanes (1997) looks at the impact of product and labour market rigidities on job reallocation rates comparing seven OECD countries, including Norway and the US.

Table 2: Employment dynamics

	Domestic plants				Foreign plants				Foreign divestures		Foreign acquisitions	
Year	JC	Entry	JD	Exit	JC	Entry	JD	Exit	JC	JD	JC	JD
1980	6.41	0.71	6.57	0.91	4.28	0.42	2.76	0.29	5.49	7.99	11.96	3.60
1981	6.26	0.99	7.85	1.32	2.38	0.01	4.45	0.25	2.37	41.42	14.52	5.05
1982	4.19	0.53	8.03	1.27	3.08	0.03	5.26	0.87	2.91	10.23	7.92	4.52
1983	5.30	0.98	12.18	2.25	4.63	1.42	8.07	1.98	0.77	7.03	5.32	12.18
1984	6.82	0.82	8.21	2.04	3.55	0.15	7.01	1.44	7.60	3.32	6.32	11.67
1985	7.48	0.98	7.15	1.43	5.55	0.05	6.31	2.15	4.96	6.15	12.93	5.93
1986	8.07	0.93	8.34	2.44	7.00	0.50	4.31	0.50	5.11	4.22	7.73	5.76
1987	7.01	1.13	7.65	2.05	8.43	1.79	5.99	0.47	0.42	8.96	8.25	9.73
1989	6.17	1.19	12.15	2.53	4.01	0.91	11.98	1.16	4.30	16.10	4.11	8.69
1990	8.41	1.82	9.29	2.28	4.63	0.89	12.66	1.00	14.58	6.33	1.78	9.66
1991	7.24	1.90	8.87	2.18	3.82	1.60	13.07	3.84	1.91	15.72	8.54	5.09
1992	5.98	1.01	9.12	1.68	6.80	1.31	10.66	4.03	40.83	4.06	7.26	11.07
1993	8.21	1.89	13.96	8.32	6.21	0.84	8.54	3.49	5.56	39.26	10.03	3.62
1994	8.84	1.01	5.40	0.89	7.53	2.74	6.15	1.35	1.75	5.74	4.91	4.33
1995	9.34	1.61	6.39	1.87	7.71	1.32	5.67	0.92	9.75	2.59	5.39	2.98
1996	8.29	1.09	7.96	2.99	7.12	1.27	5.33	2.06	7.13	5.94	11.52	2.96
1997	10.76	2.24	7.25	2.14	5.82	1.19	4.95	0.99	7.65	6.52	10.47	3.23
1998	9.92	1.95	10.33	4.39	6.03	1.45	5.18	1.07	7.03	11.49	8.84	7.71
1999	8.15	1.91	9.94	2.42	7.40	1.28	9.88	2.86	0.00	83.49	10.80	4.31
2000	5.73	0.10	12.05	4.10	6.10	0.01	12.66	1.75	4.17	10.47	7.41	15.26
Mean	7.43	1.24	8.93	2.48	5.60	0.96	7.54	1.62	6.71	14.85	8.30	6.87
Std. Dev.	1.63	0.56	2.24	1.64	1.72	0.72	3.20	1.15	8.76	19.34	3.19	3.64

1988 omitted due to missing information on foreign ownership for this year

Table 2 reveals some differences between foreign and domestic plants. Both job creation and job destruction rates are mostly higher in domestic than in foreign-owned plants. As a result, the mean gross job reallocation rate over the two decades is higher for domestic plants (16.36%) than for foreign plants (13.14%). Over the period from 1980 to 2000 there is overall job destruction, which is in line with the decline in manufacturing employment as seen in Table 1. When looking at job creation and job destruction in plants that undergo a change in ownership, in most years foreign acquisitions generate more employment than they destroy. On average there is also more job creation and less job destruction in the year of foreign acquisition than is the case for continuing foreign plants. However, the volatility of job creation and destruction in acquisitions is much higher than in plants that do not change owner. Foreign divestures seem to destroy more jobs than they create, but the mean number of foreign divestures per year is less than half that of foreign acquisitions and varies substantially over time (cf. Table 1). Thus, the volatility in job creation and job destruction rates for foreign divestures is also very high.

Grouping the results for all manufacturing sectors together may hide differences in job creation and destruction rates in the different sectors as well as differences between foreign and domestic plants. To investigate this we calculate the numbers in Table 2 separately for nine 2-digit sectors, and present the resulting means of annual values in Table 8 in the Appendix. With the exceptions of the wood and paper sectors, job reallocation is smaller in foreign than in domestic plants as is the case in the aggregate dynamics. Similar to Table 2, in six of the nine sectors in Table 8, plants that are acquired by foreign owners tend to increase employment rather than to reduce their workforce, while foreign divestures on average are associated with net job destruction in eight of the nine sectors.

3.2 Productivity

We now turn to examining productivity dynamics in our different groups of plants. Plant heterogeneity has been identified as the main driver of within-industry reallocation of productivity. Changes in aggregate productivity are brought about by a combination of expansion and contraction within heterogenous plants, by market share reallocation between plants, and by entry and exit. A substantial empirical literature that decomposes productivity growth into the contributions of surviving, entering and exiting firms has confirmed the importance of this reallocation process for aggregate productivity dynamics (see Bartelsman and Doms (2000) for a survey).

To measure total factor productivity (TFP) we use an index calculated at the plant level as

$$\ln TFP_{it} = \ln Y_{it} - \alpha_t^K \ln K_{it} - \alpha_t^H \ln H_{it} - \alpha_t^M \ln M_{it}, \quad (1)$$

where Y_{it} is deflated plant output, measured as gross production value net of sales taxes and subsidies. H_{it} is the number of person hours in the plant.[8] Since only blue-collar hours are reported prior to 1983, and only total hours from 1983, we estimate total hours before 1983 by using information on the blue-collar share of the total wage bill. M_{it} is the total cost of materials used. Since this variable in the data includes rented labour and capital, we subtract these and allocate them to the labour and capital measures respectively. Rented labour hours are calculated from the costs of rented labour using the calculated average wage for own employees. The details of the construction of our estimate of capital services K_{it} can be found in the Appendix. We use separate price deflators for inputs and output and for investment in buildings and machinery obtained from Statistics Norway. The aggregation level for the price deflators is according to the sector classification used in the National Accounts, which is somewhere in between the 2- and 3-digit ISIC level. In equation 1 the α_t^z's are the 3-digit means of cost shares of each factor z relative to output Y_{it}. We impose constant returns to scale.[9]

Using this plant level TFP index, we calculate mean productivity in each 3-digit sector for entrants, exitors, survivors and acquisitions as well as the deviation in mean productivity of all groups from domestic survivors in each sector. Table 3 presents the averages of annual values for the periods 1980 to 1989 and 1990 to 2000.[10] The table shows foreign survivors to be significantly more productive than domestic survivors in both periods. Foreign entrants have higher productivity than domestic survivors as well, though this difference is not significant. In contrast, domestic entrants have lower levels of productivity than domestic survivors. This may be surprising; however, recent research with output prices available demonstrates that entrants have higher physical productivity levels than incumbents but charge lower prices, hence, their revenue based productivity advantage (as

[8] A similar TFP measure is also used in the productivity decompositions by Foster et al. (2001), Disney et al. (2003), and Møen (1998).

[9] Klette (1999) estimated scale parameters for different sectors of Norwegian manufacturing, and concluded that constant returns to scale could not be rejected.

[10] Using labour productivity as an alternative measure yields a very similar picture for Table 3. However, the labour productivity differences between foreign and domestic plants are much larger than differences in terms of TFP, reflecting the fact that foreign plants are larger and more capital intensive than domestic plants.

measured here) is much less pronounced (Foster et al., 2005).[11] Plants that exit have lower productivity than domestic survivors, though this productivity deviation is not significant for foreign exitors. Both foreign acquisitions and divestures have on average higher productivity than domestic survivors in the year after the ownership change, although the difference is significant only in the 1990s.

Table 3: Deviation from productivity of domestic survivors

	1980s		1990s	
	Obs.	TFP	Obs.	TFP
Domestic survivors	60,815	0.0	50,131	0.0
Foreign survivors	2,044	6.0*	5,422	5.0*
Foreign divestures	184	2.9	369	4.8*
Foreign acquisitions	268	3.1	944	5.6*
Domestic entrants	1,652	-4.5*	1,434	-0.1
Foreign entrants	54	4.7	150	3.4
Domestic exitors	2,567	-13.2*	2,505	-11.0*
Foreign exitors	86	-8.5	259	-0.1

* indicates significant difference from domestic survivors at the 5% level

In Table 3 the productivity levels of entrants, exitors, and plants that change ownership represent only a single year for each plant. Foreign acquisitions are more productive the year after ownership change than domestic survivors, but we cannot tell whether this is due to the acquisition of high productivity domestic plants, or whether the ownership change has induced an improvement in productivity. In order to look more closely at the development of productivity around the time of ownership change, we follow plants from two years before a change in ownership until two years after the ownership change. The upper panel of Table 4 shows year-on-year TFP growth and the deviation in productivity from domestic survivors for foreign acquisitions and foreign divestures. We also present the figures for job creation, job destruction and net employment flows.[12]

[11] The productivity of entrants is calculated the first year we observe the plant. For small plants, the first year may be more subject to data problems. If we calculate the productivity of entrants the second year, domestic entrants no longer have lower productivity than domestic survivors. We then get a TFP deviation for domestic entrants of -0.2 in the 1980s and 0.7 in the 1990s.

[12] The results are based on selecting plants that undergo one ownership change during the five year period, and with entry more than 2 years before and exit more than 2 years after the ownership change. Around 10% of ownership changes end in plant exit within 2 years after the ownership change. This share is the same for foreign acquisitions and foreign divestures.

Plants that are acquired by foreign owners do not seem to perform exceptionally well before takeover. In the two years before domestic plants are taken over by foreign owners, they have on average negative productivity growth and are less productive than other domestic surviving plants. On average these plants also reduce employment before foreign takeover. For the average acquired plant this process is reversed in the year of the ownership change and continues over the next two years with productivity increases and net employment creation.[13] For foreign divestures, the trends in productivity and employment before and after a domestic takeover are not as clear as in the case of foreign acquisitions.

Table 4: Productivity and employment dynamics in entrants, exitors and acquisitions

	TFP		Employment			TFP		Employment		
Age	Δ	Dev	JC	JD	Net	Δ	Dev	JC	JD	Net
	Foreign acquisitions					Foreign divestures				
-2	-0.5	-1.1	6.3	8.4	-2.1	-1.5	-0.5	8.0	5.1	2.9
-1	-2.6	-1.0	5.7	11.7	-6.1	1.5	0.6	10.7	7.9	2.9
0	2.5	2.9	9.5	8.3	1.2	1.5	2.6	6.1	34.6	-28.5
1	1.6	3.5	8.9	6.0	2.9	-5.9	-0.2	24.7	19.8	4.9
2	0.2	2.5	7.8	5.9	1.9	5.5	6.8	10.1	16.5	-6.3
	Foreign entry					Domestic entry				
1	6.7	10.7	24.1	10.9	13.2	4.0	0.8	31.3	6.7	24.7
2	-10.9	-4.0	17.7	5.5	12.2	1.5	2.5	17.1	8.0	9.1
3	9.4	5.6	10.6	9.5	1.1	-0.6	1.9	13.9	8.6	5.3
4	4.8	11.2	10.5	12.7	-2.2	-0.8	2.2	13.4	7.8	5.6
	Foreign exit					Domestic exit				
-3	4.1	5.1	8.3	8.2	0.1	-1.0	-3.2	7.2	10.7	-3.5
-2	-10.2	-2.9	3.7	12.8	-9.1	-1.2	-5.0	8.1	9.9	-1.9
-1	-1.2	-5.5	10.0	11.1	-1.1	-1.3	-5.7	8.1	12.7	-4.6
0	1.0	-2.5	12.0	31.4	-19.4	-5.9	-11.6	6.2	26.4	-20.1

Figures are averages of annual values from 1980-2000.
Δ = Growth rate from $t-1$ to t, Dev = Difference from TFP level of domestic survivors in year t.

In addition to ownership changes, Table 4 also includes productivity and employment dynamics in entrants and exitors. We follow entrants for 4 years after entry, and exitors for 4 years before exit, and include only plants that do not change ownership during the tracking period. Employment dynamics in entrants is very similar to that presented for

[13] When estimating employment effects of foreign acquisitions, Girma and Görg (2004) find some evidence that takeovers reduce employment growth in the UK electronics industry.

US manufacturing plants in Davis and Haltiwanger (1992). Entrants have large net job creation rates the first years after entry, and then job creation falls as the plants get older. During the first four years of operation net employment creation is smaller in foreign than in domestic entrants. With the exception of the second year after entry, foreign entrants impress with their performance in productivity growth and productivity levels relative to domestic survivors. Overall, they seem to perform better in terms of productivity than domestic entrants the first four years after entry. Foreign and domestic exits perform similarly, their productivity deteriorates before exit and they reduce employment before closing down. Foreign plants seem to close down at higher productivity levels than domestic plants since their productivity levels are closer to that of the domestic survivors than is the case for domestic exitors (cf. the TFP-Dev. columns).

4 Contributions to Aggregate Productivity Growth and Employment Creation

So far we have seen that foreign-owned plants are generally more productive than domestic plants. In order to assess the contribution of foreign plants to aggregate productivity growth in Norwegian manufacturing, we continue with a decomposition of productivity growth. Decompositions of productivity are a common method to analyse the sources of aggregate productivity growth at the industry level. The method calculates the contributions to productivity growth coming from changes within and between existing plants in addition to entry and exit.

Different methods to decompose productivity growth have been proposed by Baily et al. (1992), Griliches and Regev (1995), Olley and Pakes (1996) and Haltiwanger (1997). We use the decomposition proposed by Haltiwanger (1997). This approach tracks changes in productivity relative to a reference point (i.e. industry averages) and is therefore straightforward to interpret.[14] The decomposition starts from an index of industry level productivity

$$P_t = \sum_i \theta_{it} p_{it},$$

where P_t is the index of aggregate industry productivity in year t, θ_{it} is the output market

[14] A full discussion of the differences between alternative decomposition methods is provided in Foster et al. (2001) and in Disney et al. (2003). Petrin and Levinsohn (2005) examine the aggregation of plant-level measures of productivity growth to the economy-wide level in productivity decompositions. They also look at how productivity growth relates to welfare.

share of plant i in the industry and p_{it} is the plant's productivity measure.

In our case p_{it} is the TFP measure described in equation (1), with the cost shares α_t^z replaced by the average of year t and $t-k$. According to Haltiwanger (1997) the change in industry productivity between period t and $t-k$ can then be decomposed in the following way

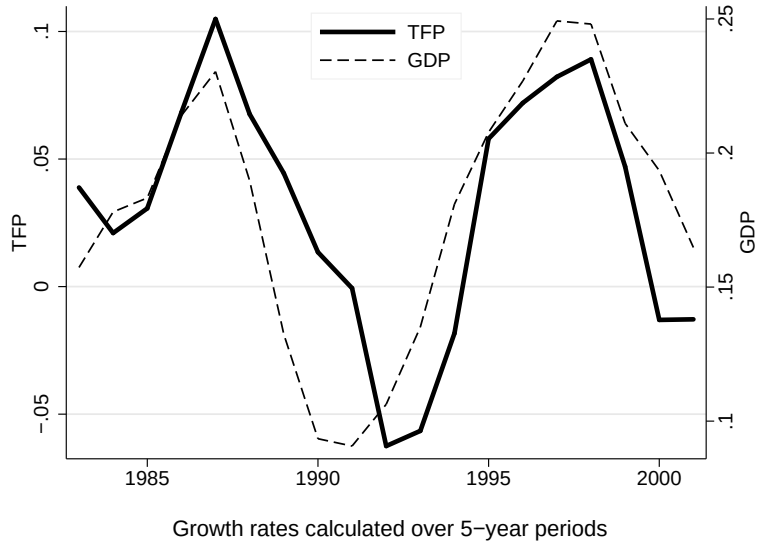
$$\begin{aligned}\Delta P_t = &\sum_{i\epsilon S,A} \theta_{i,t-k}\Delta p_{it} + \sum_{i\epsilon S,A} \Delta\theta_{it}\left(p_{i,t-k} - P_{t-k}\right) + \sum_{i\epsilon S,A} \Delta\theta_{it}\Delta p_{it} \\ &+ \sum_{i\epsilon N} \theta_{it}\left(p_{it} - P_{t-k}\right) - \sum_{i\epsilon X} \theta_{i,t-k}\left(p_{i,t-k} - P_{t-k}\right), \end{aligned} \tag{2}$$

where S, A, N and X denote plants that survive, plants that survive and are acquired, plants that enter and exit between t and $t-k$, respectively. We take k to be 5 in the following decompositions. The first line in equation (2) shows the contribution to productivity growth from surviving and - in our case - acquired plants. We split the surviving plants into 4 groups: plants that are domestic all years between $t-k$ and t, plants that are foreign all years between $t-k$ and t, plants that change ownership and end up as foreign in year t (foreign acquisitions), and plants that change ownership and end up as domestic in year t (foreign divestures). The contributions from survivors and acquisitions can be split into three parts: The first term in equation (2) shows the contribution to productivity growth from changes within surviving and acquired plants, the 'within' effect. The second term is the 'between' plants effect, which is positive if those plants that initially had above average TFP are the ones that gain market shares. The third term is a 'covariance' term that will be positive if plants with positive productivity growth increase their market shares or plants with negative productivity growth lose market shares. The last two terms represent the contributions to productivity growth accounted for by entry and exit.

Figure 2 plots our measure of aggregate productivity growth from equation (2) against GDP growth in Norway. Productivity growth in manufacturing corresponds closely to the business cycle over the 2 decades. In order to compare two similar time periods in terms of the business cycle, we select the two periods of expansion ending at the peaks in 1987 and 1997. Thus for the decomposition of productivity growth we focus on the periods 1982-1987 and 1992-1997.

Table 5 shows the components of the decomposition. Entrants have market shares of around 6% in both periods. The market share of exiting plants is also rather constant at just below 10%. The big change from the boom during the 1980s to the boom during

Figure 2: Business Cycle and TFP



the 1990s is the increase in market shares of foreign plants, part of which is due to the inclusion of indirect foreign ownership in the 1990s. Taking foreign survivors and foreign acquisitions together, their market share increased from 8% in 1982 to 38% in 1992. In the TFP-columns of Table 5, the productivity of entrants in year t is compared to aggregate productivity in t-5, and we see that foreign entrants are more productive than domestic entrants and substantially more productive than the average as well. Both domestic and foreign exitors have below average productivity, similar to the pattern in Table 3. Plants that experience foreign acquisitions have below average productivity before acquisition, in line with Table 4. From Table 5 also note that foreign survivors have higher productivity growth than domestic survivors.

Table 6 shows the results of the decomposition of aggregate TFP growth according to equation (2). As in most other TFP decompositions, productivity growth within surviving plants is the dominant driver of aggregate TFP growth. The total within effect accounts for 61% of aggregate TFP growth in the 1982-1987 period,[15] while its contribution is reduced to 43% in the 1992-1997 period. In line with their small market share, foreign plants play a negligible role in the within effect during the 1982-1987 period. Over the period 1992-

[15]Calculated as the sum of the within entries for foreign and domestic survivors and acquisitions (4.75+0.38+1.99+0.16) divided by total TFP growth (11.87).

Table 5: Components of the TFP decomposition

	Plants		Market share		TFP		TFP growth	
	82-87	92-97	82-87	92-97	82-87	92-97	82-87	92-97
Domestic survivors	5,327	3,971	75.24	49.29	-3.84	-7.06	4.41	1.80
Foreign survivors	122	314	5.88	23.95	-2.59	-3.72	11.55	4.87
Foreign divestures	77	90	7.08	2.63	5.20	-9.50	14.07	5.40
Foreign acquisitions	86	255	2.38	14.01	-3.10	-4.37	-1.83	6.34
Domestic entrants	849	651	5.05	4.13	2.34	-1.34		
Foreign entrants	36	84	0.62	2.10	17.99	10.52		
Domestic exitors	1,129	1,108	9.02	8.35	-10.10	-14.59		
Foreign exitors	32	114	0.39	1.77	-7.90	-11.14		

Market shares are aggregated from 3-digit level using 3-digit output shares. Entrants' market share is calculated in year t, survivors' and exitors' in t-5.

TFP columns show average deviations from aggregate 3-digit TFP. For entrants it is the deviation of plant-level TFP in year t from aggregate TFP in t-5, for exitors and survivors we compute the deviation in t-5.

The TFP growth columns show unweighted average TFP growth from t-5 to t.

Table 6: Decomposition of TFP growth for 1982-1987 and 1992-1997

	Domestic	Foreign	Domestic	Foreign
Period	1982-1987		1992-1997	
Survivors-within	4.75	0.38	0.14	1.35
Survivors-between	-0.78	-0.15	-0.55	-0.27
Survivors-covariance	3.65	0.27	2.28	0.89
Acquisitions-within	1.99	0.16	0.00	1.34
Acquisitions-between	0.00	0.01	0.08	0.00
Acquisition-covariance	0.51	0.02	0.15	0.44
Entrants	0.72	0.10	0.22	0.30
Exitors	0.29	-0.03	0.21	-0.01
Total TFP growth	11.87		6.57	

Domestic acquisitions correspond to what we elsewhere refer to as foreign divestures.

1997 productivity growth in foreign survivors and foreign acquisitions accounts for 95% of the growth coming from productivity increases in surviving plants. The between effect for surviving plants is negative in both periods for domestic and foreign plants, indicating that surviving plants with above average productivity in the base year lose market shares over the 5-year periods under consideration. The covariance effect is positive; which means that plants with positive productivity growth increase their market shares. In Table 6 both the entry and exit effects are positive. This indicates that the entry and exit process increases aggregate productivity growth, i.e. entrants are plants with above average productivity while plants that exit have below average productivity.

Based on table 6 we calculate the share of total productivity growth accounted for by each group of plants in the two periods. The results are presented in the first column of Table 7. In addition, Table 7 presents the contribution to job creation and job destruction over the two 5-year periods. From the table we see that net entry of foreign and domestic plants accounts for about 10% of TFP growth in both periods. This is slightly below a net entry effect of 14% for the US between 1982-1987 (Foster et al., 2001).[16] From 1982-1987 there is net job destruction in Norwegian manufacturing. 60% of the net reduction in employment is due to the exit of domestic plants destroying more jobs than the new domestic entrants create. During the boom from 1992-1997 there is net job creation in manufacturing. This is entirely due to job creation in surviving plants, as the process of domestic entry and exit still wipes out jobs.

In line with the small market share of 8% (cf. Table 5) for foreign plants in the 1982-1987 period, the contribution of foreign firms to both employment change and productivity growth is also small, 5-6%. During this period in the 1980s, the domestic survivors account for 64% of productivity growth and 22% of net job destruction. Ten years later the market share of foreign plants has increased to 38%, and the overall share of productivity growth attributed to foreign plants increased by even more to 61%. With respect to net job creation, the domestic survivors are by far the largest contributors to employment growth, but also plants that are acquired by foreign owners are substantial contributors to employment growth.

[16]The role of net entry or plant turnover in aggregate productivity growth is likely to be larger than what productivity decompositions suggest. The entry of new and efficient plants may increase competition and induce surviving plants to perform better. Bartelsman et al. (2004) demonstrate that plant turnover enhances productivity in surviving plants across a large number of developed and developing countries.

Table 7: Percentage of job creation and productivity growth due to different groups of plants

Share in	Prod. Growth	Employment Growth Net	JC	JD
		1982-1987		
Domestic Survivors	64.2	21.9	60.9	47.3
Foreign Survivors	4.2	2.3	2.5	2.5
Foreign Divestures	21.1	12.2	1.5	5.2
Foreign Acquisitions	1.6	2.9	1.7	2.1
Domestic entry/exit	8.5	60.6	30.7	41.2
Foreign entry/exit	0.6	0.0	2.7	1.7
Total growth/jobs	11.9	-27,429	51,186	-78,615
		1992-1997		
Domestic Survivors	28.5	144.3	47.7	23.7
Foreign Survivors	30.0	13.6	8.8	7.7
Foreign Divestures	3.5	9.1	3.1	1.6
Foreign Acquisitions	27.1	33.8	10.6	4.8
Domestic entry/exit	6.5	-103.7	21.5	52.7
Foreign entry/exit	4.4	2.8	8.3	9.6
Total growth/jobs	6.6	12,089	60,681	-48,592

Where numbers in the columns do not add up to 100, this is due to rounding.

5 Conclusions

In this paper we analyse employment and productivity dynamics in foreign and domestic plants over two decades. In this analysis, we also consider foreign acquisitions and foreign divestures as additional groups. The presence of foreign ownership in Norwegian manufacturing increased substantially from the 1980s to the 1990s. All types of foreign plants are on average more productive than their domestic counterparts. Thus, along with the increase in market shares of foreign-owned plants, their contribution to productivity growth and employment dynamics also increased. We find that both job creation rates and job destruction rates are larger in domestic than in foreign plants. Plants that are acquired by foreign owners create more jobs than they destroy in the year of acquisition, while the opposite seems to be the case for plants where foreigners reduce their ownership interests.

We compare two 5-year periods at similar points of the business cycle, and find that the contribution of entry and exit of plants accounted for about 10% of aggregate man-

ufacturing productivity growth in both the boom during the 1980s and the boom during the 1990s. In both periods the entry and exit process was associated with net employment destruction. Foreign entrants are more productive than domestic entrants, and foreign plants also seem to close down at higher productivity levels than domestic exitors.

The main mode of foreign entry into Norwegian manufacturing in the 1990s is by foreign acquisition. Foreign owners do not seem to 'cherry-pick' when targeting domestic takeover candidates. In fact, they manage to reverse a negative trend in productivity in the acquired plant and they are also likely to generate employment after the change in ownership. During the boom from 1992-1997, foreign surviving plants and foreign acquisitions taken together were the largest contributors to productivity growth in Norwegian manufacturing. What is more, foreign acquisitions are second only to domestic surviving plants in generating employment, and they create more jobs than foreign surviving plants. Thus, the common perception that foreign firms buy domestic firms to strip their assets and lay off their employees in order to generate productivity growth is not confirmed in this analysis.

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A Appendix

Construction of the capital measure

K_{it}, our estimate of capital services, is constructed from the following aggregation:

$$K_{it} = R_{it} + (0.07 + \delta^m)V_{it}^m + (0.07 + \delta^b)V_{it}^b,$$

where R_{it} is the cost of rented capital in the plant, V_{it}^m and V_{it}^b are the estimated values of machinery and buildings at the beginning of the year, $\delta^m = 0.06$ and $\delta^b = 0.02$ are the depreciation rates. We take the rate of return to capital to be 0.07.[17] The estimated values of buildings and machinery are obtained from information on fire insurance values. To reduce noise and avoid discarding too many observations with missing fire insurance values, we smooth these values using the perpetual inventory method. Fire insurance values are not recorded after 1995, thus from 1996 we estimate capital values by adding investments and taking account of depreciation. Where possible, we also use estimates of firm level capital values (distributed to the plant level according to employment shares) as starting values for plants with entry after 1995. These capital values are obtained from recent work by Raknerud et al. (2003) to improve on capital estimates in Norwegian manufacturing.

[17] The output and input definitions and values for depreciation rates and the rate of return to capital rely in large part on previous work with this data. See Balsvik and Haller (2006) and references therein.

Table 8: Employment dynamics by industry

	Domestic plants				Foreign plants				Foreign divestures		Foreign acquisitions		Share in employ-
Industry	JC	Entry	JD	Exit	JC	Entry	JD	Exit	JC	JD	JC	JD	ment
Food&Tobacco	7.98	1.21	8.17	1.90	5.97	1.32	8.03	1.76	5.37	10.62	11.07	7.35	17.90
Textiles	6.14	0.79	11.30	2.93	6.74	0.42	8.68	2.32	4.31	7.57	5.19	15.26	4.11
Wood	6.53	0.81	7.94	1.73	4.91	0.29	15.61	4.05	3.61	2.76	5.71	6.76	8.32
Paper&Printing	5.03	0.59	6.64	1.55	5.31	0.74	8.07	2.07	2.74	5.88	6.72	21.60	15.58
Chemicals	6.27	0.75	6.97	1.18	3.98	0.49	6.19	1.07	7.35	8.20	13.49	5.90	7.50
Minerals	6.59	0.99	7.77	1.20	4.58	0.78	6.64	1.09	3.69	7.73	12.07	5.97	2.98
Basic Metals	3.77	0.42	6.66	1.08	1.64	0.21	3.82	0.05	1.59	3.04	2.20	1.44	6.86
Metal Products	9.50	1.93	10.52	3.21	7.40	1.32	8.69	2.17	7.48	15.34	18.17	7.08	35.99
Miscellaneous	6.87	1.31	9.04	3.46	4.87	0.00	7.29	1.16	1.11	1.55	1.51	1.02	0.96

Figures are averages of annual values for each 2-digit ISIC sector from 1980-2000, excluding 1988.