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JOB FLOWS IN DUTCH MANUFACTURING, 1979–1993** EMPIRICAL EVIDENCE AND THEORETICAL IMPLICATIONS

BY

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Key words: labour market dynamics, job creation, job destruction

1 INTRODUCTION

In the past decade the number of studies in labour market dynamics has proliferated. Especially the papers by Davis and Haltiwanger (1990, 1992) on job creation and job destruction in the USA were followed by a host of studies on job flows in other countries. Examples include Burda and Wyplosz (1994) for a number of European countries, Leonard and Van Audenrode (1993) for Belgium and Blanchflower and Burgess for the UK.

In this paper, we will describe and characterize the flows of job creation and job destruction in the Dutch manufacturing sector and we will discuss the implications of our results for a number of currently developed economic theories on job and firm turnover. For extensive treatment of these recent theories, see Jovanovic (1982), Davis and Haltiwanger (1990), Caballero and Hammour (1994), Burda and Wyplosz (1994), and Mortensen and Pissardes (1994). Most empirical studies of job flows rely on longitudinal plant-level employment observations. For The Netherlands, we have three potential sources. The one used by Hamermesh et al. (1994) is based on a data set of Dutch firms in all economic sectors. Its major drawback, however, is that it is limited to only one year, so no account can be taken of entry and exit of firms. The second source is an annual survey by the Dutch Chambers of Commerce including firms of all sectors for the period 1987–1992. In this data set, only firms with more than 50 employees are present on a full sample basis; cf. Van der Hoeven and Verhoeven (1994). The source we use is based on a panel of firm-level data in the manufacturing sector collected by The Netherlands' Central Bureau of Statistics over the period 1978–1993.

Our main findings are summarized in the following points. (1) Firms, even defined in a narrowly defined class (two-digit SBI, the Dutch SIC system), are

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very heterogeneous in their employment behaviour. (2) Job creation and destruction are large compared to net changes in employment. This suggests that frictional unemployment might be a more important phenomenon than we used to believe. (3) We find a negative correlation between job reallocation, i.e. the sum of job creation and job destruction, and net employment growth. This has also been found for many other countries. (4) Both job creation and job destruction are higher in small firms compared to large ones. Net employment change does not differ very much for the different size classes. (5) Persistence of created and destroyed jobs varies over the business cycle and varies with firm size. (6) We find that in large firms job reallocation is more counter-cyclical than in small firms. (7) The major source of reallocation stems for employment shifts between firms within the same sector, rather than between firms of different sectors.

This paper is organized as follows. Section 2 describes the data and defines our measures of the various job flows. Section 3 analyses various aspects of job creation and job destruction. In section 4, we present evidence on the persistence of created and destroyed jobs. Section 5 deals with cross-industrial variation and addresses the question whether aggregate job reallocation mainly reflects *within sector* or *between sector* changes in employment opportunities. In section 6 we consider differences in employment behaviour of firms in different size classes. Finally, section 7 concludes.

2 DATA AND DEFINITIONS

Our data consist of a sample of firm-level observations over the period 1978–1993, provided by The Netherlands' Central Bureau of Statistics (CBS). The database contains information of firms with respect to the number of employees and a number of other issues. It is based on firms having more than 20 employees on September 30 of each year, all of whom are working 15 hours or more. Firms which temporarily fall below this level are also taken into account. So only a part of the firms with 10 to 20 employees is taken into account. This database gives a complete coverage of all manufacturing firms that fulfil those criteria. The very small businesses, with less than 10 employees are not taken into account. These are typically the ones in which high job turnover takes place, therefore our job reallocation measure underestimates the true value. There is substantial attrition in these statistics because of mergers, firms dropping below the employment threshold, changes in legal status or location, management buy-outs, etc. Considering continuing firms only leads to a reduction of some 60 per cent in the number of firms that are included in the statistics in all 16 years. It is, however, not wise to restrict the analysis to continuing firms only because this will lead to a selectivity bias (the continuing firms are also likely to be the more successful firms). Therefore we perform our analysis on both continuing firms and on all firms.

As exits in period *t*, we consider firms which are observed for the last time in period $t-1$ and as entries in period *t* we consider those firms which show up for the first time in period *t*. In this way, we avoid some of the bias that is caused by firms which temporarily fall below the employment threshold. We do however have to make an adjustment at the tails because we ignore the firms which temporarily fall below the employment threshold after 1993.[1] To get an idea of the importance of entry and exit it is useful to look at some results found for other European countries. Studies by the OECD (1987, 1994) reveal that some 70 per cent of entry of firms in France consists of newly created business starting from scratch. For Germany, this figure is reported to be between 80 and 90 per cent. The rest consists of take-overs or created subsidiaries of existing firms and the like. Total job creation and destruction due to entry and exit of establishments ranged between 1 and 2 per cent of employment over the period 1978–1990 for Germany, Norway and Canada. In France, Denmark, Finland, Italy, and Sweden, these rates were between 2 and 6 per cent. Using the information of the two OECD studies, it is likely that about three quarters of our entry and exit figures concern the actual birth of new firms from scratch and the actual closure of firms. Another reason to believe that the amount of spurious entries and exits in our study is relatively small is the fact that our figures are of a similar magnitude as entry and exit found by Kleijweg and Lever (1995) for the Dutch manufacturing sector, using a different data set.

There are reasons to believe that the manufacturing sector is representative for the whole economy. Anderson and Meyer (1994) show that the job creation in the manufacturing sector of the USA is slightly lower than job creation in the whole of the economy. Blanchflower and Burgess (1994) report the same for the UK. Evidence for The Netherlands, by Van der Hoeven and Verhoeven(1994), suggests that about 15 per cent of total job creation in 1992 took place in the manufacturing sector. In that year this sector accounted for about 19% of total employment. Hence, job flows in the manufacturing sector are somewhat lower than in the rest of the economy, nevertheless this sector seems to be a reasonable representation of the whole economy.[2]

1 We do this by using detailed entry and exit information, which is available for 1987–1993. In Abbring and Gautier (1996) it is described how this information is linked to the panel. The correction procedure is the following. First we took the difference between 'true' exits (bankruptcies and voluntary closings) and 'true' entries (the start of a brand new firm). Call this difference *d*. Since the entry rate for 1993 in our series is consistent with the other years we just added *d* to this rate to obtain our corrected exit rate. Another correction method we experimented with, which is based on averages of spurious exits of the proceeding years, led to almost the same figure. We also checked what the time span was of the firms which temporarily disappeared in order to see if we had to adjust more years. It turned out that in 95% of the cases this time span was only one year, so we did not need to adjust the exit rates of 1992 and before.

2 Only in 1993 did employment in the manufacturing sector decrease much more than in the rest of the economy.

We define our measures of job flows according to the standard, as set out in Davis and Haltiwanger (1990). When $emp_{e,t}$ is the number of employees in firm e at time t, then the size of the firm is defined as:

$$x_{e,t} = \frac{1}{2}(emp_{e,t} + emp_{e,t-1}) . \tag{1}$$

Furthermore, when the growth rate $g_{e,t}$ of firm e is defined as:

$$g_{e,t} = \frac{\Delta emp_{e,t}}{x_{e,t}}, \tag{2}$$

then gross job creation in sector s at time t is:

$$\begin{aligned} JC_{s,t} &= \sum_{e \in E_{s,t},\, g_{e,t} > 0} \left(\frac{x_{e,t}}{X_{s,t}}\right) g_{e,t} \\ &= \sum_{e \in E_{s,t}} \left(\frac{\Delta emp_{e,t}}{X_{s,t}}\right), \quad \text{where } \Delta emp_{e,t} > 0 , \end{aligned} \tag{3}$$

and where $\Delta emp_{e,t} = emp_{e,t} - emp_{e,t-1}$, $E_{s,t}$ is the set of firms in sector s at time t and $X_{s,t}$ is the size of sector s, that is, total average employment of all firms in sector s or

$$X_{s,t} = \sum_{e \in E_{s,t}} x_{e,t} . \tag{4}$$

Job destruction is defined analogously as:

$$\begin{aligned} JD_{s,t} &= \sum_{e \in E_{s,t},\, g_{e,t} < 0} \left(\frac{x_{e,t}}{X_{s,t}}\right) |g_{e,t}| \\ &= \sum_{e \in E_{s,t}} \left(\frac{-\Delta emp_{e,t}}{X_{s,t}}\right), \quad \text{where } \Delta emp_{e,t} < 0 . \end{aligned} \tag{5}$$

The sum of JC and JD is a measure of job reallocation between $t-1$ and t, so:

$$JR_{s,t} = JC_{s,t} + JD_{s,t} . \tag{6}$$

The net change in employment, which is a common statistic to analyze when the employment performance of a sector or a country is at stake, equals the difference in job creation and job destruction, or:

$$NET_{s,t} = JC_{s,t} - JD_{st} \tag{7}$$

Before we continue, it is important to note that we define a job to be an employment position in a firm. In this way we avoid difficult issues like whether a secretary who changes her typewriter for a computer changes her job or not. Hamermesh et al. (1994) propose a measure of job creation and job destruction based on actual employment flows into, out of and within the firm, instead of the net employment changes as in (3) and (5). However, they find the within-firm flows to be small.

3 MAGNITUDE AND CYCLICAL BEHAVIOUR

3.1 *Stylized Facts*

Figure 1 graphs the annual rates of job creation, job destruction, job reallocation

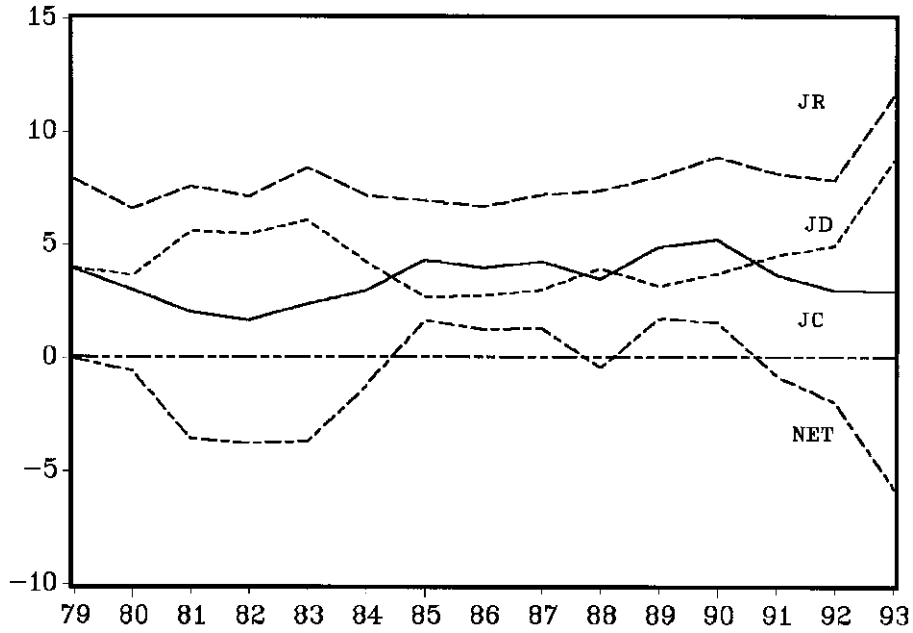

Figure 1 – Rates of job creation, job destruction, job reallocation and net employment change at continuing firms in the Dutch manufacturing sector, 1979–1993.

and net employment growth for continuing firms in the manufactoring sector in The Netherlands over the period 1979–1993. It is evident that there is simultaneous job creation and job destruction, even in the recession period of the early 1980s. As we would expect, the pattern of *JC* and *JD* moves in opposite ways.

Figure 2 plots rates of job creation, job destruction, reallocation and net employment change of both continuing firms and entry and exit. Surprisingly we see firm entry increasing in the recession of 1983. One reason might be that, in that period, the easiest way for an unemployed worker to enter employment was by starting a new firm. This figure also shows that total job destruction behaves more volatile than total job creation. Hence, net employment change, as well as total job reallocation, is mainly driven by job destruction. This finding is consistent with a number of other studies on job flows, like Davis and Haltiwanger (1992) and Blanchflower and Burgess (1994). Job reallocation appears to have been particularly high in the economic downturn of the early 1980s and 1990s.

Table 1 presents characteristics of the main variables introduced in the previous section, again decomposed into continuing firms and all firms, including entry and exit. Manufacturing employment dropped with 1 per cent in firms that contunuously operated during the entire sample period, but the underlying gross job flows were considerably larger. *JD* is more volatile than *JC* and dominates both the magnitude and cyclical behaviour of *JR*. When we consider all firms,

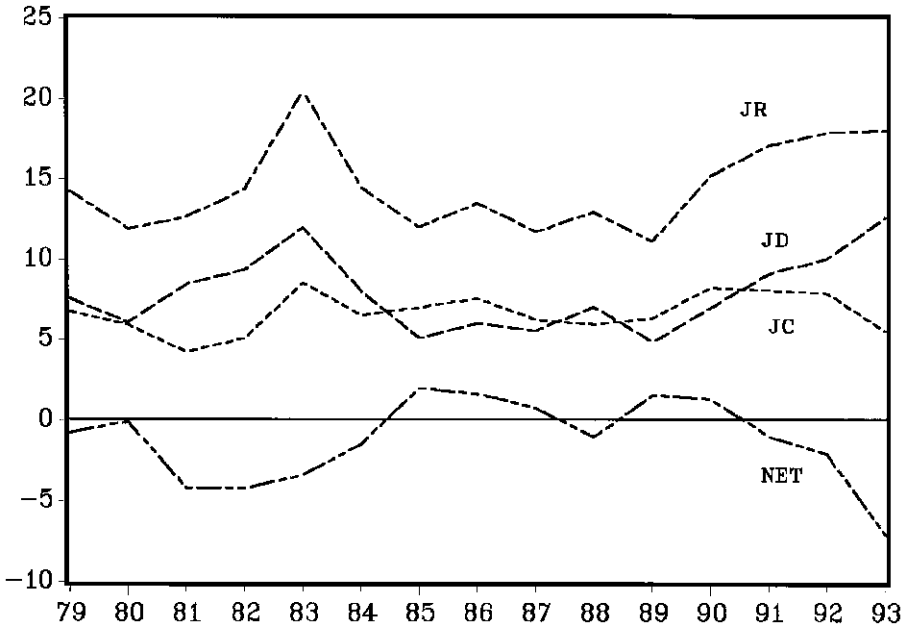

Figure 2 – Rates of job creation, job destruction, job reallocation and net employment change at continuing firms and because of entry and exit in the Dutch manufacturing sector, 1979–1993.

i.e., including entry and exit, the variance in *JD* dominates the variance in *JC* even more. Again, we find a significant negative correlation between *JR* and *NET*. In the next section we will discuss possible reasons for this pattern. Gross job flows, including entry and exit of firms, are about six times larger than the net employment change.

The OECD (1987) introduced a measure of the 'normal' and 'structural' level of job reallocation. This measure is defined as the sum of the rate of job creation in a recession and the rate of job destruction in a boom. So it represents the amount of job turnover occurring in an economy, regardless of the economic conditions. We find a 'structural' amount of job turnover equal to 10 per cent. Hence, some 70 per cent of job reallocation appears to be of a structural nature.

A useful for heterogeneity of firms in the manufacturing sector is given by the variable *EXC*, which is defined by taking job reallocation, *JR*, in excess of the absolute value of the net employment change:

$$EXC_{s,t} = JR_{s,t} - \mid NET_{s,t} \mid . \tag{8}$$

The absolute value of net employment change can be interpreted as the minimally required amount of job reallocation. If all firms would be homogeneous *JR* would equal *NET*. Hence, *EXC* shows the importance of simultaneous job creation and destruction within a certain sector, in other words: the heterogeneity within a sector. A non-zero value of *EXC* implies that firms are not homogeneous. For continuing firms, we find a value of *EXC* of 5.8 per cent, while if we also include entries and exits *EXC* equals 13.4 per cent. This relatively high value shows that there is tremendous heterogeneity among firms in the manufacturing sector.

TABLE 1 – JOB FLOW CHARACTERISTICS OF THE DUTCH MANUFACTURING SECTOR, 1979–1993 (IN PERCENTAGES OF EMPLOYMENT)

Variable	Mean	Standard deviation	Correlation with *NET*
Continuing firms:			
JC	3.41	1.02	0.86
JD	4.44	1.58	−0.94
JR	7.85	1.22	−0.51
NET	−1.03	2.36	
All firms:			
JC	6.59	1.25	0.41
JD	7.86	2.39	−0.88
JR	14.46	2.77	−0.57
NET	−1.26	2.61	

To non-economists, who are not familiar with the 'representative agent and firm' jargon, this heterogeneity among firms may seen obvious. However, most standard economic theories still depart from this premise. This implies that the development of (theoretical) models that explicitly deal with employment and product heterogeneity should be placed high on the research agenda. Possible explanations may stem from the Bayesian learning theory, developed by Jovanovic (1982), or the monopolistic competition literature, see Starz (1989). Also from an industrial organization point of view, heterogeneity of firms is a familiar phenomenon. See e.g., Sinclair-Desgagne and Röller (1995) and Geroski and Gregg (1995) and the references therein. Caballero (1992) also warns against the dangers of ignoring the heterogeneity of firms when going from the representative agent or firm to the aggregate level.

Finally, we want to obtain a meaningful comparison of job reallocation with the reallocation of workers. Clearly, job reallocation implies worker reallocation, but the other way around does not necessarily have to be the case since different workers can allocate themselves over a given set of jobs. We only have information on worker flows in The Netherlands at the aggregate level. However, if we assume that the manufacturing sector is a fair representation of the whole economy, we can say something about it, using the worker flow series from Broersma and Den Butter (1995). Over the period 1979–1991, they find that on average 10.6 per cent of the workers has moved from one job to another, 5.5 per cent of the workers has moved into unemployment and 2.4 per cent has moved out of labour force. The inflow into employment of new workers from unemployment or non-participation is some 8.8 per cent of employment. Hence, total worker reallocation is 27.3 per cent of employment over the sample. From this it follows that the ratio of total job reallocation to total worker reallocation equals 53%. This is the percentage of total worker reallocation causes by shifts in the distribution of employment opportunities across firms. To avoid double counting of the workers who move from a destroyed to a newly created job we use $X_{s,t}MAX_{s,t}$ as a lower bound on worker reallocation caused by job reallocation, where

$$MAX_{s,t} = max\{JC_{s,t}, JD_{s,t}\}\,. \tag{9}$$

In that case we find a ratio of 30 per cent. Hence, between 30 to 53 per cent of worker reallocation is instigated by job reallocation. This is in line with Davis and Haltiwanger (1992) and Albæk and Sørensen (1995). In other words, a major fraction of worker reallocation stems from reallocation of jobs.

3.2 *Why Does Job Reallocation Move Counter-cyclically?*

In the recent theoretical literature we can find a number of, not mutually exclusive, explanations for the counter-cyclicality of job reallocation. One line of rea-

soning concentrates on opportunity costs, e.g. Davis and Haltiwanger (1990) and Saint-Paul (1993). The main message is that reallocation of labour takes time and effort, which cannot be used for normal production. Firms will reallocate in downturns because the opportunity costs, in the form of foregone production, are lowest at that particular moment.

Other explanations make use of search and hiring and firing costs, as Nickell (1992) and Mortensen and Pissarides (1994). They argue that job destruction is concentrated in downturns and job creation tends to take place all over the cycle because fast job creation is more costly than fast job destruction. In booms labour markets are tight, which makes it more difficult to fill up newly created vacancies. This last effect is assumed to be stronger than the equally plausible effect that in downturns job destruction is more expensive, because the flow of voluntary quits is lower.

Caballero and Hammour (1991, 1994) also focus on search costs but besides that they emphasize the importance of sunk instalment costs in the process of job creation. The argument goes as follows. If the wage is the result of a bargaining over the match-surplus between worker and firm, then the instalment costs cannot be subtracted from this surplus as far as they are sunk. We know that in booms, the costs for an individual worker to quit his job and search for a better one are relatively low, but at the same time (and because of this), the costs of creating a new job will be high for the firm because if the match is only expected to last for a short period, the firm will loose the sunk creation costs.

Then there is the so-called 'lame duck'-effect, introduced by Blanchard and Diamond (1990). Their idea is that in bad times the fear of bankruptcy and closure is much more real than during good times. In order to avoid going bankrupt, firms restructure in an economic downturn.

In all the theories described above, the causality goes from business cycle to job reallocation. Gautier (1994) shows that the causality can also be the other way around. In periods of structural change when both job creation and job destruction are high, congestion increases and the queues for each vacancy will become longer. As a result, unemployment will also rise.

3.3 *An International Comparison*

In Table 2 a comparison between gross job flows in a number of industrialized countries is presented. if job flows of continuing firms and entry and exit are taken together, we find that our figures for job creation are in line with OECD studies for a number of countries, notably Germany, Finland, Sweden, Norway, and Belgium in the early 1980s (before the major reforms in the Swedish economic system). For Denmark and the USA, higher rates of job reallocation are found. If high rates of job creation and job destruction are an indication of the ease with which jobs are being created and destroyed and if we believe that the flexibility of the labour market is linked to this ability to create and destroy jobs,

TABLE 2 – COMPARISON OF TOTAL JOB FLOW RATES IN VARIOUS COUNTRIES. MANUFACTURING SECTOR ONLY

Country	Source	Period	*JC*	*JD*	*JR*
Netherlands	this paper	1979–1993	6.6	7.9	14.2
USA	Davis and Haltiwanger (1992)	1973–1986	9.2	11.3	20.5
	OECD (1994)	1984–1991	13.0	10.4	23.4
UK	Konings (1995)[1]	1973–1986	1.6	5.6	7.2
Canada	OECD (1987)	1979–1984	8.7	9.2	17.9
	OECD (1994)	1983–1991	10.3	9.7	20.0
Denmark	Albæk and Sørensen (1995)	1980–1991	12.4	11.9	24.3
Norway	Klette and Mathiassen (1996)	1976–1986	7.1	8.4	15.5
Sweden	OECD (1987)	1982–1984	7.8	9.5	17.3
	OECD (1994)	1985–1991	10.7	11.6	22.3
Finland	OECD (1994)	1986–1991	7.4	10.8	18.2
Germany	OECD (1987)	1978–1984	5.7	7.0	12.7
	OECD (1994)	1983–1990	6.8	5.8	12.6
Belgium	Van der Linden (1995)	1978–1984	7.3	8.8	16.1
France	OECD (1987)	1978–1984	8.1	10.5	18.6
	Greenan and Guellec (1995)	1985–1991	8.1	9.4	17.5
Italy	OECD (1994)	1984–1992	10.9	10.4	21.3
Japan	Genda (1995)[2]	1987–1991	8.7	5.0	13.7

1 Considers very large firms only and can therefore not be compared adequately.
2 Based on continuing firms over the period 1985–1991 and entry and exit for 1987–1991.

then a high job reallocation rate implies a highly flexible labour market. Table 2 then suggests that the labour market in the US is more flexible than in Europe. The high level of reallocation for Denmark is explained by the unique data set of Albæk and Sørensen (1995), which includes all firms in Danish manufacturing, including the very small ones. Typically in the small firms, with less than 5 or 10 employees, job flow rates are much higher than in larger firms. In all other studies there is some threshold employment level below which firms are not taken into account.

4 PERSISTENCE

This section addresses the question whether the rates of job creation and destruction reflect transitory or permanent changes in firm-level employment. In other words, do job creation and destruction represent short-lived employment changes which can be implemented by means of temporary hirings, or do these changes suggest more permanent shifts in labour demand?

The persistence of created and destroyed jobs is determined as follows. Newly created jobs at firm e in period t equal $emp_{e,t} - emp_{e,t-1}$. If $emp_{e,t+1} \geq emp_{e,t}$, then all of these newly created jobs still exist in $t+1$. If $emp_{e,t+1} \leq emp_{e,t-1}$ none of these created jobs are present in $t+1$. Next, if $emp_{e,t+1} \in [emp_{e,t-1}, emp_{e,t}]$, then $emp_{e,t+1} - emp_{e,t-1}$ of the newly created job are still present in $t+1$. Carrying out this exercise for all growing firms in t and dividing the result by *JC* yields the persistence of created jobs, *PJC*. The persistence of destroyed jobs, *PJD*, is calculated analogously; *cf.* Davis and Haltiwanger (1992).

Table 3 presents the persistence levels of created and destroyed jobs in The Netherlands. These levels are somewhat higher than those found for the USA by Davis and Haltiwanger (1992) and for the UK by Konings (1995). Over the whole sample, more than 76 per cent of the jobs created in year t still existed in year $t+1$, while 84 per cent of the jobs destroyed in uear t remained destroyed in $t+1$.

TABLE 3 – PERSISTENCE RATES FOR JOB CREATION (*PJC*) AND DESTRUCTION (*PJD*) IN CONTINUING FIRMS IN THE MANUFACTURING SECTOR FOR THE NETHERLANDS, THE USA AND THE UK (PERCENTAGES)

	This paper				Davis and Haltiwanger	Konings
	1980–1983	1984–1990	1991–1993	1980–1993	1974–1985	1974–1985
Persistence of						
job creation	71.8	82.4	68.9	76.5	67	62
job destruction	84.4	78.7	92.0	84.0	81	81

Our persistent rates change over the cycle, as is shown in Table 3. Jobs created in a period of economic downturn, like 1980–1983 and 1991–1993, have less chance to survive the first year than jobs created in an economic upsurge, like 1984–1990. The opposite is true for the persistence of job destruction.

5 CROSS-INDUSTRY VARIATION

Table 4 presents the average annual net and gross job flows, as introduced in section 2, for each two-digit industry in the manufactoring sector (i.e., SBI 2 and 3). Employment contracted in almost every industry, with the rubber and plastics industry and the instruments industry as notable exceptions. The largest fall in employment took place in the clothing industry, while the textile and leather industry also showed a substantial contraction. Evidently, competition in these low productivity sectors has been quite large, especially from low-wage countries. The

Netherlands are more competitive in the high-tech process industry, like chemicals, rubber and the like, and indeed in those sectors employment was relatively stable.

Despite the overall net decline of employment, there still is substantial job creation, even in the sectors with a large drop in employment. In the contracted clothing sector for example, job creation still amounted to 6.15 per cent. Job creation is particularly low in the basic metals industry, while it is relatively high in the food, lumber and wood industries and in the fabricated metal industry. The highest rate of job destruction is also found in the clothing sector, reaching 15 per cent. Job destruction is lowest in electric machinery and in basic metals.

All this implies that there is considerable cross-industry variation in job reallocation. The correlation between reallocation and net employment change for the various SBI subclasses is in almost cases negative, the only exception is the instruments and food and beverages industry. This suggests that also at the industry level job reallocation moves counter-cyclical.

We are also interested in the magnitude and source of job reallocation in firms of different SBI sybclasses. In order to investigate this we use the methodology of Dunne et al. (1989). We can consider the lower bound on reallocation to be

TABLE 4 – AVERAGE NET AND GROSS RATES BY INDUSTRY 1979–1993 (IN PERCENTAGES)

Industry (SIC code)	JC_s	JD_s	NET_s	JR_s	$corr(NET_s, JR_s)$
Food, beverages and tobacco (20/21)	7.91	9.07	−1.16	16.98	0.04
Textile (22)	6.24	11.34	−5.10	17.58	−0.56
Clothing (23)	6.15	14.33	−8.18	20.48	−0.69
Leather and leather products (24)	4.37	10.44	−6.06	14.81	−0.44
Lumber and wood products (25)	7.25	10.08	−2.83	17.33	−0.66
Paper and allied products (26)	6.35	7.17	−0.82	13.52	−0.31
Printing and publishing (27)	6.81	6.92	−0.11	13.73	−0.42
Petroleum (28)[1]	3.55	6.01	−2.46	9.56	−0.21
Chemical and allied products (29/30)	5.36	6.13	−0.77	11.49	−0.37
Rubber and plastics (31)	8.70	7.69	1.02	16.38	−0.13
Stone, clay and glass products (32)	6.28	7.94	−1.66	14.22	−0.44
Primary metals (33)	1.32	3.72	−2.40	5.04	−0.88
Fabricated metals (34)	7.33	8.69	−1.36	16.03	−0.40
Non electric machinery (35)	7.12	7.96	−0.84	15.09	−0.43
Electric machinery (36)	4.67	5.73	−1.06	10.40	−0.19
Transportation (37)	5.38	8.12	−2.75	13.50	−0.55
Instruments (38)[1]	11.4	9.49	1.91	20.89	0.43
Miscellaneous (39)[1, 2]	15.3	12.3	3.01	27.6	−0.23

1 Based on 1984–1991.
2 Contains break around 1987.

the absolute net change of employment. Job reallocation that exceeds this lower bound arises from shifts of employment across different firms. This excess job reallocation can be disaggregated into two components: employment shifts among firms with similar characteristics (two-digit SBI) and employment shifts across groups of firms with different characteristics. All of this is captures in the following identity[3]:

$$JR_t = |\Delta EMP_t| + \left[\sum_s |\Delta EMP_{s,t}| - |\Delta EMP_t| \right] + \sum_s \left[JR_{s,t} - |\Delta EMP_{s,t}| \right]$$

$$= |\Delta EMP_t| + \left[\sum_s |\Delta EMP_{s,t}| - |\Delta EMP_t| \right] + \sum_s \Delta EXC_{s,t}, \qquad (10)$$

where summation is over sector *s*, in our case the two-digit SBI class. The first term arises from expansion or contraction of the manufacturing sector as a whole. The second term represents shifts in employment across sectors *s* minus reallocation resulting from the net change in employment of the manufacturing sector. The final term is the reallocation within a sector, which is composed of reallocation in excess of net employment change in that sector.

Table 5 summarizes the magnitude of job reallocation of these three components as a percentage of total reallocation, where the components are based on the two-digit SBI code. Job turnover resulting from the net change in manufacturing is only 2 per cent for continuous firms. The reallocation across industries on average accounts for almost 37 per cent of total reallocation and the within-sector reallocation is by far the largest component, averaging more than 61 per cent, and when we include entry and exit, it is almost 85%. Similar results are found for the USA by Dunne et al. (1989).

TABLE 5 – DECOMPOSITION OF JOB REALLOCATION, AS PERCENTAGE OF TOTAL REALLOCATION (AVERAGES OVER 1979–1993)

Source of reallocation	Continuing firms	All firms
net change in employment	1.93	0.76
across sector shifts	36.94	14.53
within sector shifts	61.13	84.70

Davis and Haltiwanger (1990) have made a variance decomposition of job reallocation into aggregate, sectoral and idiosyncratic shocks. They found that most of the job reallocation is driven by idiosyncratic shocks. Abbring and Gautier (1996) find the same result for The Netherlands while Gautier and Broersma

3 This equation is in persons not in rates.

(1995) show that aggregate shocks are more important than sectoral shocks in The Netherlands.

These results provide evidence against Lilien (1982), who claimed that sectoral shocks are the driving force behind fluctuations in unemployment. According to the sectoral shift theory, sector-specific technology shocks generate large flows of jobs from less productive to productive sectors. When the production factor labour cannot adjust immediately, this results in unemployment.

6 FIRM SIZE

Finally, we disaggregate the data to analyze job creation ans job destruction by firms of specific sizes. We distinguish two categories determined by the number of employees: small firms with less than 100 employees and the medium-sized and large firms with more than 100 employees. Table 6 presents the averages of the net and gross job flows by firm size. From this table we can also observe that firms are very heterogeneous. Job reallocation rates decline sharply with average firm size. Small firms have the highest rates of job creation, but also of job destruction. Total job reallocation reaches some 23 per cent of employment for these firms, while for the second size class, it is less than half this value. The large difference between the two categories can be attributed to differences in entry and exit in firms. Entry of firms mainly takes place in the size class of small firms. But exit from this class is also higher than for firms with more than 100 employees. When both continuing firms and entry and exit are taken into account, we find that small firms reallocate less counter-cyclically than large firms. Also note that contraction among continuing firms in the manufacturing sector mainly took place in the larger firms, with more than 100 employees.

Note that it has been argued that this somewhat higher net rate of small firms in mainly caused by regression-to-the-mean bias. The idea is that 'temporary unlucky' firms, which are relatively overrepresented in the class of small firms, will gain jobs on the way to their equilibrium level, whereas firms which have had temporary good luck loose jobs. Another reason could be that in a period of struc-

TABLE 6 – AVERAGE JOB FLOWS OF MANUFACTURING FIRMS BY DIFFERENT SIZE, 1979–1993 (IN PERCENTAGES OF EMPLOYMENT)

No. of employees (s)	JC_s	JD_s	JR_s	NET_s	$\rho(JR_s, NET)$
Continuing firms:					
10–99	4.79	4.92	9.72	−0.13	−0.40
> 100	2.93	4.23	7.15	−1.30	−0.51
All firms:					
10–99	10.89	12.03	22.92	−1.14	−0.42
> 100	4.94	6.27	11.22	−1.33	−0.71

tural change, there is often a shift from old to new industries and because of that, many firms will cross size borders. Finally it could be the case that in large firms there is much more simultaneous hiring and firing which we cannot filter out with our data.

Recently, Davis et al. (1993) have developed methods to avoid this regression fallacy. They found that in definitions of job creation and job destruction, like (3) and (5), where the denominator is the average employment, $X_{s,t}$, as in (4), is less sensitive to this pitfall than the usual definitions, where the denominator is the employment of the previous year ($\Sigma emp_{e,t-1}$). Particularly the older studies of job flows in relation to firm size use this latter definition, like Birch (1981). Nevertheless, even with our more robust definitions, we have found that small firms have higher rates of job creation and destruction and that they contribute more to the growth rate of employment than large firms. See also Klette and Mathiassen (1966), who find similar results for Norway.

Apart from statistical pitfalls, as the regression-to-the-mean bias, there may also be a number of economic explanations for the difference in rates of job creation and destruction between firms of different size. First, entry of new firms consists mainly small firms. The small firms, whether entering or continuing, have better opportunities to adjust more quickly to changes in economic circumstances than large firms. On the other hand, small new firms also have high exit rates; *cf.* Broersma and Gautier (1995). This may have to do with several difficulties which small, new firms encounter. Mismanagement seems one of the major reasons for new firms to go bankrupt, as Van der Hoeven and Verhoeven (1994) found for The Netherlands. Another reason may be that small firms are faced with more financial constraints compared to large firms, as pointed out by Gertler and Gilchrist (1994).

The persistence of created and destroyed jobs is reported in Table 7, where we again distinguish between persistence over the whole sample period and persistence of jobs created and destroyed in an economic downturn, 1980–1983, 1990–1993 and in a boom period, 1984–1990. It is clear that the persistence of *JC* is much higher in booms than in recessions while for *JD* the opposite holds. Over

TABLE 7 – PERSISTENCE RATES FOR JOB CREATION AND DESTRUCTION BY FIRM SIZE (IN PERCENTAGES)

	PJC				*PJD*			
Firm size	1980–1983	1984–1990	1991–1993	1980–1993	1980–1983	1984–1990	1991–1993	1980–1993
10–99	72.2	82.8	69.9	77.0	79.1	68.6	78.8	68.1
>100	71.2	82.3	68.5	76.5	92.7	81.7	94.5	87.6

the whole sample, we find that the persistence of *JD* in particular rises with form size.

7 CONCLUDING REMARKS

In this paper we have studied job creation and job destruction of the manufacturing sector in The Netherlands over the period 1979–1993, based om employment observations at the firm level. We found that there is large heterogeneity of firms in their employment behaviour. This implies that the theoretical concept of the representative firm may have to be abandoned and replaced by theories that can take account of employment heterogeneity. Our finding that job reallocation moves counter-cyclically, especially when entry and exit of firms are included, is in line with observations in a number of other countries. We also found that there are differences in the behaviour of small firms, with less than 100 employees and medium-sized and large firms, with more than 100 employees. Finally, we stress the point that the main source of reallocation comes from firms within the same sector. Hence, idiosyncratic shocks of individual firms may be more important for explaining employment shifts, and thus unemployment, than sectoral or aggregate shocks. Two important topics for further research that result from this study are the relation between newly created jobs and productivity and the transition and propagation of idiosyncratic shocks into large fluctuations at the aggregate level.

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Summary

JOB FLOWS IN DUTCH MANUFACTURING, 1979–1993

EMPIRICAL EVIDENCE AND THEORETICAL IMPLICATIONS

This papers describes and characterises job creation and job destruction in the Dutch manufacturing sector. Our results show that firms are very heterogeneous in their employment behaviour. In addition, we find that job reallocation moves counter-cyclical and that the main sources of job reallocation are not shifts *between* sub-sectors, but shifts *within* sub-sectors. This provides evidence against the premise that sectoral shocks cause unemployment. We also look at the behaviour of firms in different size classes. Small firms create and destroy more jobs than large firms. However, net employment change does no differ very much between different size classes.