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Job creation and job destruction in a transition economy: Ownership, firm size, and gross job flows in Polish manufacturing 1988–91

Jozef Konings [a,*], Hartmut Lehmann [b], Mark E. Schaffer [c]

[a] *Leuven Institute for Central and East European Studies, Catholic University of Leuven, De Beriotstraat 34, B-3000 Leuven, Belgium*

[b] *Department of Economics, Trinity College, Dublin 2, Ireland*

[c] *Centre for Economic Reform and Transformation, Department of Economics, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, UK*

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Abstract

Comprehensive firm-level data for Polish manufacturing show that in state-owned firms the large drop in net employment since the start of the transition in 1990 has been driven by a jump in the job destruction rate; job creation, by contrast, is located disproportionately in the private sector. Small firms are more dynamic than large firms, but even after controlling for size, private firms have a higher net employment growth rate.

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1. Introduction

The transition towards a market economy that started in Poland in 1990 involves substantial restructuring of its industrial base, implying major changes in

* Corresponding author. Tel.: (+32) 16-326591; fax: (+32) 16-326599; e-mail: jozef.konings@econ.kuleuven.ac.be.

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goods produced, closing down of some product lines and factories and opening up of others, and reallocation of labour from shrinking firms and sectors to growing ones. With the dismantling of central planning, the removal of most subsidies to firms, and the imposition of 'hard budget constraints' for firms that accompanied the start of transition, most of this restructuring is decentralized, taking place at the level of the individual firm. The purpose of this paper is to report and analyze firm-level gross job and worker flows in Polish manufacturing between 1988 and 1991.

The paper has a three-fold motivation. First, there is a recent increased interest from both labour and industrial organization economists in the theoretical and empirical aspects of gross flows of jobs (e.g. Davis and Haltiwanger, 1992). However, there is no study to date on gross job flows in economies in transition, despite the obvious relevance given the shocks affecting the Central and East European countries (CEEs). We expect to gain some insight into the nature of the adjustment in a transition economy by studying various aspects of gross job flows, such as ownership and size effects.

Second, there is now a large literature on labour market adjustment in transition economies using aggregate employment data and micro-data from household and labour force surveys. There is an emerging consensus in this literature that, except for the Czech Republic, outflows from unemployment are extremely low in comparison with OECD countries. Unemployment can be characterized as a 'stagnant pool' which imposes a heavy social burden on transition economies. Recent evidence shows that supply-side factors cannot really be held responsible for this result. Eligibility criteria for unemployment benefit have been tightened severely, benefit levels and durations have been cut substantially since the beginning of the reforms in virtually all CEEs. None of these policy tools meant to increase job search efforts by the unemployed seem to have raised outflow rates from unemployment in a discernible way (Boeri et al., 1996). Weak labour demand seems to drive most of the labour market flows in transition economies. This paper is one of the few empirical studies to date that uses enterprise-level data to examine for one country, Poland, a specific aspect of labour demand in a transition economy, and to our knowledge the first to do so from the perspective of gross job flows.

Third, recent evidence suggests these economies are now starting to emerge from their deep recessions. The analysis of gross job flows is particularly well-suited for helping us to understand the nature of the growth process in transition economies. In particular, evidence is gradually accumulating regarding the relative dynamism of different ownership sectors in transition economies: state-owned firms, privatized firms (and within this group, for example, worker-controlled vs. manager-controlled vs. outsider-controlled privatized firms), and de novo (newly-established) private firms (see e.g. Belka et al., 1995; Earle and Estrin, 1994; Earle et al., 1996; Johnson and Loveman, 1995; Richter and Schaffer, 1996). De novo firms in particular appear to be extremely dynamic. In

Poland, for example, manufacturing output has been growing at a rate of over 10% per annum since 1993. This remarkable recovery is apparently driven largely by the new private sector. In 1989, the private sector [1] accounted for 8% of industrial output and 15% of industrial employment; by 1994, it accounted for 36% of industrial output and 37% of industrial employment. [2] Privatization has been relatively slow in Poland – at the end of 1994 only 6% of total industrial employment was in privatized firms [3] – and so most of this private sector growth is attributable to the entry and expansion of de novo private firms. We estimate, using Polish CSO data, that employment in the de novo private sector in industry grew at a rate of 10% p.a. between 1989 and 1994. [4] More recent data show continued strong private sector growth.

Recent theoretical work (e.g. Aghion and Blanchard, 1993; Chadha et al., 1993) has explored the nature and speed of transition in multi-sector models with different ownership sectors. The results in this paper are an empirical contribution to this literature relating performance to ownership and origin. To anticipate, we present evidence supporting this view of transition, with job destruction located predominantly in the state-owned sector and job creation disproportionately located in the private and especially de novo private sectors.

The evidence presented in this paper also allows us to start to address the question of the sources of growth of the new private sector. Because of the distorted structure of output at the start of transition, one could expect initial rapid growth in certain sectors: trade, services, certain consumer goods, etc. This could imply that overall private sector growth will slow down after the stock adjustment process has come to an end and new firms stop entering and expanding in underrepresented sectors (Blanchard et al., 1995; Richter and Schaffer, 1996). Similarly, small and medium-sized enterprises (SMEs) were rare under the socialist system. One might therefore expect initial rapid growth by new firms as they enter and fill the SME 'niche' (Richter and Schaffer, 1996), followed by a slowdown as the niche is filled. We find, however, that the robust job creation and net employment growth by new private firms appears to be driven by ownership and/or life-cycle effects rather than purely sectoral or size effects.

In Section 2 we present the apparatus used to analyze gross job flows and describe the dataset we use, while in Section 3 we report and discuss various results on gross job and worker flows in Poland at the level of aggregate manufacturing. In Section 4 we look at the relationship between employment

[1] Excluding cooperatives; see below.

[2] *Rocznik Statystyczny 1990*, p. 274; *Rocznik Statystyczny 1992*, p. xv; *Rocznik Statystyczny 1995*, p. xxxix.

[3] *Rocznik Statystyczny 1995*, pp. xlix, 119.

[4] Sources as in footnotes 3 and 4. De novo private sector output growth in Poland in the period since 1991 has been estimated at over 20% p.a. in real terms; see Schaffer (1996), Commander and Coricelli (1993).

growth, gross job flows and firm size and ownership type. Section 5 concludes the paper.

2. Definitions and data

Net employment change in an economy is the result of firm expansion on the one hand and firm contraction on the other. It is the employment flows resulting from this dynamic firm behaviour which is referred to as *gross flows of jobs*. [5] Formally, the job creation rate is defined consistent with the literature (Davis and Haltiwanger, 1992) as

$$pos_t \equiv \Sigma_{i \in I^+}(n_{it} - n_{it-1})/\Sigma_{i \in I} x_{it}, \quad (1)$$

where I stands for the set of all firms and I^+ for the set of all expanding firms in the relevant sector (which might be the whole economy); n_{it} stands for employment in firm i at time t; and employment in firm i averaged over the two periods is $x_{it} = (n_{it} + n_{it-1})/2$. *Pos* is thus the increase in employment in expanding firms expressed as a proportion of total employment in the sector. *Pos* lies in the interval $[0, 2]$; it would be equal to 2 in the extreme case where all firms in the sector not merely expanded employment but were new entrants.

The job destruction rate, *neg*, is defined analogously over the set of contracting firms I^-, for which the numerator in (1) is a negative number; however, *neg* is usually expressed in absolute value. *neg* is thus the absolute value of the decrease in employment in contracting firms expressed as a proportion of total employment in the sector. *neg* lies in the interval $[0, 2]$; it would be equal to 2 in the extreme case where all firms in the sector not merely contracted employment but exited the sector.

The net employment growth rate *net* is simply $pos - neg$; this growth rate definition is symmetric and lies in the interval $[-2, 2]$. Net employment growth can also be calculated in this way at the level of the individual firm: a new entrant would have a growth rate of $net = 2$, and a firm which exited would have $net = -2$. The difference between *net* and more conventional growth rate definitions is small when growth rates are small and grows with the absolute value of the growth rate: thus for an entrant, $net = 2$, whereas the log growth rate is infinite (undefined). Defining job creation, job destruction, and net employment growth rates as a proportion of average employment over the two periods enables an integrated treatment of job creation, job destruction, entry, exit, growth, etc., at the sector and firm level. [6]

[5] The job flow measures in this paper are all derived from *firm* level rather than *plant* level data. Thus we do not take into account the reshuffling of jobs between plants within the same firm, implying that the rates reported here will be lower than those computed from plant level data.

[6] To express the above definitions as a proportion of beginning-of-period employment, one can use the transformation $2(pos + neg)/(2 - pos - neg)$.

The gross job reallocation rate, *gross*, is defined as $pos + neg$. If there are large net changes in employment in the sample, which is the case here, however, then this definition of job reallocation gives rise to some peculiarities. Imagine a situation where no firm expands, but all firms contract by 10 per cent. This implies a gross job reallocation rate of 10%, yet there has been no job reallocation in the sample. In contrast, if 3% of the jobs are destroyed in half of the firms and the laid off workers get jobs with the other half, then the job reallocation rate will be 3%, which is lower than in the former case, though genuine reallocation of 3% of jobs has taken place. For this reason we introduce a different measure of reallocation which takes into account the amount of job turnover necessary to accommodate a given net aggregate employment change. The excess job reallocation rate (*excess*) is defined as $gross - |net|$, the difference between the gross job reallocation rate and the absolute value of the net employment growth rate. An alternative interpretation of *excess* is as an index of firm heterogeneity, in that it captures the amount of 'churning' by firms, i.e. job creation and destruction above that required by net employment growth. Finally, *gross flows of workers* refers to hirings and separations of workers; total worker turnover is defined as the sum of the two. Dividing these by total employment of all firms – again, averaged over the two periods – gives the corresponding gross worker flow rates.

To analyze the gross job and worker flows in Polish manufacturing before and after the start of the transition, we use a unique firm-level census-type panel dataset covering practically all state-owned manufacturing firms over the period 1988–91. Furthermore, for the year 1991, we have information on all manufacturing firms with legal entity in the country, both state-owned and private. The year 1991 is of particular interest because this is when the new private sector in manufacturing began its explosive growth. Growth of industrial output in the new private sector was less than 10% in 1990, the first year of transition, compared with over 20% per annum in subsequent years.

The data were collected by the Polish Central Statistical Office and include information on firm-level full-time end-year employment (and lagged, i.e. start-year, employment) as well as hirings and departures of workers and other standard information such as regional location and industrial classification. Using the information supplied on the ownership category to which firms belong, we constructed three major ownership groups. *State* firms include unincorporated state-owned enterprises (SOEs), joint stock companies with 100% state ownership, [7] and majority state-owned firms. *Private* firms include domestically-owned 100% private firms, foreign firms, and majority private-owned (i.e. minority state-owned) companies. [8] We note here that although we cannot distinguish

[7] Typically SOEs are first transformed into this ownership form before they are privatized.

[8] The exclusion of cooperatives means our definition of 'private' differs from that currently used by the Polish CSO.

privatized from de novo private firms, general information about the Polish privatization process as of 1991 allows us to say that the first of the three private groups will be composed almost entirely of de novo private firms, the second will have a large number of (often small) firms established (in many cases prior to 1990) with the participation of emigré Poles, and the third group is probably mostly privatized firms. Finally, the third main ownership group, others, consists mostly of cooperatives plus a smattering of communal firms.

Table 1 summarizes the basic features of the data by ownership category in 1991. State firms are largest (average employment = 604); domestically-owned 100% private firms and foreign-owned firms are smallest (average employment 53 for the former, 78 for the latter); majority privately-owned firms are also typically fairly small (average employment = 172). The main gap in our sample derives from that fact that it covers only firms with legal entity. Very small firms, individual entrepreneurs, etc. rarely choose to incorporate in Poland (or in most other countries). Such micro firms, the bulk of which are de novo private firms, are abundant in Poland: over one-quarter of total manufacturing employment in Poland in 1991 was in the private sector, compared to 9% of total employment in our sample. [9] The under-representation of small firms and de novo firms in our sample relative to aggregate manufacturing should be borne in mind in what follows.

The analysis in the paper focuses on continuing firms only. In Konings et al. (1996) we also look at job flows resulting from entry and exit of firms in 1991. The main results are not, however, affected in any significant way. Furthermore, the way in which entry and exit is measured suffers from some drawbacks, such as a survivorship bias in the sample (exits are much more likely than entries to be missing from the sample) and the difficulty of distinguishing between a true entry and a change of ownership category from one year to the next. The remainder of the paper analyzes job and worker flows derived from continuing firms only. Concentrating on continuing firms also allows us to compare our results to similar studies for other countries.

3. Results for the aggregate manufacturing sector

Table 2 shows the gross job flow measures for the state sector during the period 1988–91. The regime switch which accompanied the start of transition in 1990 is clearly visible for SOEs in Table 2. The very deep decline in state sector industrial output in 1990–91 (close to 40% according to the Polish CSO) was accompanied

[9] Average total employment (full-time equivalent) in industry in the private sector, excluding cooperatives, was 27% of total industrial employment (*Rocznik Statystyczny 1992*, p. xv). The percentage would be slightly higher if, as in the paper, we considered manufacturing only.

Table 1
Description of sample of manufacturing firms according to ownership type in 1991 [a]

Ownership type	Number of firms	Total employment	Employment share	Frequency	Average employment
State firms	3092	1,870,036	0.78	0.36	604
of which:					
100 % state owned incp.	207	265,822	0.11	0.02	1284
Unincorporated SOEs	2733	1,575,985	0.66	0.32	576
Majority private-owned	152	28,229	0.01	0.01	185
Private firms	3064	210,542	0.09	0.36	68
of which:					
Domestic 100 %	2192	116,719	0.05	0.25	53
Foreign	599	46,755	0.02	0.07	78
Majority private-owned	273	47,068	0.02	0.03	172
Others	2323	299,085	0.12	0.27	128
of which					
Cooperatives	2265	290,828	0.12	0.26	128
Communal	58	8,257	< 0.01	< 0.01	142
Total	8479	2,379,663	1	1	281

[a] Employment is end-1991 employment. Only firms with non-zero end-1991 employment are included in the table.

by very substantial labour shedding; state sector net employment growth in our sample (start-year to end-year) was about −15% in 1990 and −17% in 1991. Net employment growth turned sharply negative during transition almost solely because of a jump in the job destruction rate, from 4–6% in the years prior to the start of transition (1988–89) to 15–18%; the job creation rate, by contrast, hardly changed.

With respect to job reallocation in the state sector, the annual average gross job reallocation rate ($pos + neg$) amounted to about 6% in the pre-transition period, while the annual average excess job reallocation ($gross - |net|$) rate was about 3%. About half of the observed gross job reallocation therefore referred to 'real' churning which took place independently of the movements in net industrial

Table 2
Gross job and worker flows: Continuing state enterprises, 1988–91

Year	*pos*	*neg*	*gross*	*net*	*excess*	Hiring rate	Departure rate	Worker turnover
1988	0.007	0.036	0.043	−0.028	0.015	0.171	0.20	0.372
1989	0.020	0.061	0.081	−0.040	0.040	0.179	0.229	0.409
1990	0.006	0.153	0.150	−0.146	0.013	0.129	0.276	0.406
1991	0.010	0.176	0.186	−0.165	0.021	0.097	0.26	0.36

employment growth. This picture changes drastically with the start of transition. One would naturally expect that the implementation of a radical economic reform programme would be accompanied by an increase in the gross job reallocation rate, and indeed the average gross job reallocation rate for 1990–91 is about 18%. However, the excess job reallocation rate stays at about the pre-transition level, suggesting that state-owned firm heterogeneity, as measured by the excess job reallocation rate, did not change in response to the economic reforms. The proportion of gross job reallocation that took place independently of movements in net employment growth fell substantially.

Interestingly, before the regime switch the gross worker turnover rate (hiring rate + departure rate) in the state sector is high and at levels comparable to those seen in Western economies, providing more evidence for the notion that in the eighties Polish labour turnover was much more dynamic than one might have expected in a socialist economy (see Freeman, 1987; Lehmann and Schaffer, 1995). Furthermore, the gross worker turnover rate is relatively constant over the entire period, varying between 37% and 41%. Thus the amount of worker turnover caused by gross job reallocation, which can be interpreted as 'involuntary worker turnover', increased with the start of transition and is 51% (= 0.189/0.364) in 1991. Finally, the hiring rates in 1990 and 1991 are, even though lower than before the regime switch, still surprisingly large given the severe employment contraction. As Polish SOEs experienced from the start of the transition a hard budget constraint (Schaffer, 1992) some lock-in of certain production technology might drive this outcome during the initial phase of the transition (Commander et al., 1995).

Table 3 gives the gross job and worker flow measures for 1991 according to ownership. It can be seen that the private sector is fundamentally the most

Table 3
Gross job and worker flows by ownership category [a]

Ownership type:	*State*	*Private* of which	Domestic100% private	Foreign	Majority private	*Others*
pos	0.010	0.096	0.080	0.094	0.141	0.009
neg	0.176	0.216	0.206	0.287	0.165	0.237
gross	0.186	0.313	0.286	0.381	0.306	0.246
net	−0.165	−0.119	−0.125	−0.193	−0.023	−0.227
excess	0.021	0.193	0.160	0.188	0.282	0.019
Hiring rate	0.097	0.304	0.280	0.394	0.269	0.112
Departure rate	0.263	0.412	0.404	0.550	0.283	0.327
Worker turnover	0.361	0.717	0.685	0.945	0.552	0.440
Job creat. share	0.489	0.439	0.200	0.021	0.138	0.071
Job destr. share	0.742	0.091	0.048	0.010	0.015	0.165
Size share	0.790	0.079	0.043	0.011	0.017	0.130

[a] Size share refers to the share in total employment (as measured by average size in 1991) of *continuing firms*, i.e. excluding firm entry and exit.

dynamic, reflected in the high gross and excess job reallocation rates of 31% and 19%, respectively. Private sector net employment growth in the sample is significantly negative at −11.9% (more about this below), but this conceals interesting differences between the different ownership categories. Employment growth is significantly negative (−12.5%) in the domestic 100% private group (i.e. mostly de novo firms), slightly negative (−2.3%) in the majority private group (including privatized firms), and very negative in the foreign-owned group (−19.3%). [10]

We recall that aggregate data from this period indicate rapid expansion of the entire new private sector, in contrast to the contraction we observe in our data in new private firms with legal entity. Indeed, the survivorship bias noted above has the effect of adding an *upwards* bias to our private sector net employment growth figures; but we instead observe growth figures which are, at the end of the day, *lower* than those observed for the entire de novo sector. Net employment growth in the state sector in our sample, by contrast, is not much different from that observed in the official aggregate statistics. [11]

The absence of the unincorporated (micro) private sector from our sample is probably one reason for the lower de novo growth in our sample, and not only because it was expanding rapidly during this period. Private sector firms show very high turnover rates (see below), and we suspect life-cycle effects possibly to be operating here (a point to which we will return later). Because our dataset is limited to firms with legal entity, we may be oversampling older private sector firms which are more likely to be downsizing than younger private sector firms.

The relatively poorer net employment growth performance of foreign firms may reflect the poor performance in transition of those firms established by emigré Poles in the 1980s more than poor performance by those (few) firms purchased or established by foreign companies in 1990–91. The relatively better performance by majority private firms, most of which we suggest are privatized firms, should not be interpreted to mean that privatization causes better performance, since (especially in Poland) privatization is endogenous; good performance means more likely privatization (see Earle and Estrin, 1994). We return to this point at more length below.

The private sector job creation rate in continuing firms is 10%, far higher than in the state sector (1%), indeed so much so that the private sector accounts for 44% of jobs created in continuing firms despite representing only 9% of total employment in the sample. The job destruction rate in the private sector is actually

[10] If entry and exit of firms is included in the sample the corresponding growth rates are significantly higher, although a downwards bias is still present (see below): −3.4% for the domestic 100% private group, +5% for the majority private group and −11.5% for the foreign-owned group (Konings et al., 1996).

[11] According to the Polish CSO, state sector employment in industry in 1991 fell by about 15% (start-year to end-year), about what we observe in our sample.

higher than that in the state sector, but only slightly, and so only 9% of all destroyed jobs are destroyed in the private sector.

It follows that the private sector is also inherently different from the state sector with respect to the job reallocation process in 1991. The gross job reallocation rate in continuing firms in the private sector (Table 3) is 31% (compared to 19% for state firms) and the excess job reallocation rate is 19% (vs. 2% for state firms), meaning that 62% of the observed gross job reallocation in the private sector is due to heterogeneous firm behaviour, rather than accommodation for any given net employment growth; the corresponding figure for state firms is only 11%.

Cooperatives, which make up the bulk of the firms in the category 'others', had by far the largest employment contraction in 1991 – almost one-quarter – pointing to the very precarious financial situation that cooperatives in the manufacturing sector were confronted with.

Gross worker turnover is significantly higher in the private sector, at 72% vs. 36% in the state sector. This is probably at least partly a size effect (more about which below). Small firms experience more rapid turnover than large firms, and so majority private firms, which are larger on average than 100% private firms and foreign firms but smaller than state firms, have lower turnover rates than the former but higher turnover rates than the latter. The worker turnover for foreign firms is about 100%, which is extremely high and could hint at a much looser employer–employee relationship than in those private firms where the leading management consists of Polish citizens. One should finally note, though, that the fraction of private sector worker turnover due to job reallocation (i.e. *gross* ÷ turnover rate) in continuing firms is 44% in 1991, not much less than in the state sector (52%).

How do the observed gross flow measures compare to those of Western economies? The results of such a comparison must be interpreted very cautiously. We are able to compare our results for Polish manufacturing with those for large continuing UK manufacturing firms and large continuing US manufacturing plants. [12] Comparison of firm vs. plant level results is problematic, though this is not a problem with the UK–Poland comparison. Differences in sampling criteria relating to firm or plant size are also a problem, though perhaps not a very severe one since the bulk of employment in all the samples is in larger firms/plants. Indeed, when we recalculated our results for continuing Polish state-owned firms but limited the sample to firms employing more than 1000 people, the quantitative results changed only slightly. More fundamentally, since job reallocation rates are highly sensitive to the phase of the business cycle that the economy is in, comparisons are most meaningful if the economies are either in about the same phase of the cycle over the same sample period or if the period is to be long

[12] The figures refer to large continuing firms/plants in an attempt to make a consistent comparison (see Konings, 1995a).

enough to average across cycles. Although our comparisons use gross job flows for the UK and the US manufacturing sector over the period 1973–86 – a period of declining manufacturing output and employment – given the magnitude of the shocks in Poland, and the short period of transition we are considering, the comparisons with the Western countries are useful mostly as benchmarks for the magnitudes we are observing in Poland.

The job creation and destruction rates for large continuing UK manufacturing firms have been calculated at 1.6% and 5.6%, respectively, with a gross job reallocation rate of 7.2%. The comparable figure for large US manufacturing plants is on average 6% and 7.8% for the gross job creation and destruction rates, respectively, and 14% for the gross job reallocation rate (Konings, 1995a). Thus, perhaps surprisingly, the gross job creation rates in Polish state-owned manufacturing both before and after transition are not much different from those in the UK (though below those in the US), whereas, not surprisingly (given the scale of the transition recession) the job destruction rates are much higher than in either the UK or the US. Gross job reallocation in the state sector has moved from a pre-transition level similar to that observed in the UK to an early-transition level similar to that observed in the US. The large gross job flow measures for the Polish private sector are also consistent with Western empirical evidence since the firms in this sector are young and small and such firms tend to have high gross job flow rates in market economies as well.

4. Firm size, ownership, and gross and net flows of jobs

In this section we investigate the relationship between gross and net job flows and firm size. If small firms are in a different phase in their life cycle than large ones one would expect different gross job flow rates. As noted earlier, a priori, one might also expect more robust job creation in smaller firms early in transition, as firms enter and expand to fill the SME niche.

Table 4 compares job flows for the three ownership categories and five size classes in 1991. There is a negative relationship between size and the job creation, job destruction, gross job reallocation and excess job reallocation rates; but in the case of the net job creation rate this relationship is not so clear. For all the ownership categories it is clear that firms in the smallest size classes are the most dynamic ones in terms of the job reallocation rate. When we focus on the shares of jobs created and destroyed within ownership categories, these are driven in part by size shares – thus most state sector jobs are in large firms and hence most state sector jobs are created and lost in large firms – and so it is informative to compare the gross job creation and destruction shares to the size share. Regarding job creation, irrespective of the ownership type the smallest firms contribute proportionately the most to the job generation process – the job creation share/size share ratio falls with size – suggesting that it is the smallest firms in general (and not

Table 4
Job flows and size according to ownership type in 1991

Size	*pos*	*neg*	*gross*	*net*	*excess*	*pos* share	*neg* share	*size* share
0–99								
State	0.050	0.347	0.397	−0.297	0.100	0.062	0.026	0.013
Private	0.146	0.269	0.416	−0.122	0.293	0.373	0.306	0.246
Others	0.013	0.383	0.396	−0.370	0.026	0.253	0.298	0.184
100–249								
State	0.029	0.255	0.284	−0.226	0.058	0.159	0.085	0.059
Private	0.102	0.299	0.401	−0.197	0.204	0.200	0.262	0.189
Others	0.008	0.251	0.259	−0.243	0.016	0.337	0.423	0.398
250–499								
State	0.017	0.192	0.209	−0.174	0.035	0.205	0.137	0.126
Private	0.074	0.151	0.226	−0.077	0.149	0.124	0.113	0.162
Others	0.010	0.163	0.173	−0.152	0.020	0.316	0.202	0.294
500–999								
State	0.013	0.192	0.205	−0.178	0.027	0.246	0.210	0.192
Private	0.061	0.211	0.273	−0.149	0.123	0.075	0.115	0.118
Others	0.003	0.129	0.132	−0.126	0.006	0.021	0.034	0.063
1000 +								
State	0.005	0.156	0.161	−0.150	0.011	0.326	0.539	0.608
Private	0.077	0.154	0.231	−0.076	0.154	0.226	0.201	0.283
Others	0.011	0.163	0.174	−0.151	0.022	0.070	0.040	0.059

[a] Shares are size class shares of the total for a given ownership category.

just private ones) which are the most dynamic in the transition. The fact that most new state jobs are created in large firms and most new private jobs in small firms thus results from differences in size shares between the two ownership classes rather than from ownership effects per se. The case of job destruction is somewhat different. Most state jobs are lost in large state firms but small state firms account for a disproportionately large fraction of state jobs destroyed. In the private sector the job destruction share and the job destruction share/size share ratio decline with size.

From the cross tabulations just reported it is impossible to infer whether the observed pattern is predominantly driven by size effects or by ownership type. We have seen that the private sector is generally more dynamic than the state sector, but this could be the result of smaller overall firm size in the private sector. We investigated this further by trying to establish whether there is any pure ownership effect on net job creation after controlling for size effects. The process of job creation and destruction is ultimately linked to the underlying evolution of firm size. The creation and destruction of jobs reflects the growth and decline of firms and hence changes in the organization of industries. In the industrial organization literature there exists a large body of research investigating dynamic aspects of

firm growth. Evans (1987a,b) and Dunne et al. (1989) among others have investigated the relationship between firm level growth rates and initial size.

In this spirit we estimate a growth equation in which the firm-level growth rate, *net*, is a function of firm size and ownership category: [13]

$$[n_{it} - n_{it-1}]/x_{it} = \alpha_0 + \alpha_1 \ln(x_{it}) + \alpha_2 \, ownership + \alpha_3 \, interaction + \epsilon, \tag{2}$$

where $x_{it} = size = [n_{it} + n_{it-1}]/2$, *ownership* is an indicator for ownership category which we shall approximate using ownership dummies, *interaction* represents the interaction terms between size and ownership class, and ϵ is a white noise error term. We use average size rather than initial firm size to avoid Galton's fallacy of regression towards the mean: if initial size were used then firms that have a transitory low initial size will on average seem to grow faster than those with transitory high initial size. [14] The size–ownership interaction term allows for size effects to differ depending on the ownership type; nevertheless the control for size is admittedly still crude. As noted earlier, one might also expect net employment growth early in transition to be driven in part by sectoral effects, as firms enter and expand in sectors which were underrepresented in the socialist system. A similar argument can be made for regional effects. For these reasons we introduce sectoral and regional dummy variables, to try to control for these influences. In the regression analysis we also excluded a small number of outlier firms with extreme growth rates (defined as $|n_{it} - n_{it-1}|/x_{it} > 1.5$).

Table 5 reports the results with the benchmark ownership category being 'state-owned'. Ideally we should also aim at controlling for the age of the firm, but we did not have this information at our disposal. Since we are interested in size-dependent growth rate differentials, we refer the reader again to the last column in Table 1, which presents average 1991 employment for the different size categories. We note, however, that while most domestic 100% private, foreign and majority private (privatized) firms have fewer than 1000 employees, there is a significant number of state firms with more than 1000 employees. In the state sector these larger firms are still in a minority, accounting for about one-fifth of all state sector firms, but there are enough of them so that they account for the bulk of total state sector employment in the sample (61%, vs. 28% in the private sector, Table 4).

In column one of Table 5 we included neither industry nor regional dummies; in the second and third columns we included either 25 industry dummies or 48

[13] In an earlier version of this paper we used log growth rates as the dependent variable; the regression results were similar.

[14] For a discussion of Galton's fallacy we refer to Friedman (1992), Leonard (1986) or Konings (1995b).

Table 5
Regression results. Dependent variable: Employment growth rate of firm i in 1991 [a]

Explanatory variables:	(1)	(2)	(3)	(4)	(5)
ln(*size*)	0.016	0.016	0.013	0.013	0.017
	(0.004)	(0.005)	(0.004)	(0.005)	(0.002)
d100p (domestic and 100% private)	0.321	0.332	0.309	0.320	0.239
	(0.043)	(0.045)	(0.043)	(0.044)	(0.043)
d100p * ln(*size*)	−0.047	−0.051	−0.042	−0.047	−0.026
	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)
foreign	0.430	0.441	0.422	0.433	0.247
	(0.091)	(0.092)	(0.091)	(0.092)	(0.092)
foreign * ln(*size*)	−0.082	−0.084	−0.079	−0.081	−0.045
	(0.020)	(0.020)	(0.020)	(0.020)	(0.017)
mpo (majority privately-owned)	0.134	0.136	0.114	0.116	0.222
	(0.100)	(0.098)	(0.098)	(0.096)	(0.089)
mpo * ln(*size*)	−0.007	−0.010	−0.002	−0.005	−0.026
	(0.020)	(0.020)	(0.020)	(0.019)	(0.012)
others	−0.247	−0.181	−0.256	−0.185	−0.215
	(0.053)	(0.053)	(0.053)	(0.053)	(0.046)
others * ln(*size*)	0.041	0.023	0.043	0.024	0.032
	(0.010)	(0.010)	(0.009)	(0.009)	(0.008)
constant	−0.277	−0.309	−0.215	−0.260	−0.230
	(0.031)	(0.066)	(0.053)	(0.072)	(0.053)
Industry dummies	No	Yes	No	Yes	Yes
Regional dummies	No	No	Yes	Yes	Yes
Adjusted R^2	0.054	0.080	0.058	0.085	0.11
Number of observations	7405	7405	7405	7405	7405

[a] Heteroscedastic (Huber) consistent standard errors in brackets for first four specifications. The last column reports a weighted regression, with size as weight. Benchmark ownership category is state-owned. The (symmetric) growth rate measure used is *net*, defined as $(n_{it} - n_{it-1})/size$, where $size = (n_{it} + n_{it-1})/2$. This is consistent with the definitions used for job creation and destruction.

regional dummies; in the fourth column results with both industry and regional dummies are reported. The estimated coefficients on size and ownership type are robust to the inclusion of these dummies; the differences we observe across ownership and size do not appear to be driven by industry and regional effects. The size effects for the non-state ownership classes are obtained by adding the coefficient on size to the coefficient on the size–ownership interactive term. The pure size effect is positive and highly significant for the benchmark category, state-owned firms: the larger these firms, the faster they are growing (or the slower they are shrinking). The insignificant coefficient on the size–ownership interactive term for the majority private group means that the size effect for these firms is no different from the (positive) size effect for state-owned firms. The size effect in the cases of domestic 100% private firms and foreign private firms is quite different: the negative coefficients on the size–ownership interactive terms are

such that they offset the positive benchmark size effect. [15] This negative size effect is consistent with reported size effects for Western private manufacturing firms (Evans, 1987a; Evans, 1987b). Possible interpretations are 'SME-niche-filling' by smaller private firms, and life-cycle effects (larger private firms are older).

We focus here on the ownership effect, which is most easily expressed as a size-dependent growth rate differential between the benchmark ownership category (state ownership) and the ownership category of interest. Using the results with both industry and region dummies (column 4), for a firm of 100 employees (the size of an average non-start-up domestic 100% private firm or a small state-owned firm), domestic 100% private ownership adds about 16 percentage points to the net employment growth rate in 1991. [16] The differential is driven by the statistically-highly-significant intercept dummy for domestic 100% private ownership. The differential decreases with firm size but a significant negative differential does not emerge for the size range observed for most de novo private firms; for example, at $n = 1000$ the growth rate differential is still 9%. The results for foreign ownership are very similar. The third private ownership category, majority privately-owned (i.e. minority state-owned) is different. Neither the size effect nor the intercept dummy is significantly different from that for the state sector, indicating that employment growth among firms in this group is actually not greatly different from firms in the state-owned sector. It is worth noting that no significant difference in size effects emerges even though the observed size distribution for majority private firms is rather different from the size distribution for state firms.

We saw in Section 3 and Table 3 that the aggregate net employment growth was highest in the majority private group. These aggregate figures differ from the regression results apparently because the majority private group contains a small number of larger firms with strong employment growth; their large weight in the group means they offset the weaker growth by more numerous but smaller firms. This is confirmed by the size-weighted regression reported in column (5). The coefficient on majority private firms (privatized) becomes statistically significant, and in fact both the intercept dummy and the size interaction coefficients are very

[15] For example, in regression (4), the size effect for the benchmark ownership group (state) is 0.013. The size–ownership coefficient for the domestic 100% private group is -0.047, with a standard error of 0.009. The actual size effect for the domestic 100% private is therefore $0.013 - 0.047 = -0.034$.

[16] The intercept dummy for domestic 100% private firms is 0.320, i.e. these firms grow 32 percentage points faster than state firms before taking size effects into account. The positive contribution of size for an average firm with employment = 100 is $0.013 * \ln(100) = 0.060$; the negative contribution of size for a domestic 100% private firm with employment = 100 relative to all firms is $-0.047 * \ln(100) = -0.216$. The size-dependent growth differential between a domestic 100% private firm and state firm, both with employment of 100, is therefore $0.320 + (0.060 - 0.216) = 0.164$, i.e. 16.4%.

close to those for the domestic 100% private group. Indeed, once we weight by firm size, the coefficients for all three private ownership categories are all very similar: all are growing substantially faster than state-owned firms. For a firm of 100 employees, the growth rate differential relative to state-owned firms is +20, +18, and +12 percentage points, for domestic 100% private, privatized, and foreign-owned firms, respectively.

The stronger performance of larger privatized firms is worthy of further investigation. One possible explanation is the endogeneity of privatization in Poland. Privatization of large firms in Poland early in the transition has, because of the absence of mass privatization, been limited largely to 'hand-picked' firms which could be sold to strategic investors, floated on the stock exchange, etc. Such firms have, understandably, tended to be both large and in good economic shape (since the payoff to privatization is larger, and it is easier to find buyers, respectively). In this interpretation, privatization does not yield strong employment growth in larger firms, but rather strong economic performance (which implies strong employment growth) leads to privatization.

Endogeneity is also an issue for smaller privatized firms in Poland because of what is known as 'privatization by liquidation' (see e.g. Gomulka and Jasiński, 1994). Under one form of privatization by liquidation, smaller state-owned firms may be privatized as the result of what is essentially bankruptcy. Such privatized firms will tend to be poorer performers, and hence the selection bias would operate in the same direction with respect to size: against smaller firms and towards larger firms. On the other hand, under another form of privatization by liquidation in Poland, many smaller firms have been privatized as the result of what are essentially voluntary management/employee buyout schemes, often funded in part by debt. We would expect such buyouts to be more likely to occur when the firm being purchased is financially healthy, i.e. both worth buying and capable of generating cash flow sufficient to pay off the debt incurred to buy the firm.

Clearly more work is required on the endogeneity of privatization and on size–ownership effects. We note here only that this research poses difficult challenges for empirical work: finding good instruments for privatization appears extremely problematic.

With respect to our unweighted results in regressions (1)–(4), there are at least two possible interpretations of the results. One is that domestic de novo private sector firms (composing the bulk of the domestic 100% private group) and small foreign sector firms (which also include a large number of de novo private firms) are inherently more dynamic than either state-owned firms or the average majority privately-owned (i.e. privatized) firm; their strong performance is not driven by size, industry, or regional effects. The second interpretation, not necessarily incompatible with the first, is that we are identifying life-cycle effects and the ownership (and possibly ownership–size) variables are proxying for age. The domestic 100% private group in particular has a large number of small, very young and rapidly expanding firms, whereas state-owned and privatized firms are

more mature and are expanding less quickly or are actively downsizing. This too is an area for further research.

5. Conclusions

The main findings of this paper can be summarized as follows. First, there exists considerable firm heterogeneity in the Polish manufacturing sector, reflected in simultaneous creation and destruction of jobs in both the state and private sectors, with a sharp increase in the gross job destruction and reallocation rates in the state sector at the start of the transition in 1990, and with the private sector accounting for a disproportionately large fraction of all jobs created. Second, controlling for size, industry, and region, de novo and foreign-owned private firms (but not majority privately-owned, i.e. privatized, firms) have on average a substantially higher net employment growth rate, suggesting that the observed higher gross and net job flow rates in the private sector are due to ownership and/or life-cycle effects as well as to size effects. Third, stronger job creation and employment growth performance among a small number of larger privatized firms is significant enough in aggregate to generate strong performance for privatized firms as a whole, offsetting weaker performance by the bulk of privatized firms. Selection bias, in which larger and healthier state-owned firms were more likely to be privatized, may have contributed to this.

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References

Aghion, Philippe and Olivier Blanchard, 1993, On the speed of transition in Central Europe, Discussion paper no. 6 (EBRD, London) July.

Boeri, Tito, Hartmut Lehmann and Andreas Woergoetter, eds., 1996, What can we learn from transition countries' experience with labour market policies (OECD, Paris) forthcoming.

Belka, Marek, Saul Estrin, Mark E. Schaffer and I.J. Singh, 1995, Enterprise adjustment in Poland:

Evidence from a survey of 200 private, privatized, and state-owned firms, Discussion paper no. 233 (Centre for Economic Performance, London) April.

Chadha, Bankim, Fabrizio Coricelli and Kornelia Kranjak, 1993, Economic restructuring, unemployment, and growth in a transition economy, IMF Staff Papers 40, no. 4, Dec.

Blanchard, Olivier, Simon Commander and Fabrizio Coricelli, 1995, Unemployment and restructuring in Eastern Europe and Russia, In: Simon Commander and Fabrizio Coricelli, eds., Unemployment, restructuring and the labour market in Eastern Europe and Russia (EDI, World Bank, Washington, DC).

Commander, Simon and Fabrizio Coricelli, 1993, Output decline in Hungary and Poland in 1990/91: Structural change and aggregate shocks, In: M. Blejer, G.A. Calvo, F. Coricelli and A. Gelb, eds., Eastern Europe in transition: From recession to growth?, Discussion paper no. 196 (World Bank, Washington, DC).

Commander, Simon, John McHale and Ruslan Yemtsov, 1995, Russia, In: Simon Commander and Fabrizio Coricelli, eds., Unemployment, restructuring, and the labor market in Eastern Europe and Russia (EDI/World Bank, Washington, DC).

Davis, S. and J. Haltiwanger, 1992, Gross job creation, gross job destruction and employment reallocation, Quarterly Journal of Economics 106, 819–863.

Dunne, T., M. Roberts and L. Samuelson, 1989, The growth and failure of US manufacturing plants, Quarterly Journal of Economics 103, 495–515.

Earle, John, Saul Estrin and Larisa L. Leshchenko, 1996, Ownership structures, patterns of control, and enterprise behavior in Russia, In: Simon Commander, Qimiao Fan and Mark E. Schaffer, eds., Enterprise restructuring and economic policy in Russia (EDI/World Bank, Washington, DC).

Earle, John and Saul Estrin, 1994, Employee ownership in transition, Paper presented at the World Bank/Central European University Conference on Corporate Governance in Central Europe and Russia, December, Revised February 1995.

Evans, D.S., 1987a, Tests of alternative theories of firm growth, Journal of Political Economy 95, 657–674.

Evans, D.S., 1987b, The relationship between firm growth, size and age: Estimates for 100 manufacturing industries, Journal of Industrial Economics 35, 567–581.

Freeman, Richard, 1987, If it doesn't work, fix it... if you can: Reforming the labour market in socialist Poland', Mimeo. (London School of Economics, London, and Harvard University, Cambridge, MA) Jan.

Friedman, Milton, 1992, Do old fallacies ever die?, Journal of Economic Literature 30, 2129–2132.

Gomulka, Stanislaw and Piotr Jasiński, 1994, Privatization in Poland 1989–1993: Policies, methods and results, In: Saul Estrin, ed., Privatization in Central and Eastern Europe (Longman, London).

Johnson, Simon and Gary W. Loveman, 1995, Starting over in Eastern Europe: Entrepreneurship and economic revival (Harvard Business School Press, Cambridge, MA).

Konings, J., 1995a, Gross job creation and destruction in the UK manufacturing sector, Oxford Bulletin of Economics and Statistics 57, 1–20.

Konings, J., 1995b, Gross job flows and the evolution of size in UK establishments, Small Business Economics 7, 213–220.

Konings, J., H. Lehmann and M. Schaffer, 1996, Job creation and job destruction in a transition economy: Ownership, firm size, and gross job flows in Polish manufacturing 1988–91, Discussion paper no. 282 (Centre for Economic Performance, LSE, London).

Lehmann, Hartmut and Mark E. Schaffer, 1995, Productivity, employment and labour demand in Polish industry in the 1980s: Some preliminary results from enterprise-level data, Economics of Planning 28, no. 1, 1–27.

Leonard, J., 1986, On the size distribution of employment and establishments, Working paper 1951 (NBER, Cambridge, MA).

Richter, Andrea and Mark E. Schaffer, 1996, Growth, investment, and newly-established firms in

Russian manufacturing, In: Simon Commander, Qimiao Fan and Mark E. Schaffer, eds., Enterprise restructuring and economic policy in Russia (EDI/World Bank, Washington, DC).

Schaffer, Mark E., 1992, The Polish state-owned enterprise sector and the recession in 1990, Comparative Economic Studies 34, no. 1, Spring.

Schaffer, Mark E., 1996, Worker participation in socialist and transitional economies, In: Ugo Pagano and Robert Rowthorn, eds., Democracy and efficiency in economic enterprise (Routledge, London).