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Gross job flows in Ukraine

*Size, ownership and trade effects**

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Abstract

This paper documents and analyses gross job flows and their determinants in Ukraine using a dataset of more than 2200 Ukrainian firms operating in manufacturing and non-manufacturing for the years 1998–2000. Job destruction dominates job creation in both 1999 and 2000. Another clear-cut result of our analysis is the strong positive effect of new private firms on net employment growth. We also find an inverse relationship between job reallocation and size for both manufacturing and non-manufacturing, while only in the latter sector is employment growth inversely related with size. The main focus of the paper is the effect of trade flows on employment adjustment in manufacturing. Our results show that both employment growth and job reallocation at the firm and two-digit sector level are affected by strong exposure to import competition and product market competition in export markets. These effects are more pronounced when we consider trade flows to the world at large and to the EU than when the analysis is based on trade flows to the CIS.

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1. Introduction

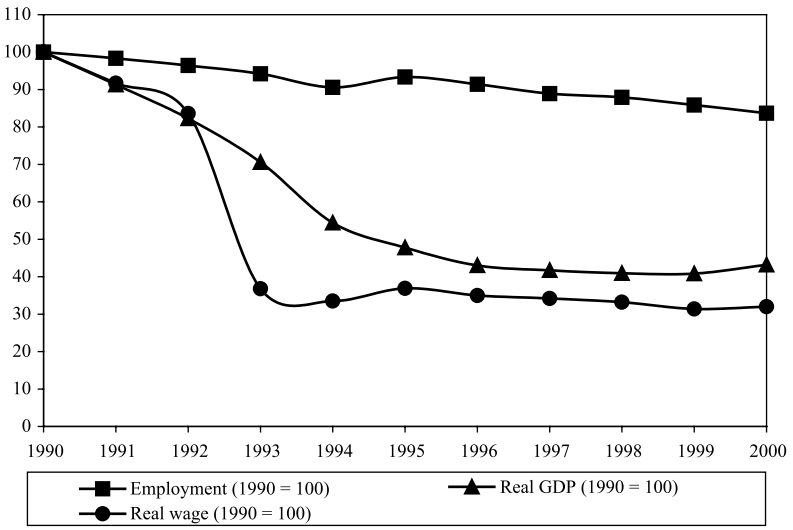
It is generally known that flexibility of the labour market is an important feature of well-functioning market economies. Davis and Haltiwanger (1999, 1992) and Baldwin, Dunne and Haltiwanger (1998) report that in the US and in Canada roughly one in every ten jobs is created and one in every ten jobs is destroyed each year. Flexibility of the labour market is important because it permits the rapid reallocation of resources to the most efficient uses and thus it may be vital for economic growth. As suggested by Aghion and Howitt (1994), we might expect a relationship between gross job creation, destruction and productivity growth. Firms (sectors) that engage in restructuring destroy low productivity jobs and create high productivity ones. This leads to high job turnover, an increase in labour productivity and better general performance. However, a high degree of job reallocation may also have negative effects, at least in the short run, in terms of worker displacement and earnings losses, but the aggregate and long-run benefits are more likely to compensate for the individual costs.

These issues are particularly relevant for the post-communist economies, characterized by highly distorted factor allocations and many inefficient firms. The reallocation of labour from inefficient firms (usually non-restructured state and privatized firms) to efficient ones (usually new private and restructured state and privatized firms) is a desirable feature of a successful transition from plan to market. How job creation and destruction have contributed to this reallocation process has been the subject of a small burgeoning literature on gross job flows in Central Europe and the CIS.

Haltiwanger and Vodopivec (2002) analyse the role of labour market flexibility for Estonia. According to their findings, Estonia's transition process can be characterized as successful. The country's approach to rapid reform has led the economy to sustainable GDP growth and to rates of job reallocation similar to those reported for Western economies. Konings, Lehmann and Schaffer (1996) analyse gross flows of jobs in Poland at the start of transition and find high rates of gross job destruction, which are concentrated in state-owned enterprises. This suggests that state-owned enterprises in Poland rapidly engaged in downsizing. They also find that new private firms contribute disproportionately to job growth in the economy. The same patterns are found for most of the other Central and East European countries as shown in Faggio and Konings (2001).

The purpose of this paper is to study gross flows of jobs in Ukraine, a transition country that has been lagging behind in reforms. The paper focuses on the years 1998–2000, when Ukraine finally started to come out of a prolonged depression that lasted nearly a decade. Figure 1 shows the dismal performance of the Ukrainian economy over the nineties, with precipitous falls of GDP and real wages and a modest decline of employment. Wage flexibility, forced unpaid leave and wage arrears on a scale even larger than in Russia can explain the diverging trends of GDP and employment. What explains the overall dismal performance in the

Figure 1. GDP, employment and real wage dynamics in Ukraine: 1990–2000



Source: Ukrainian Statistical Office – Derzhkomstat; TACIS.

nineties? Some oligarchs, their co-opted cronies in parliament and the presidential administration, most of whom came from the Communist nomenclatura, had an iron grip on most economic activity in Ukraine throughout the nineties. These groups had captured all organs of the state and used them to their private economic benefit, maintaining weak property rights and an over-regulation of the privatized and emerging new private sector (Aslund, 2002). In essence, supply was shackled by a 'bad equilibrium' of maximized rent-seeking by the oligarchs and their cronies and the overpowering presence of government bodies over-regulating economic agents, making Ukraine one of the most corrupt countries in the world. However, in 1998 and 1999 Ukraine experienced a severe balance of payments crisis leading to the first serious and quite radical reforms under the Yushchenko government, which successfully broke the iron grip of the oligarchs and liberalized supply for the first time in 2000 (Aslund, 2002). While the jury is still out on whether these reforms set Ukraine on a path of sustained growth,[1] the evidence we shall present on job flows shows a clear hiatus between the nineties and the year 2000.

Konings and Walsh (1999a, b) use survey data based on small samples to document gross job flows in Ukraine and Russia in the early nineties. They report job destruction being dominant in both countries reaching a peak of 15.3 percent in

[1] Once the balance of payments crisis had passed, the oligarchs managed to push prime minister Yushchenko out of the government, which does not bode well for the future.

Ukraine in 1996 and of 16.7 percent in Russia in 1994. In contrast, in both countries they find rather modest job creation in the first half of the nineties, not exceeding 3 percent. They explain the high job destruction in Ukraine and Russia with the existence of 'disorganization' in the production process (see, for example, Blanchard and Kremer, 1997; Roland and Verdier, 1999).

Apart from the two cited papers by Konings and Walsh there are some important studies on the reallocation process in the economies of the Commonwealth of Independent States (CIS). For Russia, Brown and Earle (2002a) find that job destruction and reallocation rose markedly after the beginning of reforms and that job destruction was concentrated among the less productive firms in the second half of the nineties. Konings and Lehmann (2002), in addition, show that five years into the Russian transition employment responses in privatized firms are more strongly negatively correlated with wage movements than in state-owned firms pointing to the slowly emerging beneficial effects of privatization on productivity. The datasets of both cited papers on Russia do not include new private firms; their contribution to the employment growth of the Russian economy is documented by Acquisti and Lehmann (2000). According to their evidence new private firms have disproportionately high job creation *and* destruction rates, the latter of which might be attributed to a relatively hostile environment for new businesses in Russia and the inexperience of managers to operate in this environment. Brown and Earle (2002b) in a comparative study of Russian and Ukrainian 'traditional' firms in manufacturing[2] provide evidence that the reforms undertaken in both countries had an impact on firm-level restructuring and labour reallocation. They also show that in Russia and Ukraine this labour reallocation has enhanced productivity and that these effects manifested themselves more rapidly in faster reforming Russia than in 'laggard' Ukraine.

Our paper makes several contributions. The paper has as one aim to document gross job flows in both the manufacturing and non-manufacturing sectors in Ukraine for the years 1999 and 2000, when Ukraine for the first time embarked on consistent reforms resulting in strong positive growth in the year 2000 (Aslund, 2002). We use large representative samples of firms in both the manufacturing and the non-manufacturing sectors, in order to compare and contrast gross job flows in these two sectors. Since the Ukrainian economy was even more biased towards the manufacturing sector under central planning than other Soviet and East European economies, it is of interest to see whether there are significant differences in net employment growth between the two sectors that lead to a shrinking of the manufacturing sector and an expansion of the non-manufacturing sector as a move in the direction of a market economy would suggest. Of particular interest in this context is whether job creation or job destruction is the driving force behind this possibly different net employment growth.

[2] 'Traditional' firms are firms that already existed in Soviet times, so new private firms are excluded from their analysis.

The data that we use have information on ownership types of firms, i.e., we can distinguish between new private, privatized and state-owned enterprises. This allows us to contribute to the on-going debate about the effects of ownership on employment growth. Many papers have indicated that the employment adjustment in terms of gross flows of jobs is not very different between privatized and state-owned enterprises, but that most of the dynamics emerges from the new private firms.[3]

The third and most innovative contribution of this paper is the exploration of the link between the exposure of Ukrainian manufacturing industries to foreign trade and employment adjustment by firms operating in these industries. One strand of the Western literature on gross job flows considers the link between foreign trade and job creation and destruction tying it in with the debate on the effects of globalization on employment in the domestic labour market. For example, Levinsohn (1999) explores the effects of trade liberalization on the Chilean labour market and finds that size and macro effects overwhelm any trade effects. Once size and macro shocks are controlled for, export-led, import-competing and non-traded sectors have similar employment patterns. Klein, Schuh and Triest (2003) identify trade-related adjustment costs by estimating the effects of real exchange rates on labour reallocation using detailed data on US manufacturing industries for the years 1973 through 1993.

In a transition context, the effects of trade on job reallocation have been overlooked, even though the rapid opening up of transition economies to world markets seems to come close to a natural experiment. Trade ties of Ukrainian manufacturing sectors with Western (European Union) markets were virtually non-existent before independence, but have developed rapidly since then. Some sectors, however, developed strong links with Western markets in the nineties while other sectors remained relatively closed. We exploit these differences to investigate how the relative openness of a sector, in which a firm operates, impacts upon the creation and destruction of jobs in this firm. We also investigate how relative openness affects gross job flows at the two-digit sector level.

In the next section we describe the various datasets employed in the analysis of gross job flows and provide a brief review of the job flow measures. The subsequent section looks at foreign trade flows of Ukrainian manufacturing over the nineties and presents and discusses the construction of indices of relative openness at the sector level. Section 4 reports gross flows of jobs for the entire economy, for different sectors in the economy and ownership categories. It also discusses these flows according to employment size categories and to the relative openness of the sector where firms are active. In Section 5 we report regression estimates of the

[3] E.g. Konings, Lehmann and Schaffer (1996); Bilsen and Konings (1998); Acquisti and Lehmann (2000) and Richter and Schaffer (1996). In contrast, Konings and Lehmann (2002) find different employment adjustment of privatized and state-owned Russian firms.

determination of employment growth and job reallocation at the firm level as well as estimates of the impact of relative openness on job flows at the sector level. The final section summarizes our main findings.

2. Data and job flow measures

We use two firm/establishment-level datasets in our work. The first dataset covers 7,303 'traditional' establishments in manufacturing between 1996 and 2000, of which 6,189 have positive employment levels in all years. This data on the manufacturing sector is provided by the Government Statistical Committee ('Derzhkomstat') and covers virtually the entire population of those manufacturing establishments that already existed in Soviet times, allowing one to study the evolution of job flows over time for the 'traditional' manufacturing sector, which, as stated above, excludes new private firms.[4] The use of this dataset is twofold. First, as a check of whether the job flow measures generated from the second data source are reasonable, and second, we use information on employment as an important building block for our relative openness indices.

The second dataset is based on annual company accounts data of 2,239 Ukrainian firms in both the manufacturing and the non-manufacturing sectors, where we have annual observations for the years 1998–2000. These data are retrieved from the Amadeus database compiled by Bureau Van Dijck, a commercial data provider. The Amadeus database consists mostly of company accounts data of European Union firms, however, it also reports information on some countries in Central and Eastern Europe. To be included in the database at least one of the following criteria has to be fulfilled: operating revenue must be at least 1.5 million Euro, total assets must be at least 3 million Euro or the number of employees has to be larger than 15. These restrictions on the data imply that micro firms are not included. Nevertheless, a substantial number of medium sized and small firms enter the data. Abstracting from micro firms, the data is assumed to be a random sample of the population of firms and enables us to infer some basic patterns of job reallocation in Ukraine. The manufacturing sample covers roughly one-third of all employment in manufacturing, while the data from non-manufacturing sectors comprise about 9 percent of total non-manufacturing employment over this period.

The Amadeus dataset includes the company names of all firms and based on this information it is possible to determine that the data overwhelmingly relate to establishments. Only 2 percent of firms in the overall sample have more than one plant in the reported period, although there are three very large firms in the

[4] This has been done in the above-mentioned comparative study by Brown and Earle (2002b). They convincingly show that new private firms do not enter the Derzhkomstat 'register' of manufacturing establishments. Note that the survey procedures of the Russian and Ukrainian statistical offices, like in Soviet times, still stipulate the collection of employment information from *establishments*.

Table 1. Summary statistics of Amadeus firms

	Number of firms		Mean employment		Mean employment growth	
Year	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
Overall sample	2,239	2,239	968	947	−0.061	−0.062
			(3,745)	(3,928)	(0.25)	(0.31)
Manufacturing	1,259	1,259	1,098	1,063	−0.065	−0.073
			(2,521)	(2,708)	(0.22)	(0.25)
Non-manufacturing	980	980	800	798	−0.055	−0.048
			(4,883)	(5,081)	(0.30)	(0.37)
Manufacturing[a)]	15,228[a)]		37[a)]			
Non-manufacturing[a)]	3,665[a)]		133[a)]			
Manufacturing[b)]	19,536[b)]		378[b)]			
Non-manufacturing[b)]	13,154[b)]		625[b)]			

Note: Standard deviation in brackets; a) averages for 1994–99 in Belgium; b) averages for 1994–99 in the United Kingdom.

non-manufacturing sample.[5] The information on company names also allows us to match ownership information of each firm from an external source. Consequently, we are able to identify new private firms, privatized firms and state-owned enterprises.

The dataset that we use in the analysis comprises only firms that we can identify with certainty as continuing firms, i.e., firms that have positive employment levels in all years.

While the Amadeus dataset has the advantage that it includes new private firms and firms in the non-manufacturing sector, it is restricted to the years 1998–2000. These are, however, the years when the Ukrainian economy started to emerge from nearly a decade of decline and stagnation as discussed previously. In addition, throughout this stagnation period forced unpaid leave was a very widespread practice of Ukrainian firms, generating potentially large biases in job flow measures. At the end of the nineties the incidence of forced unpaid leave was dramatically reduced, attenuating biases arising from this source of measurement error.[6]

Table 1 gives some summary statistics of the Amadeus dataset for the years 1999 and 2000. From the table it is clear that Ukrainian firms on average are still

[5] These firms are Ukrainian Telekom, Lviv-Railways and Odessa-Railways. Throughout the rest of the paper we use the terms firm and establishment interchangeably.

[6] For a more detailed discussion of measurement error connected to forced unpaid leave, see Konings, Kupets and Lehmann (2002).

very large compared to the typical Western firms. Furthermore, not surprisingly for transition economies, the average firm is larger in the manufacturing sector than in the non-manufacturing sector. But even in the non-manufacturing sector the average firm size is quite large compared to Western standards, as the benchmark figures for Belgium and the UK in Table 1, taken from the Amadeus database, show.

We can also note that the average employment growth rates in the sample are negative in both sectors, with average employment contraction in the manufacturing sector being larger in absolute value in both years.

Following Davis and Haltiwanger (1992, 1999) gross job creation (*pos*) is defined as the sum of all employment gains in all expanding firms, while gross job destruction (*neg*) is the sum of all employment losses in all contracting firms in an economy or sector. Usually gross job destruction is expressed as a positive number. These gross job flows can be expressed as rates by dividing them by the total amount of jobs available in an economy or sector. The sum of the gross job creation rate and the gross job destruction rate is the gross job reallocation rate (*gross*), while the difference is the net aggregate employment growth rate (*net*) that can be observed in aggregate statistics. A measure of churning or reallocation of jobs which is over and above the amount of job reallocation necessary to accommodate a given net aggregate employment growth rate is the excess job reallocation rate (*excess*) and is defined as the gross job reallocation rate minus the modulus of the net aggregate employment growth rate. We interpret *excess* as a measure of genuine labour reallocation within a sector.

The shares of job creation and destruction of specific sectors or categories of firms are given by the ratio of the number of created or destroyed jobs of these sectors/categories of firms over the number of all created or destroyed jobs. These shares establish the absolute contribution of sectors/categories to job creation or job destruction, but comparisons of job flow shares with employment size shares also give insights into their relative contributions.

The one-year persistence rate of job creation is the fraction of jobs created in year t that remain filled at the sampling date one year later. The one-year persistence rate of job destruction is the fraction of jobs that do not reappear at the sampling date one year later (Davis and Haltiwanger, 1999). These persistence rates document whether the observed job flows are of a temporary or more permanent nature, an issue of particular relevance in the transition context.

Because the Amadeus data are not census-type data, the presented job flow rates are estimates and it is, therefore, important to establish the precision of these estimates by providing standard errors. One way to generate these standard errors, which is computer-intensive but computationally simple, is bootstrapping.[7] Under the assumption that the sample is random this is a legitimate procedure, which

[7] Davis, Haltiwanger and Schuh (1996) present alternative ways to compute standard errors of job flow rates, requiring knowledge of sampling weights.

thus far has been used seldom in the literature on gross job flows in transition economies even when small random samples were analysed instead of census-type data.

3. Trade flows and the relative openness of manufacturing sectors

We use the changing trade patterns of the Ukrainian manufacturing sectors to investigate how the opening up of an economy to world markets affects employment adjustment at the firm and sector level. We, therefore, first discuss these changing trade patterns and then describe the construction of indices that attempt to capture this opening up of an economy.

We have two sets of trade data available in our work. The Ukrainian State Customs Committee provides trade data by country of origin and destination for product groups using a Derzhkomstat classification.[8] We mapped these groups to NACE2 commodity groups at the two-digit level. From an external source we are also able to match the value of imports and exports at the firm level into our Amadeus dataset.

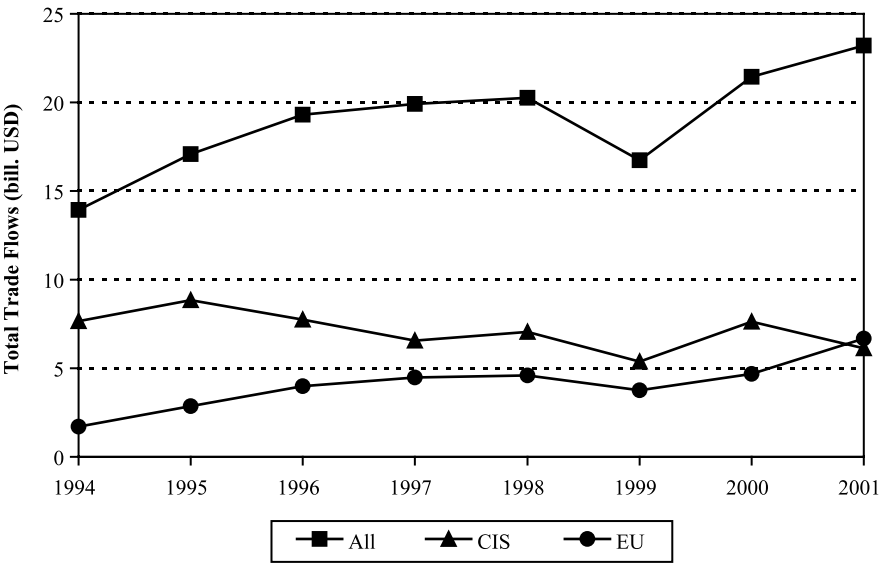
The large increase in trade flows to and from Western countries that Ukrainian manufacturing sectors have experienced since independence can be inferred from figures 2–4, which show annual total trade, import and export flows to and from three geographic areas, the world as a whole, the European Union (EU) and the CIS for the years 1994–2001. The presented flows are restricted to those sectors, which are included in the Amadeus dataset, and are based on Ukrainian customs house data, only available since 1994. Figures 2–4 and Tables A1 and A2 in the appendix show several noteworthy trends. First, trade to and from the world at large has risen between 1994 and 2001 by roughly two-thirds, with a particular steep rise of EU trade (by ca. 300 percent), while CIS trade has been slightly declining. As a consequence the share of EU trade has roughly doubled in this period and the CIS share has been more than halved. Secondly, while imports from the EU increased dramatically, the rise in exports to the EU is spectacular, exceeding the growth in imports by nearly 100 percentage points. However, most of this growth occurred in the last three years of the reported period. Thirdly, the EU trade flow levels in 1994 are low, and we assume that at the beginning of transition they were close to zero. This inference seems especially valid for export flows (Figure 4).

Using the trade data at the sector level we first construct the following index of the relative openness of a sector in the spirit of Klein, Schuh and Triest (2002):

$$Open(total)_{j,t} = [(Import_{j,t} + Export_{j,t})/(Import_{tot,t} + Export_{tot,t})]/(employment_{j,96}/employment_{tot,96}).$$

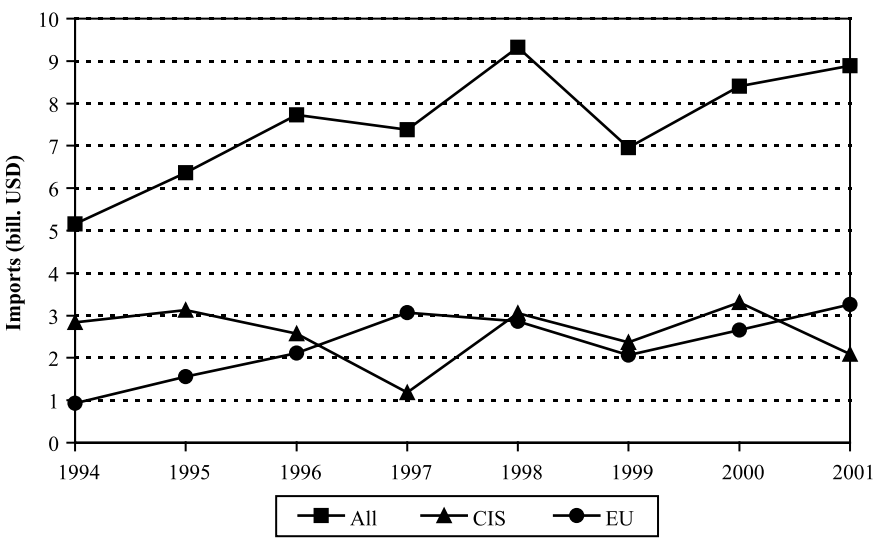
[8] We refer to these data as customs house data.

Figure 2. Total trade flows of manufacturing sector in Ukraine, 1994–2001



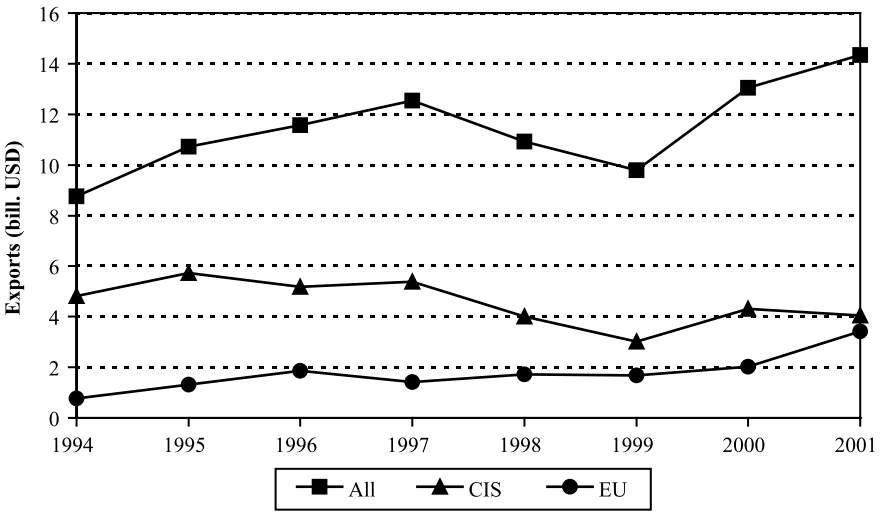
Source: Ukrainian State Customs Committee. Only sectors used in the manufacturing sample of the Amadeus dataset are included.

Figure 3. Import flows of manufacturing sector in Ukraine, 1994–2001



Source: Ukrainian State Customs Committee.

Figure 4. Export flows of manufacturing sector in Ukraine, 1994–2001



Source: Ukrainian State Customs Committee.

The index gives the relative share of imports and exports, i.e., of total trade flows, of sector *j* in year *t*, weighted by its employment share in 1996. As no reliable data on employment at the sector level are available, the employment levels are aggregates derived from the Derzhkomstat data on manufacturing establishments.[9] We employ a smoothed version of this index, taking averages over the years 1996–98, so that any short-run shocks, e.g., terms of trade shocks, are averaged out. Averaging over the indicated years generates an index, which is exogenous to the analysed gross job flows of the years 1999 and 2000. This index is calculated for world, EU and CIS trade flows.

For the first two trading areas, and especially for the EU area, the index tries to measure the relative degree, with which a respective sector in manufacturing industry has opened up to the world economy.[10] Assuming that at the beginning of transition EU trade flows of Ukrainian manufacturing were close to zero, the relative level of a sector averaged over the years 1996–98 tells us the relative change of this sector, i.e., it proxies for the relative speed, with which a sector has established ties with Western markets. The index can, therefore, be used to

[9] Employment is a measure of economic activity, which is far from perfect in the Ukrainian context given the amount of forced unpaid leave. However, under the assumption of roughly proportional incidence of unpaid leave across manufacturing sectors, the calculated employment shares do provide reliable relative weights of economic activity.

[10] An index measuring the absolute level of openness of a sector employed by Klein, Schuh and Triest (2003) might be preferable but requires reliable data on production, unavailable in the Ukrainian case.

investigate how relative openness of a sector affects employment adjustment at the firm and sector level.

Ukraine as part of the former Soviet Union has trade flows to and from countries within the CIS (mainly Russia) that were, of course, intra-country flows of goods before independence. A high relative level in CIS trade flows of a sector in manufacturing might reflect the re-establishment of previously existing trade links between enterprises, i.e., the attenuation of the problems of 'disorganization' discussed for example by Blanchard and Kremer (1997), Roland and Verdier (1999) and Konings and Walsh (1999a), or it might represent a genuine opening up of this sector to competition within CIS economies.

We are not able to identify these alternative scenarios with the data at our disposal. The firm-level import data cover only that part of firms' input requirements originating outside Ukraine. Aggregating firm-level imports up to two-digit sector levels and using these aggregates to construct an index of relative import intensity along the lines of the above index will not necessarily say much about how well a sector has re-established supply chains. Some sectors might rely predominantly on suppliers from within Ukraine and some sectors on suppliers from other CIS countries. Employing the customs house data, we simply investigate whether CIS trade flows result in different employment adjustment by firms and sectors than world and EU trade flows.

In order to get additional insights into how trade affects employment growth and job reallocation, we also construct the indices of relative openness separating the information on import and export flows:

$$Open(import)_{j,t} = (Import_{j,t}/Import_{tot,t})/(employment_{j,96}/employment_{tot,96});$$
$$Open(export)_{j,t} = (Export_{j,t}/Export_{tot,t})/(employment_{j,96}/employment_{tot,96}),$$

where the indices have a similar interpretation to that of the index based on total trade flows. Summary statistics of the various indices, based on the 26 manufacturing sectors in the Amadeus dataset, are given in Table A3. The figures of the index based on EU-exports are particularly striking, pointing to a large number of sectors that are very little engaged in exports to the EU area, and to a small number of sectors that are very strongly involved in export activities to the EU. The five most open sectors with respect to EU exports are (in descending order): recycling; manufacture of coke, refined petroleum products and nuclear fuel; manufacture of wearing apparel; manufacture of fabricated metal products; manufacture of leather and leather products.

One reason for developing indices based on imports and exports separately is that sectors that are particularly open to imports might not be especially export intensive. This conjecture is in part confirmed in Table A4, where Spearman rank correlation coefficients are shown for the various indices. The high and significant coefficient of the import and export indices for the CIS trading area and the low and insignificant coefficient of the same indices for the EU trading area imply that

sectors that are import intensive are also export intensive as far as trade with the CIS is concerned, while those sectors that are more exposed to import competition from EU countries are not the sectors that rank high in exports to this trade area.

Both the import- and the export-based indices proxy for a varying degree of product market competition in either domestic markets or markets abroad, since the customs house data, from which they are derived, relate to products groups and not inputs required by industries.[11] Increased competitive pressure is associated in the literature with firm behaviour that leads to productivity gains, to continuous improvements in product quality and stable or expanding market shares.[12] Thus competitive pressure might positively affect employment growth and job turnover at the firm level. This latter result can come about because firms in sectors faced with external competition have more incentives for constant productivity increases, and consequently have high turnover of employees. Whether import competition and competition in export markets lead to similar employment policies by firms is, however, not entirely clear though it is worth investigating. One noteworthy and obvious difference between import competition and competition in export markets is that all firms in a sector experiencing strong import competition face the competitive pressure, while only those firms in a strongly export-oriented sector that actually export are exposed to such pressure. Bernard *et al.* (2003) for example show that US establishments confronted with this pressure are more efficient than other establishments in the same sector. We take account of this difference in the firm-level regressions by interacting the relative openness index, which is based on exports, with a dummy if the firm is observed to have exports in the years 1996–98. Before we turn to these regressions we present some basic patterns of job creation and job destruction in the years 1999 and 2000.

4. Basic patterns of job creation and destruction in Ukraine

Table 2 presents the distributions of employment growth rates[13] for various years using both the Amadeus and the Derzhkomstat datasets. The Amadeus-based distributions for manufacturing are calculated for all firms and for 'traditional' firms, i.e., without new private firms. For both 1999 and 2000 the mean growth rates are negative in the overall sample of the Amadeus data as in the sub-samples of manufacturing and non-manufacturing. The same holds for the four years of the

[11] In other words, the data do not relate to imports by an industry, but imports of goods, which this industry produces. Also note that we do not have trade data on intermediate and final goods, so it is hard to disentangle whether Ukrainian firms are genuinely exposed to competition in export markets or whether they are mainly involved in transfer pricing activities.

[12] Repkine and Walsh (1999) discuss these issues in the context of transition.

[13] Davis and Haltiwanger (1992) and most subsequent research on job flows measure the employment growth rate as $\frac{2(emp_t - emp_{t-1})}{emp_{t-1} + emp_t}$. This rate is used here.

Table 2. Distribution of year-by-year employment growth rates

Source	Year	1%	5%	10%	25%	50%	75%	90%	95%	99%	Mean	StDev
Amadeus Overall sample n = 2239	98–99	−0.665	−0.341	−0.241	−0.158	−0.092	0.002	0.163	0.342	0.851	−0.061	0.254
	99–00	−1.013	−0.518	−0.333	−0.153	−0.040	0.025	0.137	0.315	1.137	−0.062	0.307
Amadeus Manufacturing n = 1259	98–99	−0.582	−0.293	−0.230	−0.155	−0.094	−0.011	0.111	0.269	0.800	−0.065	0.216
	99–00	−0.974	−0.482	−0.308	−0.138	−0.036	0.024	0.100	0.194	0.763	−0.073	0.248
Amadeus 'traditional' Manufacturing n = 1213	98–99	−0.582	−0.293	−0.230	−0.155	−0.096	−0.016	0.088	0.187	0.580	−0.077	0.190
	99–00	−0.956	−0.475	−0.304	−0.138	−0.037	0.021	0.095	0.176	0.626	−0.075	0.237
Amadeus Non-manufacturing n = 980	98–99	−0.942	−0.404	−0.262	−0.161	−0.088	0.023	0.225	0.436	0.885	−0.055	0.296
	99–00	−1.122	−0.598	−0.346	−0.167	−0.044	0.028	0.240	0.554	1.376	−0.048	0.369
Derzhkomstat Manufacturing n = 6189	96–97	−0.621	−0.308	−0.234	−0.144	−0.070	0.000	0.061	0.126	0.475	−0.078	0.185
	97–98	−0.744	−0.321	−0.229	−0.130	−0.055	0.005	0.075	0.143	0.529	−0.065	0.197
	98–99	−0.748	−0.339	−0.248	−0.141	−0.058	0.005	0.080	0.163	0.477	−0.072	0.196
	99–00	−1.126	−0.537	−0.340	−0.168	−0.056	0.022	0.102	0.192	0.503	−0.098	0.264

growth rates derived from the Derzhkomstat data. For all years and both datasets, we observe a zero growth rate at the 75th percentile. This implies that slightly less than three-quarters of all firms destroy jobs, while roughly one-quarter creates jobs in each year. The mean growth rates of the overall sample of the Amadeus dataset are in both years (with values of −0.061 percent and −0.062 percent) lower than the (negative) growth rates implied by the employment levels in Figure 1, which amount roughly to −0.02 percent. The lack of micro firms in the Amadeus dataset might explain some of this discrepancy since these firms might contribute to job creation in a particularly strong fashion.

The distributions of employment growth based on the Derzhkomstat data are relatively compressed in the first three years for which we have data; in the year 2000 the distribution becomes more dispersed as shown in the increase of the standard deviation. We see a similar jump in the standard deviation between 1999 and 2000 with the Amadeus-based 'traditional' manufacturing firms. In the case of the latter, the wider distribution is mainly brought about because of higher levels of labour shedding by some firms, since at the 5th percentile, for example, the growth rate falls from −0.293 to −0.475. We see a similar pattern of higher levels of labour shedding in the Derzhkomstat-based distributions. In non-manufacturing, the wider distribution is a result both of more labour shedding and of an increase in employment expansion by some firms. At the 5th percentile we see a decrease in the growth rate from −0.404 to −0.598 and an increase at the 95th percentile from 0.436 to 0.554 over the two years. Heterogeneity in employment behaviour clearly increased in the year 2000 in this sector.

Inspection of the Amadeus-based distributions of all manufacturing and of 'traditional' manufacturing firms leads us to conclude that the large majority of new private firms is expanding employment in both years; up to the 75th percentile the two distributions are virtually identical, while we find lower growth rates throughout the upper tail of the 'traditional' manufacturing distributions. Also, the latter distributions are roughly in line with the Derzhkomstat-based distributions for the years 1999 and 2000.

Most of the job flow rates that we present are estimates based on the Amadeus dataset. Only Table 5 shows job flow measures of manufacturing based on the census-type Derzhkomstat data. In all the tables based on the Amadeus data bootstrapped standard errors of the job flow measures are reported. These standard errors, which are based on 1000 repetitions, allow us to establish the precision of the estimates. Using various distributional assumptions, this enables us to construct confidence intervals and thus to compare job flow rates across categories in a statistically meaningful way. Ninety-five percent confidence intervals of the job flow measures are similar whether one imposes a normal distribution or uses the percentile method.[14] For the purposes of the paper it suffices to double the

[14] For a discussion of how to construct confidence intervals from bootstrapped standard errors, see Efron and Tibshirani (1993). The confidence intervals are not presented but are available on request.

Table 3. Gross flow rates for overall sample

Year	*pos*	*neg*	*gross*	*net*	*excess*	*n*
1999	0.026	0.109	0.135	−0.083	0.052	2239
	(0.003)	(0.008)	(0.009)	(0.008)	(0.006)	
2000	0.059	0.081	0.140	−0.022	0.118	2239
	(0.017)	(0.006)	(0.017)	(0.019)	(0.028)	

Note: Bootstrap standard errors in parentheses, based on 1000 repetitions; *pos* = job creation rate, *neg* = job destruction rate, *gross* = job reallocation rate, *net* = net employment growth rate, *excess* = excess job reallocation rate.
Source: Amadeus dataset.

shown standard error to get a satisfactory approximation of half of the width of the confidence interval.

Table 3 presents estimates of the job flow rates using the overall sample of the Amadeus dataset. Table 4 shows estimates of these rates and of gross job flow shares and size shares after the dataset has been split into manufacturing and non-manufacturing. While job destruction dominates job creation in the Ukrainian economy in both years, job creation rises and job destruction falls in 2000 compared with 1999. As already stated, heterogeneity in employment behaviour increased in 2000 as shown by the doubling of the excess job reallocation rate. In addition, given the bootstrapping procedure, the increase in the bootstrap standard errors from 1999 to 2000 for all job flow measures apart from the job destruction rate tells us that job creation but not job destruction has become more heterogeneous in 2000.[15]

The manufacturing and non-manufacturing sectors have very similar job flow measures in 1999. In the year 2000, on the other hand, there seem to be clear differences between the two sectors of the economy, as job creation is more than double in the non-manufacturing sector. We can, however, also see that the rise in heterogeneous employment behaviour in 2000 can be mainly attributed to the non-manufacturing sector, which makes the estimates in this sector much more imprecise than in manufacturing. The large standard error in the job creation rate does not allow us to say unequivocally that non-manufacturing has a larger job creation in the year 2000 than manufacturing. We infer, however, that non-manufacturing

[15] *Pos* and *neg* are the two job flow measures from which the other three measures are derived. The bootstrapping procedure treats the sample as a population and draws 1000 random samples *with* replacement, then calculates the mean and the standard deviation of the job flow measure in question. This standard deviation is then the bootstrapped standard error. If there is more variation in e.g., job creation than in job destruction, this will show up as a larger standard deviation of the first job flow measure. In other words, very precise estimates hint at uniform behaviour across the sampled firms, while imprecise estimates hint at heterogeneous behaviour.

Table 4. Job flow rates and shares by sector: 1999 and 2000

Year	*Sector*	*pos*	*neg*	*gross*	*net*	*excess*	*jcsh*	*jdsh*	*szsh*	*n*
1999	Manufacturing	0.023	0.104	0.127	−0.081	0.046	0.573	0.608	0.637	1259
		(0.003)	(0.006)	(0.007)	(0.007)	(0.006)				
1999	Non-manufacturing	0.031	0.118	0.149	−0.087	0.062	0.427	0.392	0.363	980
		(0.007)	(0.021)	(0.025)	(0.018)	(0.013)				
2000	Manufacturing	0.040	0.073	0.113	−0.033	0.080	0.431	0.571	0.635	1259
		(0.007)	(0.007)	(0.007)	(0.012)	(0.014)				
2000	Non-manufacturing	0.092	0.095	0.187	−0.003	0.184	0.569	0.429	0.365	980
		(0.048)	(0.015)	(0.048)	(0.052)	(0.048)				
1999	'Traditional' manufacturing	0.020	0.105	0.125	−0.084	0.041				1213
		(0.003)	(0.006)	(0.007)	(0.007)	(0.006)				
2000	'Traditional' manufacturing	0.038	0.072	0.110	−0.033	0.077				1213
		(0.007)	(0.007)	(0.007)	(0.012)	(0.013)				

Note: Bootstrap standard errors in parentheses, based on 1000 repetitions; *jcsh*, *jdsh* and *szsh* denote share in job creation, job destruction and size share respectively.
Source: Amadeus dataset.

Table 5. Gross job flows in manufacturing – Census-type Derzhkomstat data

Year	*pos*	*neg*	*gross*	*net*	*excess*	*n*
1997	0.016	0.099	0.115	−0.083	0.032	6189
1998	0.020	0.081	0.101	−0.061	0.040	6189
1999	0.021	0.079	0.100	−0.058	0.042	6189
2000	0.034	0.079	0.113	−0.045	0.068	6189

Note: See Table 3.
Source: Ukrainian Statistical Office – Derzhkomstat.

contributes disproportionately to job creation in both years, while its destruction shares are only marginally higher than its size shares.

The estimates of the job flow rates of the manufacturing sector are clearly more precise. It is, therefore, noteworthy that the 95 percent confidence intervals of all but one of the job flow rates in 'traditional' manufacturing given in Table 4 include the values in Table 5, where we report the same measures using Derzhkomstat census data.

The empirical evidence on gross job flows in manufacturing in other transition countries generally shows low creation, high destruction and low excess reallocation rates in the early phase of transition. For example, Haltiwanger and Vodopivec (2002) report a job creation rate of 3.1 percent and a job destruction rate of 8.3 percent for the early period of transition in Estonia. Konings, Lehmann and Schaffer (1996) present a job creation rate of 0.6 percent and a job destruction rate of 16.5 percent for Polish state-owned manufacturing firms in 1990 and 1991. Brown and Earle (2002b) show a similar relationship between job creation and destruction in the 'traditional' Russian manufacturing sector in the early reform period (1992–96), with an average job creation rate of 2.1 percent and an average job destruction rate of 11.2 percent.[16] Evidence on job flows for all sectors points to less dominance of job destruction and, therefore, higher excess reallocation rates. The latter rates reach Western levels especially in later stages of transition. For example, Faggio and Konings (2001) report job creation and destruction rates of 4.3 and 5.2 percent, respectively, for all sectors in Slovenia in the years 1994–97, implying an excess reallocation rate of 8.6 percent. Using a different database, Haltiwanger and Vodopivec (2003) establish job creation and destruction rates of 10.1 percent and 9.2 percent for all Slovenian sectors at the end of the nineties, implying an excess reallocation rate of 18.4 percent. In the light of these numbers, job reallocation in Ukraine, relatively low in 1999, was certainly comparable to job reallocation in other transition economies in the year 2000. The 18.4 percent excess

[16] The implied excess job reallocation rates for the three countries are 6.3 percent, 1.7 percent and 4.2 percent, respectively.

Table 6. One-year persistence rates for annual job flows: Overall sample and by sector

Category	*jcpers*	*jdpers*
Overall sample	0.804	0.886
	(0.023)	(0.023)
Sector	***jcpers***	***jdpers***
Manufacturing	0.852	0.861
	(0.023)	(0.034)
Non-manufacturing	0.740	0.926
	(0.039)	(0.020)

Note: Bootstrap standard errors in parentheses, based on 1000 repetitions; *jcpers* = job creation persistence rate, *jdpers* = job destruction persistence rate.
Source: Amadeus dataset.

job reallocation rate of the non-manufacturing sector points to a particularly impressive amount of job reallocation for this year. While the estimated job flow rates for Ukraine seem to point to a clear hiatus between the nineties and the year 2000[17], unfortunately we cannot know from one data point whether the better performance of the year 2000 in terms of job reallocation is a temporary 'blip' or the beginning of a sustained trend.

The one-year persistence rates of annual job flows in Table 6 clearly demonstrate that these flows are not of a temporary nature. Roughly 80 percent of jobs created in 1999 are still there one year later, and about 90 percent of all jobs destroyed in 1999 do not reappear in 2000. Both these rates are roughly 10 percentage points higher than those presented for the US by Davis and Haltiwanger (1999). Different persistence patterns emerge in the two sectors of the economy. Job creation and destruction persistence are equal and roughly 85 percent in manufacturing, while in non-manufacturing the destruction persistence is, at 92 percent, roughly 20 percentage points higher than the persistence of new jobs. Surprisingly the non-manufacturing sector has the higher destruction persistence.

Behind the aggregate job flow figures tremendously heterogeneous behaviour in job reallocation within sectors occurs as the decomposition of the excess job reallocation at the two-digit level in Table 7 shows. As in Western economies a large majority of job shifts takes place within sectors. However, in 2000 between sector job shifts reach one-third of all job shifts, which is a very large fraction in international perspective.

[17] This hiatus is also visible in the figures presented by Brown and Earle (2002b).

Table 7. Decomposition of excess job reallocation (at the two-digit level)

Year	Sector	Within-sector shifts	Between-sector shifts
1999	Manufacturing	0.952	0.048
1999	Non-manufacturing	0.972	0.028
2000	Manufacturing	0.666	0.334
2000	Non-manufacturing	0.622	0.378

Note: The sector is excluded if the number of firms in this sector is less than 10 (sectors excluded are: Mining of coal and lignite, Manufacture of tobacco products, Manufacture of office machinery and computers, Recycling; Water transport, Air transport, Post and telecommunications, Financial intermediation, Renting services, Computer and related activities, Public administration and defence, Education, Sewage and refuse disposal, Other service activities).
Source: Amadeus dataset.

Cross-tabulated evidence on firm size and job flows reported in Konings, Kupets and Lehmann (2002) gives a somewhat inconsistent picture and is not presented here for brevity. However, small firms in Ukraine seem to contribute more to job creation than we observe in Western economies. But this size effect could be closely connected to firm age or ownership type: young firms and new private firms tend to have small employment levels. While there is unfortunately no reliable information on the age of the firm, we can condition on ownership type and see whether the size effect is partially explained by composition effects.

Table 8 presents the five job flow measures and the three share statistics disaggregated by three ownership types, i.e., privatized, new private and state-owned firms. There are striking differences with respect to job creation between new private firms and privatized and state-owned firms. New private firms are much more dynamic as far as job creation is concerned, leading to positive employment growth in both years. We also observe more heterogeneity in the employment behaviour of new private firms as shown by the much higher excess job reallocation rate in both years. Privatized firms in particular but state-owned ones as well predominantly destroy jobs, while new private firms both create and destroy jobs, a finding that was also established for the Russian economy (Acquisti and Lehmann, 2000). The good job creation performance of new private firms in both years could imply that there is a genuine ownership type effect at work or a size effect. Below, we will try to disentangle these size and ownership effects properly within a regression framework.

New private firms contribute a disproportionately large number of jobs to the pool of new jobs, while their contribution to job destruction corresponds roughly to their employment share. The difference between state-owned firms and privatized firms on these measures is striking. Relative to their employment share

Table 8. Job flow rates and shares by ownership type – overall sample

Year	Ownership type	*pos*	*neg*	*gross*	*net*	*excess*	*jcsh*	*jdsh*	*szsh*	*n*
1999	Privatized	0.023	0.119	0.142	−0.096	0.046	0.503	0.619	0.567	1413
		(0.003)	(0.007)	(0.007)	(0.007)	(0.005)				
1999	New Private	0.192	0.069	0.261	0.123	0.138	0.139	0.012	0.019	132
		(0.027)	(0.020)	(0.030)	(0.036)	(0.040)				
1999	State	0.022	0.097	0.119	−0.075	0.044	0.356	0.366	0.413	685
		(0.005)	(0.017)	(0.019)	(0.015)	(0.011)				
2000	Privatized	0.049	0.089	0.138	−0.040	0.098	0.461	0.612	0.558	1413
		(0.008)	(0.008)	(0.008)	(0.013)	(0.015)				
2000	New private	0.159	0.134	0.293	0.025	0.268	0.057	0.035	0.021	132
		(0.031)	(0.028)	(0.034)	(0.048)	(0.044)				
2000	State	0.068	0.067	0.135	0.001	0.134	0.482	0.350	0.419	685
		(0.040)	(0.010)	(0.040)	(0.044)	(0.039)				

Note: See Tables 3 and 4.
Source: Amadeus dataset.

privatized firms create fewer new jobs and destroy more jobs than do state-owned firms. The figures on job creation shares also clearly show that because of their large employment base both privatized and state-owned firms still contributed the lion's share of created jobs in the Ukrainian economy in the reported period.

Cross tabulations of groups of sectors categorized according to the relative level of openness and their job flows, based on the different indices and trade areas, do not exhibit any statistically significant differences and are not shown here.[18] Regression analysis seems to be a more appropriate way to shed light on the impact of relative openness on firm-level and sector-level employment adjustment.

5. Evidence from firm level and sector level regressions

The gross job flow rates which we documented in the last section are linked to the individual firm's employment decision. Factors that influence firm-level employment will most probably also shape the pattern of gross job flows in the aggregate. In this section therefore, we initially explore which factors drive firm-level employment decisions. This may allow us to disentangle, for instance, the effects

[18] We split sectors into three groups; those with low relative openness, belonging to the lower third of the distribution of the index, those with medium relative openness and those with high relative openness, belonging to the medium and upper thirds of the distribution of the index respectively. The cross tabulations based on the three indices and the three trading areas are available upon request.

of ownership and size to establish the importance of ownership for the job generation process. In addition, the relationship between the relative openness of a sector in which a firm operates and the firm's employment growth and job reallocation can be investigated, holding factors like size and ownership type constant.

First, an employment growth equation for the years 1999 and 2000 of the following form is estimated:

$$g_{it} = \beta_0 + \beta_1 ln(size)_{it} + \beta_2 newprivate_i + \beta_3 privatized_i + \beta_4 \sum_j I(ij) open(x)_j + \sum_j \delta_{ij} inddum_j + \sum_t \gamma_i \lambda_t + \varepsilon_{it} \quad (1)$$

size is measured by average contemporaneous size, in order to avoid the regression-to-the-mean fallacy. The variable *open* is the relative openness index averaged over the years 1996–98, with the argument x equal to total, import or export. The variables *newprivate* and *privatized* are ownership dummies, while *inddum* is an industry dummy and λ_t is a year dummy. The indicator variable $\boldsymbol{I}(ij)$ takes the value one when firm i is in industry j. The error term is heteroscedastic and includes unobserved factors, which are assumed to be similar for each firm across the years, i.e., the ε_{it}'s are assumed clustered for each i. However, since ownership changes in the sampled firms occurred no later than 1996 and since we have taken the average of the openness index over the years 1996–98, the ownership dummies and the openness index are by construction not correlated with the error term. We also follow the firm growth literature in assuming that average size is weakly exogeneous. Consequently, as long as this latter assumption holds and as long as we correct for the heteroscedastic and clustered nature of the error term, equation (1) is consistently estimated with OLS.

In the case where the openness index is based on exports we extend equation (1) by additionally interacting the index with a dummy variable when firm i had positive levels of exports in the years 1996–98. This allows us to test the hypothesis that firms in an export intensive sector that export have different employment adjustment from firms that do not. We also experimented with more complex specifications, allowing for interactions of size with ownership types and relative openness. These interactive terms were, however, jointly insignificant.[19]

A second estimation concerns the determination of firm-level job reallocation. We employ the same right-hand-side variables as in equation (1), but replace the dependent variable by the modulus of the growth rate.

Finally, in order to establish whether a sector's relative openness affects its job flows we estimate models of the following form, pooling data over 1999 and 2000:

$$Job\_Flow_j = \alpha_0 + \alpha_1 median\_size_j + \alpha_2 new\_private\_share_j + \alpha_3 privatized\_share_j + \alpha_4 open(x)_j + \sum_t \gamma_\tau \lambda_t + \varepsilon_{jt} \quad (2)$$

[19] These regressions are available upon request.

where $Job\_Flow_j = \{pos_j, neg_j, net_j, gross_j, excess_j\}$, $median\_size_j$ is the median size of firms in sector j, $new\_private\_share_j$ is the share of new private firms in sector j, $privatized\_share_j$ is the share of privatized firms in sector j and $openness(x)_j$ and λ_t denote the same as in equation (1). The error term is heteroscedastic and clustered across years. Again, we assume the right-hand-side variables to be strictly or weakly exogeneous, rendering OLS estimation of the various models based on equation (2) consistent.

Turning to the evidence, the negative relationship between firm size and gross flows of jobs is confirmed for firm-level employment flows in the case of non-weighted regressions with respect to the entire sample and non-manufacturing as columns 1 and 3 in Table 9a show. When we weigh these regressions by employment, this negative effect is attenuated (columns 2 and 4) implying that some large firms contribute disproportionately to employment growth. The influence of these larger firms can also be seen with respect to manufacturing where an insignificant correlation of size and growth turns into a small positive size effect when employment weights are added to the regression (*cf.* columns 5 and 6). Since the correlation of size and growth is different for manufacturing and non-manufacturing, firm size alone is an important factor that can explain differences in turbulence or gross flows of jobs between the two sectors.

Controlling for size, new private firms have much higher growth rates than firms in the other two ownership classes, state-owned and privatized firms. While survival bias might play a role here, work on firm-level growth equations done for market economies and emerging economies has established that much of potential selection bias is eliminated by including size of the firm in the regression (e.g., Evans, 1987; Konings and Xavier, 2001). While new private firms have higher average growth rates in the manufacturing sector than in the non-manufacturing sector, it is also noteworthy that privatized firms have the same employment growth as have state-owned firms. Such a finding was established by Konings, Lehmann and Schaffer (1996) for Polish manufacturing and by Richter and Schaffer (1996) for Russian manufacturing at the start of transition. In contrast, Brown and Earle (2002a) find a small positive effect of privatization on employment growth in the Russian manufacturing sector. Our result would suggest that in Ukraine privatization has so far had little effect on the employment behaviour of firms.

Tables 9b and 9c investigate the impact of relative openness of a sector in manufacturing on firm-level employment growth.[20] The results of Table 9b use relative openness indices calculated on the basis of total trade flows and imports. They show a strong positive effect of the relative openness of a sector in which a firm operates, on its employment growth. If we understand a higher relative openness index based on imports as increased import competition, then our results state that firms, which have been operating in sectors with more import competition,

[20] Since the differences between non-weighted and weighted regressions are miniscule, we only report the non-weighted regressions here.

Table 9a. Estimates of firm-level net employment growth rate (Pooled OLS estimates)

Regressor	Total sample	Total sample, employment weights	Non-manufacturing	Non-manufacturing, employment weights	Manufacturing	Manufacturing, employment weights
ln(size)	−0.013**	−0.007	−0.045***	−0.033**	0.009	0.011*
	(0.006)	(0.006)	(0.013)	(0.013)	(0.006)	(0.006)
New private	0.141***	0.145***	0.092**	0.097**	0.212***	0.210***
	(0.032)	(0.032)	(0.039)	(0.039)	(0.055)	(0.056)
Privatized	−0.009	−0.006	−0.014	−0.009	−0.010	−0.009
	(0.012)	(0.011)	(0.020)	(0.020)	(0.012)	(0.012)
R^2	0.050	0.045	0.054	0.047	0.057	0.055
N	4460	4460	1954	1954	2506	2506

Note: Heteroskedastic robust standard errors in brackets; *** (**/*) denotes statistically significant at the 1% (5%/10%) significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

Table 9b. Estimates of firm-level net employment growth rate in manufacturing (Pooled OLS estimates)

Regressor	Trade-all	Import-all	Trade-CIS	Import-CIS	Trade-EU	Import-EU
ln(size)	0.009	0.009	0.009	0.009	0.009	0.009
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
New private	0.212***	0.212***	0.212***	0.212***	0.212***	0.212***
	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)
Privatized	−0.010	−0.010	−0.010	−0.010	−0.010	−0.010
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Relative	0.050***	0.033***	0.037***	0.014***	0.056***	0.023***
Openness	(0.017)	(0.005)	(0.013)	(0.005)	(0.009)	(0.004)
R^2	0.057	0.057	0.057	0.057	0.057	0.057
N	2,506	2,506	2,506	2,506	2,506	2,506

Note: Heteroskedastic Robust standard errors in brackets; *** denotes statistically significant at the 1% significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

exhibit more employment growth. Table 9c gives estimates that use relative openness indices based on exports. Several important points emerge from these results. First, we observe a positive impact of relative openness on employment growth for world exports and exports to the EU area, while exports to the CIS do not seem to affect firm-level employment growth. Secondly, only those firms that actually export to the world and the EU experience higher employment growth when they are located in a relatively export intensive sector: the coefficient on the relative openness index turns insignificant when we add an interactive term, which links relative openness with the incidence of firm-level exports. Finally, this interactive term reduces the effect of the new private dummy, implying that part of the good growth performance of new private firms can be attributed to their operation in export markets.

The quintessence of this evidence seems to be that competitive pressure, whether brought on by import competition or competition in export markets leads to better firm performance in product markets and enhanced efficiency resulting in larger employment growth. The results also suggest that firms operating in export markets of the CIS might not be exposed to the same competitive pressures as firms operating in export markets in the world at large and in the EU.

The firm-level job reallocation regressions in Table 10a show that smaller firms engage in more job reallocation, as do new private firms in the manufacturing sector. Table 10b, on the other hand, establishes that import competition originating from the world at large and from EU countries lowers job reallocation

Table 9c. Estimates of firm-level net employment growth rate in manufacturing (Pooled OLS estimates)

Regressor	Export-all	Export-all	Export-CIS	Export-CIS	Export-EU	Export-EU
ln(size)	0.009	0.006	0.009	0.006	0.009	0.006
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
New private	0.212***	0.140**	0.212***	0.142**	0.212***	0.139**
	(0.055)	(0.068)	(0.055)	(0.068)	(0.055)	(0.068)
Privatized	−0.010	−0.019	−0.010	−0.019	−0.010	−0.020
	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)
Relative Openness	0.031***	0.007	0.024	0.023	0.009***	−0.003
	(0.010)	(0.010)	(0.016)	(0.022)	(0.003)	(0.002)
Relative openness index	–	0.012***	–	0.007	–	0.010***
*firm-level export dummy		(0.005)		(0.007)		(0.002)
R^2	0.057	0.044	0.057	0.043	0.057	0.046
N	2,506	2,012	2,506	2,012	2,506	2,012

Note: Heteroskedastic robust standard errors in brackets; *** (**) denotes statistically significant at the 1% (5%) significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

Table 10a. Estimates of firm-level employment reallocation rate (Pooled OLS estimates)

Regressor	Total sample	Total sample, employment weights	Non-manufacturing	Non-manufacturing, employment weights	Manufacturing	Manufacturing, employment weights
ln(size)	−0.025***	−0.021***	−0.026**	−0.020*	−0.023***	−0.022***
	(0.005)	(0.005)	(0.011)	(0.010)	(0.005)	(0.004)
New private	0.059**	0.066***	−0.005	−0.0002	0.178***	0.183***
	(0.023)	(0.025)	(0.029)	(0.029)	(0.043)	(0.043)
Privatized	−0.009	−0.007	−0.024	−0.022	0.010	0.0116
	(0.009)	(0.009)	(0.016)	(0.015)	(0.009)	(0.009)
R^2	0.058	0.055	0.044	0.037	0.065	0.066
N	4,460	4,460	1,954	1,954	2,506	2,506

Note: Heteroskedastic Robust standard errors in brackets; *** (**/*) denotes statistically significant at the 1% (5%/10%) significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

Table 10b. Estimates of firm-level employment reallocation rate in manufacturing (Pooled OLS estimates)

Regressor	Trade-all	Import-all	Trade-CIS	Import-CIS	Trade-EU	Import-EU
ln(size)	−0.024***	−0.024***	−0.024***	−0.024***	−0.024***	−0.024***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
New private	0.178***	0.178***	0.178***	0.178***	0.178***	0.178***
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)
Privatized	0.010	0.010	0.010	0.010	0.010	0.010
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Relative Openness	0.003	−0.010**	−0.016	−0.006	−0.016**	−0.007**
	(0.011)	(0.005)	(0.011)	(0.004)	(0.008)	(0.003)
R^2	0.065	0.065	0.065	0.065	0.065	0.065
N	2,506	2,506	2,506	2,506	2,506	2,506

Note: Heteroskedastic Robust standard errors in brackets; *** (**) denotes statistically significant at the 1% (5%) significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

Table 10c. Estimates of firm-level employment reallocation rate in manufacturing (Pooled OLS estimates)

Regressor	Export-all	Export-all	Export-CIS	Export-CIS	Export-EU	Export-EU
ln(size)	−0.024***	−0.023***	−0.024***	−0.026***	−0.024***	−0.023***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
New private	0.178***	0.102**	0.178***	0.121***	0.178***	0.103**
	(0.044)	(0.047)	(0.044)	(0.043)	(0.044)	(0.046)
Privatized	0.010	0.007	0.010	0.010	0.010	0.007
	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)
Relative Openness	0.002	−0.005	−0.017	−0.019	0.0005	0.001
	(0.006)	(0.009)	(0.014)	(0.022)	(0.002)	(0.002)
Relative openness index	–	−0.002	–	0.002	–	−0.004***
*firm-level export dummy		(0.004)		(0.006)		(0.001)
R^2	0.065	0.039	0.065	0.042	0.065	0.040
N	2,506	2,012	2,506	2,052	2,506	2,012

Note: Heteroskedastic Robust standard errors in brackets; *** (**) denotes statistically significant at the 1% (5%) significance level. All regressions include two-digit sector dummies and year dummies. Omitted ownership category: state-owned firms.
Source: Amadeus dataset.

of manufacturing firms. Competition in export markets in the EU also lowers firm level job reallocation as the last column of Table 10c highlights. The result that firms experiencing more competitive pressures engage in less job reallocation is somewhat unexpected. It could be that those firms in Ukraine, which for some time have been exposed to more competitive pressures, have their main job reallocation efforts already behind them in 1999 and 2000. But, since this explanation is not entirely satisfactory, we turn to sector-level regressions where we can directly investigate the impact of a sector's relative openness on its job flows.

Table 11, which displays coefficients on the openness index for the five sector-level job flow rates, reveals some interesting patterns. If we take the world and the EU as trading areas, export flows seem to be much more important in the determination of sector-level employment adjustment than import flows. Sectors, which are more export intensive, create more and destroy fewer jobs leading to increased employment growth. In contrast, sectors being exposed to strong import competition from the CIS destroy fewer jobs and also engage in less job reallocation than sectors with weaker import competition from this trading area. The significant positive impact on the excess job reallocation rate in column 8 tells us that sectors with relatively strong export links to the EU genuinely reallocate more jobs than sectors lacking these links. On the other hand, sectors experiencing strong import competition from the EU exhibit lower genuine job reallocation, as the negative entry for the excess job reallocation rate in column 9 shows. So, more product market competition in EU export markets seems to increase job turbulence at the sector level, while increased import competition from EU products seems to decrease it. It is noteworthy, finally, that stronger links with the world and CIS trading areas have no impact on the excess job reallocation rate.

6. Conclusions

This paper documents and analyses gross job flows and their determinants in Ukraine, using a dataset of more than 2,200 Ukrainian firms operating in manufacturing and non-manufacturing in the years 1998–2000.

There are several important findings in the paper. First, job destruction is dominating job creation in both 1999 and 2000, with destruction rates of 11 percent in 1999 and of 8 percent in 2000, while the creation rates are 3 and 6 percent, respectively. This result in conjunction with the arguments put forth by Aslund (2002) leads us to believe that the Ukrainian economy is still at an early phase of transition. A very clear-cut result is the strong positive effect of new private firms on net employment growth, a finding established for other transition economies as well. At the same time, we do not find differences in the employment growth of state-owned and privatized firms. We also observe an inverse relationship between size of a firm and net employment growth at the firm level in non-manufacturing.

Table 11. Impact of relative openness on job flows at the two-digit sector level

Measure	Trade-all	Export-all	Import-all	Trade-CIS	Export-CIS	Import-CIS	Trade-EU	Export-EU	Import-EU
Pos	0.014**	0.011**	0.003	0.006	0.008	0.001	0.012***	0.004***	0.001
	(0.006)	(0.005)	(0.003)	(0.004)	(0.007)	(0.001)	(0.002)	(0.0003)	(0.004)
Neg	−0.014***	−0.010***	−0.004	−0.013**	−0.011	−0.004*	−0.007***	−0.003**	−0.0003
	(0.003)	(0.003)	(0.003)	(0.006)	(0.009)	(0.002)	(0.002)	(0.001)	(0.005)
Net	0.027***	0.021***	0.006	0.019**	0.020	0.005	0.018***	0.007***	0.001
	(0.007)	(0.005)	(0.004)	(0.008)	(0.014)	(0.004)	(0.003)	(0.001)	(0.008)
Gross	0.00003	0.001	−0.001	−0.007	−0.003	−0.003**	0.005*	0.002*	0.0004
	(0.007)	(0.007)	(0.003)	(0.006)	(0.008)	(0.002)	(0.003)	(0.001)	(0.004)
Excess	0.0007	0.005	−0.004	−0.002	−0.006	0.0006	0.004*	0.003***	−0.007*
	(0.006)	(0.003)	(0.003)	(0.005)	(0.005)	(0.001)	(0.002)	(0.0004)	(0.004)

Note: Heteroskedastic robust standard errors in brackets; *** (**/*) denotes statistically significant at the 1% (5%/10%) significance level. Coefficients come from OLS estimates of the various models based on equation (2).
Source: Amadeus dataset.

An inverse correlation between size and the firm-level reallocation rate is, however, present in both manufacturing and non-manufacturing.

In manufacturing, the relative openness of a sector in which a firm operates is an important factor of firm-level employment adjustment, whether we look at total trade flows, import flows or export flows. Firms exposed to more import competition have superior employment growth, whether this competition arises from imports from the world at large, from the CIS or from the EU. In contrast, only firms that export to the world at large and the EU and are located in more export intensive sectors have faster employment growth. We also find that job reallocation is lower for firms that are experiencing either strong import competition or competitive pressures in export markets. This result only holds for firms engaged in world and EU trade. It might be attributed to the fact that firms that have operated in a more competitive environment for some time require less reshuffling of jobs in the reported period than those firms with less competitive pressures in the past.

The final set of results deals with the impact of the relative openness of a sector on its gross job flows. These results are also divided along geographic lines. For world and EU trade export intensive sectors create more jobs and destroy fewer, while sectors that strongly compete with imports from the CIS destroy fewer jobs, but have no increased job creation. Sectors with strong export links to the EU also show higher excess job reallocation rates, i.e., exhibit increased genuine job reallocation, while sectors confronted with strong competition from EU imports actually show lower genuine job turnover.

While trade flows are clearly important in explaining employment adjustment of Ukrainian manufacturing firms and sectors, the presented results are of an exploratory nature given the limited data at hand. More work with time series data is required to understand these results better. Future work needs to understand in particular why strong trade links with the world at large and especially with the EU impose discipline on firms and sectors, which seems substantially weaker when it comes to trade flows with the CIS.

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Appendix 1

Table A1. Percentage change in trade flows in manufacturing in 1994–98 and 1994–2001

	Total Trade Flows			Imports			Exports		
	All	CIS	EU	All	CIS	EU	All	CIS	EU
1994–98	45.5	–7.9	169.8	80.8	7.7	207.5	24.7	–17.0	124.4
1994–2001	66.7	–19.9	292.5	72.2	–26.4	251.2	63.5	–16.1	342.3

Source: Ukrainian State Customs Committee. Only sectors used in the manufacturing sample of the Amadeus dataset are included.

Table A2. Share of trade flows in manufacturing to CIS and EU countries

Year	Total trade flows		Imports		Exports	
	EU/All	CIS/All	EU/All	CIS/All	EU/All	CIS/All
1994	12.2	55.0	18.0	55.0	8.8	54.9
1995	16.8	51.8	24.4	49.1	12.3	53.4
1996	20.6	40.1	27.4	33.3	16.1	44.7
1997	22.5	32.9	41.6	16.1	11.3	42.9
1998	22.6	34.8	30.6	32.8	15.8	36.6
1999	22.4	32.2	29.6	34.0	17.2	30.9
2000	21.9	35.5	31.6	39.4	15.6	33.1
2001	28.7	26.4	36.7	23.5	23.8	28.2

Source: Ukrainian State Customs Committee. Only sectors used in the manufacturing sample of the Amadeus dataset are included.

Table A3. Summary statistics of relative openness indices

Index	Min	Max	Median	Mean	Std. Dev.
Trade-all	0	6.23	0.74	1.67	1.91
Import-all	0	10.77	0.84	1.99	2.87
Export-all	0	9.93	0.57	1.45	2.30
Trade-CIS	0	5.74	0.56	1.38	1.58
Import-CIS	0	15.31	0.64	1.75	3.14
Export-CIS	0	4.55	0.55	1.21	1.36
Trade-EU	0	13.48	0.98	1.99	2.73
Import-EU	0	7.18	0.99	1.76	2.00
Export-EU	0	34.88	0.32	2.42	6.80

Source: Own calculations.

Table A4. Spearman rank correlation coefficient

Correlation between	All countries	CIS	EU
Total Trade Index-Export Index	0.8373	0.9330	0.5792
	(0.0000)	(0.0000)	(0.0019)
Total Trade Index-Import Index	0.8024	0.8701	0.7757
	(0.0000)	(0.0000)	(0.0000)
Export Index-Import Index	0.4605	0.7074	0.1628
	(0.0179)	(0.0001)	(0.4269)

Note: p-values in brackets.

Appendix 2

Definitions of variables used in regressions

Employment is the average number of employees over the year.

Size is the average of the firm's employment in two successive years (e.g., $size_{99} = (emp_{99} + emp_{98})/2$).

Manufacturing is a dummy variable equal to one if the enterprise's main economic activity according to the two-digit NACE-Rev.1 classification falls into the interval [10, 41].

State is a dummy variable equal to one if the enterprise has state or municipal ownership or if the enterprise has been partly privatized before 1999 and more than 50 percent of shares belong to the state. Information about the type of ownership

comes from the database of the Ukrainian State Property Fund accompanied with information about the registered legal form and name of the enterprise, and the date of its incorporation.

Privatized is a dummy variable equal to one if the enterprise has been privatized before 1999 and less than 50 percent of shares belong to the state.

New Private is a dummy variable equal to one if the enterprise is 100 percent privately owned and newly established, i.e., it has never been a state enterprise.

Relative openness index of a sector based on total trade is the relative share of imports and exports of the two-digit NACE sector j in year t (1996–98), weighted by its employment share in 1996:

$$Open_{j,t} = [(Import_{j,t} + Export_{j,t})/(Import_{tot,t} + Export_{tot,t})]/(employment_{j,96}/employment_{tot,96}).$$

Import and export volumes by countries of origin and destination (in thousands US dollars) come from the Ukrainian State Customs Committee data based on the six-digit Harmonized Commodity Description and Coding System (HS). The employment share of the sector in 1996 was calculated using the Derzhkomstat dataset.

Relative openness index of a sector based on exports is the relative share of exports of the two-digit NACE sector j in year t (1996–98), weighted by its employment share in 1996:

$$Open(export)_{j,t} = (Export_{j,t}/Export_{tot,t})/(employment_{j,96}/employment_{tot,96}).$$

Firm-level export dummy is a dummy variable equal to one if the firm's average export in 1996–98 is larger than 0. Firm-level export volumes come from the Derzhkomstat dataset.

Relative openness index of a sector based on imports is the relative share of imports of the two-digit NACE sector j in year t (1996–98), weighted by its employment share in 1996:

$$Open(import)_{j,t} = (Import_{j,t}/Import_{tot,t})/(employment_{j,96}/employment_{tot,96}).$$

These indices are averaged over the years 1996–98 and calculated for the three geographic areas world, CIS and EU, leading to the nine indices shown in Table A3.