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GROSS JOB FLOWS IN UKRAINIAN INDUSTRY

This paper documents and analyses gross job flows in manufacturing sector in Ukraine using annual census data from 1993 to 2001. Annual job destruction dominated job creation during 1993-2000 implying persistent net employment losses every year, while a sharp jump in job creation rate from 2000 to 2001 has led to net employment gain in 2001. We find also that small firms are more dynamic than large firms, that private firms have a higher net employment growth rate, and that the behavior of firms is quite heterogeneous across industrial sectors and regions.

Introduction

Transition towards a market economy by its nature involves substantial restructuring in economy and a significant degree of labor reallocation across jobs, sectors, industries and geographical location. However, macro-economic evidence indicates that despite the initial phenomenon of hyperinflation and a halving of industrial production, the performance of the Ukrainian labor market during a decade of transition diverges from those of many other transition economies: decline of employment was modest comparatively to precipitous falls of GDP and real wages, mass unemployment was slow to emerge, and labor turnover appeared to be considerably lower than in other transition countries. One of the demand-side explanation of such divergence can be "price adjustment" of the Ukrainian labor market [1]: many large state enterprises in Ukraine as well as in Russia reacted to the imposition of hard budget constraints and the removal of state subsidies that accompanied the start of radical reforms by reducing working hours and using compulsory unpaid leaves, not indexing salaries to inflation and allowing wage arrears to build [1, 2]. Analysis of the extent to which firms actually adjust employment in response to changes in their environment is, therefore, essential to get a fuller picture of labor market adjustment in Ukraine.

In this paper we use a large enterprise level data set to look at firm-level gross job flows in Ukrainian manufacturing between 1993 and 2001. We expect to gain some insight into the nature of firm adjustment in the Ukrainian economy during the period of transition by studying various aspects of gross job flows, such as size, ownership, sector specific and region specific effects. Job creation and job destruction in Ukraine have been recently analyzed by Konings and Walsh [3, 4] and Konings et al. [5]. However, the data that they used consisted of a small and non-representative sample

and over a shorter period of time. The authors find that job destruction dominates job creation during the whole period under observation, that new private firms have a strong positive effect on net employment growth, that job reallocation and employment growth is inversely related with firm size, and that both job reallocation and employment growth are affected by strong exposure to international trade. Brown and Earle [6] use richer and longer census-type data set of industrial firms but their main focus is concentrated on the comparison of gross job flows in Russia and Ukraine and the impact of the reforms undertaken in both countries on firm-level restructuring and labor reallocation. They find that liberalizing reforms in these countries have brought substantial increases in job reallocation and in the productivity enhancing consequences of the reallocation process, and that these effects manifested themselves more rapidly in faster reforming Russia than in Ukraine.

With our data we are able to extend the existing analysis of gross job flows, of persistence and heterogeneity of firm-level employment changes, and variation of job flows with employer characteristics such as size, type of ownership, region, and sector. Thus we expect to contribute to the ongoing debate about the effects of demand factors on gross labor reallocation in transition countries.

Definitions and data

The job flow concepts in this paper follow the definitions of Davis and Haltiwanger [7-9]:

Gross job creation in sector s at time t equals the sum of all employment gains in firms in sector s that expand or start up between t and $t - 1$:

$$POS_{st} = \sum_{e \in S^+} (emp_{est} - emp_{es(t-1)}),$$

where emp_{est} denote the number of employees in firm e in sector s at time t , and S^+ stands for the set of all expanding firms in the relevant sector.

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Likewise, *gross job destruction* in sector s at time t equals the sum of all employment losses in firms in sector s that contract or shut down between t and $t-1$:

$$NEG_{st} = \sum_{e \in S^-} |emp_{est} - emp_{es(t-1)}|,$$

where S^- stands for the set of all contracting firms in the corresponding sector.

The sum of these two measures yields a measure for *gross job reallocation* (GROSS) and their difference gives us the *net sectoral employment growth* (NET):

$$GROSS_{st} = POS_{st} + NEG_{st}, \quad NET_{st} = POS_{st} - NEG_{st}.$$

In order to capture the amount of 'churning' by firms, i. e. job reallocation in excess of the amount required to accommodate net employment change, a measure of *excess job reallocation*, equal to the difference between the gross job reallocation and the absolute value of the net employment growth, is widely used:

$$EXCESS_{st} = GROSS_{st} - |NET_{st}|.$$

Given a particular classification of sectors indexed by s , excess job reallocation can be decomposed into *between* and *within-sector components*:

$$GROSS_{st} - |NET_{st}| = \left(\sum_s |NET_{st}| - |NET_t| \right) + \sum_s (GROSS_{st} - |NET_{st}|).$$

The first term on the right-hand side represents the contribution of excess job reallocation among sectors, and the second component captures excess job reallocation within sectors.

To express the job flow measures as rates, we divide all the above measures by a measure of size and use lower-case letters for presenting rates, for instance, sectoral *job creation rate* can be written as

$$pos_{st} = \frac{POS_{st}}{SIZE_{st}},$$

where $SIZE_{st} = \sum_{e \in S} (emp_{est} + emp_{es(t-1)})/2$ (total employment of all firms in a sector averaged over the two periods) is the size of sector s at time t .

The *one-year persistence of job creation* is the fraction of newly created jobs at year t that remain filled at the sampling date one year later. The *one-year persistence rate of job destruction* is the fraction of newly destroyed jobs at year t that do not reappear at the sampling date one year later [9]. These persistence rates document whether the observed job creation or job destruction represent short-term employment changes or more persistent long-term ones, an issue of particular relevance in the transition context.

To analyze the gross job flows in Ukrainian manufacturing before and after the year 2000, when Ukraine registered a sudden and substantial economic growth, we use a rich firm-level census-type panel dataset from the Derzhkomstat registry of enterprises and organizations covering practically all manufacturing establishments inherited from the socialist period. It should be noted that our data consists of establishments as well as firms and that small new private firms are underrepresented in our sample due the methodology implied by the Derzhkomstat for collection and distribution of statistical information.

Basic patterns of job flows in Ukrainian manufacturing

Table 1 presents the gross job flow measures for the overall sample of industrial enterprises during the period 1993-2001. The results for net employment change (*net*) for the sample show a pattern of employment decline in manufacturing which is consistent with the evolution of the industrial output, but is a bit steeper compared to the official figures reported by the Derzhkomstat: the very deep decline in industrial output in the early phase of transition was accompanied with substantial downsizing of enterprises (with net employment growth being negative every year from 1993 to 2000 with its peak of about 10 % in 1994), and only the recovery in the Ukrainian industry in 2000-2001 brought positive net employment change of about 2.4 % due to a *sharp* jump in job creation. The job creation rate in Ukrainian manufacturing has increased from a very low level of 0.93 % in 1994 to a level of 10.6 % in 2001, which is comparable to the typical range of creation rates found in the U.S. and other advanced countries [9]. The destruction rate remains quite high throughout the transition period reaching on average 10.62 % during the years of early reforms (1993-1997) and decreasing to 8.69 % during the period of late reforms (1997-2001). It should be noted, however, that while job destruction rates were large during the nineties in Ukraine, they were no higher than in the US manufacturing during recession (e.g. 15.6% in 1983 [9]). This finding suggests that despite the enormous structural changes in the manufacturing sector and the whole economy job destruction rate in Ukraine occurred at a smaller scale than in the country with more modest structural transformations during recessions, implying that there is still significant difference in the labor market performance between Ukraine and more developed market economies. Additionally, the one-year persistence rates of annual job creation and job destruction in Table 2 show that job flows in Ukraine are not

temporary phenomena. About 70 % of jobs created remain filled one year later, and more than 90 % of all jobs destroyed do not reappear in future year. Both these rates are close to those presented by Davis and Haltiwanger for the US [9], although destruction persistence is even higher by roughly 10 percentage points.

With respect to job reallocation in the manufacturing sector, the annual gross job reallocation rate (*gross*) fluctuates around 12 % with its sudden peak of 18.8 % in 2001 following the destruction and creation trends, while the annual excess job reallocation rate gradually increases from 1.87 % in 1994 to 16.41 % in 2001. This indicates that firm heterogeneity in employment behavior, as measured by the excess job reallocation rate, has increased substantially in response to the economic reforms, and that performance of the Ukrainian labor market becomes much better in terms of job reallocation despite its laggard aggregate evolution in employment in the early phase of transition¹. Another way to examine the heterogeneity between firms is to decompose the excess job reallocation into between- and within-sector components. Table 3 shows the results of our decomposition exercise for 5-digit industries defined according to the general classification of branches of the national economy (ZKNG). Like in other developed and transition countries, employment shifts within sectors account for the vast majority of job reallocation. In some years, however, and as a result, on the average for the early and late reform periods between sector job shifts reach 25% of all job shifts, which is a very large fraction in international perspective and comparable only with that in Estonia [10]. This suggests that employment shifts among firms in the different industries may be an important component of labor market restructuring in Ukraine, although the within-industry flows still dominate.

Cross-tabulated evidence on firm size and job flows in Ukraine (Table 4) indicates that firm size is negatively associated with job creation and excess job reallocation during the whole period, while the relationship between size and job destruction or gross job reallocation is ambiguous in the early reform period but very strong and negative during the late reform period. Our results are consistent with the empirical evidence in transition and developed market economies [9, 10], suggesting that small and young enterprises are the most dynamic entities in terms of job reallocation.

With implementation of reforms starting the period of transition to a market economy after an era of regional clustering of industries pursued under central planning, it is obvious to expect that some

regions can be hit more than others in transition. Table 5 displays job flow rates cross-tabulated by four geographic regions in Ukraine. According to this table, every region experiences net job loss over the sample period, the western and southern regions exhibit noticeably higher gross job reallocation rates primarily due to high job destruction, while central oblasts of Ukraine seem to be more dynamic as far as excess job reallocation is concerned. In addition, the pattern of job flow regional dispersion has changed in Ukraine during the sample period: less industrialized southern and western regions lagging behind in terms of job creation and excess job reallocation in the early period of transition became even more dynamic than central or eastern oblasts during the late nineties.

In order to say something about restructuring within industries we need to look at job flow measures for various industries (Table 6). This table shows the tremendous heterogeneity in manufacturing sector. While some sectors (namely, energy and electricity during the whole sample period, ferrous and non-ferrous metallurgy during 1997-2001) have on average positive net employment growth, most of the industrial sectors experience net employment loss. The sectors most affected by restructuring of the economy in terms of employment losses are machine-building, wood and paper industry, light and glass industries. Estimates of excess job reallocation ranges from 0.65 % for petrochemical industry to 5.7 % for non-ferrous metallurgy during 1994-1997 and from 4.2 % for ferrous metallurgy to 13.1% for food industry during 1997-2001, while most industries reallocate between 2 % and 10 % of all jobs over a year. The different degrees of job reallocation across sectors suggest that not only sectors are heterogeneous, but also firms within sectors exhibit significant heterogeneity.

Finally, Table 7 gives the gross job flow measures for 2000 and 2001 disaggregated by the type of ownership, defined according to the Derzhkomstat classification of ownership types. It can be seen that the private and foreign-owned sector albeit small in our sample are fundamentally the most dynamic, reflected in the high gross and excess job reallocation rates, a finding established for other transition economies as well [6, 10]. The job creation rate in the private sector is far higher than in the state, communal or collective enterprises, while its job destruction rate is significantly lower than in the enterprises of the other form of ownership. A good job creation performance of private enterprises implies that there is a genuine ownership type effect at employment and not just a size

¹ The same results were found by Konings et al. [5] and Brown and Earle [6] for the period up to 2000.

effect, while it is still important to disentangle effects of size and ownership on firm-level employment growth properly within a regression framework, which is a subject of our further research.

Conclusions

This paper documents the magnitudes and patterns of job flows in the Ukrainian industry (manufacturing sector) over the years 1993-2001 and compares job flow measures for the period of early reforms in 1993-1997 with those for the late reform period (1997-2001). There exists considerable firm heterogeneity in the Ukrainian manufacturing sector, reflected in simultaneous job creation and destruction. We find that unsurprisingly job destruction dominates job creation in the early stages of transition up to 2000. However, as transition progresses, job destruction decreases and job creation increases, implying an increase of net employment growth from about -10 % in 1994 to

2.4 % in 2001. This result leads us to believe that although Ukraine is considered to be a slower reformer and less developed transition country as opposed to Russia or Central European economies, the Ukrainian economy seems to have come out of a deep depression in 2000 and its better overall performance has been mirrored in significant and sustained improvement of the labor market performance. The association of job flows with firm characteristics such as size, region, industrial sector and ownership became much stronger during the second phase of transition (1997-2001). This suggests that the behavior of industrial enterprises in Ukraine became more consistent with regularities found for the mature market economies and more advanced transition economies. Finally, our results lead us to conclude that the long-run aggregate benefits of job reallocation process characterized by "Schumpeterian" creative destruction [9] seem to compensate for the short-term individual costs.

Table 1. Job Flow Rates in Ukrainian Manufacturing (%)

Year	Pos	Neg	Gross	Net	Excess	Number of firms
1993-94	0.93	10.85	11.78	-9.91	1.87	7768
1994-95	1.63	9.82	11.45	-8.18	3.27	8023
1995-96	1.85	10.48	12.33	-8.63	3.71	7900
1996-97	1.84	11.32	13.16	-9.48	3.68	8163
1997-98	2.23	9.10	11.32	-6.87	4.45	7671
1998-99	2.98	9.37	12.36	-6.39	5.97	9066
1999-2000	4.06	8.10	12.16	^0.05	8.11	8074
2000-2001	10.59	8.20	18.80	2.39	16.41	7275
1993-1997 average	1.56	10.62	12.18	-9.05	3.13	
1997-2001 average	4.97	8.69	13.66	-3.73	8.74	

Note: The numbers of firm-year observations are 31,854 during 1993-1997 and 32,086 during 1997-2001.

Table 2. Year-by-Year Job Flow Persistence Rates (%)

Period	1-year job creation persistence rate	1-year job destruction persistence rate
1994-1997 average	71.57	96.24
1997-2000 average	79.73	90.14

Table 3. Decomposition of Excess Job Reallocation (%)

Period	Within-sector shifts	Between-sector shifts
1994-1997 average	77.48	22.52
1997-2000 average	74.42	25.58

Note: The average number of categories (5-digit ZKNG sectors with number of firms of more than 10) is 140.

Table 4. Job Flow Rates by Employment Size (%)

Size	Period	Pos	Neg	Gross	Net	Excess
1-99	1993-1 997 average	2.75	10.94	13.70	-8.19	5.51
	1997-2001 average	7.21	16.74	23.94	-9.53	14.42
100-249	1993- 1997 average	1.93	11.11	13.04	-9.19	3.85
	1997-2001 average	6.14	12.57	18.71	-6.42	12.29
250-499	1993-1 997 average	1.60	10.81	12.40	-9.21	3.19
	1997-2001 average	5.67	11.64	17.31	-5.97	11.34
500-999	1993-1 997 average	1.48	11.73	13.21	-10.24	2.96
	1997-2001 average	4.59	10.80	15.39	-6.21	9.19
>1000	1993- 1997 average	1.47	10.23	11.70	-8.76	2.94
	1997-2001 average	4.45	5.99	10.44	-1.55	5.59

Note: Size of a firm is defined as the average of the firm's employment in two consecutive years. The numbers of firm-year observations are 31,854 during 1993-1997 and 32,086 during 1997-2001.

Table 5. Job Flow Rates by Geographic Region of Ukraine (%)

Region	Period	Pos	Neg	Gross	Net	Excess
Center	1993-1 997 average	1.67	10.83	12.51	-9.16	3.34
	1997-2001 average	4.70	9.26	13.96	-4.55	9.31
East	1993-1 997 average	1.66	9.43	11.09	-7.77	3.31
	1997-2001 average	4.99	6.76	11.76	-1.77	6.97
South	1993-1 997 average	1.33	12.62	13.95	-11.28	2.66
	1997-2001 average	6.23	10.01	16.24	-3.78	8.61
West	1993- 1997 average	1.21	11.26	12.47	-10.05	2.42
	1997-2001 average	4.45	13.08	17.53	-8.64	8.90

Note: Center consists of Vinnyts'ka, Zhytomyrs'ka, Kyivs'ka, Kirovohrads'ka, Poltav's'ka, Sums'ka, Cherkas'ka, Chernihiv's'ka oblasts and Kyiv City, East stands for Dnipropetrovs'ka, Donets'ka, Zaporiz'ka, Luhans'ka and Kharkiv's'ka oblasts, South consists of Avtonomna Respublika Krym and Sevastopol', Mykolayiv's'ka, Odes'ka and Kherson's'ka oblasts, and the rest oblasts (Chernivets'ka, Ivano-Frankiv's'ka, Khmel'nyts'ka, L'viv's'ka, Rivnens'ka, Ternopil's'ka, Volyn's'ka, Zakarpats'ka) belong to the Western region.

The numbers of firm-year observations are 30,472 during 1993-1997 and 32,067 during 1997-2001.

Table 6. Job Flow Rates by Industrial Sector (%)

Sector	Period	Pos	Neg	Gross	Net	Excess
Energy and electricity	1993- 1997 average	5.97	2.70	8.67	3.27	5.01
	1997-2001 average	9.16	4.71	13.87	4.45	8.40
Fuel industry	1993-1 997 average	2.35	9.39	11.74	-7.05	4.69
	1997-2001 average	4.65	5.83	10.49	-1.18	6.42
Ferrous metallurgy	1993-1 997 average	2.40	3.09	5.49	-0.69	2.85
	1997-2001 average	6.13	2.72	8.84	3.41	4.20
Non-ferrous metallurgy	1993-1 997 average	2.85	8.50	11.34	-5.65	5.69
	1997-2001 average	8.73	3.24	11.96	5.49	5.32
Chemical industry	1993-1 997 average	1.64	7.89	9.54	-6.25	3.29
	1997-2001 average	4.55	9.79	14.35	-5.24	8.20
Petrochemical industry	1993-1 997 average	0.33	9.23	9.55	-8.90	0.65
	1997-2001 average	3.95	12.37	16.32	-8.42	5.43
Machinery & equipment	1993- 1997 average	0.65	14.45	15.10	-13.81	1.29
	1997-2001 average	3.29	11.13	14.41	-7.84	6.57
Wood & paper industry	1993-1 997 average	1.12	13.38	14.49	-12.26	2.23
	1997-2001 average	4.96	15.37	20.33	-10.41	9.92

The continuation of the Table 6

Sector	Period	Pos	Neg	Gross	Net	Excess
Construction materials	1993-1997 average	1.13	11.52	12.65	-10.40	2.26
	1997-2001 average	3.19	10.34	13.53	-7.15	6.38
Glass and china industry	1993-1997 average	1.13	8.67	9.81	-7.54	2.26
	1997-2001 average	2.87	13.07	15.94	-10.19	5.75
Light industry	1993-1997 average	0.76	15.24	15.99	-14.48	1.51
	1997-2001 average	3.78	11.89	15.67	-8.11	7.56
Food industry *	1993-1997 average	2.15	6.60	8.75	-4.45	4.30
	1997-2001 average	8.54	9.38	17.92	-0.84	13.10
Medical industry **	1993-1997 average	1.20	11.83	13.04	-10.63	2.41
	1997-2001 average	4.68	11.10	15.78	-6.42	9.36
Other industries	1993-1997 average	2.32	10.18	12.50	-7.85	4.65
	1997-2001 average	5.67	9.06	14.73	-3.39	8.25

Note: Sector is defined according to the General Classification of Branches of Economy (ZKNG). The numbers of firm-year observations are 31,854 during 1993-1997 and 32,086 during 1997-2001.

* Includes manufacturing of grain mill products.

** Includes microbiological industry.

Table 7. Job Flow Rates by Type of Ownership (%)

Type of Ownership	Year	Pos	Neg	Gross	Net	Excess	Number of Firms
Private	2000	14.69	6.59	21.28	8.11	13.17	82
	2001	20.69	6.85	27.54	13.83	13.71	80
Collective	2000	4.49	8.80	13.29	-4.30	8.99	6471
	2001	10.37	9.35	19.72	1.01	18.71	5907
State	2000	3.01	6.81	9.82	-3.80	6.02	1256
	2001	10.90	5.05	15.95	5.85	10.10	1052
Communal	2000	3.64	4.19	7.82	-0.55	7.27	213
	2001	14.46	39.58	54.04	-25.11	28.93	189
Foreign	2000	8.59	10.95	19.54	-2.36	17.18	40
	2001	10.82	10.94	21.76	-0.12	21.63	36

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О. Купець

ПОТОКИ РОБОЧИХ МІСЦЬ В УКРАЇНСЬКІЙ ПРОМИСЛОВОСТІ

У статті аналізуються потоки робочих місць у промисловості України на основі щорічних даних реєстру промислових підприємств з 1993 по 2001 рр. Щорічний рівень ліквідації робочих місць домінував над рівнем їх створення протягом 1993-2001 рр., призводячи до стійких чистих втрат щодо зайнятості кожного року, але стрімке зростання рівня створення робочих місць з 2000 по 2001 р. призвело до чистого приросту зайнятості у 2001 р. Також показано, що відносно малі фірми є динамічнішими, ніж більші за обсягами зайнятості підприємства, що приватні фірми мають найвищі рівні чистого приросту зайнятості, що поведінка фірм є досить неоднорідною в розрізі галузей промисловості та регіонів.