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COMPARATIVE ADVANTAGES, JOB DESTRUCTION AND THE REGIONAL PATTERN OF POLISH UNEMPLOYMENT

A. NEWELL – F. PASTORE – M. SOCHA

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This paper investigates the relationship between industrial restructuring and regional unemployment in Poland. Poland's regional unemployment broke out of nothing at the beginning of the 1990s decade. Since then, it has remained remarkably unchanged over the decade for a variety of factors, such as the gradual restructuring process, labour supply rigidities and technological differences. The role of each of these factors is assessed within the framework of hazard functions applied to the inflow to unemployment from a job, computed using Polish Labour Force Survey data. When *voivodships* are grouped according to their unemployment rate it can be seen that low unemployment voivodships form a heterogeneous group, including both rural and urban areas. Applying a new method of analysis of the labour market effects of trade integration, the paper reveals circumstantial evidence on how Poland's international comparative advantages in labour-intensive manufacturing combine with the economic advantages of urbanised regions to play a significant role in shaping the regional distribution of Poland's unemployment.

Keywords: international trade, structural change, job destruction, regional unemployment, Poland

JEL classification index: F15, J63, R23, P20

INTRODUCTION

The standard explanation of Poland's unemployment is structural changes in labour demand caused by domestic economic reforms, foreign direct investments, and shifts in the pattern of international trade (Scarpetta and Wörgötter, 1995; Blanchard, 1997; OECD, 1998). To reconcile a fairly stable regional pattern of unemployment with this explanation, one needs to add arguments why regional unemployment might persist. Theorists have so far formulated three major lines of reasoning. Firstly, within the theoretical framework of the optimal speed of

Corresponding author: F. Pastore, University of Naples "Federico II", Department of Theoretical and Applied Economics, Via Mezzocannone 16, 80135 – Naples, Italy. E-mail: fpastore@unina.it

transition (OST) models, there are many reasons why restructuring and privatisation are gradual rather than all at once. The gradual nature of these processes may give rise to a steady flow of mismatched workers into unemployment (Blanchard, 1997; for a survey of the theoretical and applied literature on this issue, see Pastore, 2000). Secondly, the persistence of mismatched unemployment may be reinforced by labour immobility caused by, for instance, adjustment costs in labour supply or wage rigidity. In fact, shocks generating spatial unemployment may go unabsorbed because of the immobility of workers caused by high costs of relocation and insensitivity of wages to local labour market conditions. In the case of Poland, a chronic lack of housing in the potential destination areas also represents a relevant constraint to factor mobility (Boeri, 2001). Thirdly, a stable regional pattern of unemployment is consistent with an equilibrium interpretation with differences in tastes and technology across regions (see, for instance, Marston, 1985). A mixture of these theories creates a convincing "story" in which gradual restructuring and supply-side rigidities combine to create persistence in the regional pattern of unemployment.

The present paper argues that demand side influences explain most of the regional patterns of unemployment in Poland. Newell and Pastore (2000) investigate the relationship between industrial restructuring and regional unemployment. This paper looks at the way Poland's international comparative advantages in labour intensive manufacturing have combined with the economic advantages of urbanised regions to play a significant role in determining the regional distribution of unemployment in the mid-1990s and, most likely also in recent years.

The following sections overview the relationships between regional economic structure, unemployment and labour market flows, and report the results of estimating a hazard model for job loss. Although our estimates show a number of interesting effects, the main point of this paper is presenting how location and labour intensity in manufacturing may combine to make particularly safe jobs.

REGIONAL UNEMPLOYMENT AND ECONOMIC STRUCTURE

The most dramatic effects of the Polish transition were felt at the beginning of the process. From 1990 to 1992, GDP decreased by almost 20%. Hyperinflation exploded in 1989 and persisted for some years as a consequence of the failure of the pre-transition reform plan. Registered unemployment rose from zero in 1989 to 14% of the labour force in 1992. A few years later, the growth of the country's monetary indicators started to slow, as predicted by the advocates of "shock therapy" (Balcerowicz, 1994). Inflation subsided to an annual rate of about 20% in 1993 and has been falling since. Despite impressive GDP growth in the mid-

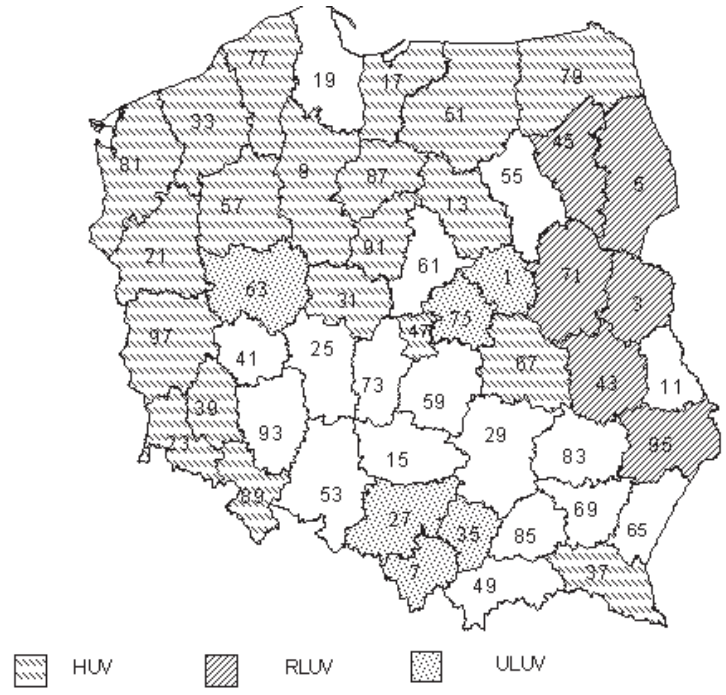
1990s, the period considered here, unemployment persisted at very high levels. It has started to increase again from the late 1990s.

Since 1990, unemployment has tended to be persistently concentrated in certain areas of the country. Newell and Pastore (2000) provided evidence for this when they found a correlation coefficient of 0.73 between regional unemployment in 1992 and in 1997. Such a strong regional dimension of transitional unemployment in Poland has not been left unobserved. Scarpetta and Wörgötter (1995) assume that transition had its hardest effects in the regions where the former socialist planning had concentrated most of the socialist interventions, especially in the manufacturing sector. In order to study this hypothesis, three papers have produced sophisticated classifications of voivodships by economic structure: Scarpetta and Huber (1995), Góra and Lehmann (1995) and Lehmann and Walsh (1998). None of these classifications fit with the regional pattern of unemployment, as the authors themselves recognise. Newell and Pastore (2000) found that the classifications correlate fairly strongly with each other, but none correlate significantly with voivodship unemployment rates.

This finding is not in conflict with the fact that in local areas retrenchment by a dominant employer contributes heavily to local unemployment. In their study of unemployment outflows in the regions of Warsaw and Ciechanów, Cazes and Scarpetta (1998) analyse what influence economic restructuring has on unemployment. At a more aggregated level, these effects seem to be harder to find. The aim of this paper is to seek national generalisations about the relationship between who enter unemployment and the pattern of economic restructuring.

In order to simplify our work, we follow our previous practice (Newell and Pastore, 2000) of grouping regions according to unemployment levels. Specifically, we use the average unemployment rate over the period from 1994 to 1997, calculated using the Polish Labour Force Survey. The 49 Polish voivodships are thus divided into three groups of 12 low-, 17 medium- and 20 high-unemployment regions, in such a way that each group represents about one-third of the sample.

Appendix Table 1 compares the characteristics of the two groups of low- and high-unemployment voivodships. The differences are relatively small. More importantly, they do not point to the expected inverse correlation between unemployment and the level of development. Low-unemployment voivodships have a lower share not only of manufacturing, but also of public services. Moreover, they have a higher share of mining, a sector where the role of the state is important. In fact, employment in the state sector is also higher in low-unemployment voivodships. Looking at the skill level of workforce in the two areas, we notice a higher share of low-skilled individuals and semi-skilled manuals in high-unemployment voivodships, which points to the lower quality of jobs in these areas.



The pattern of spatial unemployment

N.	County	N.	County	N.	County
1	Warszawskie	35	Krakowskie	67	Radomskie
3	Bialskopodlaskie	37	Krosnienskie	69	Rzeszowskie
5	Białostockie	39	Legnickie	71	Siedleckie
7	Bielskie	41	Leszczyńskie	73	Sieradskie
9	Bydgoskie	43	Lubelskie	75	Skiernewickie
11	Chelmskie	45	Lomzynskie	77	Slupskie
13	Ciechanowskie	47	Lódzskie	79	Suwalskie
15	Częstochowskie	49	Nowosadeckie	81	Szczecińskie
17	Elbląskie	51	Olsztynskie	83	Tarnobrzeskie
19	Gdańskie	53	Opolskie	85	Tarnowskie
21	Gorzowskie	55	Ostroleckie	87	Toruńskie
23	Jelenogorskie	57	Pilskie	89	Wałbrzyskie
25	Kaliskie	59	Piotrkówskie	91	Wloclawskie
27	Katowickie	61	Plockie	93	Wrocławskie
29	Kieleckie	63	Poznańskie	95	Zamojskie
31	Koninskie	65	Przemiskie	97	Zielonogorskie
33	Koszalinskie				

Note: Until 1998, Poland was divided into 49 counties, or voivodships (*wojewodstwa*). The name corresponding to the voivodship code is given above.
Source: own elaboration by the *PLFS* (Polish Labour Force Survey).

Another difference is the relatively larger size of big firms in low-unemployment voivodships, which could be related to higher job security in those areas.

The *Figure* above shows the regions according to the classification. It can be observed from the figure that high-unemployment regions are scattered all over the country, from the South to the North, from the East to the West. Unlike in Italy, for instance, in Poland there is no simple geographical division between high- and low-unemployment regions. The lowest unemployment regions include some of the most densely populated, urban and industrial regions of the country (Warszawskie, Poznańskie, Katowickie, Krakowskie, Skiernewickie, Bielskie). Other low-unemployment voivodships are among the most backward areas of the country. These are rural areas on the Eastern border with the CIS (Lomzynskie, Bialstockie, Siedleckie, Bialskopodlaskie, Lubelskie, Zamojskie). The high-unemployment voivodships are similarly diverse.

Newell and Pastore (2000) analyse annual labour-market flows between employment, unemployment and non-participation, based on LFS data. In particular, the evidence they provide supports the view that it is the job separation rate, rather than the job finding rate that explains high unemployment. They found strong difference in the rates of flow from employment to unemployment between the high- and low-unemployment voivodships.

In *Tables 1* and *2* we report changes in labour market status between November 1995 and November 1996. The cells contain percentages of the 1995 stocks, so they sum to 100 in each row. The key difference between the high- and low-unemployment voivodships is in the rates of flow from employment to unemployment, rather than out of unemployment. Of those employed in the low-unemployment regions in November 1995, 6% were not working a year later, while in the high-unemployment regions the corresponding percentage was 9.1%, 1.5

Table 1

Labour-market transitions in low-unemployment regions of Poland including state and private employment (November 1995 – November 1996, %)

	Employed in the state sector	Employed in the private sector	Unemployed	Non-participating
Employed (state sector)	88.9	5.9	1.9	3.2
Employed (private sector)	3.5	89.8	2.9	3.8
Unemployed	9.6	26.7	46.6	17.1
Non-participating	1.1	3.9	2.1	93.0

Note: The state sector includes state firms and local authorities. The private sector includes private firms, cooperatives and independent workers.
Source: Own calculation from *PLFS*.

times higher. This seems to be an unambiguous indicator of greater turbulence and job destruction in the high-unemployment regions.

In the low-unemployment counties 46.6% of those unemployed in November 1995 were also unemployed a year later. For the high-unemployment counties the corresponding datum is somewhat higher: 54.5%. This means that in 1996 those with an unemployment period longer than 12 months represented a share of 58.1% in low- and 64.0% in high-unemployment regions. Given this small difference, it would be hard to conclude that high-unemployment regions are pockets of especially long-duration unemployment. By contrast, the difference in inflow rates to unemployment from employment was 4.4% in the high-unemployment counties compared to 2.5% in the low-unemployment counties, almost a factor of two. Similar differences exist among the 1994/95 and 1996/97 cohorts, as reported in Pastore (2000).

Table 2

Labour market transitions in high unemployment regions of Poland including state and private employment (November 1995 – November 1996, %)

	Employed in the state sector	Employed in the private sector	Unemployed	Non-participating
Employed (state sector)	87.7	5.5	2.7	4.0
Employed (private sector)	2.2	86.9	5.6	5.3
Unemployed	7.7	23.8	54.5	14.1
Non-participating	1.2	3.4	2.7	92.6

Note: The state sector includes state firms and local authorities. The private sector includes private firms, cooperatives and independent workers.
Source: Own calculation from *PLFS.*

The data underlying the statistics in *Tables 1* and *2* allow us to calculate equilibrium unemployment rates, using the following formula based on Layard, Nickell and Jackman (1991):

$$U^{ss} = \frac{i_e + i_n\left(\frac{1-p}{p}\right)}{i_e + o}. \qquad (1)$$

In (1), i_e is the inflow rate from employment, i_n is the inflow rate from non-participation, p is the participation rate and o is the overall outflow rate. We compute a U^{ss} of 7.2% for the low-unemployment regions and a rate of 12.6% for the high-unemployment regions. Of course, these are derived from gross flow data, so that significant unrecorded changes in state during the year would raise the

rates considerably. As discussed in Kiefer (1988), and for the Polish case in Pastore (2001), measuring transitions between different labour market states using intermittent cross-section surveys can lead to biased estimates. This is, among other reasons, because of the presence of unrecorded spells of unemployment intervening between two recorded employment spells. However, Góra and Lehmann (1995) find the size of the bias very small, almost irrelevant in case of flows out of employment in PLFS data.

The important point to grasp is that almost all differences in these equilibrium unemployment rates are due to differences in inflow rates from employment. It is also important to note that the actual unemployment rate, the estimated equilibrium unemployment rate and the rate of flow from employment to unemployment in high-unemployment regions are all about 70% above those of low-unemployment regions.

To understand the key role of job separation compared to job finding, the following line of reasoning has to be considered. Imagine two groups of low- and high-unemployment regions. Assume also that in equilibrium net employment change is zero, which implies that job finding and separation always equal each other, whatever the level of gross turnover is. High unemployment could be or could not be correlated to a higher degree of job finding/job separation. In case one, there is clear correlation between high unemployment and gross turnover. The hiring function must be upward sloping and equal in both areas. It is then the job separation which is different in the two regions. In case two, the separation rate is flat across regions, whatever their unemployment rate is. Gross turnover is also flat. It is then the job finding function that is different across regions and that leads to high unemployment. In other words, where unemployment depends on high job separation, we observe a considerable difference in gross turnover across regions differing because of their unemployment rate. In contrast, where unemployment depends on low job finding, we observe no difference in gross turnover across regions with a different unemployment rate.

Both of these results – of major differences in inflows from employment and minor differences in outflows from unemployment – might come as a surprise to economists who, over the last decade or so, have got used to expecting that persistent unemployment differentials are due to differences in duration of unemployment.

Flows to and from employment and unemployment in Poland, Italy, the United States and Russia are compared in *Table 3*. Italy is one of Western Europe's high-unemployment countries, with very low levels of flows in either direction. The Italian flow rates are about 40% of the level of the rates in the high-unemployment voivodships in Poland. In other words, a Polish worker in a high-unemployment voivodship is two and a half times more likely to lose his/her job than

Table 3

Changes in labour market status in international comparison
(Annual flow rates, %)

	Unemployment to unemployment	Employment to unemployment
Poland, low-unemployment voivodships, 1995/96	36.3	2.5
Poland, high-unemployment voivodships, 1995/96	31.5	4.4
Italy, 1994/95	13.1	1.6
United States, 1992/93	65.9	2.8
Russia, 1994/95	40.8	3.7

Sources: for Poland *Appendix Table 2*; for Italy own calculation from Table 4 in Mazzotta (1996), p. 24, based on data from the *Rassegna Trimestrale delle Forze di Lavoro*; for United States and Russia Boeri (1997).

his/her Italian counterpart. The opposite is true for job finding: the Italian worker's expected duration of unemployment is two and a half times longer than that of his/her Polish counterpart in a high-unemployment voivodship. In contrast to Italy, the United States has a high-turnover labour market. As can be seen from the numbers above, a worker in the United States is more likely to leave unemployment within a year than his Polish counterpart. On the other hand, the flow rate from employment to unemployment is actually lower in Poland than in the US, probably reflecting a lower level of economic restructuring.

Table 4

The sectoral structure of employment in rural and urban low-unemployment regions in Poland[1]
(1995)

	Urban LUR			Rural LUR		
Number of employees	All	State	Private	All	State	Private
Agriculture	10.2	1.1	18.5	42.6	2.4	62.9
Mining	8.7	17.0	0.6	0.3	0.8	0.0
Manufacturing	21.8	19.2	24.5	14.6	19.6	12.1
Construction	7.0	3.1	10.8	4.1	3.4	4.5
Private services[2]	22.2	9.1	35.1	13.5	8.6	16.0
Public services[3]	29.9	50.4	9.8	24.9	65.2	4.2

Notes: [1] In a small number of cases the answer is not available.
[2] The private sector includes: trade and repair; hotels and restaurants; financial services; real estate and business activities.
[3] The public sector includes: electricity, gas and water supply; transport and communications; public administration and defence; health services; other services, personal services; international organisations.
Source: own elaboration by *PLFS.*

The low-unemployment group of voivodships is very heterogeneous, as we have already discussed. If we separate the rural eastern voivodships from the urban low-unemployment voivodships, the differences in employment structure are very sharp *(Table 4)*. The predominance of private agriculture in the rural low unemployment voivodships must be the main reason for low unemployment figures. The explanation of persistently low unemployment in rural voivodships is straightforward: few self-employed farmers declare themselves unemployed. The labour market in Poland's rural low unemployment voivodships is similar to that of Russia, as depicted in Boeri (2001). Low-unemployment urban areas are more intriguing. In the following paragraphs we study how these regions differ from the rest of Poland, especially with respect to job security.

Comparison of gross worker flows in urban and rural low unemployment voivodships show little differences between the two groups. Rural low-unemployment regions have a slightly higher turnover, probably due to a relatively higher share of temporary work (*Tables 5* and *6*).

Table 5

Labour-market transitions in rural low-unemployment regions
(November 1995 – November 1996, %)

	1996			
1995	Employed	Unemployed	Non-participating	Shares
Employed	94.4	2.8	2.8	55.8
Unemployed	45.3	39.2	15.5	7.3
Non-participating	5.9	2.2	92.0	37.0
Shares	58.1	5.2	36.7	

Source: Own calculation from *PLFS.*

Table 6

Labour-market transitions in urban low-unemployment regions
(November 1995 – November 1996, %)

	1996			
1995	Employed	Unemployed	Non-participating	Shares
Employed	93.8	2.3	3.9	50.5
Unemployed	32.0	50.1	17.8	6.0
Non-participating	4.7	2.0	93.3	43.5
Shares	51.3	5.0	43.6	

Source: Own calculation from *PLFS.*

MODELLING JOB LOSS

In this section we attempt to model the process of flow from employment to unemployment for employees in the PLFS who were working in November 1995 and re-interviewed in November 1996. Using information for November 1996, we calculate the length of job tenure and whether it was terminated by entry into unemployment.

Our data, gained from pairs of interviews made a year apart, do not give a full account of labour-market activity over the intervening year for every worker. We chose to estimate only the chances of becoming unemployed. We treat other flows from employment, such as job to job flows and retirements, as uninterrupted jobs. Approximations made in these cases are discussed in detail in Pastore (2000).

Cox's (1972) semi-parametric procedure was applied to estimate the hazard function and the effects of the covariates on flow from employment to unemployment. Lancaster (1990) includes Cox's model in the family of *piecewise-constant* statistical models of changes in status. It is very similar to the model of Meyer (1990), and it avoids the problem of imposing strong parametric assumption in the shape of the baseline hazard. The cumulative hazard is the product of two components:

$$H_t = \lambda_t e^{\beta' X}$$

where l_t represents the baseline function, which varies over tenure and is independent of the covariates, x.

Initially, we estimated Cox's models separately for both high- and low-unemployment regions, see Newell and Pastore (1999). In unpacking the effects of sample characteristics, baseline hazards and estimated coefficients, we found that one set of coefficients, with respect to age, are primarily responsible for the difference in inflows between high- and low-unemployment regions. We allowed a spline in age with slope changes at ages 25, 35 and 45 and the difference between the low and high voivodships was that middle-aged workers in high-unemployment regions had almost no greater job security than young workers. This is in clear contrast to the situation in low-unemployment regions where young workers are much more likely to enter unemployment than their elder colleagues. Thus, in the former regions the risk of unemployment does not diminish with age (see Arulampalam and Stewart, 1995). To illustrate this, our estimates suggest that in low unemployment regions a 20-year-old worker is six times more likely to enter unemployment than a 30-year-old. For high-unemployment regions, a 20-year-old is estimated to be only 1.6 times more likely to enter unem-

ployment than a 30-year-old. This estimate is comparable to the EU average, where the corresponding ratio is 1.9.

The differences in inflow rates between high- and low-unemployment voivodships is even more pronounced when we confine ourselves to looking at the age group from 25 to 44.

Appendix Table 2 reports estimates of Cox's unemployment hazard model for prime-aged workers. The model was initially estimated for all regions, allowing special effects including a separate baseline hazard for the low-unemployment urban regions. The estimates are the results of a modest simplification from a more general model.

The estimated effects can be classified as follows:

- Personal characteristics: age, gender and marital status. We test for and accept the hypothesis that age effects are common across both regions. Following long-standing tradition in labour economics, we allow a quadratic in age. Our estimates find that between the ages of 25 and 45, the probability of entering unemployment declines with age, from whence it begins to rise. Gender and marital status effects are insignificant.
- Worktime: temporary and part-time workers are significantly more likely to fall into unemployment outside of the low-unemployment urban areas. This result is perhaps to be expected given our choice of regions.
- Education: education is estimated to protect a worker from unemployment, though only one coefficient is significant, for higher education in high-unemployment voivodships.
- Sector: working in the private sector is significantly more risky, more or less generally across our different sub-regions.
- Occupation: higher skills tend to protect from unemployment. Workers in higher skilled occupations face less risks even in high-unemployment regions. The exceptional group consists of skilled manual workers. They are very unlikely to be laid off in the low-unemployment, urban regions.
- Firm size: working in smaller firms is generally more risky, and particularly and significantly so in high-unemployment regions.

Moreover, we investigated whether voivodship-level indices of structural change impacted directly on the chances of moving into unemployment. We find that our index of industrial change has a significant effect. This index is high on average for the high-unemployment voivodships, so that the estimated effect raises the chances of falling into unemployment in the high-unemployment counties about 20% over that of the low-unemployment voivodships.

After having tested Lilien's (1982) alternative index of structural change which proved insignificant, our final experiment was to add the Herfindahl index of industrial concentration used by Curtis (1988) and Curtis and Nardinelli (1992). Our hypothesis was that the higher the degree of diversification in employment is, the lower will be the impact of adverse supply shocks. This also proved insignificant. We calibrated the scale of the effect, however. On average the index is lower in high-unemployment regions than in low-unemployment regions. Thus the estimated portfolio effect in the labour market accounts for a modest increase of 4% in the hazard rate.

Now we turn to industry effects. One effect comes from extra job security afforded in low-unemployment urban areas to workers in construction. This result fits the finding for workers with temporary jobs. In big thriving cities, a spell of unemployment at the end of a temporary job is much more easily avoidable than it would be elsewhere.

With respect to manufacturing, a shortage of observations prevents us from a full disaggregation to the two-digit level. However, it seems natural to hypothesise that new patterns of production will be generated by changes in the pattern of international trade and foreign direct investment.

To investigate this a little more deeply, we adapt the taxonomy of Neven (1995). The author developed the taxonomy using German data of the early 1990s. This taxonomy creates clusters of industries, separated by differing intensities of labour, human capital and physical capital. It divides the manufacturing sector in five groups of industries. The first cluster includes advanced technology industries intensive in human capital and physical capital, such as the chemical industry. The second group of industries uses a relatively smaller amount of physical capital, but still produces jobs, which must be carried out by workers with high human capital. It includes machinery, electronics, engineering and transport equipment sectors. The third cluster includes processes which use labour intensively, combined with relatively little physical capital. Such a configuration is typical of the production of leather and derivatives. The fourth group is composed of industries that use a relatively high share of labour and physical capital. This cluster includes textile, wood and wooden products, rubber and plastic products and metal products. We include all firms categorised as other non-metallic producers and other manufactures in this cluster. The final cluster is not homogeneous, since it includes representatives of the food industry and the production of coal, petroleum and derivatives. The common feature is the low level of diversification of production and the link with the production of agricultural and energy raw materials, which is mirrored in the relatively higher share of physical and human capital.

After a little experimentation we aggregated clusters and were left with only three: a labour-intensive one, one intensive in human capital, and a third intensive in both human and physical capital. The labour-intensive industries, independent of physical capital are identical to Neven's clusters 3 and 4; industries intensive in human capital, independent of physical capital correspond to Neven's clusters 1 and 2; and finally, industries intensive in physical and human capital are the same as Neven's cluster 5.

From *Appendix Table 2* it is clear that most of the job security in manufacturing within the urban low-unemployment districts comes from the industries intensive in labour. This cluster includes: leather goods, wood and wood products, textiles and metal products. This is our key result. Our finding can be interpreted as demonstrating the relative safety of jobs in the sectors of manufacturing where Poland is often argued to have a comparative advantage (see, for instance, OECD, 1998). However, this is only found in large urban areas, where facilities required for international trade are most readily available.

CONCLUSION

The persistently high unemployment of some voivodships in Poland is associated more with high inflows to unemployment than with high outflows. Thus it would be wrong to think of these regions simply as pockets of especially long-duration unemployment.

Based on this finding, we focused on the flows from employment to unemployment and estimated different hazard functions. We found that the manufacturing sector, especially industries with a high intensity of labour, provide their employees with particularly secure jobs in low-, but not in high-unemployment regions. We interpret this result as reflecting a combination of comparative advantages in terms of factor intensities and agglomeration effects.

APPENDIX

Appendix Table 1

Characteristics of employed workers in low- and higher unemployment voivodships (November 1995)

	All employed workers			Prime-aged workers		
	Low	High	Diff.	Low	High	Diff.
Age (years)	40.3	39.4	0.9***	36.0	35.8	0.2
Share of women (%)	54.5	53.8	1.1	54.0	53.0	1.5
Share of unmarried (%)	14.0	15.0	–1.1	11.0	13.0	–1.3
Tenure in November 1995 (years)	12.8	11.4	1.5***	9.4	9.0	0.4*
Temporary and part-time jobs (%)	6.3	9.4	–3.1***	4.7	7.1	–2.4***
Jobs started after 1989 (%)	37.9	42.8	–4.8***	40.9	43.5	–2.6*
Education (% share)						
University	12.0	11.0	1.0	13.0	11.0	2.1**
Secondary	34.4	34.6	0.2	36.4	39.1	–2.7*
Lower vocational	34.0	32.0	2.0***	40.0	34.0	5.9***
Primary or less	19.1	22.5	–3.4***	10.7	16.0	–5.2***
Industry (% share)						
Agriculture and fisheries	20.3	20.7	–0.3	15.0	17.2	–2.1**
Mining	6.7	1.9	4.8***	8.6	2.0	6.6***
Manufacturing	20.4	22.5	–2.1**	19.9	23.5	–3.6***
Construction	6.2	5.8	0.4	6.2	6.0	0.3
Trade and hotels	13.1	13.3	–0.7	14.2	13.0	1.2
Transport and communications	5.4	5.7	–0.4	6.5	6.2	3.7
Financial and business services	4.5	4.1	0.4	4.3	4.3	0
Public services	19.6	23.1	–3.4***	21.3	24.6	–3.3***
Other services	3.8	3.1	0.8*	3.9	3.2	7.2
Sector (% share)						
Private	21.8	24.7	–2.9***	21.4	24.9	–3.6***
Self-employed	21.6	20.6	1.0	20.2	18.7	1.5
Unpaid family workers	5.7	4.8	0.9*	2.8	3.9	–1.1**
Local government	3.2	4.6	0.5**	3.9	5.2	–1.3**
Cooperatives	4.4	5.3	–1.4***	4.5	5.6	–1.1*
State sector	43.3	39.9	3.4***	47.2	41.3	5.6***
Occupation (% share)						
Professional, managerial and technical	29.3	26.9	2.4**	31.2	28.5	2.7**
Skilled non-manuals	7.3	6.8	0.4	7.6	7.4	1.7
Semi-skilled non-manuals	8.3	9.5	–1.2**	9.2	9.4	–2.1
Farmers	19.1	18.1	1.0	13.5	14.7	–1.2
Skilled manuals	20.9	19.7	1.2	22.8	21.7	1.1
Semi-skilled manuals	8.1	8.3	–0.2	9.2	9.0	2.4
Low-skilled manuals	7.0	10.6	–3.6***	6.5	9.3	–2.8***

(Appendix Table 1 cont.)

	All employed workers			Prime-aged workers		
	Low	High	Diff.	Low	High	Diff.
Enterprise size (% share)						
5 or fewer employees	32.0	31.4	0.7	28.2	28.9	0.1
6 to 20 employees	13.3	16.0	–2.7***	13.7	16.2	–2.5**
21 to 50 employees	11.1	13.3	–2.2***	11.2	13.5	–2.3**
51 to 100 employees	8.3	10.1	–1.8***	9.1	10.4	–1.3
100 or more employees	35.2	29.1	6.1***	37.8	31.1	6.7***
Index of structural change						
By firm size	5.3	7.7	–2.4***	5.3	7.7	–2.4***
By sector	19.6	25.1	–5.5***	19.4	25.2	–5.8***
By industry	12.6	17.2	–4.6***	12.4	17.3	–4.8***
Herfindahl index of industrial concentration	12.1	9.6	2.6***	11.6	9.6	2.1***
Lilien index of industrial change	31.0	38.3	–7.3***	30.7	38.2	–7.5***
Average unemployment rate	9.8	17.4				
Number of observations	4039	3565		2393	2179	

Note: The table reports the significance level of normality tests on mean differences. With *, ** and ***, correlation is significant at the 0.10, 0.05 and 0.01 per cent significance level, respectively.
Source: Labour Force Survey.

Appendix Table 2

An estimated hazard function of flows from employment to unemployment, prime-aged workers, Poland, 1995/96

	Urban lowest unemployment voivodships	All voivodships
Age		–0.16
Age/100		0.17
Woman	–0.51	0.23
Marital status *(default = married)*	0.61	–0.18
Part-time	0.25	0.44**
Temporary jobs	–0.26	1.91***
Completed education:		
University	0.12	–1.03**
Secondary	–0.33	–0.06
Lower vocational	–0.33	0.06
Industry *(default = public services)*		
Agriculture and fishing	0.26	0.25

(Appendix Table 2 cont.)

	Urban lowest unemployment voivodships	All voivodships
Mining[1]	–0.33	–0.96
Manufacturing, intensive in physical and human capital	–1.51	0.27
Manufacturing, intensive in labour, independent of physical capital	–1.47**	0.44*
Manufacturing, intensive in human, independent of physical capital	–0.14	–0.65
Construction	–1.43**	0.85***
Trade and hotels	–0.27	0.24
Transport and communication	0.71	–0.50
Financial and business services	0.55	0.41
Sector *(default = State)*		
Self-employed	0.39	–0.28
Cooperative	1.54**	–0.31
Local government	0.62	0.48*
Private sector	0.83	0.74***
Occupation *(default = low skilled manuals)*		
Professional and managerial	–0.57	–0.89***
Skilled non-manuals	–0.76	–0.27
Semi-skilled non-manuals	–0.82	–0.12
Skilled manuals	0.28	–0.76***
Semi-skilled manuals	–2.18**	–0.67***
Farmers	–1.44	–2.07***
Size of enterprise *(default = more than 100 employees)*		
Less than six employees	0.39	0.90***
From 6 to 20 employees	–0.32	1.00***
From 21 to 50 employees	–0.32	0.96***
From 51 to 100 employees	0.51	0.72***
Indices of structural change		
By industry	0.03**	
Lilien index of industrial change	0.00	
Herfindahl index of industrial concentration	0.02	
Cumulative baseline after one year of job tenure		
Low-unemployment voivodship	0.03	
Medium and high-unemployment voivodship		0.01
–2*log-likelihood	4570.44	
Change in log-likelihood	645.56	
Overall chi-squared	1247.40	
Number of observations	1719	5023

Note: *, **, *** denote significance at the 0.10, 0.05 and 0.01 levels.

[1] In high unemployment regions, mining has been aggregated with manufacturing, due to the small size of the sector.

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