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Working Paper

Regional Unemployment and Industrial Restructuring in Poland

IZA Discussion Papers, No. 194

Provided in Cooperation with:
IZA – Institute of Labor Economics

Suggested Citation: Newell, Andrew; Pastore, Francesco (2000) : Regional Unemployment and Industrial Restructuring in Poland, IZA Discussion Papers, No. 194, Institute for the Study of Labor (IZA), Bonn

This Version is available at:
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DISCUSSION PAPER SERIES

IZA DP No. 194

Regional Unemployment and Industrial Restructuring in Poland

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August 2000

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zur Zukunft der Arbeit
Institute for the Study
of Labor

Regional Unemployment and Industrial Restructuring in Poland

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Discussion Paper No. 194
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IZA Discussion Paper No. 194
August 2000

ABSTRACT

Regional Unemployment and Industrial Restructuring in Poland

This paper studies regional unemployment inequality in Poland. We find that higher unemployment regions are those experiencing greater change in industrial structure. We also find high unemployment regions are those with higher inflow rates to unemployment rather than longer spells of unemployment. These findings suggest that regional unemployment varies importantly with job destruction in Poland. Econometric analysis of the determinants of employment to unemployment flows reinforces this impression. We use our estimates to assess the extent to which regional unemployment variation is due to economic restructuring. We show that this is cannot be done unambiguously and offer reasons why many previous attempts to separate out the effects of restructuring on unemployment have been unsuccessful

JEL Classification: J63, P23

Keywords: Industrial restructuring, unemployment, Polish transition

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1: Introduction

It is a widely-held view that large scale economic restructuring causes unemployment that may persist for some time. There is plenty of evidence of this, from journalistic accounts of local economic distress to novels and feature films with this as the subject or context. In economics, the pervasiveness of the idea is easily illustrated. Take, for example the 'trade versus technology' debate over the causes of the widening of wage distributions in the industrialised countries, see Wood (1995, 1998). The protagonists in this debate mostly accept that one of the causes of the rise in West European unemployment has been a structural shift in labour demand. The debate is about the causes of the shift rather than the effect, which is assumed to be evident. There are dissenters however, see Nickell (1997), for instance.

As Nickell points out, the problem with this particular piece of received wisdom is demonstrating it empirically. In the mid to late 1980s there was quite a large volume of research attempting to quantify the contribution of structural change to aggregate unemployment among the OECD countries, see Layard *et. al.* (1991). The results were largely negative. One reason for this may have been the use of inappropriate measures of structural change. To explain, much of this literature measured structural change in terms of changes in shares of employment by industry, occupation or region. Such measures reflect the assumption implicit in the research agenda that changes in the pattern of unemployment might be simply decomposed into structural and macroeconomic components. However, since Lilien (1982) at least and the ensuing debate, economists have been uncomfortably aware that sectoral shifts and aggregate movements cannot be convincingly separated. This is because measuring structural change by sectoral turbulence indices ignores differences in cyclicality between sectors. However, attempting to allow for that runs into the familiar problem of the arbitrariness involved in choosing between the very large number of statistically allowable decompositions of a variable into trend and cycle.

Another reason for failure to find much effect from restructuring to unemployment might have been that those concerned with the macroeconomics of unemployment have tended to treat structural change as shifting the equilibrium unemployment rate, see again, Layard *et. al.* (*op. cit*.). There is no particularly convincing reason for this. Many structural changes must cause nothing more than temporary disequilibrium unemployment.

Turning to the case of Poland, the standard explanation of 1990s unemployment in Eastern Europe is that it reflects structural changes in labour demand caused by domestic economic reforms, direct foreign investment, and shifts in the pattern of international trade. See, amongst others, Burda (1993), Aghion and Blanchard (1994) and Blanchard (1997).

The regional pattern of the unemployment that emerged in Poland in 1990 persisted, to a large extent, well beyond the middle of the decade. This persistence was a modest surprise; the OECD (1997), among others, noted it. To reconcile a fairly stable regional pattern of unemployment with this explanation, one needs to add arguments why unemployment might persist. There are two main types of argument. Firstly, there are many reasons why restructuring and privatisation are gradual rather than all at once. This could give rise to a steady flow of mismatched workers into unemployment. Secondly, the persistence of mismatch unemployment may be reinforced by labour immobility caused by, for instance, adjustment costs in labour supply or wage rigidity. A combination of these theories creates a seemingly convincing story in which gradual restructuring and supply-side rigidities combine to create to persistence in the regional pattern of unemployment.

More recent empirical studies of regional unemployment have ignored differences in the rate of economic restructuring, perhaps disheartened by previous failures and have tried instead to quantify the medium-term effects of supply-side rigidities, see *inter alia* Blanchard and Katz (1992) and Jimeno and Bentolilla (1998).

In section 2, we describe the evolution of regional unemployment in Poland. We show that existing economic classifications of regions are not well correlated with unemployment rates, but that regional indices of economic restructuring are highly correlated with unemployment. In section 3, we look at flows into and out of unemployment. We show inflow rates and indices of economic restructuring are

highly correlated. We also show that unemployment differences across regions are more associated with differences in inflow rates rather than outflow rates. In section 4 we use data from the Polish Labour Force Survey to model the process on inflow to unemployment. Lastly, by studying regional differences in estimated coefficients, we make a broad guess as to the contribution of industrial restructuring to the unemployment gap between high and low unemployment regions. The range of plausible estimates is, as expected, wide.

2: Unemployment, economic structure and structural change

Until 1998, Poland was divided into 49 counties, or voivodships (*wojewodstwa*). This division created a useful data set for studying patterns of unemployment. The OECD (1997), amongst others, noted the stability of the distribution of unemployment across voivodships or regions as we shall refer to them through the 1990s. The visual evidence of relative stability in Chart 1 is supported by the correlations in Table 1. This stability suggests an explanation of the geographical distribution of unemployment in terms of economic structural features. Three previous studies have produced classifications of voivodships by economic structure: Scarpetta and Huber (1995), Góra and Lehmann (1995) and Lehmann and Walsh (1998). These are presented in Table A1 of the Appendix. We discuss each briefly.

Scarpetta and Huber (*op. cit.*) aim to capture both the degree of economic development and the structure of industry in a single index. Economic development is proxied by an index of industrial diversification. They classify regions into the following six groups: I - developed agricultural; II - other agricultural; III - developed heavily industrialised; IV - other industrialised; V - developed diversified; VI - other diversified.

Gòra and Lehmann (*op. cit.*) also classify voivodships by the degree of economic development of a region. Their index is based on the following characteristics: the employment shares of services and industry in 1990, the relative change in total employment and that of employment in services and the relative per capita income of municipalities in 1992. Finally the voivodships are divided into six

groups, which the authors take to represent progressive stages of economic development.

Lehmann and Walsh (*op. cit.*) build an economic classification of voivodships with a different proposed interpretation. Their intention is to produce an index reflecting the degree of employment *restructuring*. Seven indicators are employed: the share of services in employment; the share of short-tenured men (i.e. with tenure less than ten years) in total male employment; the number of telephones per capita; the voivodship shares of domestic and direct foreign investment, normalised on population; the share of construction in total employment and the share of agriculture in total employment.

These three classifications all reflect differences in the economic structure. The Lehmann-Walsh index, though interpreted as reflecting structural change, actually contains no component measured as a temporal difference. Thus it only measures relative structural change if every voivodship started the process of transition with these indicators at the same level, or if initially more advanced voivodships had developed faster. This latter condition is possible but unlikely, so it is better to interpret the index as a measure of economic structure or perhaps of the state of development.

We study the correlations between these indices and unemployment rates. First, testing differences of mean unemployment rates for voivodships in the six Scarpetta-Huber categories revealed nothing significant. The correlations between voivodship unemployment rates and the Gora-Lehmann and Lehmann-Walsh structural indices are given in Table 2. Though the indices correlate fairly well with each other, there is no remotely significant correlation with voivodship unemployment rates.

We further investigate the relationship between regional unemployment rates and the degree of restructuring using measures of sectoral turbulence previously employed by Layard *et. al.* (*op. cit.*), among others. The indices are constructed on the assumption of the aggregate neutrality of structural changes. As discussed in the introduction, such an index will distort the impact of the underlying changes unless the compositional and aggregate impacts of these changes are highly correlated. An index I_t is defined as follows:

$$I_t = \frac{1}{2} \sum_i \left| \Delta s_{it} \right| .$$

Here s_{it} is sector i's share of employment and Δ is the change over a period ending at t. We calculate the index using the May 1994 and November 1997 rounds of the Polish Labour Force Survey (PLFS). These were, at the time of writing, the earliest and latest available surveys using a consistent, 32-industry classification. We also calculate similar indices for other dimensions of the transition: by ownership sector, and by firm size. Table 3 presents the regional correlations between these restructuring indices and unemployment rates. Clearly, there are strong relationships with respect to industrial change and privatisation.

To summarise this section, we have found virtually no relationship between indices of economic structure and regional unemployment rates. By contrast, there are strong correlations between regional unemployment rates and indices of recent industrial change or turbulence in employment.

3: Labour markets in high and low unemployment voivodships.

The correlations in Table 3 suggest a positive link between the degree of industrial restructuring and the level of regional unemployment. What other evidence can we use to substantiate this idea? Consider Chart 2. Here we employ the quasi-panel nature of the Polish Labour Force Survey to calculate the rates of flow from employment to unemployment for three cohorts, observed between November 1994 and November 1997[i]. On the horizontal axis is the sum, over the three cohorts, of rates of flow from employment to unemployment. On the vertical axis is the November 1996 unemployment rate. The chart shows a positive relationship (the correlation coefficient is 0.76, significant at the one- percent level). High unemployment voivodships tend to be regions of high flows from employment to unemployment. This is as one might expect, if industrial turbulence was a major cause of the regional pattern of unemployment.

Table 4 gives correlations between inflow rates, outflow rates, unemployment rates and our index of structural industrial change. Inflow rates and industrial change are strongly correlated, as are inflow rates and unemployment rates. As we have already seen, unemployment and structural change are also significantly correlated.

Lastly unemployment and outflow rates are significantly correlated, though outflow rates are uncorrelated with inflow rates and industrial change.

Of course, looking at unemployment stocks and flows alone does not give a full picture of labour market movements. What follows is a comparison of all the labour market flows in voivodships. In order to keep the amount of statistics to a manageable level, we first rank voivodships by unemployment rate. We discard a group of medium unemployment regions and end up with 12 low and 20 high unemployment voivodships, each representing approximately one-third of the Polish labour force. The low unemployment group includes some of the most densely populated, urban and industrial regions of the country.

We further confine ourselves to reporting results from the cohorts of the Polish Labour Force Survey observed at November 1995 and again at November 1996. The sampling design, a quasi-panel, means that almost 25,000 individuals are interviewed at both dates[ii].

Table 5 presents the characteristics of the working age populations in high and low unemployment regions. In high unemployment regions workers are a little younger and quite a lot worse educated. This may be important. The young and the less well educated tend universally to have higher unemployment rates. The aggregate participation rates in the two regions are almost identical. Also, households in the high unemployment regions contain slightly more adults.

Tables 6 and 7 below provide summary statistics of changes in economic status between November 1995 and November 1996 that re-emphasise an important fact. The key difference between the high- and low unemployment voivodships is in 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. In the high unemployment regions the corresponding percentage was 9.1%, half as high again. This seems an unambiguous indicator of greater turbulence and job destruction in the high unemployment regions.

Among the low unemployment counties 46.6% of those unemployed at November 1995 were also unemployed at November 1996. For the high unemployment counties this percentage was a little higher, at 54.5%. This means that in 1996 those with a spell of unemployment 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 make the case that high unemployment regions are pockets of especially long-duration unemployment. By contrast, the difference in inflow rates to unemployment from employment was proportionally large: 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 1994/5 and 1996/7 cohorts, though they are not reported here.

If we use the data in Tables 5, 6 and 7 to calculate equilibrium unemployment rates, then we find a rate of 7.2 per cent for the low unemployment regions and a rate of 12.6 per cent for the high unemployment regions. Of course, these data are net flow data, so that significant unrecorded changes in state during the year would raise the rates considerably[iii]. However, almost all of the difference in these equilibrium unemployment rates is due to the difference in inflow rates from employment. This is illustrated by the fact that the actual unemployment rates, the equilibrium unemployment rates and the rate of flow from employment to unemployment are all about 70 percent higher in the high unemployment voivodships.

Both of these results, of major differences in inflows from employment and minor differences in outflows from unemployment might come as a surprise. Students of the European economy have become used, over the last decade or so, to expecting that persistent unemployment differentials will be correlated mostly with differences in durations of unemployment. Nevertheless the results are consistent with our earlier finding of a positive relationship between regional unemployment and industrial change in employment.

Table 8, above, allows a comparison of flows to and from employment and unemployment between Poland, Italy, the United States and Russia. 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 her job than her Italian counterpart. The same is true for job-finding; the Italian worker's expected duration of unemployment is two and a half times that of her Polish counterpart in a high unemployment voivodship. In contrast to Italy, among the OECD countries the

United States has the highest turnover labour market. Certainly, from the data above, a worker in the United States is more likely to leave unemployment within a year than her Polish counterpart. On the other hand, the flow rate from employment to unemployment is actually lower in the United States, probably reflecting lower economic restructuring.

4: Modelling job loss.

4.1 Differences in characteristics

In this section we model the process of flowing from employment to unemployment. In order to carry out empirical work on the inflow to unemployment, we took one of our subsamples from the PLFS, employees who were working in November 1995 and re-interviewed in November 1996. Using information for November 1996, we calculate the length of job tenure. Table A2 in the Appendix gives the characteristics of the employees in our samples for low and high unemployment regions. The most noteworthy feature of the table is the small scale of the differences between the workers of the two regions, particularly in terms of industrial structure.

Nonetheless, the private sector is slightly larger in high unemployment voivodships. Also, high unemployment counties have, on average, slightly higher shares of agriculture, manufacturing and public services and lower share of mining. These higher unemployment regions also have fewer large firms. Thus the differences that do exist are suggestive of greater job fragility.

Looking at occupational difference, high unemployment regions have on average a lower share of employment in human capital-intensive jobs. High unemployment regions also have in the lower average job tenure. The higher share of jobs started after 1989 illustrates the greater turbulence of high unemployment regions. This is 43 per cent of all jobs against 37.9 percent in low unemployment regions.

4.2 Estimating hazard functions of job loss

In previous related studies, Góra and Lehmann (1995) and Boeri and Scarpetta (1995 and 1996) both assumed the past history of workers does not affect their probability of flowing between different labour market states. As a consequence, they modelled labour market flows as a Markov process in which the probability of transition is dependent only on individual heterogeneity and other environmental factors. The data we use refer to a later period of economic transition. Five years after the implementation of the first privatisation plans, the idea that worker's experience is irrelevant to the chances of job loss seems much less likely to be appropriate.

Our data, from two interviews a year apart, give a less than full account of labour market activity over the intervening year for some workers[iv]. In Details of the approximations we make in these cases are discussed in the Appendix. We chose to develop our empirical work estimating only the chances of becoming unemployed. We treat other flows from employment, such as job to job flows and retirements, exactly as uninterrupted jobs. This could be thought of as unsatisfactory, compared to a competing risks approach to all departures from the current job.

We apply the Cox's (1972) semiparametric procedure to estimate the hazard function and the effects of the covariates on outflow 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:

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

Here λ_t represents the baseline function, specifying the part of the cumulative hazard that is independent of the covariates, *x*.

Initially, we estimated Cox models separately for both high and low unemployment regions, see table A3 in the Appendix. In unpacking the effects of sample characteristics, baseline hazards and estimated coefficients, we found that one set of coefficients are primarily responsible for the difference in inflows between the high and low unemployment regions. The key effect came from the role of the worker's age in the regressions. 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 have almost no greater job security than young workers. This is in clear contrast to the situation in the low unemployment regions where young workers are much more likely to enter unemployment than their older colleagues are. Thus in those regions the risk of unemployment does not diminish with age, as is normally the case (See Arulampalam and Stewart, 1995). Looking back at the raw flow data, we find that this parametric difference has its origins in the large gap between the inflow rates for the 25-45 year age group in high and low unemployment regions.

These results suggested that we should study separately the behaviour of prime aged (25 to 45 years) workers. Tables 9 and 10 give prime-aged workers flows for the period 1995 and 1996. The regional difference in the inflows from employment to unemployment, previously noted is even more pronounced here.

Table 11 reports estimates of a Cox unemployment hazard model for prime-aged non-agricultural workers. Here we revert to estimating across all voivodships. The estimates are the results of a modest and statistically acceptable simplification from a more general model. The key set of estimates is in Column 1.

The estimated effects can be grouped as follow. First, a set of personal characteristics: age, gender, marital status and education. We find that between the ages of 25 and 45, the probability of entering unemployment declines gently. We tested, unsuccessfully, for non-linearities. The gender effect shows that the probability of flowing into unemployment for unmarried women is about 60 percent of the probability for men. We estimate a similar further reduction for married women. Having completed university education also reduces the likelihood of entering unemployment, *ceteris paribus*, to about 30 percent of its level otherwise.

The significant industrial effects all increase the risk of becoming unemployed. These are construction, which has a high turnover rate universally, and financial, business and other services. Workers in private sector jobs are much more at risk of unemployment than state sector workers, as are, perhaps surprisingly, workers in local government.

Among occupations, we only find effects for clerical workers and for unskilled manual workers. Unskilled manual workers are three times more likely, *ceteris*

paribus, to enter unemployment than workers in most other occupations. Also, working for a larger enterprise tends to protect against unemployment. Workers in enterprises with less than 50 employees are three times more likely to enter unemployment than those in enterprises with more than 100 employees.

Lastly, we investigate whether voivodship-level indices of structural change impact directly on the chances of moving into unemployment. We include the index of industrial change described in section 2 above. 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 15 percent over that of the low unemployment counties.

In column 2 of Table 11, we report the results of experimenting with interacting this structural change index with other variables. Most interactions were insignificant, though we do find that the probabilities of entering unemployment from the construction and retail trade industries does appear to rise significantly with structural change. In column 3, we check the interpretation of our structural change index. First, we add voivodship population density. More densely populated, urban voivodships are more heavily sampled in the Labour Force Survey. As a consequence, the sampling error associated with derived statistics such as industry shares will be small in such voivodships. This disparity will raise the industrial turbulence index in less populated regions. Adding voivodship population density to the model should help ameliorate bias any bias in the coefficient of the structural change index due to this systematic variation in sampling errors. This does lower the coefficient on the structural change index, but it still has a significant effect.

In column 3 we add a further variable attempting to capture an aspect of structural change. This is an indicator variable that is set to unity if a voivodship has a dominant industry (an industry with more than ten percent of non-agricultural employment) with declining share of employment 1994-1997, and zero elsewhere. This is designed to try to capture the effect of a contraction by a dominant employer. Such voivodships include six where textiles dominate, five where food processing dominate, four where metal processing is dominant and four mining regions. Having described this in detail, the variable attracts a marginally significant negative sign, counter to expectation.

A couple of further experiments were tried but are not reported in the table. We added an alternative index of structural change, due to Lilien (1982), but this proved insignificant. Our final experiment of this type is to add the Herfindahl index of industrial concentration used by Curtis (1988) and Curtis and Nardinelli (1992). Our hypothesis is that the higher the degree of diversification in employment the lower the impact of adverse supply shocks. This also proved insignificant[v].

4.3 Interpreting the inflow gap.

What do these results tell us about the causes of the inflow gap and, ultimately, the unemployment gap between our groups of voivodships? In particular, what is the role of structural change? Recall the inflow rate to unemployment from employment for prime-aged workers in high unemployment voivodships workers is 1.88 times that in low unemployment voivodships. Our model, from column 1 of Table 11, predicts a log odds gap of 0.333 given the mean characteristics of high and low unemployment voivodships. In other words, our model predicts that the average worker in a high unemployment voivodship is 1.40 more likely to become unemployed at any given job tenure. Clearly, the difference in average tenure between workers in these regions is an additional element that accounts for part of the gap between 1.88 and 1.40.

We decompose the estimated log odds gap in Table 12. 13.9 of the 33.3 points is due to differing average levels of the industrial turbulence index. The next largest component is from difference in mean size of enterprise. The other components contribute positively to the log odds gap, but none are large.

Our final question whether these estimated effects reflect, or partly reflect, structural change. It is hard to argue that any (small) differences in mean age, gender, marital status or education are due to differences in structural change. Similarly, differences in average industrial and occupational composition seem most likely to reflect differences in structure rather than structural change. Of the remaining three effects, two cannot be unambiguously interpreted. Differences in the share of the private sector and differences in average enterprise size, both of which favour low unemployment regions in terms of reducing inflows to unemployment, could reflect differences in the rate of structural change, but other stories could also account for them.

If we were to guess how much of the explained portion of the unemployment inflow rate gap between high and low unemployment voivodships could be attributed to structural change, we would put the lower bound at about 40 percent and the upper bound between 55 percent and 85 percent. The simply serves to illustrate one of our central thesis, that the decomposition of unemployment into structural and non-structural components cannot be made precise.

5: Conclusion

Our discussion leads us to conclusions about Poland and also some methodological points. On Poland, we have shown that the persistent high unemployment of some voivodships 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. In the analysis of inflows, the first important finding is that the higher inflows in high unemployment regions reflect a very much higher risk of becoming unemployed for middle aged workers, but not for younger and older workers. When the analysis is restricted to these middle-aged people, we find workers in the private sector and small firms are much more likely to flow into unemployment, as are men, the less-well educated, construction workers and those with low skills. The main explanation for the inflow gap between low and high unemployment voivodships seems to be different levels of industrial turbulence.

On methodology, we argued first that measuring structural change by sectoral turbulence indices ignores differences in cyclicality between sectors. However, allowing for such differences may be essentially arbitrary. The issue of whether difference decompositions lead to importantly different measures of structural change is interesting, but we leave this to future work. Our second contribution was to note that important determinants of unemployment inflow at the level of the individual, such as sector and firm size, may well be determined at more aggregated levels by structural economic change. One implication of this is to render less precise the calculation of the impact of structural change on inflows to unemployment. Lastly, on a more positive note, we have demonstrated the possibility using micro-data to

investigate this issue. We should no longer think of regional unemployment disparities as simply demonstrating something called 'structural unemployment'.

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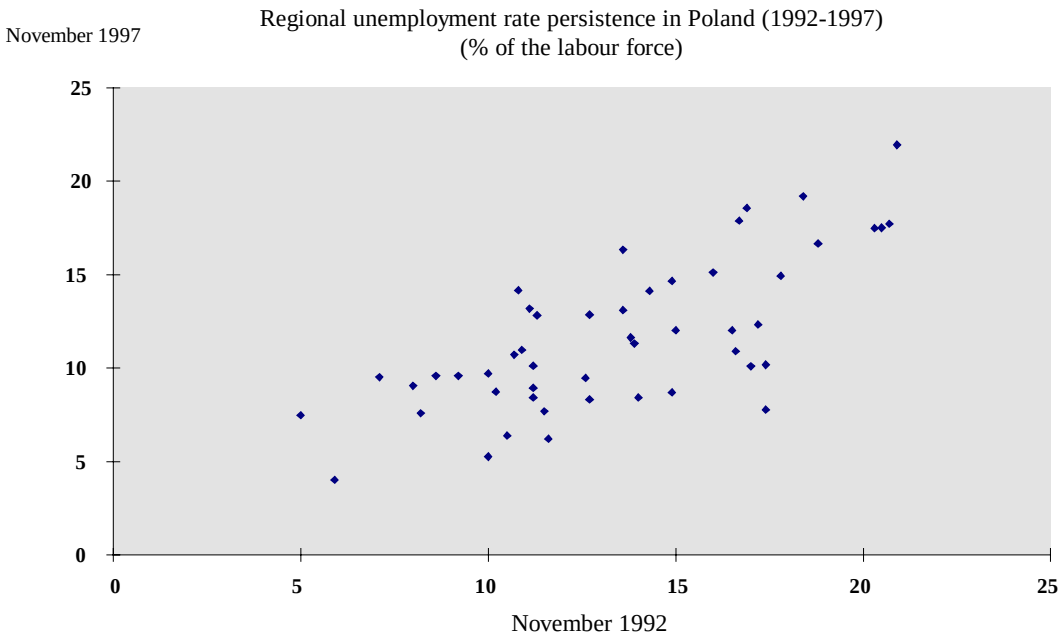
Charts

Chart 1



Source: own calculations from the Polish Labour Force Survey (PLFS).

Chart 2: Voivodship unemployment stocks and inflows

Tables

Table 1: Correlation coefficients among unemployment rates (1992-1997)

	1994	*1995*	*1996*	*1997*
1992	0.71**	0.76**	0.71**	0.73**
1994		0.81**	0.77**	0.73**
1995			0.81**	0.81**
1996				0.86**

*Note: ** denotes significance at the one-percent level.*
Source: own calculations from PLFS data.

Table 2: Correlating unemployment rates and structural indices by voivodship.

	Gora-Lehmann	*Lehmann-Walsh*
Unemployment rate 1992	0.01	0.13
Unemployment rate 1997	0.22	-0.05
Gora-Lehmann	1.00	-0.75**
Lehmann-Walsh		1.00

*Note: ** and * denote significance at the one percent and five percent significance levels.*
Sources: see text.

Table 3: Correlating structural change and unemployment between voivodships.

	Restructuring index, $I_{94,97}$, by		
	Industry	*Ownership*[1]	*Firm size*
Unemployment rate 1995	0.44**	0.45**	0.28
Unemployment rate 1996	0.47**	0.51**	0.33*
Unemployment rate 1997	0.51**	0.54**	0.35*

*Notes ** denotes significance at the one-percent level*
1. there are 4 categories of ownership: State, private, local government and co-operative.
Source: own calculations from PLFS.

Table 4: Correlation matrix for inflows, outflows, unemployment rates and industrial change across voivodships.

	Average outflow rate 1994-1997	*Average unemployment rate 1994-1997*	*Industrial change index I_{94-7}*
Average inflow rate 1994-1997	-0.25	0.78**	0.45**
Average outflow rate 1994-1997		-0.45**	-0.03
Average unemployment rate 1994-1997			0.55**

Source: Author's calculations from the PLFS.

Table 5: Characteristics of the working age populations in low and high unemployment voivodships, Poland, November 1995. (Percentage shares)

	Low unemployment regions	*High unemployment regions*
Under 35 years of age	35.4	37.1
Highest level of education:		
Above secondary	10.4	8.1
Secondary	26.3	24.1
Lower vocational	27.3	25.5
Primary or lower	36.0	42.3
Mean number of adults per household	2.45	2.53
Participation rate (%)	57.7	57.8
Unemployment rate (%)	10.8	19.3

Source: Author's calculations from the PLFS.

Table 6: Changes in labour market status in low unemployment regions of Poland 1995/6

		1996		
1995	*Employed*	*Unemployed*	*Non participating*	*Total*
Employed	94.0	2.5	3.5	100
Unemployed	36.3	46.6	17.1	100
Non participating	5.0	2.1	93.0	100

Source: Own calculation from PLFS.

Table 7: Changes in labour market status in high unemployment regions of Poland 1995/6

		1996		
1995	*Employed*	*Unemployed*	*Non-participating*	*Total*
Employed	90.9	4.4	4.7	100
Unemployed	31.5	54.5	14.1	100
Non participating	4.6	2.7	92.6	100

Source: Own calculation from PLFS.

Table 8: Changes in labour market status in international comparison
(Annual percentage flow rates)

	Unemployment to Employment	*Employment to Unemployment*
Poland, low unemployment voivodships, 1995/6	36.3	2.5
Poland, high unemployment voivodships, 1995/6	31.5	4.4
Italy, 1994/5	13.1	1.6
United States, 1992/3	65.9	2.8
Russia, 1994/5	40.8	3.7

Sources: Poland, Tables 6 and 7; Italy, own calculation based on data from the *Rassegna Trimestrale delle Forze di Lavoro*; United States and Russia, Boeri, (1997).

Table 9: Changes in labour market status in low unemployment regions of Poland 1995/6, prime aged workers

		1996		
1995	*Employed*	*Unemployed*	*Non participating*	*Total*
Employed	95.6	2.6	1.8	100
Unemployed	34.8	51.6	13.6	100
Non participating	13.1	6.9	80.5	100

Source: Own calculation on PLFS.

Table 10: Changes in labour market status in high unemployment regions of Poland 1995/6, prime aged workers

		1996		
1995	*Employed*	*Unemployed*	*Non participating*	*Total*
Employed	92.8	4.9	2.4	100
Unemployed	30.1	58.7	11.2	100
Non participating	11.9	6.5	81.6	100

Source: Own calculation on PLFS.

Table 11: Estimated hazard functions for transitions from employment to unemployment, prime-aged non-agricultural workers, Poland, 1995/6.

	Column 1	*Column 2*	*Column 3*
Personal characteristics			
Age	-0.033***	-0.033***	-0.033***
Gender (*Woman = 1*)	-0.528***	-0.540***	-0.509***
Married Woman	-0.494***	-0.520***	-0.466***
University education:	-1.179***	-1.168***	-1.188***
Industry *(default = all other industries)*			
Construction	0.855***	-1.328*	0.834***
Trade	0.257	-0.759	0.258
Financial and business services	0.607**	0.585**	0.575**
Other services	0.757***	0.752***	0.778***
Sector *(default = State and co-operative)*			
Local government	0.673***	0.677***	0.646***
Private sector	1.136***	1.145***	1.146***
Occupation *(default =all other levels)*			
Clerical	0.538***	0.534***	0.543***
Unskilled manual	1.089***	1.091***	1.074***
Size of enterprise *(default=more than 100 employees)*			
Less than 50 employees	1.153***	1.168***	1.133***
From 51 to 100 employees	0.845***	0.879***	0.836***
Index of structural change	2.397***	1.017	1.634*
Interacted with construction		5.429***	
Interacted with trade		2.529	
Voivodship population density			-0.054
Contracting dominant sector			-0.225*
-2*log-likelihood	4782.6	4773.4	4775.1
Overall chi-squared (*df*)	465 (*15*)	500 (*17*)	468 (*17*)
Number of observations	5839	5839	5839

*Note: *, **, *** denote significance at the 10, 5 and 1 per cent levels.*

Table 12: Decomposing the inflow rate gap between high and low unemployment voivodships in Poland 1995/6.

	Difference in log odds due to:
Age, gender, marital status and education	0.016
Industry and occupation	0.030
Ownership sector	0.047
Size of enterprise	0.101
Industrial turbulence index	0.139
Estimated log odds gap (sum of the above)	0.33

Source, see text.

Appendix

Our definition of low, medium and high unemployment voivodships is based on the average unemployment rate relative to the period 1994-'97. Every group represents about one third of the sample population. Table A1 describes the data used and contrasts the ranking of regions with the three taxonomies discussed in section 2. It confirms the result of Table 2 of scarce correlation between those classifications and the rate of unemployment.

Table A1 - Regional Taxonomies for Poland

N.	Voivodship	u[1]	Active population (%)	Active population (cumulative, %)	SH[2]	GL[3]	LW[4]	Low, Medium and High
63	Poznanskie	8.08	3.32	3.32	V	V	VI	L
95	Zamojskie	8.43	1.35	4.67	II	II	I	L
1	Warszawskie	8.67	5.48	10.15	V	VI	VI	L
35	Krakovskie	9.27	3.36	13.51	V	V	VI	L
75	Skiernewickie	9.72	1.19	14.70	II	I	II	L
7	Bielskie	10.23	2.54	17.24	III	IV	V	L
45	Lomzynskie	10.32	0.94	18.18	II	II	I	L
3	Bialskopodlaskie	10.37	0.81	18.98	II	I	I	L
71	Siedleckie	10.48	1.88	20.86	II	I	I	L
43	Lubelskie	10.51	2.76	23.62	VI	III	IV	L
27	Katowickie	11.04	9.67	33.28	IV	IV	V	L
5	Bialostockie	11.08	1.82	35.10	V	III	III	L
83	Tarnobrzeskie	11.20	1.65	36.75	II	I	II	M
25	Kaliskie	11.47	2.10	38.86	III	III	III	M
55	Ostroleckie	11.49	1.09	39.94	II	II	I	M
73	Sieradskie	11.75	1.05	40.99	II	II	I	M
53	Opolskie	11.94	2.71	43.71	IV	V	V	M
61	Plockie	12.43	1.51	45.22	II	II	III	M
93	Wroklavskie	12.45	2.76	47.97	I	VI	IV	M
85	Tarnowskie	12.63	1.87	49.84	I	II	II	M
15	Czestochowskie	12.71	1.93	51.77	IV	II	III	M
69	Rzeszowskie	12.84	1.94	53.71	VI	I	III	M
19	Gdanskie	13.05	3.39	57.10	V	VI	VI	M
29	Kieleckie	13.06	3.27	60.37	II	II	II	M
59	Piotrkowskie	13.22	1.83	62.20	IV	III	III	M
41	Lesczynskie	13.44	1.09	63.29	VI	II	IV	M
65	Przemiskie	13.72	1.02	64.32	II	I	I	M
49	Nowosadeckie	13.75	1.95	66.27	II	III	II	M
11	Chelmskie	13.84	0.73	67.00	I	I	II	M
97	Zielonogorskie	14.79	1.84	68.84	III	V	V	H
9	Bydgoskie	14.88	2.79	71.64	III	V	V	H
81	Szczecinskie	14.89	2.31	73.94	V	VI	VI	H
47	Lodzskie	14.97	2.92	76.86	III	VI	VI	H
67	Radomskie	15.30	1.94	78.80	II	II	II	H
87	Torunskie	15.38	1.73	80.53	VI	III	IV	H
13	Ciechanowskie	15.66	1.34	81.87	II	II	I	H
57	Pilskie	16.16	1.30	83.17	VI	IV	IV	H
37	Krosnienskie	16.43	1.46	84.63	II	II	I	H
31	Koninskie	16.92	1.26	85.88	II	I	II	H
39	Legnickie	17.30	1.32	87.20	III	IV	V	H
91	Wloclawskie	18.01	1.31	88.52	V	III	II	H
89	Walbrzyskie	18.71	1.79	90.31	IV	V	IV	H
33	Koszalinskie	19.40	1.30	91.61	VI	IV	V	H
51	Olsztynskie	19.52	1.99	93.60	VI	VI	V	H
17	Elblaskie	19.56	1.22	94.83	VI	V	IV	H
21	Gorzowskie	19.70	1.32	96.14	VI	V	IV	H
23	Jelenogorskie	20.87	1.47	97.61	IV	V	V	H
79	Suwalskie	21.95	1.29	98.91	II	II	III	H
77	Slupskie	22.18	0.98	100.00	VI	IV	IV	H
	Total	13.15						

[1] "u" is the average unemployment rate relative to the period 1994-'97.

[2] The SH taxonomy is due to Scarpetta and Huber (1995).

[3] The GL taxonomy is due to Góra and Lehmann (1995).

[4] The LW taxonomy is due to Lehmann, H. and P. P. Walsh (1998).

Table A2: 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 at 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 service	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**
Co-operatives	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***
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	

Source: *Polish Labour Force Survey*

Table A3: Inflow hazard functions in low and high unemployment regions

	Lowest unemployment voivodships	*Highest unemployment voivodships*
age: below 25	-0.280***	-0.0007
Between 25 and 34	-0.078**	-0.093
Between 35 and 44	-0.004	0.013**
Between 45 and 64	-0.075	-0.196***
Completed education:		
University	-1.223***	-1.926***
Secondary	-0.396	-0.461**
Lower vocational	-0.241	-0.322*
Industry *(default = manufacturing, mining and utilities)*		
Agriculture	-1.552***	-0.502
Construction	0.499	0.509**
Retail trade	0.592*	-0.003
Hotels and restaurants	1.387***	0.832**
Business and financial services	0.568	0.468
Public services	0.663*	-0.296
Other services	0.65**	0.244
Sector *(default = co-operatives)*		
State sector	-0.213	1.172**
Private sector	0.799***	2.148***
Local government	0.214	1.920***
size of enterprise *(default = more than 100 employees)*		
Less than six employees	1.098***	1.343***
From 6 to 20 employees	0.757***	1.328***
From 21to 50 employees	0.894***	1.145***
From 51 to 100 employees	0.754**	0.571*
Number of observations	4086	3864

Note: *, **, *** denote significance at the 10, 5 and 1 per cent levels.

Endnotes

[i] Our three cohorts, or quasi-panels, are observed as follows. First we take all the respondents to the PLFS who are observed at November 1994 and November 1995. Second we take the respondents observed at both November 1995 and November 1996. Lastly we take the respondents observed at November 1996 and November 1997. The design of the PLFS ensures that no respondent appears in more than one of the above groups.

[ii] We replicate our results for the November 1994-1995 and November 1996-1997 quasi-panels, and these results are in the Appendix or available on request.

[iii] As discussed in Kiefer (1988), 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 that the size of these problems is very low, almost irrelevant in the case of flows out of employment.

[iv] Details of our approximations are available on request.

[v] In unreported estimates based on the whole sample of voivodships, the coefficient was highly significant.

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