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Hartmut Lehmann
Patrick Paul Walsh



Katholieke Universiteit Leuven

LICOS Centre for Transition Economics
Huis De Dorlodot
Deberiotstraat 34
B-3000 Leuven
BELGIUM
TEL: +32-(0)16 32 65 98
FAX: +32-(0)16 32 65 99
<http://www.econ.kuleuven.ac.be/licos>

Gradual Restructuring and Structural Unemployment in Poland: A Legacy of Central Planning*

Hartmut Lehmann

LICOS, Centre for Transition Economics, Katholieke Universiteit Leuven

and

The William Davidson Institute at the University of Michigan Business School.

Patrick Paul Walsh

LICOS, Centre for Transition Economics, Katholieke Universiteit Leuven.

and

Department of Economics, Trinity College, Dublin.

Address for correspondence:

Patrick Paul Walsh
LICOS, Centre for Transition Economics
Faculty of Economics and Applied Economics
Katholieke Universiteit Leuven
Debériotstraat 34
B-3000 Leuven

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Abstract

In the transition to a market economy we examine the relationship between inherited human capital structures and the evolution of unemployment within a two-sector model of endogenous restructuring. We find evidence across Polish regions for the predictions of our theory. The inherited dominance of ineffective human capital in eastern regions of Poland has delayed restructuring, reduced unemployment turnover and lowered the number of workers with out-dated human capital in the unemployment stock. On the other hand, the dominance of effective human capital in western regions has induced restructuring, boosted unemployment turnover and increased the number of workers with out-dated human capital among the unemployed. We argue that the role of government to prevent such outcomes is limited. Yet, intervention conceived as social rather than economic policies can lessen the social cost created from the inheritance of out-dated human capital, which is a legacy of central planning.

Keywords: Out-dated Human Capital, Restructuring, Unemployment and Poland.

Journal of Economic Literature: Classification Numbers J6, L0 and O5.

INTRODUCTION

A large-scale reallocation of workers due to the need to restructure the State-Owned-Sector (SOS) and the entry of the New-Private-Sector (NPS) must facilitate the transition process to a market economy. In this paper we examine constraints on the restructuring process and the evolution of unemployment across the regions of Poland during the period 1994–1996. This issue has generated a growing theoretical literature using two sector models of endogenous restructuring, see e.g. Aghion and Blanchard (1994), Burda (1993) and Gavin (1993). These papers assume that an exogenous initial layoff of SOS workers takes place at the start of transition that creates unemployment. Such unemployment is predicted to delay restructuring when the wage premium offered to workers of the SOS to restructure is too low to compensate them for the risk of becoming unemployed for an expected duration in the aftermath of restructuring. Yet, these models also predict that fast growth in the emerging NPS will increase the speed of restructuring, leading to increased unemployment turnover and reduced unemployment duration.

Borish and Noel (1996), EBRD (1996) and OECD (1997) document that countries of Central and Eastern Europe (CEE) have simultaneously experienced both strong growth in the NPS and unemployment of long duration. Brixiova (1997) provides us with a theoretical explanation for this empirical observation by allowing for on-the-job search in state firms and flows of workers from the SOS to the NPS. This factor reduces the speed of restructuring in state firms, reduces unemployment turnover, and increases the length of job search for the unemployed. Boeri (1998) and Bilsen and Konings (1998) among others have established the empirical importance of job-to-job movements in various CEE countries.

The cited theoretical literature overlooks another important constraint on the restructuring process. There is an implicit assumption that workers in the SOS have homogenous and effective human capital, at the start of transition, when used either in the private or the restructured sector. Boeri (1998) sketches a model of hiring in the private sector that allows workers coming from the state sector

to be either low or high productivity workers once employed in the private sector. Information and screening problems on the nature of human capital inherited from planning induce more flows from the state sector into private sector than from the unemployment pool. The spirit of this approach is embedded in this paper into a two-sector model of endogenous restructuring. We model the possibility that the restructuring process can be delayed by a dominance of ineffective human capital inherited from the planning system. Its presence can lower unemployment turnover and reduce the number of workers with redundant human capital in the unemployment stock. An inherited dominance of an effective human capital stock can however, induce restructuring, increase unemployment turnover and the amount of workers with redundant human capital in unemployment. We provide empirical evidence for these predictions across Polish regions.

Throughout our analysis we treat each region (voivodship) of Poland as an independent labor market. This is justified on the grounds that inter-regional migration flows have been virtually absent while regions inherited a rather idiosyncratic socioeconomic structure coming out of planning. The advantage of a regional analysis within Poland, compared to a study across CEE countries, is that the initial human capital structure can be expected to be very different by region, while economic institutions and macroeconomic environment are the same. Why should we expect structural problems in the inherited human capital of workers in the SOS and why should these vary across Polish regions?

Boeri and Scarpetta (1996) point out that most of the polarisation observed in the recent employment performance of regions can be explained by the inherited regional socio-economic structure of the planning system. Until the reforms in 1990 many regions of the Polish economy were insulated from competition and worker human capital was employed only within the planned economies of the CMEA area. Exposure to world markets rendered the human capital accumulated in many occupations hopelessly out-of-date. Yet, as shown by Repkine and Walsh (1998), many western regions of Poland produced products for export outside the CMEA before 1990 and thus inherited human capital that was viable in the global economy. They estimate the empirical relevance of this factor

to be very significant for the recovery of industrial production. The eastern regions tended to be mainly CMEA oriented and enjoyed a privileged position in terms of allocation of resources over the forty years of central planning. These regions had a high concentration of Mining, Defence and Natural Resource Extraction industries. A stylised eastern region is one with a large industrial conglomerate surrounded by private agricultural holdings with inherited human capital not easily adaptable to the market economy. This study demonstrates that regional differences in inherited human capital are the key to understanding the regional evolution of restructuring and unemployment across Poland during the first seven years of transition.

In section I, we write down our theoretical framework and predictions that we wish to test empirically. Section II develops our taxonomy that classifies the regions of Poland by the degree of employment restructuring undertaken up to 1996. In section III we examine restructuring and unemployment with reference to our regional groupings within this taxonomy. In section IV we specify and estimate an econometric model of the impact of human capital characteristics and degree of restructuring on the dynamics of regional unemployment. Our results are shown to be consistent with our theoretical predictions. Section V puts forward some conclusions and policy issues.

I. IN SEARCH OF A THEORY

Workers councils took effective control of state owned firms at the start of transition in Poland. These councils were in place in 1981 but had no power as long as managers were backed from the centre. During the reforms in 1990 they assumed control and could veto any important decision making process within the firm. This led to delays in the restructuring process and the distribution of profits among workers in the form of higher wage growth than warranted by productivity growth. On the other hand, privatisation of state firms did not imply immediate restructuring. Privatisation through liquidation was the most popular method used, which led to insider majority ownership. Because of majority insider voting privatisation did not lead to automatic restructuring.

The economy in a region is composed of two sectors, the SOS with employment E and the private sector with employment N . We normalise the labour force to equal 1 so that $E + N + U = 1$, where U is unemployment or the unemployment rate. Before transition $E = 1$ and $N + U = 0$. The reallocation process ends when $E = 0$ and $N + U = 1$. We do not allow for entry to and exit from the labour force. The model focuses on the reallocation of SOS workers at the start of transition to private (privatised or new private) jobs or unemployment by the end of the transition period.

Within the SOS we distinguish between two broad types of inherited human capital: viable, E^v , and redundant, E^r . Workers with viable human capital are assumed to have an average revenue product of 1 in the unstructured SOS and $(1+\theta)$, where $\theta > 0$, in either the NPS or in a state-owned or privatised restructured/private previous SOS. Workers with redundant human capital are assumed, as an extreme case, to have an average revenue product of zero in all employment states in the market system. In the state sector workers are paid their average revenue product, (E^v/E) . This assumes the revenue generated from workers with viable human capital is shared among all workers in the SOS. Survival of the SOS without restructuring may require an initial partial restructuring of the SOS in the form of layoffs. We first examine our outcomes in the absence of initial layoffs and then generalise our results to incorporate their presence.

We model restructuring by assuming that employment in the privatised previously SOS is reduced to λE^v , each producing with an average product of $(1+\Phi)$. Efficient restructuring implies producing a higher total revenue product with only a fraction of the original viable workforce, $\lambda E^v(1+\Phi) > E^v$. Hence, the model concerns itself with the timing rather than the nature of the restructuring process.

The core element of the model is that E workers in the SOS dictate the timing of restructuring. If workers with redundant human capital are the majority in the SOS at the start of transition the condition that induces restructuring to take place is the following,

$$rV_{E^r} = \left(\frac{E^v}{E} \right) \leq rV_{U^r} = b \quad (1)$$

The value of a state job to workers with redundant human capital, rV_{E^r} , must be lower or equal to the value of being unemployment, rV_{U^r} , the benefit level, b . This assumes that such workers have a zero re-employment probability and gain no monetary benefit from the privatisation process. The introduction of either of these factors would ensure that this type of worker would be willing to restructure at flows of state income above the benefit level. If viable human capital dominates the SOS at the start of transition, restructuring will take place when the following condition is satisfied,

$$rV_{E^v} \leq \lambda rV_{N^v} + (1-\lambda)rV_{U^v} \quad (2)$$

The expected income stream for a worker with viable human capital, ex-post restructuring, must be at least as great as the return to the worker in a state job, rV_{E^v} , for restructuring to take place. Such a worker has a probability λ of remaining in the restructured previously SOS, earning an income stream of rV_{N^v} , and a probability $(1-\lambda)$ of becoming unemployed with an income stream of rV_{U^v} . The expected income stream, ex-post restructuring, reflects this uncertainty.

CASE I: OUT-DATED HUMAN CAPITAL INSIDER MAJORITY: The number of jobs, H , coming on stream in the NPS is determined by a , an exogenous determinant of growth, and by the rent earned from each worker hired. This assumes we have imperfect competition in the product market of the NPS. We write down the job flow or hiring function in the NPS as the following,

$$H = a[(1+\theta) - W] \quad (3)$$

The expected value of the job in the SOS sector, rV_{E^v} , when condition (1) is not satisfied, for workers with viable human capital is the following,

$$rV_{E^v} = \frac{E^v}{E} + \frac{H}{E^v} (V_{N^v} - V_{E^v}) \quad (4)$$

The expected income is the sum of the yield, average revenue product per worker in the SOS, and an expected capital gain, the probability of being hired in the NPS times the additional income stream from being employed in this sector. The probability of being hired in the NPS is determined by the ratio of hiring in the NPS to the numbers of workers that have viable human capital in the SOS. The value of a job in the NPS sector, rV_{N^v} or W , is assumed to be a fixed mark-up, rc , on the income stream expected in the SOS. We write the condition down as the following,

$$rV_{N^v} = W = r(V_{E^v} + c) \quad (5)$$

Combining (4) and (5) we can express the income stream that would induce a job-to-job flow from the SOS to the NPS as,

$$W = \frac{E^v}{E} + c \left(\frac{H}{E^v} + r \right) \quad (6)$$

In (3) and (6) we have two equations and two unknowns. One can solve for the numbers hired, H^* , and flow of income, W^* , that satisfies both conditions. A majority of insiders with outdated human capital ensures that restructuring is delayed and all of the reallocation of workers from the SOS to the private sector is undertaken by job to job flows of workers with adaptable human capital. Unemployment in this extreme case is not used to facilitate the reallocation of viable workers from the SOS to the private sector. In addition, unemployment does not accumulate workers with predominantly severe structural problems.

In the above extreme case we assumed that the entire SOS was viable, whether or not it restructured at the start of transition. The sector is made up of many firms, some of which may have undertaken layoffs or even exited at the start of transition. The presence of unemployment ensures that viable workers in SOS have to compete with the unemployed for jobs in the growing NPS. This can be shown to reduce the number of job-to-job flows and increase the expected delay in the restructuring of the SOS. In general, though, we predict that delays in restructuring reduce unemployment turnover, prolong duration and reduce the amount of redundant human capital present in unemployment

CASE II: VIABLE HUMAN CAPITAL INSIDER MAJORITY: We present the hiring in the NPS as in (3). For the SOE to restructure condition (2) must be satisfied. The expected income stream after restructuring must compensate the viable worker for the risk of becoming unemployed and for the forgone expected income stream from the non-restructured state of the SOS, W^* , using (3) and (6). The expected income stream in the event of a flow into unemployment, rV_U^v , after restructuring can be written down as,

$$rV_{U^v} = b + \left(\frac{H}{(1-\lambda)E^v} \right) (V_{N^v} - V_{U^v}) \quad (7)$$

The expected income of a worker with viable human capital in the market system in unemployment is the sum of the benefit level and an expected capital gain, the uncertain income gain from a probability of being employed in the NPS. The value of a job in the private sector for a viable worker (assuming arbitrage equalises returns in the NPS and recently privatised SOS), W , is assumed to be a fixed mark-up, rc , on the income stream expected in the state of unemployment. We write the condition as the following,

$$rV_{N^v} = W = r(V_{U^v} + c) \quad (8)$$

Combining (7) and (8) we can express the income stream that would induce a viable worker to outflow from unemployment to the NPS as,

$$W = b + c \left(\frac{H}{(1-\lambda)E^v} + r \right) \quad (9)$$

Substituting into condition (2) using W^* and (8), one can write down the constraint on wage setting that ensures workers vote for restructuring at the start of transition.

$$W \geq W^* + (1-\lambda)rc \leq (1+\theta) \quad (10)$$

If the expected return per worker is greater than $(1+\theta)$ restructuring will not take place as the SOS would not be better off ex-post restructuring. For simplicity we assume (10) holds and restructuring takes place immediately at the start of transition. This ensures that λE^v remain in the newly privatised previously SOS and $(1-\lambda)E^v + E^r$ flow into unemployment. Wages are set to compensate the viable worker majority for the threat of unemployment during the restructuring process. The threat of unemployment in this model can block restructuring for a period but, as we assume above, is more likely to result in the payment of high wages with restructuring taking place at the start of transition. Wages have a dual function and are a form of efficiency wage payments as defined in Konings and Walsh (1994). Wage premiums are paid to retain workers and induce restructuring. The wage premiums paid are only a fraction of the additional rent that is created for the restructured sector ex-post.

The outflows from unemployment depend on the hiring in the NPS. Combining (10) and (3) one can solve for the endogenous outcomes H^{**} and W^{**} for a given expansion of the NPS. The unemployment rate will depend on the inflows in the aftermath of restructuring net of the outflows into the NPS. The unemployment pool will have a structural component, U^r , which is composed of all workers with redundant human capital coming from the restructured state sector, E^r . In addition a frictional component of unemployment, U^v , equal to the inflow of viable workers, $(1-\lambda)E^v$, minus the outflow of viable workers, H^{**} .

Unemployment in this second extreme case facilitates the reallocation of viable workers, not needed in restructured previously SOS, to the private sector. This induces high levels of unemployment turnover. In addition, unemployment accumulates all workers with structural human capital problems inherited from the planning system shed from the SOS in the restructuring process. The presence of unemployment or initial layoffs at the start of transition does not change the general predictions of this extreme. It may delay restructuring but is more likely to ensure that restructuring takes place at higher

wage levels in the private sector. In summary, within a two-sector model of regional endogenous restructuring, we predict the following propositions:

(i) The inherited dominance of ineffective human capital in the SOS of a region delays the restructuring process, reduces unemployment turnover and the presence of redundant human capital in unemployment.

(ii) The inherited dominance of an effective human capital stock in the SOS of a region, however, induces restructuring, increases unemployment turnover and the presence of redundant human capital in unemployment.

While no relationship is predicted between the stage of restructuring and the unemployment rate there are predictions concerning unemployment turnover and human capital compositions. In the next section we develop the taxonomy of regional employment restructuring in Poland. In later sections we use this taxonomy to produce empirical support for the above assertions.

II. IN SEARCH OF A REGIONAL TAXONOMY

Some previous studies have developed regional labor market taxonomies of Poland, for example, Huber and Scarpetta (1994) and Góra and Lehmann (1995). In this section we build on this work to develop the taxonomy of Polish regions based on the level of employment restructuring undertaken over the period 1990-1996. Our taxonomy bundles voivodships (the highest regional administrative units) into six groups which represent a continuum of employment restructuring from Group I (least restructured) to Group VI (the most restructured).

Our classification scheme ranks voivodships by seven restructuring indicators. Taking the sum of the best six rankings establishes the score for each region. Thus, the highest possible score possible is 6, when a region is always ranked number one, and the worst score possible is 294, when a region is always ranked last, 49. The regions are then sorted in ascending order and bundled into six groups. A

large discrete break in the score of two voivodships determined the hiatus between two regional groupings, leading to the regional taxonomy of Table 1.

(Table 1 about here)

(Chart 1 about here)

In chart 1 we show that, with the exception of Warsaw and Lodz, all regions in groups I, II and III, are in eastern regions of Poland. As suggested in the introduction, one important dichotomy between western and eastern regions was their trade orientation before 1990. The human capital of workers in eastern regions of Poland was employed within the planned structures of the CMEA area. Exposure to world markets made this human capital accumulated under central planning hopelessly out-dated. In contrast, many western regions exported their products outside the CMEA before 1990 ensuring that the human capital of the workers employed was viable in the global economy. This explains differences in the inherited human capital structure of workers by region and the speed of regional employment restructuring.

In Table 2 we give summary statistics of the seven indicators of employment restructuring within our taxonomy of regions. Each indicator is designed to capture the degree of regional employment restructuring that has taken place over the period 1990-1996. As suggested by the correlation matrix in Table 2, these restructuring indicators tend to be highly correlated across the 49 regions. We now discuss each restructuring indicator in turn.

(Table 2 about here)

A: Share of Services in Total Regional Employment, per cent in 1996: Scarpetta (1995) notes that the size of the service sector within the planning system, the non-material sector, was small compared to that observed in Western Europe. Services were present under planning, but they were undertaken within industrial enterprises. As a result they were classified as industrial employment. The growth of the service sector was not only driven by the entry of firms into the NPS, but also by the

unbundling of activities in SOS into services and production. The most (least) restructured region has 63 (26) per cent of employment classified as services.

B: Share of Males in Regional Employment with Job Tenure greater than ten years, per cent in 1996: Using the labor force survey in 1996 we rank regions by the percentage of males in employment who have not changed jobs since the beginning of transition. Transition from SOS employment to private sector employment should induce job turnover. It may be possible that individuals in a similar job in a privatised previously state owned firm may not report a break in job tenure and as a result this aspect of restructuring may not be picked up by this indicator. Yet, the presence of job turnover should reflect the creation of the NPS and some degree of restructuring in the previously SOS. The most (least) restructured region has 27 (61) per cent of males remaining in the same pre-transitional job in 1996.

C: Number of Telephones in a region per 100 inhabitants in 1996: Restructuring of the SOS and growth in the NPS sector is likely to be influenced by the quality of the public infrastructure in the region. One simple indicator for this is the number of telephones per 100 inhabitants. The most (least) restructured region has 31 (8) phones per 100 inhabitants.

D: Domestic Investments per 1000 inhabitants, percentage distribution across regions in 1996: Regions with viable products and efficient operations or with the potential of having these will have attracted domestic investment flows over the transition period. In addition, regions that hosted privileged Soviet Bloc oriented trade in the planning system lost their subsidies. The most (least) restructured region has 15 (0.5) per cent share of the investment funds made available to the economy.

E: Foreign Direct Investments per 1000 inhabitants, percentage distribution across regions in 1996: As documented in Repkine and Walsh (1998), firms that were EU oriented at the start of transition attracted a large amount of FDI and as a result restructured quickly producing higher quality products for the European market. The most (least) restructured region has 38(0) per cent share of FDI in the economy.

F: Share of Building and Construction in Total Regional Employment, per cent in 1996: With the growth of the NPS one would expect greater development of new offices, hotels, housing and restaurants. In Table 2 the most (least) restructured region has a 8 (2) per cent share of Building and Construction in total regional employment.

G: Share of Agriculture in Total Regional Employment, per cent in 1996: The agricultural sector was largely privately owned before transition, had a very low capital/output ratio, and was characterised by a substantially lower level of productivity than other sectors of the economy. Restructuring of this sector was urgently required with the opening up of Poland to world markets. A relatively high employment share of agricultural in a region at the end of 1996 is therefore indicative of a relative lack of restructuring of the agricultural sector in that region. There exists another mechanism that relates the share of agricultural employment to restructuring. Much of private agriculture that remained during transition was subsistence farming which served as a buffer for labour shed in industry (Leiprecht, 1997). However, as more restructuring occurs, more opportunities will exist in the growing NPS and, *ceteris paribus*, the lower should be the employment share of agriculture. The most (least) restructured region has 6 (62) per cent share of Agriculture in total regional employment.

In summary, five of the seven indicators are based on stock values and should therefore reflect unequivocally the relative degree of restructuring at the end of 1996. The two investment indicators on the other hand are based on flow values. However, since rankings of regions are similar when based on these two indicators for the years 1994 and 1995 (rank correlation coefficients for 96/94 and 96/95 are 0.94 and 0.96, respectively, and are highly significant), the rankings for 1996 reflect a persistent pattern of investment flows. All regional indicators are highly correlated and show that the degree of restructuring has varied across the regions of Poland. Workers in western oriented regions with a more competitive inherited human capital stock at the start of transition have undertaken far more restructuring of employment over the seven year period in comparison with workers in traditionally

CMEA oriented regions. In the next sections we examine unemployment outcomes within our regional groups that are based on distinct levels of restructuring.

III. RESTRUCTURING AND UNEMPLOYMENT

In fig. 1 we plot the male unemployment rate against the ranking of regions in terms of employment restructuring in 1996. The region ranked number one is the most restructured region. We restrict ourselves here and in the subsequent empirical analysis to male unemployment flows and stocks. They are less affected by short-term supply considerations and by distortions arising from the institutional set-up of the unemployment compensation system than are female stocks and flows. In terms of the unemployment rate across our ranking of regions, the overall effect of the stage of restructuring is not evident. Given our theoretical framework this may not be surprising. All regions are predicted to have components of frictional and structural unemployment. The least restructured regions are predicted to have less frictional and structural throughputs compared to the advanced regions but the duration of unemployment could be longer. A systematic relationship between the level of unemployment and the degree of regional restructuring is, therefore, not a consequence of our model.

(Figure 1 about here)

In this section we examine whether there is a systematic relationship between unemployment turnover and duration by human capital characteristics, in terms of age, education and previous job tenure across the regional groupings of our taxonomy. The annual inflow rate and outflow rate by region using official Live Register data are constructed as follows,

$$\text{The inflow rate} = (I_{t \rightarrow t+1} / (U_t + U_{t+1})/2) \quad (11)$$

$$\text{The outflow rate} = (O_{t \rightarrow t+1} / (U_t + U_{t+1})/2) \quad (12)$$

where $I_{t \rightarrow t+1}$ and $O_{t \rightarrow t+1}$ are, respectively, the gross regional flows of individuals into and out of unemployment over the period t to $t+1$, U_t and U_{t+1} are the regional stocks of unemployment at time t and $t+1$, respectively.

(Table 3 about here)

Table 3 presents the regional inflow rates, outflow rates and shares of long unemployment spells in the regional unemployment stocks for the years 1994-1996. We observe that the unemployment turnover rate increases as we move from Group I to Group VI in each time period. Also, the annual turnover rate increases over the period 1994 to 1996 within each grouping due to increased restructuring within regions over time. By 1996 Group VI had similar throughputs to those experienced by Great Britain in the midst of structural change in employment in the mid-1980s. The duration of unemployment, as measured by the share of long spells, declines as we move from Group I to the most restructured regions, Group VI, in each year. In addition, as frictional unemployment increases over time we see a secular decline in the share of LTU for each grouping within the taxonomy.

Even though no relationship exists between the unemployment rate and the degree of restructuring, we do observe a clear-cut relationship between the degree of restructuring, unemployment turnover and share of LTU in unemployment. We next turn to human capital characteristics and document the experience of males in regional unemployment flows and stocks by duration, age, education and length of previous employment tenure within our taxonomy of employment restructuring.

(Table 4 about here)

Table 4 documents the age compositions of the new registrations and those with duration of unemployment greater than a year using our taxonomy of regions for the year 1994 - 1996. The inflows have a similar share of all age groups, particularly in 1996, for all degrees of regional restructuring. Yet, there is a slightly greater relative number of over 34 years of age in the inflows of the more

advanced regions. In the LTU stock the share of under 34 years of age is in the majority in the least restructured region. As we move across the more restructured regions we observe that the LTU stock hosts a far greater number of older workers particularly those over 45 years of age. This suggests that the probability of survival in unemployment varies for different age groups in a systematic way across restructuring states.

(Table 5 about here)

Tables 5 documents the education compositions of the new registrations and the long-term unemployed for the same years. The inflows have a similar share for all education types, particularly in 1996, with a slight bias to having a greater number of males with basic educational attainment in the inflows of the more advanced regions. As we move across the more restructured regions we observe that the LTU stock hosts a greater number of workers with basic education. This again suggests that the probability of survival for different education groups in unemployment vary in a systematic way across restructuring states.

(Table 6 about here)

The tenure (of previous employment) compositions of the unemployed are shown in Table 6. The inflows have a greater relative number of males with greater than ten years previous job tenure in the more advanced regions. The most restructured regions also host a greater number of workers with long previous job tenures in LTU. The probability of survival for different tenure groups in unemployment seems to vary in a systematic way across restructuring states. Work experience under central planning seems to be identifying workers with unfavorable human capital characteristics.

In summary, we do observe differences in the regional composition of inflows and LTU by age, education and previous job tenure. The regional LTU stock in the more restructured regions of Poland have greater shares of older, less educated individuals coming recently out of pre-transition jobs. The regional differences in the composition of the inflows are not so marked compared to those observed in the stock of LTU. Nevertheless, there is still a tendency for the most restructured regions to have more

males with poor human capital characteristics in the inflows. The greater share of such human capital characteristics in LTU in more restructured regions seems to suggest that survival rates into LTU for different male types seem to vary widely across restructuring groupings.

To verify whether this is the case, we compute regional hazard rates for males conditional on the above mentioned human capital characteristics. We calculate regional hazard rates using duration specific stocks of the Polish live register data by age, education, and previous job tenure. The probability of exit for cohorts in the under 3 months duration category, $ESTU_t$, is computed by tracking this cohort into the between 3 to 6 months duration category three months later, $LSTU_{t+1}$, to find out how many remain in unemployment three months later. We adopt a similar methodology to calculate the probability of exit for cohorts in the under 6 months duration category, the short-term unemployed, STU_t . We track the numbers present in the under 6 months duration category and compare them to those who remain in the pool of between 6 and 12 months category, the medium-term unemployed, MTU_{t+1} , six months later. To calculate the probability of exit for cohorts in the under 12 months duration category we work with the under 12 months and between 12 and 24 months duration category one year later, LTU_{t+1} .

Hence, we calculate the fraction of those leaving unemployment within three months conditional upon being under three months in unemployment as the following:

$$a_{t \rightarrow t+1} = (ESTU_t - LSTU_{t+1}) / ESTU_t \quad (13)$$

We calculate the fraction of those leaving unemployment within six months conditional upon being under six months in unemployment in the following way:

$$b_{t \rightarrow t+1} = (STU_t - MTU_{t+1}) / STU_t \quad (14)$$

We calculate the fraction of those leaving unemployment within a year conditional upon being under a year in unemployment as:

$$c_{t \rightarrow t+1} = ((STU_t + MTU_t) - (LTU_{t+1})) / (STU_t + MTU_t) \quad (15)$$

In Table 7 we report these under three, six and twelve months conditional hazard rates by age, education and previous job tenure for the overall live register.

(Table 7 about here)

We observe that in all regions the exit rates from unemployment during the first three, six or twelve months are non-increasing with age. The duration of benefits that can last up to a year might create incentives to move into MTU but to avoid LTU and so exits can be delayed when we compare exits across our restructuring taxonomy. On the other hand, a clear trend emerges when we give males up to one year to exit. In Table 7 with reference to the twelve month hazard one should note that the exit rates for the young and prime age unemployed do increase as we move from Group I to Group VI, but this trend is less obvious as we move up age groups. The results imply that most age groups have a lower probability of flowing into LTU in the more restructured regions. This explains the larger presence of younger people in the LTU pool as we move from Group VI to Group I. Older groups have a low probability of exit even in more advanced regions. Together with higher unemployment turnover and a greater share of older males in the inflows, this explains the larger presence of older males in the LTU pool as we move from Group I to Group VI.

Next we examine the hazard rates in Table 7 by education, conditional on the degree of restructuring in the region. We observe that within all regions the exit rates from unemployment during the first three and six months are similar for those with basic or secondary education but increase in the presence of a university degree. Yet, for all regions those with secondary qualifications do better than those with basic qualifications when given twelve months to exit. The regional hazard rates under a year show that the exit rates for basic and secondary education increase as we move from Group I to Group VI but are similar for cohorts with university degrees. The results imply that all education groups have a lower probability of flowing into LTU in the more restructured regions. This explains why we observe larger numbers of individuals with secondary education flowing into LTU as we move from Group VI to Group I.

Finally, we examine the overall regional hazards by duration of previous tenure. In all regions and duration categories the exit rates from unemployment are highest among the individuals with no work experience. There is little difference between those with less or greater than ten years work experience when given less than 6 months to exit. The under a year regional hazard rates do show the benefit of having less than ten years of job tenure, i.e. they show us the advantage of work experience during transition compared to a recent separation from a pre-transition job. The under a year regional hazard rates show that paradoxically in all regions the exit rates from unemployment during the first year decrease with previous job tenure. This result is, however, in line with our thesis: for many individuals the human capital acquired on the job in the planned system became largely redundant after the onset of transition, particularly for the older less educated workers. We note that the exit rates for all tenure groups do increase as we move from Group I to Group VI.

Our analysis in this section confirms that inflows are lower in less restructured regions and are composed of a greater share of young, more educated males with no previous job tenure. In addition they have a greater probability of flowing into LTU or have relatively long duration spells in unemployment. The low turnover and long duration reflects the lack of restructuring and lack of outflows from unemployment in these regions. The latter may be due to either extensive job-to job flows between state and new private firms in the region, or a lack of new jobs in the NPS. The inflows into unemployment are greater in the more restructured regions and are composed of groups with more "negative forms" of human capital characteristics. Together with the low hazard rate for these groups, this lead to the large presence of older, less educated, long tenured males in LTU as we move from Group I to Group VI.

The inherited human capital structure was different across regions in 1990 as was the degree of employment restructuring since that date. The dynamics of regional labor demand in Poland seem to have pushed unemployment inflows in a systematic way by changing the magnitude and composition of the inflows, and also seem to determine the probabilities of exit conditional on duration, age,

education and previous employment tenure. In the next section we provide econometric evidence for this assertion.

IV. ECONOMETRIC EVIDENCE

The quarterly unemployment Live Register data for the period 1994-1996 at the regional level (voivodship level) is grouped or folded data. We therefore estimate a Logit model on group data. The logit function is defined as the log of the odds ratio, the proportion of the number of successes (exits from unemployment) to failures in the defined population, after being exposed to a certain treatment, controlling for other characteristics. The model that we estimate can be written as,

$$\log\left(\frac{P_{ijqt}}{1-P_{ijqt}}\right) = \beta_0 + \beta_1 X_{ijqt} + \varepsilon_{ijqt} \quad (16)$$

Where P_{ijqt} denotes the proportion of successes by type age, education or previous job tenure i , by region j in quarter q and year t . Since we have a number of explanatory variables, β_1 is here a row vector and X_{ijqt} , a column vector. Weighted least squares estimation produces the minimum χ^2 estimates of β_1 .

In Tables 8 and 9 we present the empirical results of modeling the annual hazard rate of males in the under a year duration category conditioned on being exposed to defined age, education, tenure and restructuring groupings. In Table 8 we see three regressions where we have grouped the entire population of males who have been unemployed for less than 12 months by one human capital characteristic respectively. Besides (implicitly) controlling for duration and gender, we also control explicitly for the stage of restructuring, additional region-specific effects, seasonal and macro effects. In Table 9 we undertake the same exercise for those sub-populations of short-term unemployed males who are either older than 44 years, have only basic educational attainment or have previous tenure

exceeding 10 years. The default categories for human capital characteristics and the stage of restructuring are shown in italics in both tables.

(Table 8 about here)

The results of Table 8 show the stage of restructuring as a very powerful predictor of annual hazard rates for males. Holding one human capital characteristic and other things constant, the odds of leaving unemployment are monotonically increasing in the stage of restructuring and roughly double when going from regional group I to regional group VI. So, any male unemployed with duration of less than 12 months residing in a voivodship belonging to the highest restructuring category has approximately a 100 percent lower probability of flowing into long-term unemployment than his colleague in regional group I.

The second important point that we can infer from Table 8 relates to the partial effects that human capital characteristics have on the annual hazard rate of males. *Ceteris paribus*, the odds ratio is found to decrease monotonically with age, education and tenure. While the strong negative relation between either age or education and the exit rate from unemployment comes as no surprise, the tenure result seems somewhat paradoxical. In western economies we would expect a positive relationship between firm specific human capital that a person had acquired in his last job and the exit rate from unemployment. We find that a male worker who flows into unemployment from a pre-transitional job that he held onto during transition has a significantly lower chance of exiting unemployment than someone who comes from a job started during transition or who is a new entrant.

Those among the male short-term unemployed who, according to Table 8, have particularly "bad" human capital characteristics are exposed in Table 9 to various stages of restructuring. There is a clear distinction between the effects on older age and basic educational attainment on the one hand and the effects on long previous tenure on the other hand. The odds ratios for older males and for males with basic education are more or less monotonically increasing in the stage of restructuring although they are only well defined for older males in regional groups V and VI and for males with basic

education in regional groups III through VI. In contrast for males with long previous tenure we see no upward movement in the odds ratio as far as the first five regional groups are concerned. Furthermore older males residing in a voivodship belonging to regional groups V and VI and males with basic education who have their residence in a voivodship belonging to regional groups IV, V and VI have roughly double the likelihood of leaving unemployment compared to their counterparts in less restructured regions. Males with long previous tenure living in regional groups VI, where the degree of restructuring is largest, have a more limited advantage over their counterparts from other voivodships, amounting to only 40 percent.

(Table 9 about here)

This econometric exercise has confirmed the assertion that the stage of employment restructuring and heterogeneity in human capital characteristics are key determinants of the inflows into male long-term unemployment. In particular, we find that while most males are less likely to flow into LTU in more advanced regions in terms of restructuring, males with long job tenures flowing into the stock of unemployment have generally the same outflow probability as their counterparts in the least restructured regions. Since the unemployment turnover and the share of males with long tenure in the inflow into unemployment are also higher in more advanced regions, this might explain why the stock of LTU in more advanced regions is accumulating relatively more males with this human capital characteristic. As shown in Table 6, in 1996 over 60 per cent of LTU males in regional group VI have the characteristic long previous job tenure. This compares with only 30 per cent in regional group I.

In regions that have undertaken restructuring this represents severe mismatch in human capital that was accumulated prior to transition and that seems to be outdated in the market system. This factor might also be behind the lack of restructuring in regions where worker majorities with ineffective human capital inherited from the planning system block restructuring in anticipation of a similar experience. The lack of restructuring reduces inflows into unemployment, while the lack of job creation in the NPS or the presence of job-to-job flows from state to new private firms reduces outflows from

unemployment. This lowers unemployment turnover, increases duration for all males, and makes the LTU pool less concentrated in "bad" human capital characteristics, such as older age, basic education and long previous job tenure. This confirms our assertions in the theoretical section of the paper.

V. CONCLUSIONS

In the transition to a market economy we examined the relationship between inherited human capital structures and the evolution of unemployment within a two-sector model of endogenous restructuring. We found evidence for our theory across Polish regions during transition. Until the reforms in 1990 many eastern regions of the Polish economy traded only within the CMEA area. Exposure to world markets made the human capital accumulated by many workers hopelessly outdated. Many western regions, on the other hand, traded outside the CMEA before 1990 and much of the inherited human capital in these regions was viable in the global economy after the regime switch. This created heterogeneity in the inherited human capital structure of workers across regions. These initial conditions are the key to understanding the speed of restructuring and the evolution of unemployment in Poland during transition.

Even though no relationship exists between the unemployment rate and the degree of restructuring, which is an interesting finding in itself, the more restructured regions of Poland are shown to have higher unemployment turnover rates. The share of males in the unemployment inflow with long previous employment tenure is shown to be higher in more advanced regions. Their probability of flowing into LTU is estimated to be, in most cases, the same in all regions. In conjunction with the higher turnover rate, this explains why the stock of LTU in more advanced regions is accumulating heavily in males with this human capital characteristic. In such regions unemployment has a dual function. It is used as a temporary pit stop to help reallocate workers to jobs in the NPS. Restructuring in these regions also acts as a cleansing device ensuring that any redundant

human capital is shed from employment over the course of transition. This creates the long-term structural component of unemployment.

It is the latter effect of restructuring that can lead workers in the SOS within the least restructured regions to block restructuring and reduce the inflows and the use of unemployment as a temporary pit stop or a permanent home in the reallocation process. The lack of restructuring reduces inflows into unemployment. We observe fewer long tenured males entering unemployment in the less advanced regions. We estimate that the probability of males flowing into LTU increases greatly with the lack of regional restructuring. This is likely to indicate the lack of job creation in the NPS and the presence of job-to-job flows between the SOS and NPS in these regions. This reduces unemployment turnover, increases duration for all males and makes the LTU pool less concentrated in the human capital characteristic of long previous job tenure. The severe structural component of unemployment observed in advanced regions is not yet evident in the least restructured regions. Instead, in the latter regions structural unemployment takes, to varying degrees, the form of hidden unemployment in employment.

Having empirically documented the dynamics behind LTU in the context of transition we can draw out some policy implications from our results. The build-up of structural unemployment due to structural changes in employment is not a phenomenon confined to transition countries. In many western economies since the early 1980s globalization of trade, but above all advances in technology, have caused important structural changes in the occupational structure of employment. The changing skill structure of employment has been documented for the US by Berman, Machin and Bound (1995), for France and Germany by Sneessens (1995), for the UK by Machin, Ryan and Van Reenan (1996) and Nickell (1996) and for Ireland by Strobl and Walsh (1998). Large discrete changes in the structure of employment lead to heterogeneous inflows of workers into unemployment, many of which had accumulated redundant human capital while in employment in protected sectors. These workers, separated from pre-liberalization job security, accumulated in the pool of LTU. Could a relative wage

adjustment or training not move this human capital to alternative employment? The sunk costs associated with the re-building of redundant human capital and the limited duration of any return on such an investment can lead to the voluntary and involuntary exclusion of these individuals from the effective labor force. We believe that such considerations are highly relevant to the restructured regions of Poland. Policies should be implemented to deal with such severe structural mismatch in the human capital of these males. Social policies rather than active labor market policies should be developed and targeted at these individuals, especially in advanced regions. These workers are clearly victims of a large discrete change in government policy that ended up in long-term unemployment through no fault of their own. Amidst large scale structural adjustment in employment the role for labor market training programs implemented on the grounds of efficiency to regenerate out-dated human capital of males certainly seems limited.

We also infer from our evidence that any attempt to speed up the restructuring process in eastern regions will induce structural unemployment on a much larger scale to that observed in western regions. As discussed in a more general context by Commander and Tolstopiatenko (1996), this may have serious implications for taxation, welfare payments, and the growth of the NPS. It may therefore be wise for the government, as part of a regional industrial policy, to delay restructuring with transfers from western regions. The role of government is limited to offsetting the social damage that outdated human capital, a legacy of planning, has been shown to have on the restructuring and reallocation process in Poland.

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TABLE 1Employment Restructuring Taxonomy of Polish regions ^a

I	II	III	IV	V	VI
41. Ciechanowskie	32. Chelmskie	25. Czestochowskie	17. Walbrzyskie	8. Katowickie	1. Warszawskie
42. Ostroleckie	33. Kieleckie	26. Bialostockie	18. Slupskie	9. Zielonogorskie	2. Szczecinskie
43. Krosnienskie	34. Radomskie	27. Plockie	19. Elblaskie	10. Legnickie	3. Poznanskie
44. Sieradzkie	35. Tarnowskie	28. Suwalskie	20. Gorzowskie	11. Bydgoskie	4. Wroclawskie
45. Przemyskie	36. Koninskie	29. Kaliskie	21. Lubelskie	12. Opolskie	5. Krakowskie
46. Bialskopodlaskie	37. Skierniewickie	30. Rzeszowskie	22. Torunskie	13. Koszalimskie	6. Lodzkie
47. Siedleckie	38. Nowosadeckie	31. Piotrkowskie	23. Leszczynskie	14. Bielskie	7. Gdanskie
48. Lomzynskie	39. Tarnobrzeskie		24. Pilskie	15. Jeleniogorskie	
49. Zamojskie	40. Wloclawskie			16. Olsztynskie	

^a Ranked in ascending order by a rank score that sums the best six ranked positions in seven employment restructuring indicators outlined summarised by the above taxonomy in Table2.

TABLE 2

Summary Statistics of Restructuring Indicators by Regional Group (RG)

Indicator	A	B	C	D	E	F	G
RG I							
Mean	29.4	53.1	10.0	00.7	00.4	02.7	53.3
Std. Dev.	02.7	03.3	01.6	00.2	00.5	00.8	06.3
Min	25.9	48.4	08.0	00.5	00.0	01.6	41.2
Max	33.0	58.1	14.0	01.0	01.7	03.8	62.0
RG II							
Mean	32.4	51.3	11.0	01.1	00.7	03.8	45.4
Std. Dev.	03.2	05.3	01.3	00.4	00.6	00.4	03.3
Min	25.6	43.4	10.0	00.5	00.0	03.2	40.3
Max	37.2	60.4	13.0	01.8	01.5	04.3	50.4
RG III							
Mean	35.0	49.4	13.0	01.4	00.5	04.6	38.2
Std. Dev.	04.5	03.5	02.5	00.5	00.3	00.6	03.7
Min	29.8	44.5	10.0	00.7	00.3	04.0	32.8
Max	41.2	54.7	18.0	02.3	01.1	06.2	43.7
RG IV							
Mean	43.7	39.0	13.0	01.2	00.8	04.6	25.6
Std. Dev.	0.43	07.6	00.7	00.5	00.4	00.6	07.5
Min	37.0	26.5	12.0	00.7	00.3	03.3	13.7
Max	49.8	52.0	14.0	02.4	01.6	05.5	36.9
RG V							
Mean	46.1	39.0	14.0	03.1	02.0	06.4	18.4
Std. Dev.	04.2	03.5	02.3	03.1	01.9	01.6	06.3
Min	40.7	34.7	11.0	01.1	00.4	04.8	06.4
Max	54.0	45.5	17.0	11.0	06.1	09.7	25.0
RG VI							
Mean	54.3	36.5	21.0	05.2	08.9	07.0	12.1
Std. Dev.	04.8	03.1	05.6	04.6	13.0	01.1	05.2
Min	49.0	31.9	16.0	02.4	01.1	04.9	05.7
Max	63.0	41.4	31.0	15.4	38.0	08.2	21.0

A: Share of Market and Non-Market Services in Total Regional Employment, per cent in 1996

B: Share of Males in Regional Employment with Job Tenure greater than ten years, per cent in 1996

C: Regional Telephones per 100 inhabitants in 1996.

D: Investments per 1000 inhabitants, percentage distribution across regions in 1996.

E: Foreign Direct Investments per 1000 inhabitants, percentage distribution across regions in 1996.

F: Share of Building and Construction in Total Regional Employment, per cent in 1996

G: Share of Agriculture in Total Regional Employment, per cent in 1996

Correlation	A	B	C	D	E	F	G
A	1.0						
B	-0.86	1.0					
C	0.74	-0.50	1.0				
D	0.51	-0.31	0.63	1.0			
E	0.47	-0.34	0.69	0.84	1.0		
F	0.70	-0.52	0.56	0.62	0.40	1.0	
G	-0.92	0.83	-0.65	-0.53	-0.39	-0.80	1.0

TABLE 3

Male Inflow, Outflow Rates and LTU Share by Regional Group

	<i>Group</i>	<i>Inflow Rate</i>	<i>Outflow Rate</i>	<i>LTU Share</i>
1994	I	0.71	0.87	.46
	II	0.72	0.77	.40
	III	0.78	0.83	.42
	IV	0.73	0.91	.41
	V	0.85	1.00	.37
	VI	0.96	1.10	.33
1995	I	0.92	0.87	.38
	II	0.95	1.00	.34
	III	0.96	1.04	.35
	IV	1.02	0.97	.34
	V	1.10	1.13	.30
	VI	1.10	1.24	.30
1996	I	0.91	1.14	.35
	II	0.88	1.10	.34
	III	0.97	1.21	.33
	IV	1.04	1.30	.31
	V	1.13	1.37	.28
	VI	1.12	1.48	.27

Source: Polish Live Register.

TABLE 4

Composition of Male Unemployment Inflows and Long Term Unemployment
by Age and Regional Group

<i>1994</i>								
<i>Group</i>	<i>15-24</i>		<i>25-34</i>		<i>35-44</i>		<i>>44</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.48	.36	.25	.30	.19	.22	.08	.12
II	.47	.34	.25	.28	.18	.24	.10	.14
III	.42	.32	.25	.27	.21	.25	.12	.16
IV	.42	.31	.25	.26	.23	.27	.10	.16
V	.42	.27	.23	.24	.23	.28	.12	.21
VI	.38	.23	.22	.21	.23	.29	.17	.27

<i>1995</i>								
<i>Group</i>	<i>15-24</i>		<i>25-34</i>		<i>35-44</i>		<i>>44</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.51	.32	.23	.29	.18	.24	.08	.15
II	.48	.31	.23	.28	.20	.25	.09	.16
III	.46	.28	.23	.26	.21	.25	.10	.21
IV	.44	.28	.23	.25	.22	.27	.11	.20
V	.45	.25	.22	.23	.22	.27	.11	.25
VI	.41	.21	.21	.19	.24	.27	.14	.33

<i>1996</i>								
<i>Group</i>	<i>15-24</i>		<i>25-34</i>		<i>35-44</i>		<i>>44</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.38	.30	.29	.28	.22	.25	.11	.17
II	.38	.28	.28	.26	.23	.26	.11	.20
III	.36	.25	.26	.24	.24	.25	.14	.26
IV	.36	.25	.25	.23	.25	.27	.14	.25
V	.38	.23	.23	.21	.25	.26	.14	.30
VI	.33	.18	.22	.16	.26	.24	.19	.42

Source: Polish Live Register.

TABLE 5

Composition of Male Unemployment Inflow and Long Term Unemployment Pool
by Education and Regional Group

<i>1994</i>						
<i>Group</i>	<i>University</i>		<i>Secondary</i>		<i>Basic</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.01	.01	.72	.65	.27	.34
II	.01	.01	.71	.64	.28	.35
III	.02	.01	.68	.61	.30	.38
IV	.01	.01	.65	.61	.34	.38
V	.01	.02	.66	.57	.33	.41
VI	.03	.04	.58	.58	.39	.38

<i>1995</i>						
<i>Group</i>	<i>University</i>		<i>Secondary</i>		<i>Basic</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.01	.01	.73	.64	.26	.35
II	.01	.01	.71	.62	.28	.37
III	.02	.01	.69	.59	.29	.40
IV	.01	.01	.65	.57	.34	.42
V	.01	.01	.67	.56	.32	.43
VI	.03	.03	.63	.54	.34	.43

<i>1996</i>						
<i>Group</i>	<i>University</i>		<i>Secondary</i>		<i>Basic</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.01	.01	.65	.63	.34	.36
II	.01	.01	.66	.61	.33	.38
III	.02	.01	.63	.56	.35	.42
IV	.01	.01	.60	.55	.39	.43
V	.01	.01	.62	.55	.37	.44
VI	.03	.03	.59	.53	.38	.44

Source: Polish Live Register.

TABLE 6

Composition of Male Unemployment Inflow and Long Term Unemployment Pool
by Tenure and Regional Group

1994						
<i>Group</i>	<i>None</i>		<i>Tenure</i>			
	<i>Inflow</i>	<i>LTU</i>	<i>0-10 Years</i>		<i>>10 Years</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.37	.32	.36	.40	.27	.28
II	.31	.22	.39	.45	.30	.33
III	.28	.21	.36	.42	.36	.37
IV	.24	.18	.38	.41	.38	.41
V	.27	.18	.35	.37	.38	.45
VI	.22	.19	.35	.31	.43	.50

1995						
<i>Group</i>	<i>None</i>		<i>Tenure</i>			
	<i>Inflow</i>	<i>LTU</i>	<i>0-10 Years</i>		<i>> 10 Years</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.38	.29	.37	.40	.25	.31
II	.32	.21	.42	.41	.26	.38
III	.30	.23	.35	.36	.35	.41
IV	.25	.17	.38	.42	.37	.41
V	.27	.17	.38	.35	.35	.49
VI	.25	.17	.35	.27	.40	.56

1996						
<i>Group</i>	<i>None</i>		<i>Tenure</i>			
	<i>Inflow</i>	<i>LTU</i>	<i>0-10 Years</i>		<i>> 10 Years</i>	
	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>	<i>Inflow</i>	<i>LTU</i>
I	.23	.27	.48	.41	.29	.32
II	.19	.19	.55	.43	.26	.38
III	.17	.19	.43	.35	.40	.46
IV	.15	.16	.47	.40	.38	.44
V	.17	.15	.45	.33	.38	.52
VI	.17	.14	.39	.25	.44	.61

Source: Polish Live Register.

TABLE 7

Under a year average Hazard Rates for Male Unemployed
by Age/Education/Tenure by Regional Group^a

Three Month Hazard Rates (a_{t-y+1})

Group	Age				Education			Tenure		
	15-24	25-34	34-44	>45	Uni.	Sec.	Basic	None	0-10	>10
I	.21	.17	.16	.12	.36	.18	.16	.24	.16	.15
II	.25	.23	.22	.19	.39	.23	.22	.29	.22	.21
III	.22	.21	.15	.15	.38	.20	.18	.25	.18	.17
IV	.20	.23	.20	.16	.28	.21	.19	.27	.19	.19
V	.28	.26	.24	.17	.36	.25	.24	.31	.25	.23
VI	.30	.28	.29	.22	.35	.25	.31	.35	.28	.25

Six Month Hazard Rates (b_{t-y+1})

Group	Age				Education			Tenure		
	15-24	25-34	34-44	>45	Uni.	Sec.	Basic	None	0-10	>10
I	.37	.35	.35	.31	.52	.35	.35	.39	.33	.36
II	.39	.37	.36	.31	.53	.37	.36	.43	.36	.35
III	.39	.37	.35	.31	.52	.37	.35	.45	.35	.34
IV	.43	.39	.35	.29	.51	.38	.37	.50	.36	.35
V	.46	.43	.41	.33	.54	.43	.41	.50	.41	.40
VI	.48	.48	.46	.36	.54	.44	.47	.53	.46	.42

Twelve Month Hazard Rates (c_{t-y+1})

Group	Age				Education			Tenure		
	15-24	25-34	34-44	>45	Uni.	Sec.	Basic	None	0-10	>10
I	.72	.67	.65	.56	.80	.69	.65	.70	.67	.66
II	.74	.70	.67	.57	.82	.71	.66	.72	.70	.67
III	.75	.72	.70	.58	.80	.73	.67	.73	.73	.68
IV	.78	.75	.72	.60	.81	.75	.70	.77	.74	.72
V	.81	.77	.75	.61	.81	.77	.72	.80	.77	.72
VI	.85	.81	.78	.62	.80	.80	.76	.82	.82	.74

^a These rates are averaged over the flows between 1994-95 and 1995-96.

Source: Polish Live Register.

TABLE 8

Weighted least squares logit estimates for grouped data: Annual Exit Rate of Male under a year stock conditioned on either age, education or tenure

Odds Ratio (t-stat)	Age	Odds Ratio (t-stat)	Education	Odds Ratio (t-stat)	Tenure
Observations	1556	Observations	1167	Observations	1167
R ²	0.75	R ²	0.75	R ²	0.62
Adj. R ²	0.74	Adj. R ²	0.73	Adj. R ²	0.60
Age 15-24		University		No Previous Tenure	
Age 25-34	.84 (-11.1)*	Secondary	.77 (-5.1)*	Tenure 0-10	.93 (-3.3)*
Age 35-44	.73 (-19.9)*	Basic	.61 (-9.5)*	Tenure > 10	.74 (-14.4)*
Age > 44	.41 (-13.1)*	-	-	-	-
RG I		RG I		RG I	
RG II	1.2 (1.7)	RG II	1.2 (1.8)	RG II	1.3 (2.3)*
RG III	1.5 (5.4)*	RG III	1.4 (5.0)*	RG III	1.5 (4.6)*
RG IV	1.8 (6.6)*	RG IV	1.8 (7.4)*	RG IV	1.6 (4.6)*
RG V	1.7 (6.1)*	RG V	1.7 (5.9)*	RG V	1.7 (5.0)*
RG VI	2.3 (10.5)*	RG VI	1.9 (9.3)*	RG VI	2.0 (7.4)*
Regional Dummies	Yes	Regional Dummies	Yes	Regional Dummies	Yes
Seasonal Dummies	Yes	Seasonal Dummies	Yes	Seasonal Dummies	Yes
Year Dummies	Yes	Year Dummies	Yes	Year Dummies	Yes

* Significant at the 5% level.

TABLE 9

Weighted least squares logit estimates for grouped data: Annual Exit Rate of Male under a year stock conditioned on either older age, basic education or long job tenure

Odds Ratio (t-stat)	Age	Odds Ratio (t-stat)	Education	Odds Ratio (t-stat)	Tenure
Observations	389	Observations	389	Observations	389
R ²	0.53	R ²	0.70	R ²	0.67
Adj. R ²	0.46	Adj. R ²	0.66	Adj. R ²	0.64
<i>RG I</i>		<i>RG I</i>		<i>RG I</i>	
RG II	1.3 (1.3)	RG II	1.2 (1.3)	RG II	1.1 (0.8)
RG III	1.2 (0.9)	RG III	1.4 (2.2)*	RG III	0.8 (-1.5)
RG IV	1.5 (1.9)	RG IV	1.9 (3.7)*	RG IV	1.3 (1.5)
RG V	2.2 (4.5)*	RG V	1.9 (4.4)*	RG V	1.1 (0.4)
RG VI	1.8 (3.9)*	RG VI	2.0 (4.9)*	RG VI	1.4 (2.2)*
Regional Dummies	Yes	Regional Dummies	Yes	Regional Dummies	Yes
Seasonal Dummies	Yes	Seasonal Dummies	Yes	Seasonal Dummies	Yes
Year Dummies	Yes	Year Dummies	Yes	Year Dummies	Yes

* Significant at the 5% level.

FIGURE 1

Unemployment and the ranking of Polish regions by degree of restructuring

