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Essays on Regional Restructuring and The Polish Labour Market

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Thesis submitted to Trinity College, Dublin in fulfilment of the requirements for the degree of Doctor in Philosophy (Ph.D) in Economics.

October 2001

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Summary

The fall of the iron curtain and the transition shock that Poland faced in the early 1990s necessitated substantial adjustments throughout the economy. Planners no longer dictated prices, trade, financial allocations or employment levels. The general consensus in the literature was, at least at the start of transition, that the most salient economic adjustments were occurring in the functioning of labour markets. All the Central East European Countries except for the Czech Republic experienced rapidly rising and persistently high (double digit) unemployment rates over the first seven years of transition. A lot of studies have been done on the transition in Central and Eastern Europe and its impact on the labour market. The problem is that most of the studies focused on developments observed at the national level. This of course facilitates cross-country comparisons of experience. At the regional level there was also considerable interest in labour market adjustments across transition countries but data limitations have meant that most of these studies focused on either particular groupings of regions within a country or generalized regional issues across Central and Eastern Europe within a very descriptive analysis.

In this thesis I present new evidence concerning labour market adjustments specifically looking at the Polish economy. I apply a new taxonomy of socio-economic development to Polish regions to examine two aspects of regional labour market adjustments, first wages and second employment and unemployment changes. I use micro-level evidence provided by the Polish Central Statistics Office to present three essays on Polish labour market adjustments and regional restructuring.

The data sources surveyed in chapter two of the thesis include the 1994 to 1996 waves of the Polish Labour Force Survey, the Regional Statistical Yearbooks data also provided by the Polish Central Statistics Office and finally the Amadeus Company Accounts firm level data provided by the Bureau Van Dijk. My access to the Polish Labour Force Survey was an invaluable opportunity to examine the effects of economic restructuring on the Polish labour market and the firm level data provided by the Bureau Van Dijk gave me the opportunity to combine firm level data with the household data in the Labour Force Survey. By doing this I have introduced a new novelty into this research. In chapters three and four I can include controls for employment dynamics into the estimated wage equations.

In these essays I create an index of job reallocation to proxy for the quality of jobs available in a local or regional labour market. Similar work has been undertaken by Belzil (2000) for Denmark but my research is the first study to my knowledge, which attempts to do this for an economy in transition. The thesis is divided into three core essays on labour market adjustments: first, "A Regional Analysis of Wage Determination, Unemployment and Job Reallocation", second, "Individual Pay and Outside Earning Options: With Evidence from the Polish Labour Force Survey" and finally "An Essay on Regional Restructuring and Unemployment Dynamics in Poland".

The first two essays of this thesis in chapters three and four aim to address the following questions on labour market wage adjustments in Poland. How have regional wages responded to local labour market conditions in the regional labour market? What determines regional wage levels? How have individual wages of workers responded to conditions in their regional labour markets and what determines individual wages? Can we use Blanchflower and Oswald's (1994) "Wage Curve Hypothesis" in the context of a transition economy? and finally what happens in wage equations if I include controls for labour market dynamics using job reallocation rates?

Results in chapter three on regional wage response show that regional wages do respond positively to changes in the rate of regional restructuring across firm populations. Workers in the more restructured regions are shown to receive higher premiums in pay indicating compensation for exposure to risk during restructuring. Furthermore, regional wages react negatively to regional unemployment and workers in low unemployment regions earn more pay indicating the presence of profit sharing. This chapter is an indirect test of profit sharing in wage setting and its findings are consistent with the existence of a Polish Wage Curve. The regional level of aggregation used in this chapter is still lower than the time series work surveyed by authors like Nickell, Jackman and Freeman (1997). It is my first step in examining wage adjustments over transition.

Chapter four delves into the wage curve hypothesis at a richer level of analysis. Using information gathered from the Polish Labour Force Survey I created a panel of individuals to examine whether competition for labour has induced individual pay to depend on outside options, availability and quality of jobs at a more disaggregated micro level of analysis. The novelty of this research is the application of a Heckman Selection Model to a large panel of

Polish individuals while including controls for labour market dynamics in my wage regressions. Using the Polish Labour Force Survey data, I ask if individuals earn more by exploiting outside earning options during transition? The estimated elasticities of pay to outside local labour market conditions, comprising of local unemployment (tightness) and job reallocation rates (dictated by the degree of structural change in the surrounding labour market), are approximately -0.1 and + 0.1, respectively. Variations in local labour market conditions explain approximately fifty per cent of the differences in expected individual earnings across regions, while differences in inherited human capital and occupation structures explain the rest. In addition I find that technical education and work experience accumulated under planning are not well rewarded during transition. Yet, academic education, youth and specific occupations are rewarded.

The final issue explored in this thesis concerns the relationship between restructuring and unemployment. This is examined in chapter five which introduces quantity/employment adjustments and models structural change in unemployment as an outcome of inherited social capital. Is unemployment unavoidable in the process of reform? Does unemployment assist the process of restructuring? The destructive part of restructuring is likely to be positively correlated with unemployment, as the more rapidly jobs are destroyed the higher the unemployment rate is likely to be. On the other hand job creation is likely to be associated with low unemployment. Chapter five explores these issues and their relevance to the Polish economy.

Chapter six concludes the thesis with a summary and review of the main results. Possible further extensions to this work are also outlined.

Acknowledgments

Work on this research began in the Department of Economics, Trinity College in 1998. It was Dr. Hartmut Lehmann who first introduced me to the study of reform in the Polish labour market, and I owe him much gratitude for allowing me to work on the Polish Labour Force Survey. However it is Dr. Paul Walsh who provided me with ongoing input and material assistance during the course of my research. He contributed determinately to each of the chapters in this thesis and made a significant contribution to the research in chapters three, four and five.

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Finally I would like to thank my family and all the staff and postgraduates of the Department of Economics, Trinity College Dublin for their help and support over the last four years. It was a pleasure to work in the Department.

Contents

	Summary	I
	Acknowledgements	IV
	Table of Contents	V
	List of Tables	IX
	List of Figures	XIV
1	**Introduction**	**1**
	1.1 Introduction	1
	1.2 Motivation for Research	2
	1.3 Contribution to Existing Literature	5
	1.4 Aims of the Thesis	7
	1.5 Methodology and Data	8
	1.6 Structure of Thesis	9
2	**Data Sources**	**13**
	2.1 Introduction	13
	2.2 Description of the Polish Labour Force Survey	14
	2.2.1 Sampling Strategy	15
	2.2.2 Data Questions	16
	2.2.3 Labour Market Classifications in Labour Force Survey	17

2.2.4 Questions on Remuneration 18

2.2.5 Comparing the P.L.F.S. to other Western Surveys 19

2.3 Amadeus Company Accounts Data 20

2.4 Unemployment, Economic Structure & Indices of Structural Change 23

2.4.1 Previous Indices of Economic Restructuring 23

2.4.2 Newell and Pastore Index of Industrial Change 25

2.4.3 An Index of Job Reallocation 26

2.4.4 Results from the Faggio and Konings (1999) Study 27

2.5 Polish Central Statistics Office Yearbook Data 28

2.6 Conclusion 29

3 A Regional Analysis of Wage Determination, Job Reallocation and Unemployment in Poland 30

3.1 Introduction 30

3.2 Literature Review 36

3.3 Some Theoretical Considerations 40

3.3.1 Limitations of the Model 45

3.4 Empirical Data 47

3.5 A Regional Taxonomy by Socio-Economic Development 47

3.5.1 Issues with the Lehmann-Walsh (1998) Taxonomy 50

3.6 Empirical Model and Results 51

3.6.1 Robustness and Alternative Model Specifications 54

3.7 Conclusion 55

4 Individual Pay and Outside Options: Evidence from the Polish Labour Force Survey 57

4.1 Introduction 57

4.2 The Outside Option and Individual Earnings 60

4.3 Alternative Specifications of the Econometric Model 66

4.4 Returns to Educational and Occupational Work Experiences 68

4.5 Conclusion 70

5 Regional Restructuring and Unemployment Dynamics in Poland 72

5.1 Introduction 72

5.2 Contribution to Literature 74

5.2.1 Literature on the Unemployment Inflow Rate 77

5.2.2 Literature on the Unemployment Outflow Rate 78

5.3 Theory 79

5.3.1 Firm Level Restructuring in the State-Owned Sector 80

5.3.2 Regional Job Separation Rates 81

5.3.3 Regional Hiring Rates 82

5.3.4 Regional Unemployment Rates 83

5.4 Unemployment Inflows, Outflows and Duration 84

5.4.1 Construction of Inflow and Outflow Rates 84

5.5 Econometric Evidence 90

5.5.1 Regional Level Regressions 90

5.5.2 Individual Level Regressions 91

5.6 Conclusion 94

6 Conclusion 96

Bibliography 99

List of Tables

		Page
Table 1.1	Unemployment in Selected Transitional Economies	108
Table 1.2	E.B.R.D. Unemployment Rates by Country, 1991 to 1998	108
Table 2.1	Labour Force Rotation Samples, 1993 to 1997	109
Table 2.2	Labour Force Survey Samples of 19 Quarters, 1992 to 1998	110
Table 2.3	Amadeus Samples of Polish Firms according to Ownership Types	110
Table 2.4	Percentage of Polish Firms Under Different Employee Categories	111
Table 2.5	Estimates of Percentages of Firms by Employment Size using the Lehmann-Walsh (1998) Regional Taxonomy and the P.L.F.S.	111
Table 2.6	Job Reallocation Rates, Unemployment Rates and Average Monthly Wage Levels by Lehmann-Walsh (1998) Regional Groupings	112
Table 2.7	Correlation Coefficients Between Gora-Lehmann and Lehmann-Walsh Structural Indices	113
Table 3.1	Composition of Polish Exports by Branch Group	113
Table 3.2	Poland's Exports by Groups of Countries	114
Table 3.3	The Slowing Down of Polish Migration: Gross Migration Flows	115
Table 3.4	First Generation Papers 1970s and 1980s	115
Table 3.5	Second Generation Papers late 1980s and 1990s	116
Table 3.6	Blanchflower and Oswald's Wage Curves in 12 Nations	117
Table 3.7	Blanchflower's Wage Curves in Eastern Europe	118
Table 3.8	Summary Statistics of Restructuring Indicators	119
Table 3.9	Employment Restructuring Taxonomy of Polish Regions	120
Table 3.10	Correlation Matrix of Lehmann-Walsh Restructuring Indicators	120
Table 3.11	Summary Statistics of the Monthly Wage 1992 to 1996	121

		Page
Table 3.12	Summary Statistics of the Unemployment Rate 1992 to 1996	122
Table 3.13	Regressions across Polish Regional Panel 1992 to 1996	123
Table 3.14	Two Stage Least Squares Estimations 1992 to 1996	124
Table 3.15	Random Effects G.L.S. Regressions 1992 to 1996	125
Table 3.16	O.L.S. Regressions using Job Creation and Job Destruction Rates	126
Table 3.17	Two Stage Least Squares Estimations using Job Creation and Job Destruction Rates	127
Table 3.18	Random Effects G.L.S. Regressions 1992 to 1996	128
Table 4.1	Changes in Female Employment and Labour Force Participation Rates in Selected C.E.E. Countries 1989 to 1997	129
Table 4.2	P.L.F.S. Educational Categories and Two-Digit Occupational Codes	130
Table 4.3	Correlation Matrix of Age and Job Tenure for the years	131
Table 4.4	Age Composition of Job Tenure by Lehmann-Walsh Taxonomy	131
Table 4.5	Two Stage Least Squares Estimation: Effect of Local Labour Market Conditions on Individual Wages 1994 to 1996	132
Table 4.6	Two Stage Least Squares Estimation: Regression with Local Labour Market Conditions & Industry Dummies	133
Table 4.7	Two Stage Least Squares Estimation: Regression with Local Labour Market Conditions, Industry Dummies & Age	134
Table 4.8	Two Stage Least Squares Estimation: Regression Results with Age, Education and Industry Dummies (Model 4.1)	135
Table 4.9	Augmented Wage Curve Regressions Across Polish Individuals Comparison 2S.L.S. and 2S.G.E.E. Estimation	136
Table 4.10	Augmented Wage Curve Regressions for State Sector Employees	137

		Page
Table 4.11	Augmented Wage Curve Regressions for State Sector Employees Comparison 2S.L.S. and 2S.G.E.E. Estimation	138
Table 4.12	Augmented Wage Curve Regressions for Private Sector Employees	139
Table 4.13	Augmented Wage Curve Regressions for Private Sector Employees Comparison 2S.L.S. and 2S.G.E.E. Estimation	140
Table 4.14	Two Stage Least Squares Estimation: Effect of Local Labour Market Conditions (expressed as levels) on Individual Wages	141
Table 4.15	Two Stage Least Squares Estimation: Regression with Local Labour Market Conditions (as levels) & Industry Dummies	142
Table 4.16	Two Stage Least Squares Estimation: Regression with Local Labour Market Conditions (as levels) Industry Dummies and Age	143
Table 4.17	Two Stage Least Squares Estimation: Regression Results with Age, Education and Industry Dummies	144
Table 4.18	Two Stage Least Squares Estimation: Regression with Job Creation and Job Destruction Rates 1994-1996	145
Table 4.19	Two Stage Least Squares Estimation: Regression Results with Job Creation and Job Destruction Rates	146
Table 4.20	Comparing 2S.L.S. Results with a Heckman (1979) Earning Regression	147
Table 4.21	Comparing 2S.L.S. Results with a Heckman (1979) Regression for State Sector Workers	148
Table 4.22	Rates of Return to Human Capital and Occupational Characteristics	149
Table 4.23	Rates of Return to Human Capital and Occupational Characteristics Splitting Sample by Age	150

		Page
Table 4.24	Elasticity of Pay with respect to Local Unemployment and Local Job Reallocation by Human Capital and Occupational Groupings	151
Table 5.1	Pace of Structural Change in Transitional Economies and O.E.C.D. Countries	152
Table 5.2	Unemployment Inflow and Outflow Rates and Share of Long-term Unemployment using Amadeus and Polish Live Register Data	153
Table 5.3	Data Comparisons for Three Different Taxonomies	154
Table 5.4	Composition of Male Unemployment Inflows and Long-Term Unemployment by Age and Regional Group	155
Table 5.5	Under a Year Average Hazard Rates for Unemployed Males by Age and Education	156
Table 5.6	Composition of Male Unemployment Inflows and Outflows with Long-Term Unemployment by Age	157
Table 5.7	Weighted Least Squares Logit Models for (A) Annual Male Inflow Rate and (B) Annual Male Exit Rate	158
Table 5.8	O.L.S. Regressions across Polish Regional Panel 1994 to 1996	158
Table 5.9	Two Stage Least Squares Estimation 1994 to 1996	159
Table 5.10	Random-Effects G.L.S. Regressions across Polish Regional Panel	160
Table 5.11	Weighted Least Squares Logit Model for Grouped Data: Annual Exit Rate of Males in under a Year Stock conditioned on Age	161
Table 5.12	Weighted Least Squares Logit Model for Grouped Data: Annual Exit Rate of Males in under a Year Stock conditioned on Education	162

		Page
Table 5.13	Basic Characteristics of Males in Dynamic and Stagnant Voivodships	163
Table 5.14	Logit Models of Male Unemployment Outflow Transitions 1994/95 and 1995/96	164
Table 5.15	Logit Models of Male Unemployment Inflow Transitions 1994/95 and 1995/96	165

List of Figures

		Page
Figure 3.1	Monthly Wage and Short-term Unemployment Rate 1996	166
Figure 3.2	Monthly Wage and Short-term Unemployment Rate 1995	167
Figure 3.3	Monthly Wage and Short-term Unemployment Rate 1994	167
Figure 3.4	Monthly Wage and Short-term Unemployment Rate 1993	168
Figure 3.5	Monthly Wage and Short-term Unemployment Rate 1992	168
Figure 3.6	Monthly Wage and Job Reallocation Rate 1996	169
Figure 3.7	Monthly Wage and Job Reallocation Rate 1995	169
Figure 3.8	Monthly Wage and Job Reallocation Rate 1994	170
Figure 3.9	Monthly Wage and Job Reallocation Rate 1993	170
Figure 3.10	Monthly Wage and Job Reallocation Rate 1992	171
Figure 3.11	Monthly Wage and Job Creation Rate 1996	171
Figure 3.12	Monthly Wage and Job Creation Rate 1995	172
Figure 3.13	Monthly Wage and Job Creation Rate 1994	172
Figure 3.14	Monthly Wage and Job Creation Rate 1993	173
Figure 3.15	Monthly Wage and Job Creation Rate 1992	173
Figure 3.16	Monthly Wage and Job Destruction Rate 1996	174
Figure 3.17	Monthly Wage and Job Destruction Rate 1995	174
Figure 3.18	Monthly Wage and Job Destruction Rate 1994	175
Figure 3.19	Monthly Wage and Job Destruction Rate 1993	175
Figure 3.20	Monthly Wage and Job Destruction Rate 1992	176
Figure 5.1	Evolution of the Polish Unemployment Rate	177

Chapter One

Introduction

The transformation to a market system and the exposure to world competition after the collapse of communism has been associated with considerable adversity in Poland. Since 1989 gross industrial output has fallen by 35 per cent and gross domestic product by 20 per cent. Polish firms began to cut staff and unemployment rose independently of reform strategies pursued by the national government. The Polish labour market is a key vehicle for the expression and reallocation of skills and talents.

(Commander 1998)

1.1 Introduction

While it was functioning, the Soviet-type centrally planned system was characterised by full employment of labour (zero open unemployment) and centrally set wages, prices and output targets for state owned enterprises. The fall of the iron curtain and the transition shock that Poland faced in the early 1990s necessitated substantial adjustments throughout the economy. Planners no longer dictated prices, trade, financial allocations or employment levels. The general consensus in the literature was, at least at the start of transition, that the most salient adjustment was in the area of unemployment and the functioning of labour markets. Examining the data in Table 1.1 it can be seen that, all the Central East European Countries except for the Czech Republic experienced rapidly rising and persistently high (double digit) unemployment rates over the first seven years

of transition. This "unemployment crisis" in the Central East European Countries contributed to a political backlash as the post revolutionary governments were soon voted out of office in all the countries except for the Czech Republic[1]. It was now a case where labour market adjustments needed to be carefully examined by economic researchers.

A lot of studies have been done on the transition in Central and Eastern Europe and its impact on the labour market. The problem is that most of the studies focused on developments observed at the national level. This of course facilitates cross-country comparisons of experience. An interesting question however relates to the existence of empirical based research of labour market adjustments across regions but *within* a country during transition? The answer to this question is that there has been considerable interest in regional labour market adjustments across transition countries but data limitations have meant that most of these studies focused on either particular administrative groupings of regions or generalized regional issues within a very descriptive analysis. In this thesis I present new evidence concerning labour market adjustments specifically looking at the Polish economy. The thesis examines the impact of restructuring on three aspects of the Polish labour market during transition and is based around a central thesis that Polish regions, which historically traded with the West under the old planned regime were better able to adapt to a changed economic climate. By applying a new taxonomy of socio-economic development to Polish regions the thesis investigates the impact of cross-regional differences in the extent of restructuring on first regional wage determination, second individual wage determination and third inflows and outflows from unemployment.

1.2 Motivation for Research

The motivation for undertaking this research stems from a number of factors. First an intellectual interest in the area of labour economics, this was the original driving force behind undertaking the study. With access to the Polish Labour Force Survey it became possible to explore the operation of the labour market in the case of a very unique

[1] In the Czech Republic the coalition of the reformist parties lasted until December 1997 (Svejnar, 1999).

setting, a transition economy. For an economist, the transition process provides an interesting laboratory or natural experiment as transition economies are said to be the nearest thing to a scientific 'experiment' for economic researchers. At the start of transition no theory or model existed to explain how an economy evolves from a planned to a market system. Since then the research gap has been filled by plenty of theoretical and empirical studies as the process of reform moves on giving the researcher the unprecedented possibility of testing their own theories. The study of transition from a labour market perspective therefore offers a means of obtaining amidst the disorder and chaos brought on by transition a reliable picture of the state of reform as well as indications of the pathways to follow and the mistakes to avoid. On the one hand, employment data are among the few reliable data available in transition economies. On the other hand, labour dynamics within these countries are highly volatile and their social effects painfully destabilising.

A second reason for pursuing this research stems from the fact that policy debates in transition economies have recently moved from macro stabilization policies to microeconomic issues including amongst other factors, enhancing the functioning of labour markets and attracting more foreign direct investment. An examination of labour market adjustments, in terms of wages and employment/unemployment dynamics explains the operation of nascent labour markets during the reform process. Furthermore by specifically examining the impact of cross-regional differences in the extent of restructuring on the Polish labour market, we can test if initial conditions[2] affect a region's, and the individuals who reside therein, ability to respond to the shock of transition. The greater a region's ability to respond to the transition shock, the more desirable it becomes as a location for foreign direct investment.

I focus on Poland rather than a range of Central and East European economies because of the following key factors. First, in 1989 Poland became one of the first countries of Central and Eastern Europe to establish political democracy and a market economy and since then it has emerged as one of the fastest growing economies in

[2] Initial conditions refer to all regional specific factors in place at the start of the transition process. These for example could be attributed to a region's historic trade orientation with either the C.M.E.A. market or the Western market.

Europe. In terms of investment in Central and Eastern Europe, Poland is second only to Hungary. Interestingly however unemployment in Poland has shown substantial and persistent regional differences. For example, Socha and Weisburg (1999) found that the ratio of the highest unemployment rate in the Suwalki region, to the lowest unemployment rate in the Warsaw region, was 5.5 in 1990 and 6.0 in 1997, an increase of 0.5 over a seven-year period.

Second although Polish regions inherited different socio-economic structures coming out of planning the microeconomic institutional changes and the macroeconomic environment during transition were the same over all regions. Focusing on one country has the advantage of allowing us to study an economy with common institutions across regions, the same culture and language yet differences in inherited socio-economic structures coming out of planning[3]. Boeri and Scarpetta (1996) were the first to hypothesise that each region in Poland inherited a rather idiosyncratic socio-economic structure coming out of planning. For example, Eastern regions are noted by Repkine and Walsh (1999) as having a high concentration of agriculture, mining, defence and natural resource extraction industries prior to reform, while the more restructured Western regions had firms producing a lot of products for export to the E.U. prior to 1990. This research examines if such an inheritance drove variations in restructuring, unemployment and average pay in a systematic way, based around a central thesis, that areas which traded with the West under the old planned regime were more able to adapt to the changed economic climate.

Third, despite this inheritance in socio-economic structures coming out of planning, inter-regional migration flows have been virtually absent in Poland. This is confirmed by studies for Poland undertaken by Faggio and Konings (1999) who found that most *job* flows are intra-region as opposed to inter-region while Boeri and Scarpetta's (1996) study of *worker* flows in Poland finds no significant evidence of inter-regional worker flows over transition. Diechmann and Henderson (2000) document that Polish internal migration decreased significantly in the 1990s. Their research claims that "current population levels everywhere (in Poland) seem frozen at a degree of

---

[3] Described in later chapters as initial conditions.

urbanisation that is low by international standards", this issue is further discussed in chapter three of the thesis. The authors also acknowledge that migration levels do not respond to unemployment differentials, perhaps because Poland's continuing housing shortage deters migration. Housing construction, which was already low, fell by half in the 1990s. Using these papers as evidence of insignificant inter-regional migration flows allows this research to treat Polish regions as independent labour markets during later empirical analysis.

In addition, my access to the Polish Labour Force Survey and the methodology of using a large micro-dataset to explore regional level issues lends itself to an interesting study. It should be noted that statistical offices across Eastern Europe have treated micro-data on individuals as highly confidential. However under conditions of anonymity of individuals, researchers have been able to obtain micro-data for research purposes from the statistical offices of the individual countries. Being able to access the Polish Labour Force Survey was a huge benefit to the research carried out in this thesis and the size of the samples lends more credibility to the research findings.

1.3 Contribution to Existing Literature

As already noted in section 1.1, increasing academic attention is being focused on labour market dynamics across the countries of Central and Eastern Europe. However it is only recently that microeconomic research has been conducted with respect to labour market developments in Poland. This is mostly attributed to the difficulty in obtaining large datasets, which are essential to this kind of research. The contribution I bring to research in this area is therefore significant.

First I apply unique micro-level data from the Polish Labour Force Survey and Amadeus Company Accounts data to my analysis of the Polish Labour Market. The Polish Labour Force Survey contains confidential information on samples of the Polish population. The confidential nature of the dataset made it difficult to access for research purposes, but thanks to Dr. Hartmut Lehmann[4] and the Polish Central Statistics Office it was possible to use the survey for the research contained in this thesis. Micro-data sets

[4] LICOS Centre for Transition Economics, Katholieke Universiteit, Leuven.

prove highly valuable in understanding labour dynamics in transition countries. In this research information gathered from the household survey of the Polish Labour Force Survey is combined with firm level data extracted from Amadeus Company Accounts data, to investigate the impact of cross-regional differences in restructuring on aspects of the labour market during transition. This area has not been previously explored in the context of a transition economy. The only study where firm level data is combined with household data relates to research conducted by Belzil (2000) for Denmark.

Moreover the Labour Force Survey data and Statistical Yearbooks data are all regionally differentiated. Poland is administratively divided into forty-nine viovodships and this is the basis of classification in both surveys[5]. A novelty in this research is that it is possible to classify these regions by grouping voivodships according to the Lehmann-Walsh (1998) taxonomy of Polish regions. This taxonomy has not been applied to Polish regions in the context of analysing the labour market and its adjustments. The Lehmann-Walsh (1998) taxonomy was chosen because it attempts to encapsulate each region's historical economic legacy and a central idea of this thesis is that regions, which historically traded with the West under the old planned regime, are more able to adapt to a changing economic climate. Obviously a region's historical economic legacy may engender a range of varying experiences across Polish regions, wages respond differently as do employment and unemployment depending on that region's experience under the old regime; the legacy of history. This greatly enlarges the set of variables, which researchers should take into consideration when trying to study the Polish transition experience. I attempt to control for these in the thesis using the regional taxonomy as an instrument for cross-regional restructuring in later chapters.

The datasets used in the thesis overcome most of the limitations of earlier empirical literature on Polish labour market adjustment. Furthermore combining information from these differing datasets allows analysis of labour market adjustments in a manner which has never been previously attempted for the Polish labour market. In particular the thesis examines the impact of restructuring on three aspects of the Polish

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[5] Although Poland has recently changed its administrative structure and has reduced the number of voivodships from forty-nine to sixteen, statistical information is available only for the old set of regions for the time period surveyed in this thesis.

labour market, regional wage determination, individual wage determination and inflows and outflows from unemployment.

On the one hand, I investigate wage responses to conditions in the local or regional labour market explicitly addressing the problem of job reallocation and employment dynamics as the new market system is being put in place. Although there has been some evidence for the existence of 'wage curves' in transition economies[6], very little research has been done in this area for Poland. This 'wage curve' literature and how my research contributes to it will be addressed in chapters three and four of the thesis. Incorporating data on job reallocation rates across Polish firms into wage equations also provides an empirical contribution to the literature on restructuring that has been in the main, very theoretical.

On the other hand, the thesis also studies the impact of cross-regional restructuring on unemployment dynamics in chapter five. This research extends work previously conducted by Dr. P. Walsh and Dr. H. Lehmann using Polish Live Register Data. Using the Labour Force Survey data however, lends more credibility to the research findings of the earlier study. Section 1.4 now outlines the aims of the thesis.

1.4 Aims of the Thesis

The primary aim of this thesis is to conduct an econometric study of several important labour market issues in Poland as it launched the transition from central planning to a market economy. It is an in-depth analysis of the impact of cross-regional differences in restructuring on labour market adjustments using a unique household dataset. Thanks to excellent contacts which were established between the Polish Central Statistics Office and Dr. Lehmann I gained access to twenty one quarterly waves of data from the Polish Labour Force Survey (P.L.F.S.) beginning May 1992. As noted in section 1.3, the lack of empirical research on Polish labour market adjustments was attributable to the difficulty in obtaining the large micro-datasets that are essential to this kind of research. My access to the P.L.F.S. was an invaluable opportunity to examine the effects of economic restructuring on the labour market in Poland based on a central thesis that

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[6] Arguing that wage *levels* respond negatively to changes in the *level* of regional unemployment rates.

areas, which traded with the West under the old planned regime were more able to adapt to a changed economic climate.

The thesis aimed to address the following questions on labour market adjustments in Poland. How have regional wages responded to local labour market conditions in the regional labour market? What determines regional wage levels? How have individual wages of workers responded to conditions in their regional labour markets and what determines individual wages? Can we use Blanchflower and Oswald's (1994) "Wage Curve Hypothesis" in the context of a transition economy? What happens in wage equations if we control for labour market dynamics using job reallocation rates? What is the relationship between inherited human capital structures and the evolution of Polish unemployment? Can we find the determinants of unemployment duration and hazard rates for Polish regions?

To address these questions the thesis crosses the three fields of labour, regional and macroeconomics. The next section briefly outlines the methodology and data used in this thesis.

1.5 Methodology and Data

This study is based on two main sources of Polish labour market data. The first is data gathered from the Polish Statistical Yearbooks, a collection of administrative, aggregate regional information allowing an exploration of labour market adjustments at the regional level of aggregation. It provides information on wage and employment adjustments across each of the forty-nine administrative Polish regions or viovodships. The second dataset, the Polish Labour Force Survey is a unique micro-level dataset that allows an exploration of several aspects of Polish labour market adjustments using richer data than that of the administrative yearbooks data. The survey was first conducted in May 1992 providing much information about households' employment characteristics, for example wages, type of job, level of completed education, age, place of residence and many more variables. Micro-level evidence on the Polish labour market provides invaluable information, richer than the aggregate, administrative data.

Standard regression analysis is used on both sets of data to identify in chapters three and four the affect of regional restructuring on regional and individual wages. One

important novelty in this research is the construction of our own indicator of economic restructuring described in greater detail in chapter two. This is constructed using information from the Amadeus Company Accounts dataset. Using this measure of job reallocation for regional restructuring in the regression analysis allows me to test the impact of local labour market conditions and the adjustments of wages and (un)employment to these conditions. A full description of the data sources used in this thesis and the construction of the job reallocation index is given in chapter two.

1.6 Structure of thesis

The thesis is based on three core research papers; first "A Regional Analysis of Wage Determination in Poland", second "A Study of Individual Pay and Outside Earning Options: With Evidence from the Polish Labour Force Survey", and finally "An Analysis of Regional Restructuring and Unemployment Dynamics in Poland".

The structure of the thesis is as follows. This chapter outlines the motivation behind this research and the contribution of the thesis to economic understanding. It then provides by way of introduction to the full analysis conducted in later chapters, a brief overview of the aims of the project and how the thesis is structured. Chapter two describes the datasets used for this study and outlines regional taxonomies applied in the literature to the Polish economy. Particular emphasis is placed on the Lehmann-Walsh (1998) taxonomy because it is used in subsequent chapters as an instrument for cross-regional restructuring.

In chapter three I explore the reactions of regional wages to regional unemployment testing for the impact of cross-regional differences in restructuring on regional wage determination. This is the first core essay of this thesis. The relationship between wages and unemployment was investigated in the early post-war period when the focus in the literature was on macroeconomic Phillips-Curve type relationships examining wage or price inflation and unemployment changes. More recent empirical studies have been concerned with wage level responses to unemployment levels (the wage curve) and rely strongly on individual data. However despite the fascination between wages and (un)employment levels remarkably few studies to date have investigated the relationship between employment dynamics (measured as job

reallocation in our study[7]) and wages[8]. Like Belzil (2000), I believe that introducing a job reallocation index of employment dynamics into a wage equation is justified for several reasons. First as argued by Belzil (2000), if firms expand faster than average and pay more in order to attract or retain workers then failure to take into account firm expansion (or decline) might seriously bias estimates of the return to human capital investments, for example in relation to education, experience or tenure. This is important in relation to the beta estimates on returns to human capital characteristics estimated using individual data in chapter four. Second, in the more general context estimates of the sensitivity of wages to job creation and job destruction provide an alternative way of measuring the sensitivity of wages to the business cycle. Belzil (2000) claims this is especially true if a relatively large proportion of job creation and destruction is explained solely by business cycle fluctuations.

In the context of transition we would expect structural change in employment to be necessary for economic efficiency as planned economies were oversized in terms of industrial and agricultural employment. Mass inter-sectoral job flows result from the forces of job creation and destruction as the new market system is being put in place. In addition, the downsizing and restructuring of traditional firms and the entry of new firms was expected to induce even greater intra-sectoral job reallocation overtime. Therefore in the context of transition it is too early in the transition phase for us to consider our measure of job reallocation as a proxy for the business cycle. It does however reflect changes in the external environment of firms as the new market system is put in place.

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[7] This measure of job reallocation is discussed in greater detail in chapter two of this thesis. At this point it is sufficient to define the reallocation of jobs across firms within regional employment as pure compositional shifts in the firms that host jobs in the regional unemployment pool over a period of a year. Firm level dynamics are driven mainly by the downsizing of large firms, changing ownership structures and the market orientation of production as the new market system is put in place during the economic transition away from communism.

[8] One study by Belzil (2000) examines the relationship between firm employment reallocation and wages using individual longitudinal data on Danish workers along with data on employment (size) changes over a period of twelve years. He finds a strong empirical link between real wages and reallocation amongst other factors including unemployment at the country level for Denmark.

A third justification proposed by Belzil (2000) is that the sensitivity of wages to job creation and job destruction can reveal important information about wage flexibility in a particular local labour market. This is especially useful in the context of nascent emerging markets like those in Eastern Europe. In chapters three and four I attempt to contribute to the understanding of the wage / (un)employment debate by examining the situation in the Polish economy. The novelty of the research in these chapters is the inclusion in wage equations of a measure of job reallocation and employment dynamics during the early stages of economic transition.

In chapter three I document evidence for the existence of a Polish Wage Curve including controls for labour market dynamics. Treating each of the forty-nine Polish regions as independent labour markets and after controlling for the degree of employment restructuring across regions, it measures the unemployment elasticity of pay using Polish Central Statistics Office data for the period 1992 to 1996. This chapter tests if my results are in accordance with the wage curve hypothesis proposed by Blanchflower and Oswald (1994), namely that wages react to regional unemployment. This regional level of aggregation is still lower than the time series work surveyed by authors like Nickell, Jackman and Freeman (1997). It is my first step in examining wage adjustments over transition. Panel data techniques are applied to the Polish data to test the above hypothesis and the impact of cross-regional differences in restructuring on regional wage determination.

Chapter four delves into the wage curve hypothesis at a richer level of analysis. Using information gathered from the P.L.F.S.[9], a panel of Polish individuals is created to examine whether competition for labour has induced individual pay to depend on outside options, availability and quality of jobs at a more disaggregated micro level of analysis. The novelty of this research is the application of various econometric specifications to a large panel of Polish individuals while including controls for labour market dynamics in the wage regressions. Using the Polish Labour Force Survey data, I ask if individuals earn more by exploiting outside earning options during transition? The estimated elasticities of pay to outside local labour market conditions, comprising of

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[9] Polish Labour Force Survey

local unemployment (tightness) and job reallocation rates (dictated by the degree of structural change in the surrounding labour market), are approximately -0.1 and + 0.1, respectively. Variations in local labour market conditions explain approximately 50 per cent of the differences in expected individual earnings across regions, while differences in inherited human capital and occupation structures explain the rest. In addition, I find that technical education and work experience accumulated under planning are not well rewarded during transition. Yet, academic education, youth and specific occupations are rewarded.

The final question addressed in this thesis concerns the relationship between cross-regional differences in restructuring and inflows and outflows to unemployment. This is examined in chapter five which introduces quantity/employment adjustments and models structural change in unemployment as an outcome of inherited social capital. Is unemployment unavoidable in the process of reform? Does unemployment assist the process of restructuring? The destructive part of restructuring is likely to be positively correlated with unemployment, as the more rapidly jobs are destroyed the higher the unemployment rate is likely to be. On the other hand, job creation is likely to be associated with low unemployment.

The final chapter of the thesis then summarises and reviews the main results and findings of this research. It also suggests further extensions to this research.

Chapter Two

Data Sources

In an economy that is changing from a centralised to a market system; the structure, quantity and quality of data are highly important for both cross-sectional and trend analyses.

(Socha and Weisberg, 1999)

2.1 Introduction

The purpose of this chapter is to present the data sources used in my analysis of Polish labour market dynamics. Three data sources were used in this thesis; the Polish Labour Force Survey, the Amadeus Company Accounts Dataset and Polish Statistical Yearbook Data produced by the Polish Central Statistics Office. First information about households' employment characteristics and demographics was gathered using the Polish Labour Force Survey which encompasses a series of standard labour force survey questions conducted over the period May 1992 to November 1997. The need for micro-evidence to analyse transition was highlighted in the previous chapter. Micro-data from a tailored labour market survey like the Polish Labour Force Survey can be an invaluable tool when analysing an economy in transition particularly in relation to identifying personal characteristics of the unemployed and labour force dynamics as pointed out by Wadsworth (1996). Section 2.2 of this chapter begins by describing the Polish Labour Force Survey in terms of its structure, features and principal questions relevant to labour market adjustments of wages and quantities.

One novelty in my empirical research as outlined in chapter one is to combine the individual data from the Polish Labour Force Survey with measures of job reallocation derived from the Amadeus Company Accounts Data. Section 2.3 thus describes the nature of the Amadeus Dataset while Section 2.4 discusses unemployment, economic structure and the construction of indices of structural change. In Section 2.5, the Regional Yearbook Data provided by the Polish Central Statistics Office is surveyed. The need for a regional-based study of Polish transition is emphasised in this section. However a regional taxonomy is not applied to the data until chapter three when administrative data is aggregated at the voivodship (regional) level. Since 1975 the Polish economy has been divided by the Polish Central Statistics Office into a total of forty-nine voivodships, with each voivodship being the basic unit of territorial and administrative division for the country. A regional taxonomy within this data allows greater understanding of the regional responses to reform and restructuring in Poland. Section 2.6 concludes this chapter by introducing the core analysis of chapter three.

2.2 Description of Polish Labour Force Survey

The Polish Labour Force Survey first introduced in 1992, is conducted by the Polish Central Statistics Office, and is a quarterly household survey yielding comprehensive information on employment, unemployment and wages by demographic characteristics. Estimates by Waclaw and Weisberg (1999) of standard errors, are 0.7 per cent for the employment rate and 3.6 per cent for the unemployment rate. The survey is based on widely accepted international concepts and definitions. It is a representative sample of approximately twenty-two thousand households (or 0.18 per cent of all Polish households)[10], and is equal to about fifty-five thousand interviewees. The sample includes individuals older than fifteen years of age and there is no upper age limit. However it does omit individuals residing in military barracks and dormitories, any household members who are residing abroad and those living in sheltered houses for the

[10] With the exception of the November 1993 wave when substantially more farm households were surveyed.

poor[11]. The fifty-five thousand interviewees thus represent the non-institutionalised population of Poland.

2.2.1 Sampling Strategy

Interviews are conducted during the third week of the middle month of a quarter with information for February, May, August and November waves. Each quarterly wave was initially treated as independent (May, August and November 1992 and February 1993), when the Polish Central Statistics Office maintained a full panel of the same individuals, however efforts were then made to track changes. Since May 1993, a rotating panel was introduced whereby the sample for each quarter has consisted of four sub-samples selected independently: two from the previous quarter, one introduced for the first time and one that participated exactly one year before. Each person surveyed was in the sample for two quarters, was excluded for another two quarters, was included again for two quarters and then was excluded altogether[12].

The rotating panel method was introduced to avoid attrition and frequent changes in residence. The main advantage of a rotating panel for the purpose of this thesis is the possibility of tracking individuals overtime and controlling for any unobserved individual heterogeneity. In total, twenty-one data waves were made available to us beginning May 1992 to November 1997 with the possibility of tracking individuals over that period. A statistical problem encountered when using matched records across different labour force survey waves is that sample attrition, non response and errors in the classification of the labour markets states of individuals at different points in time tend to bias results in a direction which is not predictable a priori. Waclaw & Weisberg (1999) find for the Polish Labour Force Survey that attrition and round tripping[13] are relatively low. Round tripping was higher for the unemployed than for the employed or

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[11] Soldiers living in private households were included.

[12] Detailed in Table 2.1

[13] Round tripping is the phenomenon of changing one's labour market status among employment, unemployment and being out of the labour force during a survey quarter and then returning to the original status before the next survey period.

those not in the labour force[14]. The rotating panel method enabled the size of the sub-sample to increase as documented in Table 2.2. Furthermore, in November 1993 or wave seven from the Polish Labour Force Survey, the sample size became larger because of an increase in the number of persons living in rural areas.

My analysis in chapters three and four uses the November 1994 to November 1996 rounds of this survey. Chapter five uses rounds eleven to fifteen, which correspond to the November 1994 to November 1995 waves respectively. The November 1994 wave was chosen as the starting point for the empirical analysis because the occupation classification changed in 1994 but has been consistent from then onwards.

2.2.2 Data Questions

The Polish Labour Force Survey questionnaire includes questions about wages, employment, the number of working hours, workers' job search, reservation wages, job tenure, registration of the unemployed, unemployment benefits, active labour market policies, labour market participation and related issues to a random sample of households in all regions of Poland. Each question follows a "tree scheme" where the answer to a question influences if and which other questions would be answered.

The survey affords the opportunity to estimate the magnitude of underemployment in the economy. Full-time workers are asked not only how many hours they worked per week but also why they worked less than thirty-nine hours when they did so. One reason is insufficient work. Part-time workers are asked to specify their reason for assuming that status. Among the possible responses are "unavailability of a full time job" and "personal or family reasons". Persons not in the labour force are classified by reason for not seeking employment including discouragement due to inefficiency of job search.

In order to reach international standards of data collection the Labour Force Survey has had to change continuously. Since May 1992, when it was first introduced there have been five versions of the survey questionnaire. The currently used

[14] Attrition of the panels was 7.5%. This is reported by Gora and Lehmann (1995).

questionnaire is much more comprehensive than the previous ones in terms of breath of questions asked. However through these changes the continuity of the data has remained unscathed. In Section 2.2.3, the definitions of employment and unemployment adopted in the survey from the International Labour Organisation's recommendations are outlined.

2.2.3 Labour Market Classifications in the Polish Labour Force Survey

Labour Market Classifications in the survey comprise of one of three types; employed, unemployed or economically inactive. Chapter five uses these categories to identify the labour market states of those sampled. The Polish version of the European Classification of Activities- the Nomenclature des Activities de Communaute Europeenne- and the International Standard Classification of Occupations (ISCO-88) are used to determine sectional and occupational activities of the employed and the unemployed.

The classification of a worker's employment status is based on the International Classification of Status in Employment. The four categories are "employer", "self-employer", "employee" and "unpaid family worker". The *employed* are those aged fifteen years and older who during the reference week, either first, worked for at least one hour for which they received pay or income (as employees, worked on their own or on a leased farm), ran their own non-agricultural business, or helped run a family farm or a family non-agricultural business without pay; or second did not work (for example because of sickness, leave, firm stoppages, bad weather or a strike) but formally had jobs as employees or were self employed. The employed also include apprentices who entered an occupational training or occupational preparation contract with a private or public employer provided they received remuneration.

Full time workers are those who, during the reference week, worked for forty or more hours in all their jobs or alternatively worked for less than forty hours but that number of hours constituted full time work in their cases as, for example the hours of teachers or people working in hazardous conditions. Full time workers also include those who worked for less than forty hours for non-economic reasons but who usually worked full time.

The *unemployed* comprise persons aged fifteen years and older who met the following conditions in the reference week; they were not employed (according to the preceding criteria) but they were actively looking for a job (that is for more than four weeks with the reference week being the fourth one) and were involved in specific, identifiable actions directed toward finding a job. Those unemployed must be ready and able to take up a job in the reference week and the next week. Persons who were not searching for a job because they had gotten one but were waiting to start it in the upcoming thirty-day period were included in the category of the unemployed.

The *economically inactive population* or persons outside the labour force are all those aged fifteen years and older who were not classified as employed or unemployed. These are individuals who neither worked nor sought a job during the reference week. It also includes persons who did not work and who did seek a job during the reference week but who were not ready to start a job during the reference week or the following week.

The unemployment rate may be overestimated in the labour force survey. According to Gora (1996), throughout the period from May 1992 to November 1995, about one-fourth of the workers classified as unemployed by the survey declared that they were not looking for a job, despite their affirmative answer to the question that directly asked them whether they were seeking a job. These persons are classified as unemployed by the Central Statistics Office, even though they represent a deviation from the International Labour Organisation's recommended protocol requiring that the individual has actively searched for a job during a recent period.

2.2.4 Questions on Remuneration

One of the principal issues in the following chapters is wage flexibility within Polish regions. In particular I examine the role of local joblessness in pay determination and test for the impact of cross-regional differences in the extent of restructuring on individual wage determination. The survey questions dealing with remuneration are typical of standard labour force survey questions. Question twenty-two for example, deals specifically with earnings, asking respondents to "Give your net earnings in the previous month from main job (in thousands of polish zloty)". The response rate to this

question is relatively low in the survey, as individuals are reluctant to disclose information on their net earnings. This reluctance may be due to psychological barriers or a lack of trust in the tax administration office despite guaranteed confidentiality. However Rutkowski (1996) notes that earnings based on the labor force survey data and earnings figures from the special wage survey conducted by the Central Statistics Office do not reveal any significant differences. In the survey there is no distinction made between basic wages and any bonuses. In chapter four the responses to earnings are deflated by a national price deflator indexed to one hundred in January 1996[15].

2.2.5 The Polish Labour Force Survey: How it Compares to other Western Labour Market Surveys

The Polish Labour Force Survey used in this thesis is of much the same standard as the labour force surveys of other western countries and as mentioned earlier, international definitions recommended by the International Labour Organisation are applied. Certainly the survey is the most comprehensive source of data on the Polish Labour Market and the data are of good quality for international comparisons. Data obtained from the Labour Force Survey are highly useful for a better understanding of the Polish economy and labour market dynamics. The main advantages of the survey are similar to those of surveys used in other countries. First it yields more reliable information on the Polish labour market than count data. The labour force survey is an important source of information on self-employment as well as employment in very small firms. It allows for the identification of problematic groups in the labour market, for example the long-term unemployed, youth and the low skilled. The survey also includes information on the personal characteristics of workers and the unemployed.

Second using the labour force survey, researchers can study labour market dynamics and transitions as well as labour flows among both regions and sectors. Wadsworth (1996) notes that details on labour market dynamics are particularly relevant in countries undergoing transformation to a different economic system and seeking to improve the allocation of labour across sectors and firms. The fact that we have access

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[15] There are no population weights in either data set.

to twenty-one data waves allows the performance of a time series analysis of transitions between different labour market states as a way of estimating employment and unemployment dynamics. The detailed characteristics of the unemployed provide the basis for analysing unemployment duration and flows in chapter five. I use characteristics of the unemployed from the Labour Force Survey, characteristics that could not be identified using count data.

In summary, the labour force survey provides a sizable set of information that is not obtainable from other sources. It appears to be an advanced and flexible tool for studying labour market developments.

2.3 Amadeus Company Accounts Data

Produced by the Bureau van Dijk and launched in 1994 the Amadeus Company Accounts Dataset contains detailed information on four million public and private companies in thirty-four European countries. Published on the Internet it is also available on CD-ROM or DVD-ROM.

The Amadeus dataset consists of all incorporated companies across all sectors that satisfy at least one of the following criteria: employment greater than one hundred workers, total assets greater than sixteen million U.S. dollars and operating revenues greater than eight million U.S. dollars. Up to ten years of detailed information[16] is presented in a standardised financial format comprising twenty-two balance sheet items, twenty-two profit and loss account items and twenty-one ratios. The descriptive information includes: official national identification number of the firm, address, telephone, fax, website, legal form, year of incorporation, senior managers, auditors, number of employees, quoted/unquoted indicator, industry and activity codes and when available, a trade description in the local language and English.

Table 2.3 compares the number of Polish firms surveyed by Amadeus, by average firm size (average employment) for the years 1994 and 1997. Within the data it is possible to distinguish amongst three ownership types: foreign (firms with foreign participation in their stock of greater than fifty per cent), state (firms characterised by

[16] Consolidated statements are also provided when available.

state participation greater than fifty per cent), and finally domestic private firms including privatised firms and cooperatives. Table 2.3 illustrates that average firm size for Polish firms surveyed decreases over transition. Between 1993 and 1997, Polish firms reduced their size by almost half (43.3 per cent). This downsizing effect is unsurprising in Poland and reflects the fact that firms under central planning were generally too large and over-manned. The removal of state subsidies, post 1989, triggers a downsizing effect as firms shed workers to increase efficiency. The Amadeus data-set tracks these changes for large enterprises extremely well.

A problem of the data however is that it bypasses smaller firms in the Polish economy including new starts and *de novo* firms. The problem arises from the criteria according to which the dataset has been constructed, firms that do not satisfy at least one of the criteria identified above are excluded from the sample. The result of this selection bias is that those firms with less than one hundred workers or inadequate total assets and operating revenues will be underrepresented in the data. In the context of a transition economy this means we have to bypass a major source of growth in the Polish economy.

Given this sample selection bias I estimate how many small *de novo* firms (or those firms with employment less than one hundred workers) are missing from the data. A positive correlation is expected between missing *do novo* firms and the problem this creates as transition progresses. In Table 2.4 I use data from the Polish Central Statistics Office to show the percentage of Polish firms in the following employee categories: first, firms with up to nineteen workers, and second, firms with twenty to ninety-nine workers employed. To facilitate comparisons, percentages of firms with over one hundred workers are also included for the years 1995 and 1997. Examining the data in Table 2.4 it can be seen that the overwhelming majority of firms have less than one hundred workers. Only 0.8 per cent of firms have more than one hundred workers in 1995 and 0.6 per cent in 1997. The fact that Amadeus only surveys larger firms appears to be unrepresentative for Poland.

To cross check I use the Polish Labour Force Survey to calculate estimates of the amount of small *de novo* firms (or those firms with employment less than one hundred workers) by six groupings of Polish regions for the years 1994 and 1997. Table 2.5 shows the number of individuals (male and female) who work in small and large firms

in Poland using the survey responses to question twenty-five of the Polish Labour Force Survey, which asks " How many persons work in your institution?". Individuals are given five possible responses, namely; one to five employees, six to twenty, twenty-one to fifty, fifty-one to one hundred, one hundred and one and above, and finally not applicable (where the individual is either not in the labour force or unemployed). Each regional grouping, one to six, represents a continuum of economic development based on that region's endowment of infrastructure. This regional grouping is discussed in more detail in section 2.4. Group one is the least developed and group six, the most developed. Examining the data it can be seen that as we move down the regional groupings from the least (Grouping One) to the most developed regions (Grouping Six), a higher percentage of individuals work in larger firms (with over one hundred and one employees). Small firms appear to be more important when it comes to employment in regions with a less well-endowed infrastructural base. In contrast, more individuals are employed in larger firms in those regions where a better socio-economic infrastructure lies in place. Moreover this is consistent overtime.

In their survey of restructuring in a transition economy, Konings, Lehmann and Schaffer (1996) present evidence, that job destruction is located predominately in the larger state-owned sector while job creation is located in the smaller private and especially *de novo* sectors. They further argue that the robust job creation by the latter appears to be driven more by ownership and/or life cycle effects rather than purely size effects. Based on this view of transition, small *de novo* firms are important during transition in terms of job creation and admittedly not being able to control for their existence is a limitation of the Amadeus data. However taking a closer look at the larger firms in the state and privatized sectors does have value, in part because of initial conditions and the fact that most firms pre-1989 were over–staffed, and in part, because of the major hemorrhaging of jobs in the Polish economy post-1989. We are interested not only in the response of larger firms to adverse initial shocks but also their response to subsequent improvements in the external environment. This is especially important given the evidence from the Polish Labour Force Survey that more individuals are employed in larger firms in the more developed regions of the Polish economy. In this case the term larger firm refers to companies with more than one hundred workers

I use Amadeus to construct an index of firm level restructuring called the "Job Reallocation Index" this index is used in the core analysis of chapters three, four and five. Before outlining how this index is constructed I first discuss in the following section the issue of unemployment, economic structure and previous indices of structural change.

2.4 Unemployment, Economic Structure and Indices of Structural Change

Until 1998, Poland was divided into forty-nine administrative regions or voivodships[17] where each voivodship was the basic unit of territorial and administrative division for the country. This created a useful division for studying patterns of unemployment using the Labour Force Survey and Regional Yearbook data. Indeed the OECD (1997) amongst others noted the stability of the distribution of unemployment across voivodships or regions throughout the 1990s. The visual evidence of relative stability and correlations is shown in a paper by Newell and Pastore (2000).

Three previous studies have produced classifications of voivodships by economic structure: Huber and Scarpetta (1995), Gora and Lehmann (1995) and Lehmann and Walsh (1998). In the following section I summarise different classifications of Polish regions based on these studies.

2.4.1 Previous Indices of Economic Restructuring

Huber and Scarpetta (1995) aim to capture both the degree of economic development and the structure of industry by constructing 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 and VI – other diversified.

Gora and Lehmann (1995) also classify voivodships by the degree of economic development of a region. Their index is based on the following characteristics: the

[17] In Polish "wojewodstwa".

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 (1998) build an economic classification of voivodships with a different proposed interpretation. Their aim is to produce an index reflecting the degree of employment restructuring based on 1996 data. Seven indicators are employed: the share of services in total employment; the share of short-tenured men (those with tenure less than ten years) in total male employment; the number of telephones per capita; the voivodship shares of domestic and foreign direct investment normalised on population; the share of construction in total employment and the share of agriculture in total employment. An application of this taxonomy to regional level data is explored in chapter three.

Clearly all three classifications reflect differences in economic structure. Admittedly the Lehmann-Walsh index, though interpreted as reflecting structural change does not contain any component measured as a temporal difference. In which case it only measures relative structural change if every voivodship started the process of transition with these indicators at the same level, or alternatively if initially more advanced viovodships had developed faster. This latter condition is possible. For example it is known that areas, which historically traded with the West under the old planned regime, had developed industries pre-transition that were more likely to succeed in the changed economic climate. They started transition with a trade advantage and therefore should have developed faster as a result. In this case the Lehmann-Walsh index does succeed in measuring relative structural change.

The problem with the taxonomy however is that it measures structural change *during* the transition period, if there is persistence in the data overtime, then we would expect the Lehmann-Walsh taxonomy to be less exogenous as a measure of structural change than if done before transition began. This problem however is hard to address in the thesis given the difficulty of constructing an alternative taxonomy based on information gathered pre-1990. I therefore assume that there is no persistence overtime

(recognising this may be unrealistic) and use the Lehmann-Walsh regional taxonomy as an instrument for restructuring in later chapters.

2.4.2 Newell and Pastore Index of Industrial Change or Turbulence in employment

Newell and Pastore (2000) studied the correlations between the three indices discussed in section 2.4.1 and Polish unemployment rates. Their findings were twofold: first, testing the differences of mean unemployment rates for voivodships in the six Huber-Scarpetta categories revealed nothing significant. Second, voivodship unemployment rates and the Gora-Lehmann and Lehmann-Walsh structural indices showed no remotely significant correlation with voivodship unemployment rates although the indices themselves correlated fairly well with each other. As a result they began to measure the degree of restructuring by constructing measures of sectoral turbulence previously employed by Layard et al (1991). These indices were constructed as follows:

$$I_t = \frac{1}{2}\left|\Delta S_{it}\right|$$

Where S_i is sector i's share of employment and ΔS_{it} is the change in sector i's employment over a period ending at time t. The index was calculated using the May 1994 and November 1997 rounds of the P.L.F.S. Similar indices were constructed for the other dimensions of transition, for example by ownership sector and firm size. Labour Force Survey data as described in section 2.2, are based on quarterly stocks and miss up to 30 per cent of the annual flow activity. It is likely that the Newell and Pastore index of industrial turbulence is underestimated for each sector.

In contrast, the measure of job reallocation presented in this thesis is based on changes in the structure of firm populations using firm level data. This is a better measure of structural change than those constructed from Labour Force Survey data, as it is a regional firm effect. I use the regional job reallocation rates constructed by Faggio and Konings (1999) from the Amadeus Company Accounts Database. They in turn use the indices developed in Davis and Haltwinger (1992). As already noted in section 2.3 the Amadeus Company Accounts Dataset does exclude small firms. This is likely to underestimate the job creation rate in the new *de novo* private sector (N.P.S.) but can be

expected to track job reallocation (employment restructuring) in the previously large state-owned sector (S.O.S.) extremely well.

2.4.3 An Index of Job Reallocation

A discrete measure of firm *i* growth is defined over the period *t-1* to *t* in region *j* as follows:

$$g_{ijt} = \left(\frac{y_{ijt} - y_{ijt-1}}{(y_{ijt} + y_{ijt-1})/2} \right) \qquad \textbf{(2.1)}$$

To examine the contribution of expanding and declining firms to the overall evolution of regional employment I sum the growth rates of each growing firm (*POS*), weighted by firm employment size, S_{ijt}, and sum the absolute growth rates of each declining sector (*NEG*) weighted by their size S_{ijt},

$$POS_{jt} = \sum_{i=1}^{n} S_{ijt} g_{ijt} \qquad \text{if } g_{ijt} > 0, \text{ and}$$

$$NEG_{jt} = \sum_{i=1}^{n} S_{ijt} \left| g_{ijt} \right| \qquad \text{if } g_{ijt} < 0.$$

The annual net change, NET_{jt}, in regional employment is a net outcome that is induced by employment growth in expanding firms being offset by employment declines in declining firms. The reallocation of jobs within regional employment is captured by the RES_{jt} index calculated as follows:

$$NET_{jt} = POS_{jt} - NEG_{jt}$$

$$RES_{jt} = POS_{jt} + NEG_{jt} - \left| NET_{jt} \right|$$

Faggio and Konings (1999) analyse and model regional job reallocation rates across five Central and East European countries including Poland. In what follows I summarise some of their key results for Poland.

2.4.4 Results from the Faggio and Konings (1999) Study

First the authors found that the vast majority of job reallocation occurs within Polish regions and not between regions. This indicates the lack of job mobility across regions of Poland. The second finding relates to the fact that striking differences in job flows are observed within regions. For example in Warsaw[18] over the period 1994 to 1997, the annual job creation rate was 4.7 per cent, the annual job destruction rate was 5.4 per cent, leading to an annual job reallocation rate of 9.4 per cent. Annually, nearly ten per cent of employment is reallocated away from one set of firms towards another[19]. In contrast, in Zamoj[20] the annual job creation rate was 2 per cent, the annual job destruction rate was 4 per cent, leading to an annual job reallocation rate of 4 per cent. The factors behind simultaneous job creation and destruction were examined at the firm level. Downsizing of large firms, changing ownership structures and historical trade orientation - E.U. versus C.M.E.A. markets, were deemed to be key factors inducing higher job reallocation rates within regions.

Table 2.6 shows unemployment rates and job reallocation rates for the period 1994 to 1996 across six regional groupings based on the Lehmann-Walsh (1998) taxonomy of Polish regions. This taxonomy is used for the following reasons; first it is the only taxonomy aiming to produce an index reflecting structural change. Previous taxonomies as noted in section 2.4.1, by Huber and Scarpetta (1995) and Gora and Lehmann (1995) developed indices of economic development but not structural change. It is possible for the Lehmann-Walsh taxonomy to measure structural change if initially more advanced viovodships had developed faster. Given the nature of the Polish economy pre-transition and its former trade links this is a strong possibility. Second the Lehmann-Walsh taxonomy uses a broader set of indicators than previous taxonomies. In total, seven indicators are employed including controls for the share of short tenured men (those with tenure less than ten years) in total male employment; the number of telephones per capita; the voivodship shares of domestic and foreign direct investment normalised on population; the share of construction in total employment and the share of

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[18] The top ranked region in social development using the Lehmann-Walsh taxonomy.

[19] See Baldwin et al (1999) for the U.S. and Walsh and Whelan (2000) for Ireland

[20] The weakest region in terms of the Lehmann-Walsh taxonomy of social development.

agriculture in total employment. None of these indicators were used in the previous studies. The Gora-Lehmann taxonomy is similar and Table 2.7 shows the correlation coefficients between the two structural indices. However the former does not include controls for the stock of a region's infrastructure in terms of telephones or foreign direct investment.

In Table 2.6 job reallocation rates increase within each of the Lehmann-Walsh regional groupings overtime, but more so, in the more advanced groupings. Moreover this "N shape" in regional job reallocation rates is robust in relation to previous regional taxonomies. These job reallocation rates will be used in chapters three, four and five of this thesis as a measure of employment restructuring within the local labour market. The job reallocation index is abbreviated as the *RES* index.

Job reallocation rates are pure compositional shifts in the firms that host jobs in the regional employment pool over a period of a year. In the context of a transition economy, restructuring requires that traditional firms either exit or move towards their production possibility frontier and induce new firms to enter. Overtime more workers should find themselves in jobs in either new or restructured firms. The *RES* or job reallocation index captures this move to efficiency in firm populations extremely well. It is likely to reflect compositional changes in firm populations that induce efficiency and increase pay. The nature of the composition shift will be different from that of mature market economies but the effect on wages should be the same, this issue is addressed in chapter three. In the next section I outline the data collected from the Polish Central Statistics Office Yearbook data.

2.5 Polish Statistics Office Yearbook Data

Information on regional wages and regional unemployment is extracted from Polish Statistical Yearbook Data provided by the Polish Central Statistics Office for the years 1992 to 1996. For each of the forty-nine administrative regions of Poland, the Central Statistics Office maintains a record of registered unemployment, the average monthly wage and the average industrial wage in that region. Monthly wages are in thousands of Polish zloty. These variables are used in chapter three to estimate the impact of local unemployment rates on regional wages. Table A1 in the Data Appendix shows the

average monthly wage data, registered regional unemployment rate and average industrial wage for each of the forty-nine Polish voivodships over the six-year period.

2.6 Conclusion

In summary, this chapter has outlined the three main data sources used in this thesis: the Polish Labour Force Survey, the Amadeus Company Accounts Data and finally the Statistical Yearbook Data. Greater emphasis was placed on the sections detailing the Labour Force Survey because of the importance of this dataset for the core analysis of chapters four and five. Amadeus is important in terms of constructing local job reallocation, job creation and job destruction rates and finally, the Yearbook Data yields voivodship information that is used in chapter three to examine regional wages and how they respond to local unemployment and job reallocation rates. In the light of the above descriptions it is now possible to begin the core analysis of chapter three.

Chapter 3

A Regional Analysis of Wage Determination, Job Reallocation and Unemployment in Poland

3.1 Introduction

As noted in chapter one, the widely held view in studies of Polish transition is that the economic shock which Poland faced in the early 1990s created substantial economic adjustments throughout the economy. To date a lot of studies have been done on the transition process across Poland and other countries of Central and Eastern Europe. These range from journalistic accounts of increases in national unemployment rates and inflation, to theoretical papers on the reallocation of workers from shrinking state-owned sectors to newly emerging private sectors. However most studies conducted on Polish transition focused on developments observed at the national level.

Analyses of adjustments at the regional level were also undertaken but data limitation created problems. For example, most regional studies faced a tradeoff, either to focus on a particular region of the selected country or, alternatively, to examine regional issues in a more general descriptive context. The objective of this chapter is to contribute to analytical and data based research of regional adjustment in Poland by examining the extent to which unemployment and job restructuring affects regional

wage averages.

The advantage of a regional analysis within Poland compared to a study across a range of Central East European countries is that although Polish regions inherited different socio-economic structures coming out of planning, the microeconomic institutional changes and the macroeconomic environment during transition were the same over all Polish regions. For example until 1998, Poland was administratively divided into forty-nine counties or regional units called voivodships. Research conducted by Boeri and Scarpetta (1996) hypothesised, that the polarisation of performance across these Polish regions could be explained by their inherited idiosyncratic socio-economic structures coming out of planning[21]. Moreover Repkine and Walsh (1999) have shown the empirical relevance of historical trade links to be very significant in the modeling of industrial production during the first seven years of transition. In Poland, Eastern regions had a high concentration of agriculture, mining, defence and natural resource extraction industries coming out of planning. Indeed until the Polish 'Balcerowicz' reforms in 1990, these eastern regions mainly traded within the planned C.M.E.A. market and enjoyed a privileged position in terms of allocation of resources over the forty years of central planning. Western regions on the other hand, had prior to 1990, firm populations already producing a lot of products for export to E.U. markets. It is not unlikely that each region's inheritance in terms of its traditional trade orientation, product bases and local infrastructure endowments under central planning, drove its ability to subsequently adapt during the transition process.

The assumption that a region's inheritance drove its ability to adapt is realistic given that first the quality of social capital such as access to telecommunications varies widely across the regions of Poland[22]. Indeed with the exception of Warsaw and Lodz, eastern regions were historically much more disadvantaged in this respect. Second, in a stylised eastern region with a large industrial conglomerate surrounded by private agricultural holdings, exposure to globalisation, greater access to E.U. and world markets and the collapse of their traditional C.M.E.A. market rendered their exports

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[21] In Poland agriculture tends to be concentrated in the farmlands of the East, with heavy industry concentrated in the West and South-West near coal and ore resources.

[22] This is documented within the Lehmann-Walsh (1998) study.

uncompetitive. Table 3.1 documents goods produced in the agricultural, forestry, metallurgical, fuel and power sectors of the economy as becoming less important post 1989, all of these products were historically produced within eastern regions of Poland. Furthermore the problem for eastern regions is exacerbated by the existence of poor local infrastructure, which in turn, means that eastern regions attract little or no inward investment flows.

In contrast, E.U. oriented products were the main force behind the observed recovery of industrial production in many Central and Eastern European countries. Poland was no exception as Table 3.2 illustrates. From 1989 to 1997 Poland's share of exports to the E.U. rose from 27.9 per cent to 64 per cent, with most of this increase occurring in the first five years of the transition process. It was Western Polish regions who inherited firms producing products orientated for the E.U. market. Regions that historically traded with high quality products to the E.U. were also better endowed with inherited social capital. For this reason they would also attract the bulk of inward investment flows.

Another reason justifying a regional analysis within Poland compared to a study across a range of Central East European countries is that all regions faced at the start of transition the same macroeconomic shocks and microeconomic institutional changes born from the 'Balcerowicz' reform package of 1990. One possibility is that certain regions could have been favoured more during the transition process, for example in terms of the establishment of legal or regulatory institutions. This is likely in the major cities of Warsaw, Krakow, Wroclaw, Gdansk, Poznan and Kotowice but no concrete evidence is presented in the literature or data suggesting a favouring of regions by Government officials. One interesting study by Kubiak (2000) studied institutional changes in Poland specifically examining those occurring in the export sector. According to the survey the major suppliers of export promotion services for Polish exporters-producers were local Chambers of Commerce. Export promotion programmes in Poland, are classified under five categories of services namely; product developments, information about foreign markets and contacts, marketing, financial support and training. However these services are only used by one third of exporters. One of the cited reasons for non-use of the service is regional discrepancies in the availability and

quality of export support services.

Compared to the Czech Republic and Hungary, Poland is relatively big with a total land mass of some 312,000 square kilometers served by one hundred and seven local Chambers of Commerce. In the Kubiak (2000) study, only seven regional Chambers of Commerce earned positive comments regarding their export promotion services to local companies, the remaining offices throughout the country did not even respond to the survey questionnaire. Exporters later identified the non-responding Chambers of Commerce as poor sources of advice and help. In terms of export promotion services therefore, there appears to be some evidence of regional disparities. The difficulty lies in assessing other microeconomic institutional changes. Ideally there should not be regional disparities when it comes to favouring regions in term of institutional changes but it is a problem difficult to quantify but one that must be acknowledged.

In this chapter, three aspects of regional adjustment are investigated; wages, job reallocation (restructuring) and unemployment. Specifically the chapter will examine the extent to which varying regional unemployment and job restructuring rates affect regional wage averages. To do this the chapter builds an empirical model based on the above assumption that a region's inheritance drove its ability to adopt during transition. First conditions in the local labour market are identified to explain differences in expected, average earnings across the regions of Poland. Conditions in local labour markets are modelled first, using local unemployment rates extracted from Regional Yearbook data and second, using local job reallocation rates calculated from Amadeus Company Accounts data. The former empirically captures the tightness of the labour market or job shortages. The latter captures the speed at which new and restructured firms are replacing non-restructured firms in local firm populations. This compositional change in labour demand increases the number of good jobs in local labour markets.

Throughout the subsequent analysis of this chapter, each region of Poland is treated as an independent labour market so that the role of local unemployment and job restructuring in pay determination can be examined. Treating the forty-nine Polish regions as independent labour markets is only a justified assumption if inter-regional migration flows for both workers and jobs have been virtually absent in Poland. As

noted in chapter one of the thesis, this is confirmed in studies for Poland undertaken by Faggio and Konings (1999) who found that most job flows are intra-region as opposed to inter-region and Boeri and Scarpetta's (1996) study of worker flows in Poland which finds no significant evidence of inter-regional worker flows over transition. A further study by Deichmann and Henderson (2000) finds Polish internal migration to have decreased significantly in the 1990s to the point where current population levels in Polish regions seem frozen at a degree of urbanization that is low by international standards. This slowing down of migration is documented in Table 3.3. It clearly shows that post-transition migration flows are lower than in the past. Not only have total flows across and within provinces decreased, but rural to urban flows have dropped enormously and urban-rural migration has only increased modestly. While in net, people are moving from rural to urban areas, the pace since transition has slowed. Deichmann and Henderson (2000) further argue that migration levels in Poland do not respond to unemployment differentials and this is attributed to two factors; namely housing shortages across regions and significant numbers of mostly young and educated temporary migrants leaving Poland annually to find employment abroad.

In section 3.2, I review the theoretical and empirical literature that uses unemployment in wage equations. This section also motivates why one should consider using job reallocation rates when examining the determination of wages. After surveying previous work on earning functions section 3.3 outlines some important theoretical considerations. In sections 3.4 and 3.5, I then apply the Lehmann and Walsh (1998) taxonomy, as outlined in chapter two, to the regional dataset. This taxonomy classifies regions of Poland by their stage of socio-economic development during the transition period. It is used to rank regions by indicators of socio-economic development and is also used as an instrument in later regressions. This ranking it is argued was predetermined by initial socio-economic conditions.

In section 3.6, I specify and estimate an empirical model of wages, unemployment and job reallocation. Across the regions of Poland, the impact of regional unemployment rates (instrumented) and job reallocation rates (instrumented) are estimated on average monthly wages, while controlling for other unobservable deterministic factors using panel data techniques. Both regional unemployment rates

(instrumented) and job reallocation rates (also instrumented) are taken as indictors of prevailing outside labour market conditions. As outlined in Blanchflower and Oswald (1994), to test for a negative relationship between wage and unemployment levels (a wage curve) is, amongst other explanations, an indirect test of profit sharing in wage setting. In the context of an efficiency wage model, unemployment acts as a disciplining device: when it is high, the generosity of workers' remuneration can be set low. Another possibility is a bargaining model. In this case a high degree of joblessness in the surrounding labour market might reduce the ability of workers to claim a large share of the surplus to be divided. Finally, Blanchflower and Oswald (1994) proposed a labour contract explanation for the existence of a negative relationship between wage and unemployment levels. In this context, if a firm dislikes risk, it will wish the wage to rise in good times and fall in bad times. When there is a boom, many workers are employed. In an economic slump, some are laid off.

The question surrounds which of these theories is the most plausible? The wage curve in labour contract theories is admittedly not a truly causal relationship between unemployment and wages. This is because changes in the level of unemployment do not cause the wage level to move. As such the wage curve in labour contract theories is inherently a model about *employment* rather than unemployment. As a result, we must infer that bargaining or efficiency wage forces better explain the existence of a Blanchflower and Oswald (1994) wage curve.

Compared to the work of Blanchflower and Oswald (1994), this chapter models wages and unemployment at the regional (voivodship) level of aggregation. This level of aggregation is still lower than the country and time series work on aggregate wage curves surveyed by such authors as Layard, Nickell and Jackman (1991) and Phelps (1990). The task of defining and modelling wages at the individual level of aggregation is the purpose of chapter four of this thesis which continues in the vain of the Blanchflower and Oswald's (1994) work but includes controls for job reallocation rates. However the focus of this chapter is the regional level of aggregation. Section 3.2 now begins the investigation of the relationship between regional wages, unemployment and job reallocation by surveying existing literature.

3.2 Literature Review

The relationship between wage and unemployment levels has been debated for many generations. From the beginning of the 1970s, the first generation of papers, summarised in Table 3.4, argued that regions with higher unemployment also experienced higher wages. The consensus in the literature was that wages and unemployment were positively correlated across space. The theoretical foundations for such a relationship can be found in Harris and Todaro (1970). Their argument is based on Adam Smith's theory of "compensating differentials" and a long-run zero migration equilibrium. According to Harris and Todaro (1970), areas with high unemployment were less desirable regions to live in, as a result out-migration would be a common occurrence so, they argued, higher wages were needed as an off-setting advantage. Pay and unemployment are positively correlated across geographical areas. This idea was substantiated by Hall (1970, 1972), who used data for twelve U.S. cities in 1966, to find a positive relationship between expected pay and unemployment when estimating wage equations across cities. Reza (1978), Adams (1985) and Marston (1985) using individual level data, also found that there was a positive relationship between what a worker earned in a region and that region's joblessness. All of these first generation results were consistent with the theory, that regions offer "compensating differentials".

However by the end of the 1980s, this accord began to crumble. The problem in the earlier literature was a failure to control for regional fixed effects, as regional dummies were not included in the estimated wage equations. Including these effects led to new evidence in a second generation of papers, summarised in Table 3.5, which suggested that regional pay and unemployment were in fact negatively correlated. This correlation refers to levels of unemployment and wages and not changes in these variables found in conventional regional Phillips curves. Using British data, Blackaby and Manning (1987, 1990a, 1990b, 1990c) found evidence for a negative spatial relationship between joblessness and workers' remuneration. Freeman (1988) used American and more disaggregated British data to find similar results. Card (1990) used Canadian data to establish the negative relationship, while Pissarides and McMaster (1990) found evidence for a short-run relationship between regional unemployment and regional wage levels in the United Kingdom.

Using larger microeconomic datasets summarised in Tables 3.6 and 3.7, Blanchflower and Oswald (1994) documented a negative empirical relationship between local unemployment and pay determination. This empirical discovery was termed by the authors' a "Wage Curve". It is a convex downward sloping function relating the wage rate to the regional unemployment rate for a country *ceteris paribus*. This is contrary to a conventional Phillips curve which examines changes in the rate of pay to the unemployment rate. What emerged from the authors' pooled cross-section equations on micro-data was a pattern linking individual pay to regional unemployment, with a typical wage curve described by the following specification:

$$\ln W_{it} = \beta_0 - 0.1 \ln U_{jt} + \beta_2 X_{it} + \beta_3 D_j + \beta_4 D_t + \varepsilon_{it} \qquad \textbf{(3.1)}$$

The natural logarithm of individual i in period t hourly/monthly/yearly earnings W_{it}, is explained by the natural logarithm of the regional unemployment rate U_{jt}, a vector of workplace and human capital characteristics X_{it} (age, education, work experience and occupation), and regional and time dummies, D_j and D_t, respectively. Regression results on data samples across twelve countries show that the unemployment elasticity of pay approximates – 0.1. A hypothetical doubling of unemployment is associated with a drop in pay of ten per cent. Empirical estimates show that a worker who is employed in an area of high unemployment earns less than an individual who works in a region with low joblessness when controlling for other individual and regional specific factors. Table 3.7 further documents evidence for countries in Eastern Europe. All these studies highlight the importance of the tightness of the outside labour market on the ability of individuals to earn.

In general equilibrium models of unemployment, where the conventional labour supply curve is replaced by a wage setting curve a negative relationship between pay and unemployment is clearly predicted. The macroeconomic models of Layard, Nickell and Jackman (1991) and the microeconomic efficiency wage model of Shapiro and Stiglitz (1984) are good examples of modelling wage and unemployment outcomes with conventional labour demand equations and imperfectly competitive wage setting behaviour. The expected wage set in general equilibrium reflects an aggregation over firms that reward productivity and pay labour rents. This issue is examined in more depth and its limitations discussed in section 3.3.

The relationship between the wage and local job reallocation rates across firm populations has not yet been studied in the literature for the countries of Central and Eastern Europe. A reason for this may be that measurement error compounds an endogeneity issue surrounding the use of job reallocation rates in wage equations. However, Belzil (2000) finds at the country level for Denmark, a strong empirical link between real wages and job reallocation rates, amongst other factors, including unemployment. In the context of transition, planned economies were in the main oversized in terms of industrial and agricultural employment. Mass inter-sectoral job flows were to be anticipated during the transition process to a market system. In addition, the downsizing and restructuring of traditional firms and the entry of new firms were expected to induce even greater intra-sectoral job reallocation overtime. In transition economies therefore, structural change in employment was clearly needed for economic efficiency and job reallocation rates should not be ignored when estimating wage equations.

Aghion and Blanchard (1994) developed a strong theoretical relationship between wage determination, unemployment and job reallocation from the previously state-owned sector (S.O.S.) to the new private sector (N.P.S.)[23]. Their model predicts that the expected wage level in a labour market, amongst other factors, will be negatively related to unemployment rates and positively related to job reallocation rates. Unemployment reduces expected earnings in the economy by blocking restructuring in the previously state-owned sector (S.O.S.) and inducing wage constraint in the new private sector (N.P.S.). Workers do not vote for restructuring due to a low probability of re-employment after a possible layoff during restructuring. Yet strong growth in the new private sector will induce restructuring of the previous state-owned sector (S.O.S.) and reallocate jobs away from the previous state-owned sector towards the new private sector. Given that wages, unemployment and reallocation are clearly jointly determined outcomes, there is a need to choose a good instrument to clearly identify the relationship

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[23] Their approach incorporates an imperfectly competitive model of restructuring and insider wage determination in the labour market, to model expected earnings in the previously state-owned, the new private sector and unemployment. Their research builds on Konings and Walsh (1994) and Bughin (1996) who explicitly model interactions of imperfections in product and labour markets in partial equilibrium.

in the empirical sections of the chapter. A good instrument can help tackle the endogeneity issue surrounding the use of job reallocation rates in wage equations.

Chapter two section 2.4.3, illustrated the use of the Amadeus Company Accounts Dataset to construct regional job reallocation rates. One novelty in this research is the inclusion of job reallocation rates into estimated regional wage equations for Poland. Regional job reallocation rates or *RES* are a measure of restructuring as outlined in chapter two. In other words they are pure compositional shifts in the firms that host jobs in the regional employment pool over a period of a year. This reallocation of jobs within regional employment is captured specifically by the RES_{jt} index calculated as follows:

$$\begin{aligned} NET_{jt} &= POS_{jt} - NEG_{jt} \\ RES_{jt} &= POS_{jt} + NEG_{jt} - \left|NET_{jt}\right| \end{aligned} \qquad \textbf{(3.2)}$$

To examine the contribution of expanding and declining firms to the overall evolution of regional employment the growth rates of each growing firm (POS_{jt}) are summed and weighted by firm employment size S_{ijt}, summing the absolute growth rates of each declining sector (NEG_{jt}) weighted by their size S_{ijt}, yields NEG_{jt}.

$$\begin{aligned} POS_{jt} &= \sum_{i=1}^{n} S_{ijt} g_{ijt} \qquad if\ g_{ijt} > 0,\ and \\ NEG_{jt} &= \sum_{i=1}^{n} S_{ijt} \left|g_{ijt}\right| \qquad if\ g_{ijt} < 0. \end{aligned} \qquad \textbf{(3.3)}$$

Therefore the annual net change NET_{jt}, in regional employment is a net outcome that is induced by employment growth in expanding firms being offset by employment declines in declining firms. It should be noted that in these RES_{jt} calculations there is no explicit distinction between job reallocation from state to private firms. However given the nature of transition, it would be expected that the contribution of expanding firms measured as POS_{jt} would be driven by the emergence of the new private sector and that the contribution of declining firms NEG_{jt}, would be driven by downsizing, restructuring and closure of state-owned firms.

In the context of a transition economy, restructuring requires that traditional firms either exit or move towards their production possibility frontier and induce new

firms to enter. Overtime more workers should find themselves in jobs in either new or restructured firms. The *RES* or job reallocation index captures this move to efficiency in firm populations extremely well, it is therefore likely to reflect compositional changes in firm populations that induce efficiency and increase pay.

However another possibility encountered when using job reallocation rates is the problem of measurement error. Measurement error occurs when using job reallocation rates in wage equations because the job reallocation index as it is constructed assumes that both job destruction and job creation will have symmetric effects on wage determination. This may not obviously be the case. In fact, job destruction NEG_{jt} is more likely to affect job firings or outflows from employment and job creation POS_{jt} is more likely to affect job hirings or inflows into firms. This issue is tested in section 3.6.

In the following section, I first outline some theoretical considerations with regard to the restructuring of the previous state-owned sector (S.O.S.), before addressing limitations of this particular model and issues arising for later empirics. Section 3.4 then outlines the dataset used for the empirical analysis and applies the Lehmann-Walsh (1998) taxonomy to the regional data.

3.3 Some Theoretical Considerations

During the Polish reforms in 1990, majority insider privatisation ensured workers took control of state firms and distributed profits amongst workers in the form of wages. Two conditions had to be satisfied before workers would vote for restructuring. The first is a *risk aversion* constraint introduced by Aghion and Blanchard (1994),

$$rV_N \leq \lambda\, rV_R + (1-\lambda) rV_U \qquad \textbf{(3.4)}$$

where the expected income stream for a worker ex-post restructuring, must be at least as great as the current income stream in the non-restructured state, rV_N. A worker is given a probability λ of remaining in the restructured firm earning an income stream of rV_R, and a probability $(1-\lambda)$ of becoming unemployed with an expected income stream of rV_U.

The second is a *viability* constraint that requires retained workers to induce a profit stream that covers labour rents and restructuring costs ex-post restructuring,

$$\pi_R \geq (rV_R - rV_U)\lambda L + \sigma \qquad \textbf{(3.5)}$$

where π_R is the ex-post profit stream, λL the retained portion of the inherited employment stock and σ the sunk costs associated with restructuring to create a profit flow that induces condition (3.5) to hold.

The implication of condition (3.4) is first examined for wage setting. The expected income stream after restructuring must compensate the worker for the risk of becoming unemployed and for the forgone expected income stream from the non-restructured state. The expected income stream in the event of a flow into unemployment, rV_U, is written down as,

$$rV_U = b + \left(\frac{H}{U}\right)\left(\frac{\bar{W}}{r} - V_U\right) \qquad \textbf{(3.6)}$$

where the expected income of a worker in unemployment is the sum of the benefit level b, and an expected capital gain- the uncertain discounted income gain from a probability of being employed earning an average wage of W in the outside labour market. The probability of being employed from unemployment is determined by the numbers hired in the outside labour market H, from the unemployment stock U. The expected income stream for a worker in the state of unemployment in (3.6) can be rewritten as,

$$rV_U = \Omega = \frac{1}{\phi}b + \frac{\phi - 1}{\phi}\bar{W} \qquad \textbf{(3.7)}$$

where ϕ is a parameter defined as follows $1 \leq \phi \leq \infty$. If the probability of being hired in the outside labour market is zero or (H/U)=0 as in equation 3.6, then ϕ =1 in equation 3.7 and the expected income stream for a worker in unemployment Ω, is just the benefit level b.

The expected income stream for a worker in the non-restructured state rV_N, is modelled as an outcome of a simple rent sharing model. The firm sets a wage for their inheritance of insider workers L subject to the constraint that the flow of labour rent, (W-Ω)L, reflects the flow of product market rent π_N, in the non-restructured state. The expected income of workers in a non-restructured firm is expressed as the following,

$$W_N = rV_N = \Omega + \frac{\pi_n}{L} = \Omega + C \qquad \textbf{(3.8)}$$

If workers are to vote for restructuring, condition (3.4) must hold. The minimum ex-post income stream rV_R, necessary to induce a vote for restructuring ex-ante, can be found by substituting outcomes in (3.7) and (3.8) into (3.4), which is written as follows,

$$W_R = rV_R = \Omega + \frac{C}{\lambda} \qquad \textbf{(3.9)}$$

Workers require a premium for exposing themselves to the risk of becoming unemployed during the restructuring process, as $0 < \lambda < 1$. There is always an ex-ante expected income stream that induces a worker vote for restructuring meeting condition (3.4), but there must also be a required increase in the ex-post profit stream that can finance the retained workers income stream and restructuring costs, condition (3.5). The minimum ex-post profit stream necessary in the presence of condition (3.4) holding is found by substituting (3.7) and (3.9) into (3.5),

$$\pi_R = (W_R - \Omega)\lambda L + \sigma = \pi_N + \sigma \qquad \textbf{(3.10)}$$

The retained workers must be able to induce a profit stream that is at least as big as the profit stream in the non-restructured state plus the sunk cost associated with increasing profitability. The total labour rent in the firm ex-post restructuring is not higher but the rent per retained worker has increased reflecting the required premium for undertaking the risk of restructuring. In order for condition (3.10) to hold, the following restructuring technology must exist,

$$\pi_R = e(\sigma)\lambda\pi_N = \pi_N + \sigma \qquad \textbf{(3.11)}$$

Retained workers must increase profitability by a factor $e(\sigma)\lambda$, where $e(\sigma) > 0$. From (3.11) it is possible to solve for the maximum layoffs $(1 - \lambda_{max})$, allowed for by the restructuring technology (capital and expertise) and restructuring costs. In the case that conditions (3.4) and (3.5) are both justified the following holds:

$$\lambda_{\max} = \frac{1}{e(\sigma)}\left\{1 + \frac{\sigma}{\pi_N}\right\} \qquad \textbf{(3.12)}$$

If a restructuring technology does not exist restructuring would not be considered, $e = 1$ and $\sigma = 0$, inducing a full retention of all the inherited labour force, $\lambda = 1$. The retention rate decreases in restructuring costs (σ) and in the responsiveness of profitability to sunk cost expenditures, ($e(\sigma) > 0$). Low restructuring costs and a good restructuring technology will induce workers ex-ante to vote for restructuring even in anticipation of a low retention rate, as ex-post profitability and labour income per retained worker will be high enough to satisfy conditions (3.4) and (3.5). Low restructuring costs for workers infers that workers know there is a low chance of entering unemployment during the restructuring phase, so $(1-\lambda)$ or the probability of becoming unemployed with an expected income stream of rV_U is low. On the other hand, good restructuring technology requires two factors, the expertise and capital needed for the restructuring process to take place.

Restructuring costs are admittedly both firm and region specific. For example the probability of becoming unemployed $(1-\lambda)$ is fundamentally driven by management decisions at firm level but it can also be assumed that both restructuring costs (σ) and the responsiveness of profitability to sunk cost expenditures $e(\sigma)$ are determined by exogenous regional factors, in particular the socio-economic inheritance of a firm coming out of planning. The sunk cost of restructuring and the resultant increase in profitability generated from a reduced labour force is related to the quality of social capital that a firm has access to in a regional labour market, such as telecommunications, banking and legal infrastructures. In addition it can be related to the amount of obsolete capital and the nature of the product a firm has inherited from the planning system. A Polish firm that historically traded poor quality products within the C.M.E.A. market located in eastern regions is less likely to restructure due to an absence of a restructuring technology and in addition a lack of access to social capital. In contrast, a Polish firm that historically traded with high quality products to the E.U. from western regions endowed with better social capital is more likely to restructure.

The required jump in profitability may not be possible in some firms due to these external inheritances. This will leave a proportion ρ, of traditional firms non-restructured and a proportion $(1-\rho)$, of firms restructured in regional labour markets. Within each

region there is assumed to be a homogenous grouping of non-restructured and restructured traditional firms determined by an exogenous regional inheritance.

The average wage paid by firms in the outside labour market is defined in equation 3.13, as the average wage paid across restructured and non-restructured traditional firms,

$$\bar{W} = \rho W_N + (1-\rho) W_R \tag{3.13}$$

By substituting (3.8) and (3.9) into (3.13), and rearranging, the average wage is expressed as follows,

$$\bar{W} = W_R + \left(\frac{C\rho(\lambda - 1)}{\lambda} \right) \tag{3.14}$$

If $\rho > 1$, some proportion of firms are restructured and the average wage is $W_N < \bar{W} < W_R$. The average wage in general equilibrium is solved using (3.7) and (3.14), as follows,

$$\bar{W} = b + \phi \frac{C}{\lambda}(1 + \rho(\lambda - 1)) = b + \left[1 + \frac{H}{U} \frac{1}{r} \right] \frac{C}{\lambda}(1 + \rho(\lambda - 1)) \tag{3.15}$$

The average wage is driven by factors that reflect profit sharing, restructuring in traditional firms and outside labour market conditions. The restructuring of traditional firms increases the average wage in the regional labour market reflecting wage premiums that compensate retained workers for undertaking the risk of job loss during restructuring.

The restructuring parameters in the model are treated as an outcome of the initial condition of socio-economic structures across the regions of Poland. The evolution of hiring and unemployment in the outside labour market are also treated as exogenous in this model. The better the conditions in the outside labour market, the higher the average wage for any stage of regional restructuring.

Yet, increases in the outside wage, induced by restructuring in traditional firms, are likely to constrain hiring in the outside labour market and reflect layoffs from traditional firms that flow into unemployment. Thus the unemployment rate is likely to depend on the rate of restructuring amongst other factors. In summary, within a simple

model of wage setting and restructuring across independent regional labour markets, the following testable proposition is predicted:

In the presence of decentralised profit sharing the average wage level in a regional labour market, amongst other factors, will be negatively related to the unemployment rate (instrumented) and positively related to the degree of regional restructuring (instrumented).

3.3.1 Limitations of the Model

The model as described above produces testable assumptions that regional wage averages depend (inversely) on the level of unemployment and (positively) on the extent of restructuring, based on the assumption that a region's inheritance drove its ability to adapt. However it is not without limitations. First, it is a highly simplified model based on restructured and non-restructured traditional or state-owned firms. In terms of the empirical sections of the thesis it will be important when examining wage determination to restrict workers in the sample, at least for some of the regressions, to those employed outside the new private sector. In the Polish Labour Force Survey, question twenty-four asks details regarding the "type of ownership of the firm". Answers to this question range from firms categorised in state ownership to those in private ownership and cooperative style structures. Using survey responses to this question the possibility unfolds in later sections of examining wage determination in state-owned sectors. This restriction fits the theoretical model but for comparison reasons wage determination in the private sector will also be examined.

Second, the above model is fundamentally a wage bargaining model as such it is based on insider effects and the reaction of wages to firm specific factors. As a result the impact of the outside option stemming from new job creation in the private sector could not be expected to affect the outcome on wages[24]. To empirically test for the impact on wages of the outside option stemming from new job creation, it becomes necessary to assume that as transition unfolds and the new sector emerges, wages are not

[24] This is apart from satisfying a participation constraint.

determined by bargaining. In fact, wage setting may not be imperfectly competitive in the emerging new private sector if it is assumed that workers are paid their marginal revenue product of labour.

As discussed above the focus of the model, at least in partial equilibrium, is on the reaction of wages to firm-specific factors. Another dimension as proposed in this thesis is to empirically test how wages respond to local labour market conditions and in general equilibrium regional wage averages are proposed in particular to depend on unemployment and restructuring. In Poland, cross-regional differences in industrial structures coupled with low labour mobility[25] have led to very different unemployment rates across regions as was documented in Table 2.6. This heterogeneity offers a potentially clear test of the effects of local labour market conditions on wages.

However one explanation for a negative relationship between wages and unemployment that is not explicitly modelled in the above theory is that, many firms may have failed immediately when transition commenced. These firms may well have had workers with low re-employment probabilities (H/U) who would enter the long-term unemployment pool. This scenario would be more likely to occur in regions with fewer new firm start-ups and in these regions wages would be expected to be lower. Therefore wage and unemployment rates could be negatively correlated for this simple reason. However this hypothesis is less likely to explain the correlations between wage and short-term unemployment rates. Using short-term rates makes the wage curve story much more convincing. The problem with the above theory is that it does not take into account differences in short and long-term unemployment rates. However in the empirical sections that follow short-term unemployment rates are used to lend credibility to the research findings.

Another limitation concerns the homogeneity assumptions of the model. Homogeneity arises because the model makes no distinction that different groups may be able to benefit more from transition in terms of wages and employment prospects.

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[25] As discussed earlier in the chapter low labour mobility has been well documented for Poland. Further evidence has been presented by Bentolila (1997) who found that the rate of inter-regional migration in Poland in 1994 was 0.42 per cent, compared to a range of 1 to 2.5 per cent across other Western European countries.

This is particularly important for those groups of employees who are say, younger or more educated. These workers are more likely to vote for restructuring, have higher levels of insider power particularly important for high skilled workers and have higher re-employment probabilities (H/U). Furthermore even the response of these groups to outside options and job creation in the new private sector will be different across different groups but the above model makes no attempt to capture this heterogeneity. Testing for such differences across worker types lends itself as an interesting hypothesis, this can be done in the following empirical sections but it should be acknowledged that such testing does not stem directly from the theoretical model given its homogeneity assumptions.

3.4 Empirical Data

The data used in this chapter come from two main sources, first the Polish Regional Statistical Yearbooks produced annually by the Polish Central Statistics Office for the years 1992 to 1996 and second, the Polish Labour Force Survey (PLFS) for the years 1992 to 1996. Using both sources of data it is possible to test the relationship between wages, unemployment and job reallocation at the regional level of aggregation. The nature of these datasets was outlined in greater detail in chapter two. Pooled cross-sectional and time series panels were constructed using regional information from the Statistical Yearbooks for each of the forty-nine polish voivodships. With information for each voivodship over a five-year period there are a total of 245 observations for each variable in the regional panel data. Table A1 in the Data Appendix shows the average monthly wage data, registered regional unemployment rate and average industrial wage with regional job reallocation rates for each of the forty-nine Polish voivodships over the six-year period.

3.5 A Regional Taxonomy by Socio-Economic Development

As noted in chapter two, previous studies by Huber and Scarpetta (1995), Gora and Lehmann (1995) and Lehmann and Walsh (1998) have carried out some aggregation of Polish voivodship-level data in order to carry out more meaningful analysis. In this section the taxonomy of Polish regions developed by Lehmann and Walsh (1998) is

applied to the Statistical Yearbook data. Their taxonomy is based on the level of socio-economic development attained by Polish regions by 1996. The taxonomy ranks each of the forty-nine voivodships, the highest regional administrative units in a continuum of restructuring. Voivodships are bundled into six groups representing stages of development, from Group I (the least developed) to Group VI (the most developed). This classification system is used to capture the stage of economic development of regions in the wage estimations of section 3.6.

The procedure employed in the Lehmann-Walsh (1998) analysis is as follows. First each region is ranked one to forty-nine for each of the following seven indicators of employment restructuring:

A: Share of Services in Total Regional Employment per cent in 1996. Scarpetta (1995) acknowledged that the size of the service sector within the old planned system was small compared to that observed in Western Europe. Services were present under planning but were mostly undertaken within industrial enterprises. As a result they were classified as industrial employment. The growth of the service sector was driven first by the entry of firms into the new private sector and second by the unbundling of activities in state-owned sector 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 Labour Force Survey, Lehmann and Walsh (1998) rank regions by percentage of males in employment who have not changed jobs since the beginning of transition. Transition from state-owned sector employment to private sector employment should induce more job turnover. It is possible that individuals in a similar job in a privatised but previously state-owned firm may not report a break in job tenure and as a result this aspect of restructuring will be ignored by this indicator. However the presence of job turnover should reflect the creation of the new private sector and some degree of restructuring in the previously state-owned sector. 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 state-owned sector and growth in the new private sector is

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) telephones per 100 inhabitants.

D: Domestic Investments per 1000 inhabitants, percentage distribution across regions in 1996. Regions with viable products, efficient operations or with the potential of having these will have attracted domestic investment flows over the transition period. Furthermore 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 already documented by Repkine and Walsh (1999), firms that were E.U. oriented at the start of transition attracted a large amount of foreign direct investment 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 foreign direct investment in the economy.

F: Share of Building and Construction in Total Regional Employment per cent in 1996. With the growth of the new private sector one would expect greater development of new offices, hotels, housing and restaurants. The most (least) restructured region has an 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. Before transition the agricultural sector was in the main privately owned. It 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 agriculture 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 new private sector 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.

Lehmann and Walsh (1998) summarise that five of the above seven indicators are based on stock values and should therefore reflect unequivocally the relative degree of restructuring at the end of 1996. On the other hand the two investment indicators (D and E) are based on flow values. However the rankings of regions are similar when based on these two indicators for the years 1994 and 1995[26], therefore the rankings for 1996 reflect a persistent pattern of investment flows. Table 3.8 provides summary statistics of the seven indicators used in the Lehmann-Walsh (1998) taxonomy.

The authors use a Borda electoral scheme taking the sum of the best six rankings for each indicator to establish the overall score for each region. The highest possible score is six where a voivodship was ranked first for each indicator and the worst possible score is, 294, where a voiovodship was ranked forty-ninth for all six indicators. These scores are then sorted into ascending order to allow voivodships to be bundled into six regional groupings where Group One is the least restructured and Group Six is the most restructured. A large discrete break in the score of two voivodships determined the boundary between any two regional groupings leading to a taxonomy of employment restructuring as shown in Table 3.9. With the exception of Warsaw and Lodz, all regions in Groups I, II and III are in Eastern regions of Poland. This taxonomy is more finely tuned to the Polish economy than the broader macroeconomic regions identified by the Polish Central Statistics Office, however using the Lehmann-Walsh taxonomy raises certain issues, which must be addressed in the following section.

3.5.1 Issues encountered with the Lehmann-Walsh (1998) Taxonomy

One of the issues encountered when using a taxonomy ranking based on several indicators, is that it can possibly disguise the individual influence of the contributory variables, so for example it may be the case that cross-regional differences in telecommunications or the share of services are driving the results. Table 3.10 presents

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[26] Lehmann and Walsh (1998) find that rank correlation coefficients for 96/94 and 96/95 are 0.94 and 0.96 respectively and are highly significant.

evidence in the form of a correlation matrix extracted from the Lehmann and Walsh (1998) paper. This shows the authors' indicators to be highly correlated with each other across the forty-nine regions. From the evidence it seems unlikely that any one indicator in particular will drive the overall results. Admittedly it is possible in cases like this to use Principal Components and Factor Analysis approaches to combine the many correlated variables into a smaller number of underlying dimensions but in this thesis it is impossible to run this kind of analysis due to a lack of detailed information concerning each individual component. The thesis uses only the aggregate score variable for each region as identified by Lehmann and Walsh (1998).

Furthermore it was acknowledged in chapter two that specific problems are encountered with the Lehmann-Walsh index, for example, though interpreted as reflecting relative structural change it does not contain any component measured as a temporal difference. This makes it difficult to test overtime for the effect of initial conditions. However despite these issues it is the only taxonomy attempting to measure structural change (as opposed to the level of economic or industrial development) and furthermore it is based on a greater number and variety of infrastructural indicators than previous taxonomies. For these reasons this classification of Polish voivodships is used as an instrument for restructuring in the wage estimations of section 3.6. The Lehmann-Walsh taxonomy reflects a systematic ranking and index of regions by their degree of economic restructuring.

3.6 Empirical Model and Results

Tables 3.11 and 3.12 present average monthly wages and average unemployment rates for the years 1992 to 1996 across the six regional groupings of Polish regions based on the restructuring indicators outlined in the previous section. Nominal wages are expressed in thousands of Polish zloty. In Poland wages are not automatically linked to the consumer price index therefore nominal as opposed to real wage levels will be used in the empirical analysis that follows. It should be noted that to measure real wages in different regions one should ideally have regional consumer price data. However Blanchflower and Oswald (1994) postulate: "nominal wages are likely to be sufficient whenever year and regional dummies can be included in the regression equations". I

have amended the empirical model to include such dummies. Furthermore in the regression analysis regional wages are allowed to vary overtime. With information available on forty-nine voivodships over a five-year period there is a total of 245 observations in the complete panel for the wage variable.

The unemployment rate used in the regional wage estimations is based on the number of workers who are eligible for unemployment benefits and are looking for a job. Following the discussion in section 3.3.1 short-term unemployment rates are used in the empirical analysis to make the wage curve story more convincing. This is because many firms, as noted earlier, may have failed immediately when transition commenced. These firms may have had workers with low re-employment probabilities (H/U) who would enter the long-term unemployment pool. This scenario in turn would be more likely to occur in regions with fewer new firm start-ups and in these regions wages would be expected to be lower. Therefore wage and unemployment rates could be negatively correlated for this simple reason. However this hypothesis as argued earlier is less likely to explain the correlations between wage and short-term unemployment rates. Using short-term rates lend credibility to these earlier predictions.

Short-term unemployment rates are available for each voivodship and the natural logarithm of these rates is taken to calculate the variable URjt – the natural logarithm of the short-term unemployment rate in voivodship j for the time period t. Table 3.12 illustrates how the average short-term unemployment rate varies for each grouping within the Lehmann-Walsh (1998) taxonomy. Group VI, the most restructured, has a lower average short-term unemployment rate than any of the other regional groupings within the taxonomy. Interestingly in all years the unemployment rate follows an inverse U-shape across the regional groupings. Unemployment increases as we move from Group I to Group III and then falls in the most developed regions in each time period. This phenomenon is the subject of chapter five of the thesis.

To control for the degree of economic restructuring in the regional wage regressions an additional variable RANK is created. RANK is derived by ranking each voivodship by their aggregate score on the best six indicators of the Lehmann-Walsh (1998) taxonomy. Values range from one: the most restructured, to forty-nine: the worst possible score. This RANK variable serves as an indicator of relative structural change

across Polish regions and is used in the regional wage regressions as an instrument to create two new causal variables replacing the values of the short-term unemployment and job reallocation rates.

In Figures 3.1 to 3.5 regional wage levels are plotted against regional unemployment rates for the years 1992 to 1996. Each data point corresponds to a voivodship numbered one to forty-nine. In the raw data there is evidence of a relationship between wage and unemployment levels. In what follows I provide econometric evidence for the assertion that regional wage averages are determined by unemployment and job restructuring levels across regions and time, while controlling for simultaneity problems and the presence of other deterministic but omitted factors in the regional level data.

As outlined in section 3.4 there is a cross-section of forty-nine voivodships over a five-year period giving a total of 245 observations in the complete panel. The average regional monthly wage model is written as follows:

Specification One:

$$\ln W_{jt} = \beta_0 + \beta_2 \ln UR_{jt} + \beta_3 \ln RES_{jt} + \beta_4 D_t + \varepsilon_{jt} \qquad \textbf{(3.16)}$$

This model estimates the impact of the log of the unemployment rate in region j and period t, $\ln UR_{jt}$ on the log of the average monthly wage in region j and period t, $\ln W_{jt}$ while controlling for the log of the job reallocation rate in region j and period t, $\ln RES_{jt}$ and other fixed effects using time and region dummies. The local unemployment rate (UR_{jt}) controls for job shortages in a local labour market while the local job reallocation rate (RES_{jt}) controls for the rate at which non–restructured firms are being replaced by restructured firms during transition. This latter process increases the number of good jobs in a local labour market. The local rate of unemployment, wages and job reallocation are entered as logarithms in the wage estimations so that the coefficients on unemployment and job reallocation represent proportional change and can be read as elasticities. Logarithms are also employed to reduce skew and linearise relations amongst the variables.

In specification two, unobserved heterogeneity in region j is controlled for by the inclusion of a unit specific residual, v_j. This is comprised of a collection of factors not in the regression that are specific to region and constant overtime, for example, human

capital and occupational structures of regions. To leave out such effects would lead to overestimated coefficients in the regressions. In addition to the random effects term, an intercept term and time dummies are included in the regression to control overtime for the evolution of unobservable macroeconomic deterministic factors, such as inflation. This alternative specification is as follows:

Specification Two: Random Effects Model

$$\ln W_{jt} = \beta_0 + \beta_2 \ln UR_{jt} + \beta_3 \ln RES_{jt} + \beta_4 D_t + \nu_j + \varepsilon_{jt} \qquad (3.17)$$

In Table 3.13 results are first reported for specification one, this is a model that does not control for the possibility of regional specific omitted variables. In these regressions an ordinary least squares estimator is used. In Table 3.14 results are reported for a two stage least squares estimation. In this case the unemployment and job reallocation rates are instrumented with RANK, RANK squared and RANK cubed to avoid possible simultaneity bias. Regional and year dummies are excluded from the first stage instrumental variable regressions because RANK does not vary within regions overtime. RANK takes values one to forty-nine as outlined above. Predicted values from the first stage regressions are taken as the values for $\ln UR_j$ and $\ln RES_{jt}$ in the second stage regression.

3.6.1 Robustness and Alternative Model Specifications

First tests for AR1 indicate that specification one is not valid. The presence of AR1 in residuals is checked using LM tests against the critical Chi-squared values. It is likely that the same regional specific omitted variables in each year are driving the auto-regressive processes.

In Table 3.15 results of specification two and the random effects model are reported now controlling for the presence of unobserved regional specific deterministic heterogeneity. The Hausman (1978) specification test checks that the difference in coefficients between fixed and random effects are not systematic and the test results reported in Table 3.15 verify the appropriateness of the random effects specification. In the final column of Table 3.15 the unemployment and job reallocation rate are instrumented as before with RANK, RANK squared and RANK cubed. The

unemployment elasticity of pay for Poland is in the region of – 0.08 and the job reallocation elasticity is estimated to be in the region of + 0.2. Workers earn higher levels of pay, on average, in regions that have lower unemployment and where firm populations have undertaken more restructuring during transition. Both job reallocation and unemployment rates are key determinants of expected regional monthly wages.

Finally in Tables 3.16 to 3.18, I attempt to separate the effects of job creation (POS) and job destruction (NEG) on regional wage averages. This is interesting because it is possible that both of these would not have symmetric effects on wage determination. In the O.L.S. regressions in Table 3.16 omitted factors drive the results. Both local job creation and job destruction rates return insignificant *t* values. In Table 3.17 results from the two stage least squares regressions are reported. Here the job creation rate returns a negative sign while the job destruction rate is positive. However in this case only the job creation rate is significant. In Table 3.18 results of the random effects generalized least squares estimation separating job creation and job destruction rates reports, in all cases, insignificant results. From these regressions it is clear that it is local job reallocation rates, as defined in section 3.2, that matter. Like Belzil (2000) for Denmark, I find an empirical link between wages and job reallocation rates, amongst other factors, including unemployment.

3.7 Conclusion

This chapter explored the determinants of average monthly wage levels across the forty-nine regions of Poland at a regional level of aggregation. Section 3.3 developed a simple theoretical model of wage setting and restructuring proposing a testable proposition namely; the average wage level in a regional labour market, amongst other factors, will be negatively related to the unemployment rate (instrumented) and positively related to the degree of job reallocation (instrumented). In section 3.3.1 the limitations of this model were addressed. The empirical model in section 3.6 examined the effects of regional unemployment and job reallocation rates on average pay levels controlling for other unobservable deterministic factors using panel data techniques.

Regional regression results show that the elasticity of average pay with respect to local unemployment is approximately –0.1. This roughly corresponds to the findings of

previous studies as outlined in section 3.2. Moreover workers in more restructured regions receive higher pay, on average, than those surrounded by non-restructured firms other things constant. In terms of local labour market conditions job shortages do not tell the whole story. Job reallocation rates are another important variable that should be considered in wage estimations. Belzil (2000) was the first to examine the sensitivity of pay to job creation and job destruction while controlling for the business cycle with the unemployment rate. The main empirical finding of the literature based on Davis and Haltwianger (1992) was the coexistence of large job creation and job destruction rates over all points of the business cycle. Structural change in employment not captured by business cycle indicators has the potential to be an important "omitted" variable in wage equations. The research in this chapter suggests that structural change in employment can be controlled for using job reallocation rates as an explanatory variable in wage equations. Given that job reallocation and unemployment rates are key determinants of expected regional monthly wages (outside earning options) I now turn in the next chapter to examine their impact on individual earnings when controlling for human capital and occupational characteristics.

Chapter Four

Individual Pay and Outside Options: Evidence from the Polish Labour Force Survey

"If several workmen were to be asked: 'How much wages do you get?' one would reply, 'I get two shillings a day', and so on. According to the different branches of industry in which they are employed, they would mention different sums of money that they receive from their respective employers for the completion of a certain task; for example, for weaving a yard of linen, or for setting a page of type. Despite the variety of their statements, they would all agree upon one point: that wages are the amount of money which the capitalist pays for a certain period of work or for a certain amount of work; it is the capitalist who determines wages."

(Marx, 1849)

4.1 Introduction

The liberalisation of labour markets in the countries of Central and Eastern Europe introduced greater competition for labour post-1990. Theoretically this should have induced individual earnings, for any given ability, to reflect outside earning options: the availability and quality of jobs in the local labour market. In this chapter firm, individual and regional level data are matched to explore whether this has been a reality

in Poland during transition. In the previous chapter regional level data was used to identify conditions in the local labour market that explained differences in regional wage averages. This chapter now builds on that body of empirical research at the lower, individual level of aggregation. Using labour force survey data in conjunction with other data sources detailed in chapter two, I now examine whether competition for labour during transition has induced *individual* pay to depend on outside options, namely the availability and quality of jobs?

Two factors have constrained the role of competition and benefits of labour market liberalisation across regional labour markets in Poland. The first, identified in chapter three of the thesis, emerges from the lack of inter-regional job and worker flows during transition. The absence of migration flows however ensures that the regression analysis which follows will not have to concern itself with the standard Harris-Todaro (1970) critique, the need to model migration as a key labour supply determinant of wage and unemployment levels. Polish wages can be modeled to depend solely on local labour market conditions and not inter-regional migration flows.

The second factor arises from the existence of intra-regional structural rigidities as identified in chapters one and two. An important feature of regional labour markets in Poland is their inheritance of idiosyncratic socio-economic structures coming out of planning. However although local labour markets have the same economic institutions and macroeconomic environment, unemployment and job reallocation rates are known to evolve differently across local labour markets during transition. This was shown in chapter three of the thesis. This cross-sectional variation in local labour market conditions is exploited in this analysis of outside earning options and individual pay. This chapter is therefore an empirical investigation of the impact of cross-regional differences in the extent of restructuring on outside options and hence on the pay of individuals.

The remainder of the chapter is as follows. In section 4.2, I first evaluate the impact of local labour market conditions (outside options) on individual earnings using data gathered from the Polish labour force survey over the period 1994 to 1996. The general consensus within firm level studies to date is that there is little evidence of a detectable "wage curve" effect for the countries of Central and Eastern Europe. This is

according to the literature reviewed by Svejnar (1999). In Svejnar's review only one study found partial evidence of a 'wage curve' effect for Poland. This was a paper conducted by Basu et al (1997) with information gathered using *firm* level data. Results found the wage elasticity with respect to the local or (district-level) unemployment rate to be statistically significant for Poland with a negative coefficient of –0.03. Furthermore until recently, only a small literature estimated wage curves for Eastern Europe using micro *individual* level data. The main studies here relate to papers by Kallo and Kertese (1997) for Hungary and Pannenberg and Schwarze (1998) for East Germany. Blanchflower (2001) uses the International Social Survey programme to estimate wage curves across nine countries of Central and Eastern Europe. The results of his study were summarised in Table 3.7. For Poland, the elasticity of pay with respect to unemployment is estimated using a sample of 4,747 individuals, to be –0.13.

In contrast to previous studies, the empirics of this chapter have a number of innovations. First regional unemployment and job reallocation rates are matched to individual wage data using information gathered from the Polish labour force survey. Both local unemployment and job reallocation rates are included in the wage estimations together with a rich set of controls for individual characteristics. The tendency in the literature so far has been to ignore job reallocation rates in wage estimations. The inclusion of job reallocation rates is important however given the empirical findings and concluding comments of chapter three. For example, the coexistence of large scale job creation and destruction rates over all points of the business cycle, as shown in a paper by Davis and Haltwinger (1992), represents structural change in employment not captured by standard business cycle indicators in wage estimations. Job reallocation rates attempt to capture this labour market turbulence and excluding such rates from wage equations may therefore lead to a misspecification of the econometric model for both transition economies and mature market economies.

Beyond the inclusion of job reallocation rates the remaining innovations of this chapter are as follows; first to avoid simultaneity bias in the econometric results local labour market conditions are instrumented. Second by exploiting the panel element of the data it is possible to control for unobservable individual fixed effects and third,

conditioning the earnings equation on a participation model controls for the possibility of sample selection bias.

In section 4.3, alternative specifications of the econometric model are tested. The effects of separating the local job creation and job destruction rates on individual wages are examined and the sample is subdivided into two underlying groups of workers, those employed in the state-owned sector and those employed in the new private sector. In section 4.4 the homogeneity assumption of the simple theoretical model developed in chapter three is relaxed. This homogeneity assumption is a severe limitation of the model because it makes no distinction that different groups of workers may be able to benefit more from transition, for example, the young and/or more educated. This is important because certain kinds of characteristics may give workers more or less insider power when it comes to voting for restructuring. Therefore a secondary issue investigated in this chapter concerns the question; to what extent are past investments in human capital and choice of occupation under planning, later rewarded in terms of earning potential during the transition period? Normally in mature market economies investment in human capital would be expected to target high wage occupations. This selection bias is not a strong feature of this data as most human capital and occupational structures were an outcome of the planning era. However section 4.4 tests which educational and occupational specific work experience, if any, yield high returns from the market economy. This is only possible by relaxing the homogeneity assumptions of the theoretical model developed in the previous chapter. Section 4.5 then concludes the chapter by summarising the main empirical findings.

In the next section the empirical model of the outside option and individual earnings is first presented.

4.2 The Outside Option and Individual Earnings

The data used in this section is extracted from the Polish Labour Force Survey for the years 1994 to 1996. As outlined in chapter two, the Polish Labour Force Survey is a quarterly household survey beginning May 1992. This chapter uses three data waves of the survey corresponding to the November 1994, 1995 and 1996 waves. From May 1993, the introduction of a rotating panel resulted in one half of the current sample being

used in the survey for the next quarter and the other half being used in the same quarter the following year. This feature of the survey made it possible to construct a panel tracking individuals overtime.

Females are deliberately excluded from this panel for the following reasons. First they are more affected by short-term supply side considerations than their male counterparts, for example, in relation to child rearing or caring for elderly family relatives. In many countries large numbers of women work on farms or in other family enterprises without pay, while others work on or near their homes mixing work and personal activities during the day. This makes it difficult to obtain reliable estimates from the labour force survey regarding the extent of their participation. Estimates of women participating in the labour force are generally lower than those of men and in many cases results based on female data are not internationally comparable. Table 4.1 shows the change in female employment and labour force participation in Poland and selected countries in Central and Eastern Europe between 1989 and 1997. For Poland both female employment and labour force participation rates declined by ten percentage points over the above period. This is because many women opted out of the labour force with the fall of communism. Others admittedly remained active by looking for work, but mostly ended up swelling the ranks of the unemployed. This rising unemployment amongst women has tempered the decline in their labour force participation rate. For all these reasons females are deliberately excluded from the panel.

The total number of observations in the data panel is 14,203 male individuals over the periods 1994, 1995 and 1996. For each observation there is a record of the personal characteristics of the worker including; age (year of birth), level of completed education, regional location (voivodship) and occupation in the reference week. Table 4.2 outlines the various categories of education and two-digit occupation codes found in the labour force survey. The wage variable corresponds to an individual's net earnings in the previous month from a main job measured in thousands of polish zloty. In Poland wages are not automatically linked to the consumer price index therefore the empirical analysis is based on nominal as opposed to real wage levels. In addition, the wage data from the labour force survey does not include any fringe benefits or any payments in

kind. This is not too problematic for as time advances and the market economy is set in place individuals are more likely to be paid just in terms of wages.

On the data panel I impose time varying, local job reallocation rates (RES_{jt}) and local short-term unemployment rates (UR_{jt}) as measures of the outside option. The motivation for using both of these measures derives from an examination of previous literature carried out in chapter three of the thesis. Both the unemployment and job reallocation rates are instrumented to avoid possible simultaneity bias. Predicted values from the first stage regressions are taken as the values for $\ln URp_{jt}$ and In $RESp_{jt}$ in the second stage regressions. An empirical alternative to using local job reallocation and short-term unemployment rates would be to employ the area wage as a measure of the outside option. This is because a region's local wage often reflects the quantity of jobs available in that area and the amount local employers are prepared to pay in order to attract and retain the appropriate staff. A Ramsey reset test is therefore used in the regression analysis to check independent variables for misspecification of the outside option. A Ramsey reset test, evaluates the null hypothesis that the specified model has no omitted variables.

The first augmented wage curve, assuming no unobserved deterministic individual fixed component in the error term is described by the following specification;

$$\ln W_{it} = \beta_0 + \beta_1 \ln URp_{jt} + \beta_2 \ln RESp_{jt} + \beta_3 X_{it} + \beta_4 D_j + \beta_5 D_t + \varepsilon_{it} \qquad \textbf{(4.1)}$$

The natural logarithm of individual i previous months net earnings from a principal job, W_{it}, in period t, is explained by the natural logarithm of the regional unemployment rate, UR_{jt} and the regional job reallocation rate, RES_{jt}. The latter as discussed above are instrumented using RANK identified as regions numbered one to forty-nine in Table 3.9, RANK squared and RANK cubed. This specification tests whether unemployment and restructuring levels in local labour markets have similar effects on the expected earnings of individuals, as on average regional wage levels estimated in the previous chapter, while controlling for a richer set of human capital and occupational characteristics. These include non-linearities in age, education by category, occupational dummies, X_{it}, and regional and time dummies, D_j, and D_t, respectively.

The model excludes a measure of work experience gained by each individual in the panel, in other words, the individual's years of tenure in a current job, or in their last

job, if out of employment. This is because under planning most individuals stayed in the same job for the duration of their working age and labour force participation rates were high. Before transition working age and job tenure were perfectly correlated. The transition period has started to break down this traditional correlation. Table 4.3 reports a correlation matrix between age and job tenure with the latter expressed as the number of completed years work experience. A correlation coefficient of 0.64 is reported over the period 1994 to 1996.

In Table 4.4 the percentage of males in regional employment who have not changed jobs since the beginning of transition is calculated. The most developed region has around 35 per cent of males and the least developed region around 60 per cent of males remaining in the same pre-transitional job in 1996. Those that resist job changes, apart from being in less advanced regions, are in older age groups. Much of the work experience gained under communism by older workers may not be rewarded so well in a market economy. Younger age groups have less work experience but any work experience accumulated, particularly during transition, may be highly rewarded in the market economy. In the data empirics it is possible to test for such a non-linearity in return to age or a flat experience and earning profile as documented for many other countries of Central and Eastern Europe[27].

Using the same rationale it may also be the case that returns to education gained under a communist regime may not be as good as those found using data from a western economy. Flanagan (1994) using pre and post-transition data for the Czech Republic includes education in the form of categorical variables and finds a decrease in the rate of return to vocational education over transition, from 0.11 to 0.07, and an increase in the rate of return to university education from 0.31 to 0.39. Chase (1997) using similar data for the Czech Republic finds that the returns to technical education and/or training

[27] For example, Flanagan (1994) finds that the return to work experience gained under planning declined during the first few years of transition in the Czech Republic. Chase (1997) using micro data for the Czech Republic and Slovakia also finds that returns to work experience fell during transition, as young workers were favoured in jobs created during transition. Kreuger and Pische (1995) and Bird et al. (1994) for East Germany and Halpern and Korosi (1997) for Hungary document very flat experience earning profiles. For all these countries returns to experience gained under planning clearly fell during transition.

greatly diminished during transition while returns to academic education experienced a large increase. Using the Polish Labour Force Survey it becomes possible to test for such hypotheses using the categories of education identified in Table 4.2.

Tables 4.5 to 4.9 present results at the individual level of aggregation using the Polish labour force survey data when local unemployment and job reallocation rates are expressed as logarithms and instrumented to avoid simultaneity bias. In columns one and two of Table 4.5, the first stage instrumental variable results for unemployment and job reallocation rates are presented. In column three results of regressing the logarithm of individual wages on local labour market conditions are calculated. Tables 4.6 to 4.8 adopt additional variables in a step-by-step manner to control for personal characteristics of workers, for example age, industry dummies and level of education attained. In Table 4.8 an augmented wage curve is estimated, assuming a random selection process to employment, described by the specification identified in equation 4.1 above. In this case both unemployment and job reallocation rates return significant and expected results.

In Table 4.9 results from the previous regression are compared to those obtained when using a generalised estimating equation. In the final column an augmented wage curve is estimated, this time assuming the presence of an unobserved deterministic component in the error term. This is a generalised estimating equation with a population-averaged estimator. An independent correlation structure would reproduce the least squares estimates of the two-stage least squares column. With an exchangeable correlation structure in Table 4.9 the estimator is asymptotically equivalent to a random effects linear regression estimator on the panel of males. From this it is possible to test whether the effects of outside options on wage determination are different when controls are in place for unobservable individual fixed effects as well as the rich set of observable individual characteristics.

The outside option has the same estimated impact on pay even when controls exist for a rich set of observed individual and occupational characteristics and unobserved individual fixed effects. The estimated unemployment elasticity of pay in Table 4.9 is –0.12 and restructuring elasticity of pay is estimated to be 0.07. Regional unemployment can be as high as twenty-five per cent and as low as three per cent while regional job reallocation rates can be higher than ten per cent and lower than one per

cent. Both of these dictate the availability and quality of jobs in terms of pay in the outside local labour market. For any given occupation and human capital characteristics individuals can expect to have large differences in expected earnings across the various regions of Poland. For example, Warsaw paid thirty per cent more, on average, than the average pay across all other regions during the period 1994 to 1996. Outside local labour markets are estimated to explain 51 per cent of this differential[28] and individual characteristics account for the remaining 49 per cent. The magnitude of the latter suggests that there does exist returns to certain human capital characteristics during transition. These results therefore do not reinforce the homogeneity assumptions of the theoretical model in chapter three, which made no distinction between different groups of workers benefiting more from transition, for example, the young and/or graduates. This is a severe limitation of the model and one that warrants more attention in section 4.4, which will examine returns to specific human capital and occupational characteristics.

In Tables 4.10 to 4.13 the sample is sub-divided into two underlying sets of workers, first those employed in the state-owned sector and second those employed in the private sector. The rationale for this subdivision stems from the theoretical model developed in chapter three. Survey responses to question twenty-four are used to identify workers in the appropriate sector. Question twenty-four of the survey asks "Who is the owner of the firm which is your main place of work?". Responses to the question range from state to local government ownership, private ownership or those owned as a cooperative/social organisation. In Table 4.11 results for the state-owned sector show expected signs and magnitudes for the effect of local labour market conditions on individual wages. Results from the private sector regressions however are less meaningful, in these cases the coefficient on local job reallocation rates are insignificant but the magnitude of the coefficient on local unemployment rates are higher than those estimated for the state-owned sector. It appears that the predicted effects of outside options on individual wages as identified in the theoretical section of

[28] Where local job reallocation accounts for 34 per cent and local unemployment rates 17 per cent, respectively.

chapter three are more apparent for workers in the state-owned sectors of the Polish economy. I now test alternative specifications of the econometric model.

4.3 Alternative Specifications of the Econometric Model

In this section the effects of regressing unemployment and job reallocation rates on individual wages are first tested when both variables are expressed as levels. This is contrary to the logarithm specification used in the previous section. Second the effects of separating the local job creation and job destruction rates on individual wages are examined, and finally results are derived based on a Heckman (1979) selection model.

First in Tables 4.14 to 4.17 results are presented when conditions in the local labour market are expressed as levels. To avoid simultaneity bias local unemployment and job reallocation rates are again instrumented. Although the coefficients on local labour market conditions yield significant results with expected signs, the magnitude of the coefficients are smaller than those found using logarithms. The difficulty in using levels however is that it makes it difficult to later interpret coefficients on unemployment and job reallocation rates as elasticities.

In Tables 4.18 and 4.19 results are presented for regressions that separate the effects of local job creation (POS_{jt}) and job destruction (NEG_{jt}) rates on individual wages. This is interesting as job creation and job destruction may not have symmetric effects on wage determination. Although the coefficients of local unemployment and job creation rates return significant results in the regressions for both the two stage least squares and two stage generalised estimating equation, this is not the case for the regressions that include controls for the local job destruction rates. In all regressions however the coefficient on local unemployment rates are as expected, negative and significant. Local job creation rates return a positive coefficient suggesting that a worker who resides in an area with a lot of job creation earns higher wages, on average, than an identical worker residing in an area of low job creation. The magnitude of the coefficient however is extremely small. All in all it appears that local job reallocation rates are what matter in terms of individual wage determination.

Finally this section tests for the existence of the analytical problem of selectivity bias in the data. This is a problem that may arise when regressing monthly earnings of

individuals on a vector of human capital characteristics. Should selectivity bias feature in the data then the estimated rate of return to human capital characteristics might in fact be underestimated because workers who expect the lowest pay choose not to participate. The large drop in participation rates documented by Boeri (1999) for many former socialist economies may suggest that some sort of sample selection could be at work. Bias in the estimates of a restricted sample is a well-known problem. An important assumption that is made in the earnings regression is violated and so the expected value of the disturbance term will not be zero in the presence of an omitted variable. To overcome this selectivity or omitted variable bias, a Heckman (1979) two-step estimation procedure is run. Correcting for sample selection bias can theoretically change the sign, magnitude or significance of the relationships found in the primary regression results of equation 4.1. The selection model, assuming a random selection into the workforce is written as follows,

$$Z_{it} = \beta_0 + \beta_1 \ln U_{jt} + \beta_2 \ln RES_{jt} + \beta_3 X_{it} + \beta_4 D_j + \beta_5 D_t + \varepsilon_{it} \qquad \textbf{(4.2)}$$

In this case Z_{it} takes the value one if an individual is working and zero otherwise. A dummy variable is included for marriage and takes the value one if the individual is married and zero otherwise. This acts as an additional, individual specific variable and identifies the instrumentation. The Heckman lambda, λ_i, is computed for each individual in the selected sample. In Tables 4.20 and 4.21, augmented wage curves are estimated conditioned on the probability of participating in employment. This is described by the following specification.

$$\ln W_{it}\Big|_{Z_{it}} = \beta_0 + \beta_1 \ln U_{jt} + \beta_2 \ln RES_{jt} + \beta_3 X_{it} + \beta_4 D_j + \beta_5 D_t + \beta_6 \lambda_i + \varepsilon_{it} \qquad \textbf{(4.3)}$$

This regression models the contributions of the explanatory variables to the expected earnings of all males of working age as it is conditioned on the probability of participating in employment.

The unconditioned two-stage least squares results in the second column of Table 4.20 and the conditioned results in the fourth column Table 4.20 are very similar. No evidence of sample selectivity bias was found. The outside labour market has the same estimated impact on pay even when there are controls for a rich set of individual and occupational characteristics and sample selection bias. The estimated unemployment

elasticity of pay is in the region of -0.11 and the job reallocation elasticity of pay is estimated to be 0.07. Moreover for any given occupational and human capital characteristics, individuals can expect to have differences in expected earnings across the various regions of Poland.

4.4 Returns to Educational and Occupational Specific Work Experience

In this section I test what educational and occupational specific characteristics yield better returns during transition? To do this the homogeneity assumption of the theoretical model proposed in chapter three must be relaxed. This allows an empirical investigation as to whether certain groups of workers are more likely to benefit during economic transition. As noted in previous sections, a problem of the earlier model was its failure to recognise that different groups might be able to benefit more from transition. Given the nature of local labour markets, results show that individuals get higher pay due to certain human capital and workplace characteristics, amongst other factors. The estimated rates of return to human capital and workplace characteristics are estimated in Table 4.22. It shows that earnings, holding other factors constant, increase by 5 per cent for those with at least academic primary education, 28 per cent with academic secondary schooling and 65 per cent with university education. The returns to vocational technical training at 15 per cent, technical secondary at 27 per cent and technical college at 32 per cent, are in the majority of cases less than the corresponding academic training, particularly at third level. This supports a general consensus that during transition, technical education under the communist regime is not as well rewarded as academic education during transition.

Work experience as mentioned earlier is measured as years of working age. Young workers, under the age of thirty, get negative returns to experience. The return to work experience increases in every year up to sixty years of age. These results, contrary to the studies conducted for Hungary, East Germany, the Czech Republic and Slovakia point to returns from years of work experience under planning. This is substantiated by the empirical findings in Table 2.23, which splits the sample by age to get a better test of rewards to education and skills obtained before transition. From the results it appears

that the young (those aged less than thirty-four years), do not reap returns as large as those obtained for individuals aged thirty-four years and above. For state sector workers overall returns are slightly lower for each age category except for those workers aged sixty-one to sixty five.

Finally, rates of return from inheriting certain occupational skills are tested. Again there are occupational specific returns. In Table 4.22 these are grouped into occupations that get the same, up to, and above 20 per cent of agricultural pay. For example, hotels and restaurants, education, and health pay the same low pay as agriculture, while retailing, transport and construction pay up to 20 per cent more and finance, motor car assembly and public administration get over 20 per cent more than agriculture.

Given that certain human capital and occupational characteristics yield a higher expected return than others, it may be the case that the response of individual pay to outside labour market conditions may not be uniform. Intra-regional structural rigidities may mitigate the ability of certain individuals to take advantage of outside options. In Table 4.24 the elasticity of expected individual pay with respect to local labour market conditions is reported when estimating the empirical model on different groupings of the data by age, sector, education and ownership. Males when grouped by youth, academic education, employed in state companies or a service sector job have in most cases more elastic responses to outside labour market conditions rather than unitary responses. Groupings by technically trained, private ownership or agriculture/manufacturing sectors are found to have inelastic responses to outside labour market conditions. This is strong evidence of intra-regional structural rigidities resulting from planning. Apart from the market system not rewarding certain human capital and occupational types they are also less able to exploit outside earning opportunities created by the market economy. From the point of view of the economic model developed in chapter three, this means that the model's homogeneity assumptions are not backed up by empirical results. Certain groups are more likely to benefit from transition and this gives these groups more insider power when it comes to the wage bargaining process.

4.5 Conclusion

The benefits of competition in the Polish labour market have been inhibited by the lack of inter-regional worker and job flows and intra-region structural rigidities. Yet, these legacies of planning have allowed this thesis to explore the role of competition in the labour market in an environment far less complex than that observed in mature market economies. This chapter provides a clearer picture of the importance of outside earning options in labour markets undergoing a transition to a market economy. In particular outside earning options are higher in regions of low unemployment (job shortages) and high job reallocation (ongoing restructuring in firm populations). It appears that the liberalisation of the market has allowed individuals, depending largely on inherited individuals' human capital and occupational characteristics, to exploit the presence of outside earning options in local labour markets.

Results in this chapter also supported the consensus that technical (specialist) education under the communist regime is not as well rewarded as academic (broad) education during transition. One should not use years of schooling but rather categorical educational variables since it is the type of education under planning, which is important. Jobs for life and full participation under planning ensured that using the number of years of working age is a good proxy for work experience. Young workers, under the age of thirty, get negative returns to experience but the return to work experience increases in every year up to sixty years of age. These results as suggested earlier, are contrary to the studies conducted for Hungary, East Germany, the Czech Republic and Slovakia, and point to returns from years of work experience under planning.

Occupational specific returns were also discovered in Section 4.4. For example, hotels and restaurants, education, and health pay the same low pay as agriculture, while retailing, transport and construction pay up to 20 per cent more, and finance, motor car assembly and public administration get over 20 per cent more than agriculture. Finally, interaction effects were reported between human capital and occupational characteristics, and local labour market conditions. Individuals with youth, academic education or those in high wage occupations have elastic responses to outside labour market conditions rather than unitary responses. Older individuals that are technically

trained or in low wage occupations are found to have inelastic responses to outside labour market conditions. This is strong evidence of intra-regional structural rigidities discussed in chapter one, the legacies of planning that mitigate the ability of certain individuals to take advantage of their recent right to take up outside options and benefit from competition in their local labour market.

Chapter 5

Regional Restructuring and Unemployment Dynamics in Poland

5.1 Introduction

The rise in unemployment from zero to double digits is a documented feature of most Central and East European countries over transition. Moreover evidence suggests that unemployment in these countries evolved in an inverse U-shape over the first seven years of the transition process[29]. Figure 5.1 presents visual evidence of this phenomenon for Poland, showing unemployment rates to be increasing in the first few years of transition and declining thereafter. Interestingly the inverse U-shaped evolution of unemployment with a build-up of structural unemployment during periods of immense structural change in employment is not a phenomenon confined to transition economies. Unemployment across the European Union followed such an evolution in the 1980s.

During the 1980s globalisation of trade and advances in technology induced important changes in the occupational structure of employment. These changes are well documented for France and Germany by Snessens (1995), for the United Kingdom by Machin, Ryan and Van Reenan (1996) and by Nickell (1996). Furthermore, while Strobl and Walsh (1998) indirectly link structural change in employment to unemployment dynamics, a direct link has never been proven. Nickell (1997) acknowledged the difficulty in empirically demonstrating any link. Indeed the large

[29] Svejnar (1999) documents these features of unemployment in transitional economies.

volume of papers that attempted to link structural change to aggregate unemployment failed. As a result many empirical studies of regional unemployment have totally ignored structural change issues, for example attention is drawn to Blanchard and Katz (1992) and Jimeno and Bentolilla (1998). Therefore the contribution of structural changes in employment on the evolution of unemployment across O.E.C.D. countries has not been adequately examined in the literature.

For the countries of Central and Eastern Europe, initial labour market conditions at the start of transition were very different to those observed in western labour markets. It was noted in earlier chapters that under the old regime there was full employment of the working age population in oversized industrial and agricultural sectors focusing on regional specialisation and export markets. During the transition period, structural change in employment was therefore to be expected as traditional markets became eroded under stiffer competition.

Theory modelled unemployment and employment restructuring within optimal speed of transition or (O.S.T.) models. In these models large-scale job reallocation within the original labour force is a prerequisite for first, the restructuring of the old state-owned sector (S.O.S.) and second, to facilitate the entry of the new private sector (N.P.S.)[30]. Economic policy makers advocated a policy of a generous unemployment benefit schemes to facilitate labour reallocation through the state of unemployment. However empirical evidence across countries of Central and Eastern Europe now documents stagnancy within the unemployment pool and long spells of unemployment for any of those who swell the ranks of unemployment. Boeri (1998) and Brixiova (1997) theoretically explain this phenomenon as the result of workers bypassing the unemployment pool when moving to the new private sector. Inflows to unemployment are thus ineffective job seekers who later accumulate in long-term unemployment attracted by generous unemployment benefits.

In contrast to previous studies and in the absence of an empirical regularity between aggregate job reallocation and unemployment rates across countries, the purpose of this chapter is to investigate two components of male unemployment

[30] Aghion and Blanchard (1994), Burda (1993) and Gavin (1993) provide insights into O.S.T. models.

dynamics, the unemployment inflow rate and the unemployment outflow rate to test if these are systematically driven by the degree of regional restructuring? The main hypothesis is that more dynamic regions will have faster turnover and therefore lower long-term unemployment as a result.

A regional study as outlined in chapter one has several advantages. This regional analysis of Poland continues in the vain of previous chapters in an attempt to understand the evolution of Polish unemployment in local labour markets undertaking employment restructuring or structural change at different paces. Against the tide of empirical evidence for countries of Central and Eastern Europe and indeed Western economies unemployment is empirically modelled with job reallocation and then its underlying constituents, the job creation and job destruction rates, as outcomes jointly determined within a very simple Optimal Speed of Transition (O.S.T.) model. In contrast to other models the O.S.T. model is not determined in this case by outside pay or benefits systems but rather by the inheritance of local public infrastructure.

In section 5.2, the contribution of this essay to economic literature on the determinants of unemployment inflow and outflow rates is first outlined. Section 5.3 refers to the theoretical framework and predictions. Section 5.4 then examines regional unemployment inflow and outflow rates with reference to the public infrastructure development of regions developed by Lehmann and Walsh (1998). The main econometric results are presented when unemployment is modelled across regions at a point in time. In section 5.5 regional unemployment inflow and outflow rates, conditioned on human capital characteristics across the public infrastructure taxonomy of regions are examined and further econometric evidence is presented. Finally section 5.6 concludes and highlights important policy considerations in the light of the suggested evidence.

5.2 Contribution to literature

Empirical cross-country studies on economic transition document the existence of an "inverse U-shape" in unemployment as transition advances. In particular structural unemployment rates increase in the first years of transition and decline thereafter. During transition structural unemployment arises from a mismatch between the

unemployed and job vacancies. The unemployed either possess skills or live in geographical areas, which are distinct from those in which the vacancies exist, mostly the larger urban regions of Warsaw and Gdansk. This has become a stylised feature of transition across many countries of Central and Eastern Europe. This feature is also true across regions of Poland at different stages of transition as documented in Table 2.6 of chapter two.

The theoretical literature comprised of studies by Aghion and Blanchard (1994), Burda (1993) and Gavin (1993) assumes that labour reallocation between the state-owned sector and the new private sector is facilitated through the state of unemployment. More specifically job destruction in the state-owned sector creates inflows into unemployment and job creation in the new private sector induces outflows from unemployment. This literature as noted in section 5.1 emphasises the need for an unemployment benefit system at the start of transition to encourage restructuring in order to free resources for use in the new private sector. Clearly the speed of transition is dictated by outside pay or unemployment benefits.

The research in this chapter builds on these standard optimal speed of transition models but in this case the speed of transition is dictated by the inheritance of local public infrastructure within a region rather than outside pay or unemployment benefits. This is because any form of decentralised economic activity needs public infrastructure especially when coming from the initial conditions of central planning. The view that something other than benefit systems drive unemployment flows is also supported by the literature as reviewed by Svejnar (1999). In his survey the parameters of unemployment benefit systems, including very large reductions in benefit levels, had only modest effects on unemployment spells across the countries of Central and Eastern Europe. Clearly some other factor must be held accountable. Section 5.4 examines the impact of restructuring on inflows and outflows from unemployment.

Another interesting feature of transition countries documented in empirical cross-country studies is unemployment stagnancy. Within the unemployment pool, turnover is low and individuals experience long unemployment durations. Boeri (1998) and Brixiova (1997) provide theoretical explanations for this empirical observation by allowing flows of workers to mostly by-pass unemployment so that most flows are then

job to job. They propose that inflows into unemployment are mainly ineffective job seekers that accumulate in long-term unemployment attracted by the presence of ill conceived, generous unemployment benefits. In this chapter regional and individual level data can be used to test this secondary issue namely; do inflows to employment actually by-pass the unemployment pool in Poland?

This is the first empirical study that will provide clear-cut evidence for theory that models unemployment with regional employment restructuring within the general theoretical framework of O.S.T. models. I test if unemployment inflow and outflow rates, and unemployment durations are systematically driven by the degree of regional restructuring captured by the index of restructuring outlined in chapter two. Employment restructuring is captured using job reallocation rates, and rates of job creation and job destruction.

Chapter two classified the forty-nine Polish regions into six regional groupings according to the Lehmann-Walsh (1998) regional taxonomy. Regions are more developed in infrastructure and employment restructuring as we moved from Group I to Group VI. In Table 2.6 we further observed that the "inverse U shape" is a strong feature of the evolution of Polish unemployment both within the groupings overtime and across the Lehmann-Walsh groupings at each point in time. The investigation in this chapter is an attempt to understand the evolution of unemployment in local labour markets undertaking employment restructuring or structural change at different paces.

In the countries of Central and Eastern Europe, structural change takes the form of ongoing occupational, sectoral and ownership changes across regions. To measure structural change I therefore use a measure of regional employment restructuring captured by the job reallocation index described in chapter two of the thesis. Job reallocation rates are the pure compositional shifts in the firms that host jobs in the regional employment pool over a period of a year. In the context of a transition economy, restructuring requires that traditional firms either exit or move towards their production possibility frontier and induce new firms to enter. Overtime more workers should find themselves in jobs in either new or restructured firms. The *RES* or job reallocation index captures this move to efficiency in firm populations extremely well.

In Table 5.1 two alternative commonly used measures of structural change are presented from the literature for Poland, Hungary the Czech Republic and for the group of O.E.C.D. countries as a whole. The first corresponds to the coefficient of variation on yearly employment growth rates across nine broad sectors[31] and the second corresponds to a sectoral reallocation index calculated over gross employment variations in the former nine sectors. Both measures of structural change point to a much faster pace of structural change in Central and Eastern Europe compared to the group of O.E.C.D. countries, and to significant *external job reallocation* of workers. The significance of the latter justifies the use of local job reallocation rates as a measure of structural change not used previously in the literature.

Furthermore it is possible to split the local job reallocation rate into its two underlying constituents, the local job creation and job destruction rates. This is very important in terms of modelling unemployment flows, as job destruction rates are more likely to affect unemployment inflows while job creation rates are more likely to affect unemployment outflows. It will be important in the empirical section that follows to carefully separate these effects on inflows and outflows from and to unemployment. In section 5.4 the empirical methodology will therefore model unemployment inflow/outflow rates as outcomes of job creation/destruction.

Another factor to consider is that job reallocation during transition may take the form of sectoral shifts from the state-owned sector to the *de novo* private sector. Although it is impossible to use Amadeus to construct a privatisation reallocation index it is possible with the individual data to identify those workers who are in either, state or private sector employment. Splitting the sample between both groups of workers may help to alleviate the problem in section 5.5.

5.2.1 Literature on the Unemployment Inflow Rate

Apart from Newell and Pastore (2000) the empirical literature thus far, as reviewed by Svejnar (1999), does not seem to concern itself with the determinants of inflow rates into unemployment across Central East European countries. The Newell and

[31] Agriculture, Mining, Manufacturing, Electricity, Gas and Water, Construction, Wholesale Trade and Hotels, Transport and Communications, Finance and Real Estate and Community and Personal Services.

Pastore(2000) paper primarily studies regional unemployment inequality in Poland and finds that higher unemployment regions are those experiencing greater change in industrial structure. Their work however is based on labour force survey indices of sectoral turbulence different to the measure of employment restructuring proposed in this thesis. Nevertheless the results from their study were an interesting motivation for using another index of employment restructuring captured in this research by the construction of the local job reallocation rates RES_{jt}, the local job creation rates POS_{jt} and the local job destruction rates NEG_{jt} all three are indices based on firm level data and changes in the structure of firm populations. These are better measures of structural change than those constructed from the labour force survey data, worker flows or inter-sectoral employment changes.

5.2.2 Literature on the Unemployment Outflow Rate

In terms of the outflow rate from unemployment, no study has to date estimated the impact of job reallocation and job destruction on the outflow rate. This allows the chapter to test if the determinant of the gap between outflow rates from unemployment across Polish regions is indeed differences in local job destruction rates. In section 5.5, this analysis is developed further by estimating the direct effect of certain human capital characteristics of the unemployed (for example age, education and marital status) and their indirect inability to augment the impact of structural changes in regional labour demand on outflow rates and duration.

There is a literature that models unemployment outflows using individual level data, but the relative importance of labour demand (proxied as either the local unemployment rate or the job vacancy rate) and labour supply (human capital characteristics) conditions are hard to disentangle. For example, Sorm and Terrell (1997) cannot identify any demographic group in terms of age or education that find it easier to leave Czech unemployment. Dushi (1997) for Albania finds little significant effects of age, education and local unemployment rates. Finta and Terrell (1997) estimate separate hazard models for males and find that the hazard of leaving unemployment falls with age and is higher for the more educated in the Czech Republic. Abraham and Vodopivec (1993) find for Slovenia that males over fifty and the least

educated found it very difficult to leave unemployment during transition. Finally, Micklewright and Nagy (1997) find for Hungarian males, that age and education matter but local unemployment rates did not affect the probability of leaving unemployment. Modelling characteristics of the unemployed in Section 5.5 will allow the chapter to empirically test if certain human capital characteristics respond or do not respond to local employment restructuring.

In the next section I outline a very simple theoretical framework and some theoretical predictions.

5.3 Theory

In this section the unemployment rate is modelled within an independent labour market undergoing a transition to a market economy. Before transition all of the labour force are employed in the state-owned sector. The labour force is therefore denoted as E. The model focuses on the partial reallocation of these state-owned sector workers, E, at the start of transition to either restructured firms that were previously state-owned, the emerging *de novo* private sector or to the state of unemployment, U. The transition process ends when E=0. The unemployment rate, U/E, is defined as the numbers unemployed over the labour force, the inflow rate, I/E, as the number of gross inflows into unemployment over the labour force and the outflow rate, O/U, is the number of gross outflows from unemployment over the unemployment stock. The unemployment rate in a steady state is further defined as the inflow rate times the average duration of unemployment spells.

Before examining the aggregate separation rates from employment to unemployment the micro-foundations are first laid in place by returning to the theoretical framework developed in chapter three. Then I follow the literature to model the aggregate hiring rate from unemployment to employment. Bringing the two together builds a model of the evolution of the unemployment rate.

5.3.1 Firm Level Restructuring in the State-Owned Sector

The core element of the model is that L workers or insiders in a state-owned firm dictate the timing of restructuring. This is not too unrealistic given that workers councils took effective control of state-owned firms at the start of transition in Poland. These councils were already in place in 1981 but had no power under planning 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. It was privatisation through liquidation that was the most popular method used, and this led to insider majority ownership. However privatisation did not lead to automatic restructuring of firms because of majority insider voting. As a result there were delays in the restructuring process and in the distribution of profits amongst workers in the form of higher wages.

In chapter three it was proposed that two conditions had to be satisfied before workers would vote for restructuring. The first was a *risk aversion constraint* where the expected income stream for a worker, ex-post restructuring, must be at least as great as the current income stream in the non-restructured state, rV_N and the second was a *viability constraint* that required retained workers to induce a profit stream that covered labour rents and restructuring costs ex-post restructuring. The model developed in chapter three also postulated that sunk cost expenditures and the ability to adapt the inherited capital stock to induce profits is determined by exogenous factors, in particular the quality of social capital in a region that a firm has access to, such as telecommunications, banking and legal infrastructures. In addition it can be related to the amount of obsolete capital, the nature of the product inherited by a firm. A Polish firm that historically traded poor quality products within the C.M.E.A. market is less likely to restructure when compared to a Polish firm that historically traded with high quality products to the European Union. The ability of firms to restructure is therefore dependent on the socio-economic inheritance of a firm coming out of planning. This was denoted as, S.

However it should be acknowledged that in some cases even a firm that historically traded poor quality products within the C.M.E.A. market may have had to restructure otherwise it would face ultimate closure. Furthermore not all firms may have

needed to restructure in the first place, this particularly concerns those firms that are in either good financial shape at the start of transition and/or producing products for which there is still a market need post reform. In both these cases neither firm necessarily needs to restructure. Unfortunately none of these possibilities could be explored in the theory developed in chapter three however the possibility of their existence should still be recognised by the reader.

Ignoring these possibilities it was proposed in chapter three that high restructuring costs, σ, and/or a low responsiveness of profitability to sunk cost expenditures, due to the socio-economic inheritance of a firm, induced workers ex-ante not to vote for restructuring, $\lambda^* = 1$. Yet, if the socio-economic inheritance of a firm was good, even in anticipation of a low labour retention rate, workers would vote for restructuring once ex-post profitability and labour income per retained worker jointly satisfy conditions (3.4) and (3.5) in chapter three, and $0 < \lambda^* < 1$. All this background sets the context for examining regional job separation rates in the following section. However this theory of firm level restructuring within the state-owned sector is subject to all the limitations discussed in section 3.3.1. These problems included the homogeneity assumptions for workers and firms which in reality would be likely to be very different across firms and regions especially in relation to workers' re-employment probabilities. Furthermore there is no allowance in the model for a firm participation constraint this arises because some firms may have failed immediately once transition commenced especially if outside options were better than staying in business. With these in mind I now discuss regional job separation rates.

5.3.2 Regional Job Separation Rates

Regions that inherited better public infrastructure are predicted to have more firm level restructuring in the previously state-owned sector, this induces higher worker separation rates from employment. In this case the layoff probability for workers is affected by whether individuals have effective human capital for the new competitive environment. The aggregate separation rate from the previously state-owned regional employment, E, is determined by aggregating over the size weighted layoff rate of firms

in a region,

$$(1-\lambda(S)) = (1-\sum_{i=1}^{n}\phi\lambda_i^*(S)) \qquad (5.1)$$

The number of laid off job seekers, F, from the initial stock of state-owned sector workers, E, after a defined period of transition is (1-λ (S)) E. In the next section hiring rates in the new private sector are modelled within a simple matching model framework.

5.3.3 Regional Hiring Rates

The aggregate hiring function, H, in the new private sector will be modelled by the convention followed in Layard et al. (1991),

$$H = f(cF, V(S)) = [cF]^{(1-\alpha)}[V(S)]^{\alpha}, \quad where \ 0<c<1 \qquad (5.2)$$

During the transition period, V vacancies come on stream in the new private sector. Vacancies are higher in regions with better physical infrastructure. The forces of job destruction and job creation are constrained by factors not related to the cost of labour. Deficiencies in infrastructure clearly represent serious structural deficiencies that can only be dealt with over a longer time horizon. If there are no roads, phones or financial institutions it is very difficult for private enterprise and restructuring to flourish, even if labour is free. Decentralised economic activity is much more likely to emerge in regions that inherited good public infrastructure.

Vacancies are matched to job seekers, F, that come on stream during transition. Only a proportion c of the job seekers is considered by the new private sector to have effective human capital. This is because not all of the human capital released from the previous state-owned sector can be used effectively in the market economy. A lot of specialised education particularly technical education gained under communism can be extremely out-dated in the new regime. This was noted in chapter four of the thesis. Given the micro-foundations offered by Pissarides et al. (1990), constant returns to scale are assumed in the matching process[32]. In other words as the size of the job market

[32] Homogeneous effective job seekers cF, search randomly over V vacancies and can only make one application in a defined period. The probability that no job seeker i applies for a vacancy j is as follows, $cF\{\ln(1-1/V)\} \equiv e^{-cF/V}$. Hence the hiring rate H/F is proportional to cF/V.

increases, in terms of the number of job seekers and vacancies, the matching process becomes more efficient reducing the average duration of job search. Thus the hiring rate in the new private sector can be written as,

$$\frac{H}{F} = cf\left(\frac{V(S)}{cF}, 1\right) = c\left(\frac{V(S)}{cF}\right)^{\alpha} \qquad \textbf{(5.3)}$$

In line with the optimal speed of transition literature it is assumed that layoffs experience an unemployment spell.

5.3.4 Regional Unemployment Rates

In a steady state the unemployment rate is defined in the literature as the inflow rate over the outflow rate. Alternatively it is the inflow rate times the average duration of unemployment spells. Substituting (5.1) and (5.3) into this definition of the unemployment rate it becomes possible to define the determinants of the unemployment rate immediately in the aftermath of the initial shock of transition as the following,

$$\frac{U}{E} = \frac{F/E}{H/F} = \left(1 - \lambda(S)\right)\left[\frac{F(S)}{c^{\frac{1-\alpha}{\alpha}} V(S)}\right]^{\alpha} \qquad \textbf{(5.4)}$$

The unemployment rate has both frictional and structural components. As S increases there is more job destruction from restructuring firms in the state-owned sector, thereby increasing the inflow rate into the unemployment pool[33]. In contrast more job creation is observed in the new private sector, thereby increasing the outflow rate of effective job seekers from unemployment into employment. The higher S, the greater F and V, inducing more efficiency in the matching process thereby reducing the duration of unemployment spells for effective job seekers. Ineffective job seekers exit and duration will remain independent of regional rates of job reallocation. These predictions are all empirically testable.

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[33] Although not explicitly modelled it is likely that the firing rate would not remain constant during transition. The initially high job separation rates experienced in the state-owned sector may overtime experience a gradual slowing down as more companies privatise and internally adjust to the new competitive market environment.

Prediction One: *Regional Unemployment Inflow Rates are predicted to monotonically increase with Job Destruction Rates.*

Prediction Two: *Regional Unemployment Hazard Rates of effective job seekers are predicted to monotonically increase with Job Creation Rates.*

Prediction Three: *The regional numbers of ineffective job seekers in unemployment are predicted to monotonically increase due to hazard rates remaining independent of Job Reallocation Rates (instrumented).*

In the next section I present unemployment inflow and outflow rates with duration to test if they are empirically conditioned on distinct stages of regional restructuring, any restructuring is driven by regional public infrastructure endowments, the legacy of history.

5.4 Unemployment Inflows, Outflows and Duration

In a recent study by Walsh (2000), monthly data on unemployment benefits was used to construct annual regional inflow and outflow (hazard) rates over the period 1994 to 1996. These rates were derived using Polish Live Register data. Similar inflow and outflow rates are constructed in this chapter using data extracted from the Polish Labour Force Survey. The advantage of using the labour force survey over information gathered from Live Register Data is that the former yields a more detailed description of the Polish unemployed and their personal characteristics.

5.4.1 Construction of Inflow and Outflow Rates

Using the Polish Labour Force Survey, the analysis began by taking wave eleven of the survey, corresponding to the fourth quarter November 1994 wave. The November 1994 wave was chosen as the starting point for the empirical analysis because the occupation classification changed in 1994 but has been consistent from then onwards. In this wave there are four sub-samples coming from samples eight, nine, twelve & thirteen. From this starting point individuals from sub-sample twelve were tracked by appending waves

ten, eleven, fourteen and fifteen of the labour force surveys. After appending the individual data there is a panel of approximately 7619 males who provide responses over rounds ten to fifteen of the labour force survey, corresponding to transitions over the period 1994/1995. A dummy variable was constructed such that a value one was allocated to those individuals who had entered unemployment from a state of employment over the period and zero was allocated to those individuals who had not changed labour market status. The same procedure was applied in relation to outflows from unemployment. This time the dummy takes a value one if the individual moves from unemployment to employment and zero otherwise. Movements from and to the state of inactivity are not examined in this chapter given the theoretical assumptions of section 5.3.

A second panel was also constructed to track unemployment transitions over the period 1995 to 1996. Starting from wave fifteen there are four sub-samples in this case coming from samples twelve, thirteen, fifteen and sixteen. Individuals from sub-sample sixteen were tracked by appending waves fourteen, fifteen, eighteen and nineteen of the labour force surveys. After appending the individual data there is a panel of approximately 6723 males who provide responses over rounds fourteen to nineteen of the labour force survey. The same procedure to that described above is used to construct the dummy variable for unemployment transitions.

The annual inflow and outflow rates by region using the Polish Labour Force Survey data are given as follows,

$$\text{The inflow rate} = (I_{t\rightarrow t+1} / (U_t + U_{t+1})/2) \qquad \textbf{(5.5)}$$

$$\text{The outflow rate} = (O_{t\rightarrow t+1} / (U_t + U_{t+1})/2) \qquad \textbf{(5.6)}$$

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, and U_t and U_{t+1} are the regional stocks of unemployment at time t and t+1, respectively.

Table 5.2 presents regional inflow rates, outflow rates and shares of long unemployment spells in the regional unemployment stocks for the years 1994 to 1996 as documented by Walsh (2000). As stated in prediction one of section 5.3, it can be observed that the unemployment turnover rate increases as we move from Group I to Group VI in each time period. Moreover, the annual turnover rate increases over the

period 1994 to 1996 within each grouping due to increased job reallocation within regions overtime. 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 advanced regions in social capital, belonging to Group VI, in each year. As in prediction two of section 5.3, it appears that as unemployment turnover increases overtime there is a secular decline in the share of long-term unemployment, or alternatively in the average duration for each grouping within the taxonomy. This Live Register data suggests a clear-cut relationship between the socio-economic inheritance of regions/job reallocation rates, unemployment turnover and duration.

Table 5.3 checks the robustness of the results found in Table 5.2 against the two competing taxonomies outlined in chapter two, first Scarpetta-Huber (1995) and second Gora-Lehmann (1995). For data comparability reasons results in Table 5.3 are computed for the period 1994 to 1995 using data extracted from the Polish Labour Force Survey. Examining the data it appears that the broad finding that more dynamic regions have faster turnover and lower long-term unemployment shares as a result is strong for both the Lehmann-Walsh taxonomy and the Gora-Lehmann taxonomy. The latter ranks regions in a continuum of progressive stages of economic development with Group VI representing the most economically developed regions in Poland. Results for the Scarpetta-Huber classification are not as strong but are harder to interpret. This time the regional groupings correspond to classifications of industrial structure for example Group I are the more developed agricultural regions and Group VI other diversified. The pace of job reallocation is lower in the more agricultural regions of Poland and these regions have higher shares of long-term unemployment and slower turnover in the unemployment pool. Overall the three taxonomies appear to yield similar results.

I next turn to human capital characteristics and document the experience of males in regional unemployment flows and stocks by duration, age and education within the Lehmann-Walsh taxonomy of social development.

Table 5.4 documents results again found by Walsh (2000) using Live Register Data on the age compositions of the new registrations and those with duration of unemployment greater than a year using the Lehmann-Walsh taxonomy of regions for

the period 1994 to 1996. The inflows have a similar share of all age groups, particularly in 1996, for all degrees of regional development. Yet, in more advanced regions there is a slightly greater relative number of those aged over thirty-four years of age in the inflows to unemployment. In the long-term unemployment stock the share of those in the under thirty-four years category is greatest in the least advanced region. As we move across the taxonomy to the more advanced regions the long-term unemployment stock hosts a far greater number of older workers particularly those over forty-five years of age. This suggests that in advanced regions with high job reallocation rates not all age groups can expect short unemployment spells. Older workers separated from employment during the restructuring of the state-owned sector seem to compound in structural unemployment with little hope of exit.

In the more restructured regions of Poland the regional long-term unemployment stock has a greater share of older, less educated individuals recently coming out of pre-transition jobs. The greater share of such human capital characteristics in long-term unemployment in advanced regions seems to suggest that greater restructuring of the state-owned sector can induce greater levels of structural unemployment. Such human capital seems to compound in unemployment irrespective of the advancement in regional job reallocation.

To verify whether this is the case Walsh (2000) computes regional hazard rates for males conditioned on age, educational and occupational characteristics. Regional hazard rates are calculated using the Live Register Data. The probability of exit for cohorts in the under three months duration category, $ESTU_t$, is computed by tracking this cohort into the between three to six months duration category three months later, $LSTU_{t+1}$, to find out how many remain in unemployment three months later. A similar methodology is adopted to calculate the probability of exit for cohorts in the under six months duration category, the short-term unemployed, STU_t. The numbers present in the under six months duration category are tracked and these are compared to those who remain in the pool of between six and twelve months category, the medium-term unemployed, MTU_{t+1}, six months later. To calculate the probability of exit for cohorts in the under twelve months duration category the author works with those in the under twelve months and between twelve and twenty-four months duration category one year

later, LTU_{t+1}. Hence, it is possible to calculate the fraction of those leaving unemployment within three months conditional upon being under three months in unemployment as the following:

$$a_{t\rightarrow t+1} = (ESTU_t - LSTU_{t+1}) / ESTU_t \quad (5.7)$$

The fraction of those leaving unemployment within six months conditional upon being under six months in unemployment as,

$$b_{t\rightarrow t+1} = (STU_t - MTU_{t+1}) / STU_t \quad (5.8)$$

The fraction of those leaving unemployment within a year conditional upon being under a year in unemployment as,

$$c_{t\rightarrow t+1} = ((STU_t + MTU_t) - (LTU_{t+1})) / (STU_t + MTU_t) \quad (5.9)$$

In Table 5.5 conditional hazard rates by age and education are reported for the under three, six and twelve months categories. Across each regional grouping, numbered I, II, III, IV, V and VI the exit rates from unemployment or hazard rates during the first three, six or twelve months are non-increasing with age. A clear trend also emerges when we examine the exit rates as we move up the taxonomy from Group I to Group VI. In this case the results suggest that most age groups have a lower probability of flowing into long-term unemployment in regions more advanced in job reallocation. This explains the larger presence of younger people in the long-term unemployment 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 long-term unemployment pool as we move from Group I to Group VI.

Next hazard rates by education are examined in Table 5.5. It is shown 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 under a year regional hazard rates show that the exit rates for basic and secondary education increase from Group I to Group VI but are similar for cohorts with university degrees. These results imply that all education groups have a lower probability of flowing into long-term unemployment in the more advanced regions. This explains why we observe larger

numbers of individuals with secondary education flowing into long-term unemployment as we move from Group VI to Group I.

In Table 5.6 unemployment inflow and outflow rates with the proportion of those long-term unemployed are presented using data gathered exclusively from the Polish Labour Force Survey. Data from twelve waves of the survey needed to be pooled to track movements over the period 1994 to 1996. Rates were calculated by tracking males by identification number in the panel and using information on their current labour market status, previous job (if currently unemployed) and cross checking with current earnings. Inflow and outflow rates were calculated using the formulae defined in equations 5.5 and 5.6. The unemployment inflow rate tracks those males who enter the state of unemployment from employment only (EU) and the unemployment outflow rate tracks flows out of the state of unemployment to employment (UE) only. Examining the data there are two important observations, first the unemployment inflow rate appears to increase as we move up the taxonomy from Group I to VI and, second the unemployment outflow rate decreases from Group I to Group VI. The general consensus from the data is that regions more advanced in restructuring have lower inflow rates, lower shares of long-term unemployed and higher outflows rates to employment for males in all age groups.

The analysis in this section suggests that the predictions of section 5.3 have empirical relevance. The different inherited social capital structures across regions in 1990 and dynamics of regional labour demand in Poland seem to have pushed unemployment turnover and duration in a systematic way. Regional unemployment turnover rates seem to monotonically increase with job reallocation rates or the social economic inheritance of a regional labour market during the transition period. The analysis of regional unemployment hazard rates suggests that the duration of most job seekers decrease with regional job reallocation. Yet, it is also clear that in regions with a more advanced social capital structure increased restructuring seems to increase the numbers of older and less educated individuals in long-term unemployment. In addition such human capital seems to have relatively long duration spells in unemployment irrespective of the stage of regional job reallocation.

In the next section econometric evidence is provided for these theoretically motivated assertions.

5.5 Econometric Evidence

Specifically in this section I examine the impact of cross-regional differences in the extent of restructuring on inflows to and outflows from unemployment first unemployment flows are modelled across regions and then across individuals.

5.5.1 Regional Level Regressions

First results at the regional level of aggregation are documented in Tables 5.7 to 5.10. In Table 5.7 results are presented from the Walsh (2000) study for the annual male inflow rate and the annual male exit rate for the period 1994 to 1996. These weighted least squares models are based on Polish Live Register data. In both cases the coefficients on local job reallocation rates are significant and important determinants of flows from and to unemployment. In these models the job reallocation rates are instrumented with RANK, RANK squared, RANK cubed, time and region dummies to avoid possible simultaneity bias in the data. Coefficients are expressed as relative odds ratios.

In Tables 5.8 to 5.10 results are presented this time using a panel of forty-nine administrative viovodships and information extracted from the Polish Labour Force Survey and Amadeus. As there are forty-nine administrative regions over a period of three years this creates a panel of 147 data observations. To monitor the effects of cross-regional restructuring I initially use local job reallocation rates to track changes in the composition of firm populations across regions. Then I separate the effects of regional job creation rates and job destruction rates on unemployment flows. This is because the unemployment inflow rate is more likely to be determined by changes in local job destruction rates and the unemployment outflow rate is more likely to be determined by changes in local job creation rates. The two basic empirical models are written as follows:

$$\text{Inflowr}_{jt} = \alpha + \beta_1 \text{NEG}_{jt} + \beta_2 \text{D}_j + \beta_3 \text{D}_t + \varepsilon_{jt} \quad \textbf{(5.10)}$$

$$\text{Outflowr}_{jt} = \alpha + \beta_1 \text{POS}_{jt} + \beta_2 \text{D}_j + \beta_3 \text{D}_t + \varepsilon_{jt} \quad \textbf{(5.11)}$$

$Inflowr_{jt}$ and $Outflowr_{jt}$ are regional unemployment inflow and outflow rates respectively, NEG_{jt} and POS_{jt} are local job destruction and job creation rates as defined in chapter two and D_j and D_t are regional and time dummies respectively. In the regressions the coefficient on local job creation rates and the coefficient on local job destruction rates both return as expected significant and positive coefficients. These results are consistent with the theoretical predictions of section 5.3 above. More dynamic regions have faster unemployment turnover and hence shorter unemployment duration.

I next turn to modelling unemployment flows using individual level data.

5.5.2 Individual Level Regressions

In this section I first present individual results extracted from the Walsh (2000) study. These grouped logit regressions are again all based on the Polish Live Register 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 is estimated can be written as,

$$\log\left(\frac{P_{ijqt}}{1-P_{ijqt}}\right) = \beta_0 + \beta_1 X_{ijqt} + \varepsilon_{ijqt} \qquad \textbf{(5.12)}$$

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

In Tables 5.11 and 5.12 the empirical results from the Walsh (2000) paper are presented for the annual hazard rate of males in the under a year duration category conditioned on being exposed to defined age, education and regional job reallocation rates. In the first column of each table the entire population of males who have been unemployed for less than twelve months is grouped by age and education respectively. Besides (implicitly) controlling for duration and gender, there are also explicit controls for regional job reallocation, additional region-specific effects, seasonal and macro effects. Since job and unemployment flows are jointly determined by the inheritance of

regional social capital from planning regional job reallocation rates are instrumented with RANK, RANK squared, and RANK cubed amongst other dummies, to avoid an endogeneity problem. RANK takes a value of one to forty-nine as discussed in chapter three.

In the other columns of Tables 5.11 and 5.12 the instrumented impact of regional job reallocation rates are estimated on sub-populations of under a year males grouped by various categories of age and education. This is to test the hypothesis that while the average duration of unemployment declines with the rate of regional job reallocation, the impact on various human capital characteristics is not uniform. In particular those who are either older than forty-four years, or have only basic educational attainment may be structurally unemployed and do not respond to the advances in regional job reallocation.

The results for age groupings are presented in Table 5.11. The default category for age in column one is fifteen to twenty-four years. Instrumented job reallocation rates have an important partial impact on the annual hazard rates for males in unemployment under a year. So any unemployed male with duration of less than twelve months residing in a voivodship advanced in restructuring has a much higher probability of exit. *Ceteris paribus*, increases in regional job reallocation dramatically reduces the average duration of under a year unemployment spells. The second important point that can be inferred from the first column of Table 5.11, relates to the partial effects that age characteristics have on the annual hazard rate of males. *Ceteris paribus*, the odds ratio is found to decrease monotonically with age. In the second, third, fourth and fifth columns the thesis is explored that as males get older the ability of regional job reallocation to reduce unemployment duration decreases. Declines in the response of the odds ratio to regional restructuring can be observed as age increases. Males over forty-four years of age seem to have a "bad" human capital characteristic, and do not respond at all to regional job reallocation.

The same analysis for education is undertaken in Table 5.12. In column one it should be noted that instrumented job reallocation rates retain their impact on the annual hazard rates for males in unemployment under a year. *Ceteris paribus*, the odds ratio is found to decrease monotonically with education. In the second, third and fourth columns the thesis is explored that less educated males respond less to regional job

reallocation in terms of reducing unemployment duration. We observe declines in the response of the odds ratio to regional restructuring with educational attainment. Males with only basic education have a particularly "bad" human capital characteristic, as they do not respond to regional restructuring.

These econometric exercises confirm the assertion that the degree of regional job reallocation has an important impact on the average duration of male unemployment during transition. Yet, this effect interacts in an important way with human capital characteristics. In particular, it is found that while most males are more likely to have shorter unemployment duration in more advanced regions in terms of job reallocation (social capital), certain groups of males have become structurally unemployed during the reallocation process. The results found with the Live Register Data are males over forty-four years of age and males with only basic education. Using the Labour Force Survey these results can be further tested.

In what follows I now provide further evidence on unemployment transitions together with information on more detailed human capital characteristics extracted from the Polish Labour Force Survey.

Using the Labour Force Survey two separate panels were constructed for the periods 1994/95 and 1995/96 as described in section 5.4.1. In the first panel there are approximately 7619 males who experienced an unemployment transition and in the second panel there are approximately 6723 males. A dummy variable for inflows was constructed such that a value one was allocated to those individuals who had entered unemployment from a state of employment over the period and zero was allocated to those individuals who had not changed labour market status. The same procedure was applied in relation to outflows from unemployment. In this case the dummy takes a value one if the individual moves from unemployment to employment and zero otherwise. Table 5.13 gives some of the characteristics of individuals from both samples for first those regions with high job reallocation rates (dynamic) and second those regions with low job reallocation rates (stagnant).

Results from various logistic regressions are reported in Tables 5.14 and 5.15. The basic empirical models are as follows;

$$UE_{94/95} = \alpha + \beta_1 POS_{jt} + \beta_2 X_{jit} + \beta_3 D_t + \varepsilon_{jt} \qquad \textbf{(5.13)}$$

$$EU_{94/95} = \alpha + \beta_1 NEG_{jt} + \beta_2 X_{jit} + \beta_3 D_t + \varepsilon_{jt} \quad \textbf{(5.14)}$$

$$UE_{95/96} = \alpha + \beta_1 POS_{jt} + \beta_2 X_{jit} + \beta_3 D_t + \varepsilon_{jt} \quad \textbf{(5.15)}$$

$$EU_{95/96} = \alpha + \beta_1 NEG_{jt} + \beta_2 X_{jit} + \beta_3 D_t + \varepsilon_{jt} \quad \textbf{(5.16)}$$

In this case $UE_{94/95}$ and $EU_{94/95}$ are the unemployment outflow and unemployment inflow zero/one dummy variables for the period 1994/95. $UE_{95/96}$ and $EU_{95/96}$ are the corresponding dummy variables for the period 1995/96. POS_{jt} and NEG_{jt} are the local job creation and job destruction rates as defined in chapter two, X_{jit} is a vector of human capital characteristics, and D_t is a vector of regional dummies.

In Table 5.14 unemployment outflows are first modelled and significant coefficients are found for regional job creation rates, the younger age groups, the better educated, the short-term unemployed and those registered at local unemployment offices. Table 5.15 presents results for unemployment inflows showing that significant coefficients are found for local job destruction rates, those in older age groups and those with only basic education. Both sets of results confirm the findings of the Walsh (2000) study.

5.6 Conclusion

In the transition to a market economy the relationship between inherited social capital structures, regional restructuring and the evolution of unemployment within a two-sector model of endogenous restructuring was examined. Evidence was found for the theoretical predictions proposed in section 5.3. Until the reforms in 1990 many eastern regions of the Polish economy traded only within the C.M.E.A. area. Exposure to world markets made the capital accumulated by firms hopelessly out-dated. Many western regions, on the other hand, traded outside the C.M.E.A. before 1990 and much of the inherited social capital in these regions was viable in the global economy after the regime switch. This created heterogeneity in the inherited social capital structure of regions. These initial conditions are the key to understanding the speed of job reallocation and the evolution of regional unemployment in Poland during transition. Higher rates of regional job reallocation (instrumented with a ranking of the socio-economic inheritance) are shown to boost regional unemployment turnover, reduce the duration of frictional unemployment and increase the incidence of structural unemployment. Job

creation rates were shown to affect the unemployment outflow rate and job destruction rates affect the unemployment inflow rate.

For most human capital characteristics higher job reallocation rates also reduce unemployment duration. The restructuring of the former state-owned sector and movement of workers to the new private sector can leave some human capital characteristics structurally unemployed. The higher turnover rate in advanced regions leaves the long term unemployment stock accumulating heavily in males with "bad" human capital characteristics, males with basic education and old age. In such regions unemployment has a dual function. First it is used as a temporary "pit-stop" to help reallocate workers to jobs in the new private sector. Second restructuring in these regions also acts as a "cleansing device" to ensure that any redundant human capital is shed from employment over the course of transition. This creates the long-term structural component of unemployment. The severe structural component of unemployment observed in advanced regions is not yet as evident in the least restructured regions. Instead, in the latter regions structural unemployment takes, to varying degrees, the form of hidden unemployment in the non-restructured previously state-owned sector.

Any attempt to speed up the restructuring process in the previously state-owned sector 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 future taxation and welfare payments. It may therefore be wise for the government, as part of a regional development policy and strategy to join the E.U., to invest strongly in the social capital of eastern regions using transfers from western regions.

Chapter Six

Conclusion

The aim of this thesis was to shed further light on labour market adjustments in the Polish economy in the aftermath of 1990 and the fall of the communist regime.

The main body of the thesis developed two empirical models of wage adjustments, the first at the regional level of aggregation using regional yearbook data and the second at the individual level using Polish Labour Force Survey data. In both models I find it is conditions in the local labour market proxied by local unemployment rates and job reallocation rates, which were significant determinants, amongst other factors of Polish wages. Moreover, wage adjustments were driven in particular directions by both variables, negatively by the unemployment rate and positively by the RES index. This index is one novelty in the research of this thesis extending the literature on employment dynamics and wage equations put forward by Belzil (2000).

Before developing and empirically testing the aforementioned models of Polish wages a review of the literature on wage determination was undertaken in chapter three. This literature review led to the following conclusions. First a failure to control for regional fixed effects in the first generation papers led to contradictory evidence concerning how regional unemployment rates affect regional wages. When regional fixed effects were included in the estimated wage equations a negative relationship between local unemployment rates and regional wages was found. Second following Blanchflower and Oswald (1994) I modelled regional unemployment rates as a

determinant of regional wages. This is one condition in the external labour market. I contribute to this literature by undertaking my study in the context of a transition economy and add to this in chapters three and four by introducing another dimension to the estimated wage equations. In these models controls are included for the quality of jobs available in the local labour market. This is important in the context of a transition economy as the new private sector is being put in place. The quality of jobs available is measured using job reallocation rates constructed from the Amadeus Company Accounts Data.

This led to the core section of the thesis. Extending previous work on wages by earlier authors two models of wage determination are proposed in the context of a transition economy. Introducing new explanatory variables extends previous empirical models. In chapter three, the model was tested for the period 1994 to 1996 on a panel of forty-nine Polish regions. A random effects model was used to capture unobserved heterogeneity. Using unemployment rates and the RES index I found that the regression equation explained on average over ninety per cent of the systematic variations in regional wages. The same result holds when a study of individual wages was undertaken in chapter four.

In chapter five of the thesis the relationship between inherited social capital structures, job reallocation and the evolution of unemployment was examined using information from the Labour Force Survey. I find that initial conditions are the key to understanding the speed of job reallocation and the evolution of regional unemployment in Poland during transition. Higher rates of job reallocation are shown to boost regional unemployment turnover, reduce the duration of frictional unemployment and increase the incidence of structural unemployment. Furthermore in chapter five, I find that for most human capital characteristics higher job reallocation rates reduce unemployment durations. The severe structural component of unemployment observed in advanced regions is not as evident in the least restructured regions. Attempts to speed up the restructuring process in the previously state-owned sector in eastern regions will induce structural unemployment on a much larger scale to that observed in western regions. The chapter concludes by suggesting that it may be wise for government to strongly

invest in the social capital of eastern regions using transfers from Western regions of Poland.

In summary the three core chapters of the thesis tested the impact of cross-regional differences in the extent of restructuring on first regional wage differences, second individual wage differences and third inflows and outflows from unemployment. The thesis can now conclude that initial conditions do indeed appear to affect a region's, and the individuals that reside therein, ability to respond to the shock of transition.

Extensions to this work in the future would primarily revolve around the main theoretical model as proposed in chapters three and five. For example modelling worker and firm heterogeneity, or allowing a participation constraint for those firms that failed immediately once transition commenced particularly if the outside option was better than staying in business. In terms of the empirical analysis no account was made for females responses in chapters four and five. Furthermore future cross-country studies could examine the use of job reallocation rates in wage equations, this variable may have invaluable use as a control for business cycle fluctuations, and could replace or augment results which have so far used changes in unemployment rates as controls for the business cycle.

BIBLIOGRAPHY

Abraham, K. and Vodopivec, M. (1993) "Slovenia: A Study of Labour Market Transitions" Washington: ***The World Bank***

Adams, J.D. (1985) "Permanent Differences in Unemployment and Permanent Wage Differentials" in ***Quarterly Journal of Economics 100***, pp29-56

Aghion, P. and Blanchard, O. (1994) "On the Speed of Transition in Central Europe", in ***NBER Macroeconomic Annual***, pp283-320

Baldwin, J., Dunne, T. and Haltiwanger, J. (1999) "A Comparison of Job Creation and Job Destruction in Canada and the United States" forthcoming in ***The Review of Economics and Statistics***

Basu, S., Estrin, S. and Svejnar, J. (1995). "Employment and Wage Behaviour of Enterpises in Transitional Economies", ***Working Paper Series*** University of Pittsburgh: Department of Economics

Basu, S., Estrin, S. and Svejnar, J. (1997). "Employment and Wage Behaviour of Industrial Enterpises in Transitional Economies: The Cases of Poland and Czechoslovakia" in ***Economics of Transition 5***, pp271-287

Belzil, C. (2000) "Job Creation and Job Destruction, Worker Reallocation, and Wages", ***Journal of Labour Economics 18 (2)***, pp183-203

Bentolila, S. (1997). ***The Labour Market in Poland.*** Madrid: CEMFI

Bird, E. Schwarze, J. and Wagner, G. (1994) "Wage Effects of the Move Towards Free Markets in East Germany", ***Industrial and Labor Relations Review 47(3)***, pp390-400

Blackaby, D. and Manning, D. (1987) "Regional Earnings Revisited" in ***Manchester School 55,*** pp158-183

Blackaby, D. and Manning, D. (1990a) "Earnings, Unemployment and the Regional Employment Structure in Britain" in ***Regional Studies 24***, pp 529-535

Blackaby, D. and Manning, D. (1990b) "The North-South Divide: Earnings, Unemployment and the Cost of Living Differences in Great Britain" in ***Papers of the Regional Science Association 69***, pp43-55

Blackaby, D. and Manning, D. (1990c) "The North-south Divide: Questions of Existence and Stability" in ***Economic Journal 100***, pp510-527

Blanchard, O. and Katz, L. (1992) "Regional Evolutions" in ***Brookings Papers on Economic Activity 1***, pp1-75

Blanchflower, D. (2001). "Unemployment, Well-being and Wage Curves in Eastern and Central Europe" ***Working Paper*** Darthmouth College: Department of Economics

Blanchflower, D. and Oswald, A. (1994) ***The Wage Curve***. Cambridge: MIT Press

Blanchflower, D. and Oswald, A. (1995) "An Introduction to the Wage Curve" in ***Journal of Economic Perspectives 9***, pp153-167.

Boeri, T. (1999) "Transition with Labour Supply" ***Working Paper No.WP-99/0146*** SITE: Stockholm School of Economics.

Boeri, T. (1998) "Labour Market Flows in the Midst of Structural Change" in Commander, S. (1998). ***Enterprise Restructuring and Unemployment in Models of Transition.*** Washington: The World Bank

Boeri, T. and Scarpetta, S. (1996) "Regional Mismatch and the Transition to a Market Economy", in ***Labour Economics 3***, pp233-254

Brixiova, Z. (1997) "On the Speed of Transition in Central and Eastern Europe: Does On-the Job Search Matter?" ***Working Paper No. WP/97/102,*** International Monetary Fund.

Bughin, J., (1996) "Trade Unions and Firms' Product Market Power", ***Journal of Industrial Economics*, Vol. XLIV, No. 3**, pp289-307

Burda, M. (1993) "Unemployment, Labour Markets and Structural Change in Eastern Europe", in ***Economic Policy 16***, pp102-137

Card, D. (1990) "Unexpected Inflation, Real Wages and Employment Determination in Union Contracts" in ***American Economic Review 80***, pp669-688

Central Statistics Office (1998) ***Labour Force Survey in Poland.*** Warsaw: Central Statistics Office pp x-xii

Chase, R., (1997) "Markets for Communist Human Capital: Returns to Education and Experience in Post-Communist Czech Republic and Slovakia", ***Working Paper 81,*** World Development Institute: University of Michigan Business School

Commander, S. (1998) ***Enterprise Restructuring and Unemployment in Models of Transition.*** Washington: World Bank EDI Development Studies

Commander, S. and Tolstopiatenko, A. (1996) "Restructuring and Taxation in transition Economies" in ***Working Paper 1625*** World Bank: Policy Research Series

Davis, S. and Haltwinger, J. (1992) "Gross Job Creation, Gross Job Destruction and Employent Reallocation" in ***Quarterly Journal of Economics 107***, pp819-863

Deichmann, U. and Henderson, V. (2000) "Urban and Regional Dynamics in Poland". ***Working Paper 2457***, Washington: World Bank

Dushi, I. (1997) ***Labour Market, Unemployment and the Impact of Training Programs in Transition Economies: The Case of Albania***. Prague: CERGE-EI

Faggio, G. and Konings, J. (1999) "Gross Job Flows and Firm Growth in Transition Countries: Evidence using Firm Level Data on Five Countries" mimeograph, ***LICOS***, Centre for Transition Economics, K.U. Leuven.

Finta, J. and Terrell, K. (1997) "Gender Differences in Flows across Labour Markets in the Czech Republic" ***Working Paper*** University of Michigan

Flanagan, R. (1994) "Were Communists Good Human Capitalists? The Case of the Czech Republic", ***Working Paper*** Stanford: Stanford University.

Freeman, R.B. (1988) "Evaluating the European View That the United States Has No Unemployment Problem" in ***American Economic Review*** *Papers and Proceedings* 78, pp294-299

Gavin, M. (1993) ***Unemployment, Labour Markets and Structural Change in Eastern Europe.*** New York: Columbia University

Gora, M. (1996) ***The Labour Market in Poland 1990-1995: Empirical and Methodological Studies.*** Warsaw: Central Statistics Office

Gora, M. and Lehmann, H. (1995) "How Divergent is Regional Labour Market Adjustment in Poland", in Scarpetta, S. and Woergoetter, A. ***The Regional Dimension of Unemployment in Transition Countries: A Challenge for Labour Market and Social Policies***. Paris: OECD-CCET

Hall, R. (1970) "Why is the Unemployment Rate So High at Full Employment" ***in Brookings Papers on Economic Activity 3***, pp369-402

Hall, R. (1972) "Turnover in the Labour Force" in ***Brookings Papers on Economic Activity 3***, pp709-756

Halpern, L. and Korosi, G. (1995) "Labour Market Characteristics and Profitability (Econometric Analysis of Hungarian Firms), 1986-1995", ***Working Paper 41,*** World Development Institute: University of Michigan Business School.

Harris, J. and Todaro, M. (1970) "Migration, Unemployment and Development: A Two-Sector Analysis" in ***American Economic Review 60***, pp126-142

Hausman, J. (1978) "Specification Tests in Econometrics" in ***Econometrics 46***, pp80-102

Heckman, J. (1979). "Sample Selection Bias as a Specification Error" in ***Econometrica 60***, pp153-161

Huber, P. and Scarpetta, S. (1995) "Regional Economic Structures and Unemployment in Central and Eastern Europe: An Attempt to Identify Common Patterns", in Scarpetta, S. and Woergoetter, A. ***The Regional Dimension of Unemployment in Transition Countries: A Challenge for Labour Market and Social Policies.*** Paris: OECD-CCET.

Janssens, S. and Konings, J. (1999) "One More Wage Curve: The Case of Belgium", ***Discussion Paper Series,*** LICOS: Centre for Transition Economics, Catholic University of Leuven,

Jimeno, J. and Bentolilla, S. (1998) "Regional Unemployment Persistence: Spain 1976-1994" in ***Labour Economics 5***, pp1-23

Kallo, J. and Kertese, G. (1997) "The Birth of the 'Wage Curve' in Hungary 1985-95" in ***William Davidson Institute Working Paper 104***, University of Michigan: Business School.

Konings, J., Lehmann, H. and Schaffer, M. (1996) "Job Creation and Job Destruction in a Transition Economy: Ownership, Firm Size and Gross Job Flows in Polish Manufacturing 1988-1991", ***Working Paper*** Edinburgh: CERT Department of Economics Heriott-Watt University

Konings, J. and Walsh, P. (1994). "Evidence of Efficiency Wage Payments in U.K. Firm Level Panel Data", ***The Economic Journal 104***, pp542-555.

Kreuger, A. and Pische, J. (1995) "A Comparative Analysis of East and West German Labor Markets: Before and After Unification", in: Freeman, R.B. and Katz, L.K., eds., ***Differences and Changes in Wage Structures***. Chicago: University of Chicago Press.

Kubiak, A. (2000). "Export Promotion and Institutional Change in Poland" in MacBean, A. ***Trade and Transition: Trade Promotion in Transitional Economies.*** London: Frank Cass Publishers

Layard, R. Nickell S. and Jackman, R. (1991). ***Unemployment: Macroeconomic Performance and the Labour Market.*** Oxford: Oxford University Press

Leiprecht, I. (1997) "Labour Market Adjustment of Agricultural Employment with Special Reference to Regional Diversity." ***Discussion Paper 46*** Munich: Ifo Institute

Lehmann, H. and Walsh, P. (1998). "Gradual Restructuring and Structural Unemployment in Poland: A Legacy of Central Planning" ***Discussion Paper 78,*** LICOS: Centre for Transition Economics.

Machin, S., Ryan, A. and Van Reenan, J. (1996) "Technology and Changes in Skill Structure: Evidence from an International Panel of Industries". ***Discussion Paper 297*** CEPR: London School of Economics

Marston, S.T. (1985). "Two Views of the Geographic Distribution of Unemployment" in ***Quarterly Journal of Economics 100***, pp57-79

Marx, K. (1849). ***Wage Labour and Capital.*** Munich: Neue Rheinische Zeitung Press

Micklewright, J. and Nagy, G. "Unemployment Insurance and Incentives in Hungary" ***Discussion Paper 1118***, London: CEPR

Newell, A. and Pastore, F. (2000) "Regional Unemployment and Industrial Restructuring in Poland" ***Discussion Paper 194,*** Bonn: IZA

Nickell, S. (1996) "Sectoral Structural Change and the State of the Labour Market in Great Britain" ***Discussion Paper Series 2,*** London: CEPR London School of Economics

OECD (1997). ***Poland: Economic Surveys.*** Paris: OECD

Pannenberg, M. and Schwarze, J. (1998) "Labour Market Slack and the Wage Curve" in ***Economic Letters 58***, pp352-354

Pissarides, C. and McMaster, I. (1990). "Regional Migration, Wages and Unemployment: Empirical Evidence and Implications for Policy" in ***Oxford Economic Papers 42***, pp812-831

Phelps, E. (1990). "Effects of Productivity, Total Domestic Product Demand and 'Incentive Wages' on Unemployment in a Non-Monetary Customer-Market Model of the Small Open Economy" in ***Scandinavian Journal of Economics 107,*** pp1003-32.

Repkine, A. and Walsh, P. (1999) "Evidence of European Trade and Investment U-Shaping Industrial Output in Bulgaria, Hungary, Poland and Romania" in ***Journal of Comparative Economics 27***, pp730-752

Reza, A. (1978) "Geographical Differences in Earnings and Unemployment Rates" in ***Review of Economics and Statistics 60***, pp201-208

Rutkowski, J. (1996) "High Skills Pay Off: The Changing Wage Structure during Economic Transition", in ***Economics of Transition*** pp90-92

Scarpetta, S. (1995) "Spatial Variations in Unemployment in Central and Eastern Europe: Underlying Reasons and Labour Market Policy Options", in Scarpetta, S. and and Woergoetter, A. ***The Regional Dimension of Unemployment in Transition Countries: A Challenge for Labour Market and Social Policies***. Paris: OECD-CCET.

Shapiro, Carl and Stiglitz, Joseph E. (1984) "Equilibrium Unemployment as a Worker Discipline Device" in ***American Economic Review 74***, pp433-444

Snessens, H. (1995) "Asymmetric Growth Effects, Skill Mismatch and Unemployment Persistence". ***Discussion Paper 9525***, IRES:Catholic University of Leuven

Socha, W. and Weisberg Y. (1999) "Poland in Transition: Labour Market Data Collection" in ***Monthly Labour Review***, pp9-21

Sorm, V. and Terrell, K. (1997) "Employment in Transition in the Czech Republic: Where Have All the Workers Gone?" ***Working Paper*** The William Davidson Institute: The University of Michigan Business School

Strobl, E. and Walsh, P. (1998) "Male Long-Term Unemployment and Structural Changes in Ireland" in Clarke, C. and Kavanagh, C. ***Unemployment in Ireland: Alternative Perspectives.*** Dublin: Ashgate

Svejnar, J. (1999). "Labour Markets in the Transitional Central and East European Economies" *in* Ashenfelter O. and Card D., ***Handbook of Labor Economics 3***, Elsevier Science.

Waclaw, S. and Weisberg, Y. (1999) "Poland in Transition: Labour Market Data Collection" in ***Monthly Labour Review*** pp 9-21

Wadsworth, J. (1996) "Labour Force Surveys and Labour Market Policies" in Lehmann, H. ***Labour Market by Design? Labour Market Policies and Creative Use of Household Surveys in Transition Economies.*** Munich: IFO Studies on Eastern Europe and the Economics of Transition:

Walsh, P. (2000) "Regional Unemployment in Poland: A Legacy of Central Planning" ***Discussion Paper 88***, Leuven: LICOS Centre for Transition Economics

Walsh, P. and Whelan, C. (2000) "The Importance of Structural Change in Industry for Growth" forthcoming in ***The Journal of The Statistical and Social Inquiry Society of Ireland***

Witkowski, J. and Szarkowski, A. (1994) "The Polish Labour Force Survey" in ***Statistics in Transition 4***, pp467-483

Woergoetter, A. (1995) ***The Regional Dimension of Unemployment in Transition Countries: A Challenge for Labour Market and Social Policies***. Paris: OECD-CCET

Table 1.1

Unemployment in Selected Transitional Economies

(End of Year Unemployment Rate in Percentages)

	1990	1991	1992	1993	1994	1995	1996	1997
Bulgaria	1.7	11.1	15.2	16.4	12.8	11.1	12.5	13.7
Croatia	11.4	18.2	15.5	14.6	14.8	15.1	15.9	17.6
Czech Republic	0.8	4.1	2.6	3.5	3.2	2.9	3.5	5.2
Hungary	1.9	7.5	13.2	12.3	11.4	11.1	10.7	10.8
Poland	6.3	11.8	13.6	16.4	16.0	14.9	13.6	10.5
Romania	0.4	3.0	8.2	10.4	10.9	9.5	6.3	8.8
Slovak Republic	0.8	4.1	10.4	14.4	14.8	13.1	12.8	12.5

Source: Business Central Europe Database at http://www.bcemag.com

Table 1.2

EBRD Unemployment Rates by Country 1991-1998 (in percentages)

	1991	1992	1993	1994	1995	1996	1997	1998
Albania	8.3	27.9	29.0	19.6	16.9	12.4	-	-
Armenia	-	1.8	5.3	6.7	6.7	9.2	10.7	9.9
Azerbaijan	-	15.4	16.0	15.2	17.0	19.4	19.3	-
Belarus	0.1	0.5	1.4	2.1	2.7	3.9	2.8	2.3
Bulgaria	11.1	15.3	16.4	12.8	11.1	12.5	13.7	12.0
Croatia	13.2	13.2	14.5	14.5	14.5	16.4	17.5	17.6
Czech Republic	4.1	2.6	3.5	3.2	2.9	3.5	5.2	7.5
Estonia	-	-	6.5	7.6	9.7	10.0	9.7	9.6
FYR Macedonia	19.2	27.8	28.3	31.4	37.7	31.9	36.0	-
Georgia	0.2	2.3	6.6	3.6	2.6	12.0	5.1	14.0
Hungary	7.4	12.3	12.1	10.4	10.4	10.5	10.4	7.8
Kazakhstan	0.0	0.5	0.6	0.8	1.7	3.6	4.1	-
Kyrgyzstan	0.0	0.1	0.2	0.7	3.0	4.5	3.2	-
Latvia	0.6	3.9	8.7	16.7	18.1	19.4	14.8	9.2
Lithuania	0.3	1.3	4.4	3.8	6.2	7.0	5.9	6.4
Moldova	0.3	1.3	4.4	3.8	6.2	7.0	5.9	6.4
Poland	11.8	13.6	16.4	16.0	14.9	13.2	10.5	10.4
Romania	3.0	8.2	10.4	10.9	9.5	6.6	8.8	10.3
Russia	0.0	4.8	5.3	7.1	8.3	9.2	10.9	12.4
Slovakia	-	-	12.2	13.7	13.1	11.1	11.6	11.9
Slovenia	8.2	11.5	14.4	14.4	13.9	13.9	14.4	14.5
Tajikistan	-	0.3	1.2	1.7	2.0	2.7	2.9	3.1
Turkmenistan	2.0	-	-	-	3.0	-	-	-
Ukraine	0.0	0.3	0.4	0.4	0.5	1.1	2.3	3.7
Uzbekistan	0.0	0.1	0.3	0.4	0.4	0.4	0.4	0.6

Source: European Bank for Reconstruction and Development
Transition Report Update April 1999

Table 2.1

Labour Force Survey Rotation Samples 1993-1997

Sample Number	Years and Quarters																			
	1993				1994				1995				1996				1997			
	I 4	II 5	III 6	IV 7	I 8	II 9	III 10	IV 11	I 12	II 13	III 14	IV 15	I 16	II 17	III 18	IV 19	I 20	II 21	III 22	IV 23
1	X																			
2	X	X																		
3	--	X	X																	
4	--	--	X	X																
5	X	--	--	X	X															
6	X	X	--	--	X	X														
7		X	X	--	--	X	X													
8			X	X	--	--	X	X												
9				X	X	--	--	X	X											
10					X	X	--	--	X	X										
11						X	X	--	--	X	X									
12							X	X	--	--	X	X								
13								X	X	--	--	X	X							
14									X	X	--	--	X	X						
15										X	X	--	--	X	X					
16											X	X	--	--	X	X				
17												X	X	--	--	X	X			
18													X	X	--	--	X	X		
19														X	X	--	--	X	X	
20															X	X	--	--	X	X
21																X	X	--	--	X
22																	X	X	--	--

X = in the sample -- = not in the sample

Note: Samples 1 and 2 are obtained from the sample of the same households used in surveys conducted between May 1992 and February 1993. Samples 3, 4, 5 are new samples with a shorter duration of service and samples 6 and higher are new samples with a regular duration of service. Since the second quarter of 1993, samples have been selected according to the following rotation scheme: in a given quarter the labour force survey uses two samples surveyed in the previous quarter, one sample introduced into the survey for the first time and one sample not surveyed in the previous quarter but introduced exactly one year before; thus each sample is in the survey for two quarters, out of the survey for two quarters, and then introduced again in the survey for two quarters.

Source: Socha, W. and Weisberg Y. (1999)

Table 2.2

Labour Force Survey Samples of 19 Quarters, 1992-1998

(Thousands of interviewees)

Labour Force Survey Samples of 19 Quarters, 1992-1998 (thousands of interviewees)				
	Quarter and Month			
Year	I February	II May	III August	IV November
1992	-	45.3	45.9	45.7
1993	45.9	50.4	52.7	54.6
1994	55.6	54.7	54.3	53.8
1995	54.3	54.8	54.7	54.5
1996	55	54.7	54.3	54.7
1997	54.3	54.6	54.9	54.7
1998	54.9	54.5	54.4	54.8
Note: Labour Force Survey began May 1992				

Table 2.3

Amadeus Samples of Polish Firms according to Ownership Types

1994 and 1997

	1994			1997		
	Firm Numbers	Average Employment	Standard Deviation	Firm Numbers	Average Employment	Standard Deviation
Overall	*834*	*1278*	*2735*	*2130*	*724*	*1995*
State Firms	72	2448	4030	78	3053	8674
Foreign Firms	47	1008	1032	56	1071	1435
Domestic Private Firms	113	1104	1608	164	945	1036
Unable to identify	602	-	-	1832	-	-

Source: Amadeus

Table 2.4

Percentage of Polish Firms Under Different Employee Categories

1995 and 1997

Country	Year	Total Firms	% of Firms in the Following Employee Categories			
			Up to 19	20 to 99	100 to 999	1000 and above
Poland	**1995**	126588	96.4	2.7	0.8	-
	1997	197443	97.1	2.3	0.6	-

Source: Central Statistics Office, Warsaw

Table 2.5

Estimates of Percentages of Firms by Employment Size using the Lehmann-Walsh (1998) Regional Taxonomy and the Polish Labour Force Survey

1994	Not applicable	Average Employment 1 to 5	Average Employment 6 to 20	Average Employment 21 to 50	Average Employment 51 to 100	Average Employment 101 and more
Region						
1	43	34	6	5	3	9
2	44	30	6	5	3	12
3	48	23	7	5	3	13
4	54	16	7	7	4	13
5	52	12	7	6	5	19
6	49	13	7	6	4	20
1997						
Region						
1	69	9	1	7	4	10
2	65	8	2	8	4	13
3	58	10	2	10	4	16
4	53	10	1	9	4	23
5	47	10	1	9	4	29
6	37	15	2	8	5	33

Table 2.6

Job Reallocation Rates, Unemployment Rates and Average Monthly Wage Levels by Lehmann-Walsh (1998) Regional Groupings

	Regional Grouping	Job Reallocation Rate	Unemployment Rate	Monthly Wage
1994	I	1.03	16.8	446.2
	II	2.12	16.9	461.3
	III	2.56	18.8	474.7
	IV	3.48	22.6	500.0
	V	4.37	18.9	512.8
	VI	6.94	12.1	530.1
				Min 425.1 Max 657.3
1995	I	2.19	16.2	588.2
	II	4.44	16.6	610.4
	III	4.45	17.7	626.3
	IV	4.63	21.0	630.0
	V	5.71	17.8	667.8
	VI	7.98	11.1	700.9
				Min 566.3 Max 876.7
1996	I	2.57	14.1	740.0
	II	4.51	14.9	769.7
	III	4.81	15.9	784.8
	IV	5.45	18.4	790.4
	V	5.87	16.2	844.0
	VI	8.44	09.4	897.9
				Min 713.4 Max 1130.6

Source: Amadeus Company Accounts Data and Polish Year Books.
Group I is the least developed and Group VI the most developed grouping based on the Lehmann-Walsh (1998) taxonomy.

Table 2.7

Correlation Coefficients Between Gora-Lehmann and Lehmann-Walsh Structural Indices

	Gora-Lehmann (1995)	*Lehmann-Walsh (1998)*
Gora-Lehmann (1995)	1.00	-0.75**
Lehmann-Walsh (1998)	-	1.00

*** Denotes significance at the one percent level.*

Table 3.1

Composition of Polish Exports by Branch Group

(Constant 1990 Prices)

	1989	**1990**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Fuels and power	10.9	10.1	9.9	9.7	9.3	8.9	7.3	6.1
Metallurgical	11.7	14.6	19.8	17.0	17.1	14.4	13.2	8.6
Electro-engineering	34.3	29.3	21.4	21.7	20.5	23.0	23.1	34.6
Chemical	9.9	12.0	13.3	11.0	10.5	10.8	11.5	10.9
Mineral	1.5	1.7	2.7	3.1	3.1	3.0	3.0	3.3
Wood and Paper	4.0	4.1	8.9	10.1	11.2	11.7	11.9	11.2
Textiles and Shoes	7.2	6.4	7.0	13.9	13.8	14.6	14.6	12.0
Food	9.8	10.0	9.4	9.1	10.8	9.8	11.5	9.4
Other	0.4	0.6	0.6	0.7	0.7	0.7	1.1	1.4
Agriculture	3.8	5.4	6.0	3.4	2.7	2.9	2.4	1.2
Forestry	0.3	0.4	0.5	0.3	0.3	0.2	0.2	0.3
Other	0.8	0.6	0.5	0.0	0.0	0.0	0.2	1.1

Source: Central Statistics Office, Warsaw

Table 3.2

Poland's Exports by Groups of Countries

Year	Developed Countries			Developing Countries	CEECs & Former Soviet Union	CEFTA
	Total	*EU*	*EFTA*			
1989	43.0	27.9	8.7	19.8	37.2	
1990	58.6	44.3	9.3	18.2	23.2	
1992	71.9	58.0	10.3	12.7	15.4	-
1993	75.1	63.0	7.9	11.6	13.3	4.8
1994	75.4	62.7	8.2	10.1	14.5	4.8
1995	75.0	70.0(a)(b)	1.6 (a)(c)	7.7	17.3	5.4
1996	71.7	66.2	2.2	7.8	20.5	6.1
1997	69.0	64.0	1.5	6.6	24.4	6.8

(a) In real conditions
(a) In Comparable conditions –63.8 per cent
(b) In comparable conditions –7.8 per cent

Source: Central Statistics Office, Warsaw

Table 3.3

The Slowing Down of Polish Migration

Gross Migration Flows ('000)

Across Voivodships

	Total	Urban-Urban	Urban-Rural	Rural-Rural	Rural-Urban
Avg. 1986-89	630	168	91	144	227
1994	438	130	90	90	129
Avg. 1997-98	422	123	100	86	113

Within Voivodships

	Total	Urban-Urban	Urban-Rural	Rural-Rural	Rural-Urban
1989	369	81	53	85	150
1994	277	64	63	61	87

Source: Central Statistics Office, Warsaw

Table 3.4

First Generation Papers 1970s and 1980s

Author	Data	Result (Pay & Unemployment Relationship)
Hall (1970, 1972)	BLS* 12 U.S. cities in 1966 Sample size = 12 regions	Positive
Reza (1978)	BLS* 1970-1972 U.S. Data Sample size = 18 regions	Positive
Adams (1985)	U.S. Panel Study of Income Dynamics 1970 Sample size = 2000	Positive
Marston (1985)	Current Population Survey (1970s) Sample size = 0.5 million	Positive

* Bureau of Labour Statistics

Table 3.5

Second Generation Papers late 1980s and 1990s

Author	Data	Country	Result
Blackaby & Manning (1987, 1990a, 1990b 1990c)	G. H. S.* 1964-1984 Sample: 7288 employed males	United Kingdom	Negative
Card (1990)	Sample of 1293 Canadian labour contracts 1968-1983 Uses OLS & instrumental variable methods	Canada	Negative
Freeman (1988)	G.H.S.* & C.P.S.**	United Kingdom and U.S.	Negative
Janssens & Konings (1999)	Social Economic Panel 1985, 1988 & 1992 Sample: 6727 households	Belgium	Negative
Blanchflower & Oswald (1994)	See Table 3.6	12 Countries	Negative

**G.H.S. General Household Survey & **C.P.S. Current Population Survey*

Table 3.6

Blanchflower and Oswalds' Wage Curves in 12 Nations

Country	Dependent Variable	Data	Coefficient on LogU	Fixed Effects	Sample size
U.S.A.	Annual Earnings	Current Population Survey 1963-1990	-0.1	Yes	1,730,175
U.K.	Monthly Earnings	General Household Survey 1973-1990	-0.8	Yes	175,500
Canada	Gross Annual Earnings	Survey of Consumer Finances 1972-1987	-0.9	Yes	82,739
S. Korea	Gross Monthly Earnings	Occupational Wage Surveys 1971-1986	-0.4	Yes	1,359,387
Austria	Gross Monthly Earnings	ISSP** 1986-1989	-0.9	Some	1,587
Italy	Gross Monthly Earnings	ISSP 1986-1989	-0.1	Yes	1,041
Holland	Net Monthly Earnings	ISSP 1988-1991	-0.12	Some	1,867
Switzerland	Net Monthly Earnings	ISSP 1987	-0.12	No	645
Norway	Gross Yearly Earnings	ISSP 1989 1991	-0.8	Some	2,599
S. Ireland	Net Monthly Earnings	ISSP 1988-1991	-0.36	No	1,363
Australia	Weekly Income	Income Dynamics Survey 1986	-0.19	No	8,429
Germany	Gross Monthly Income	ISSP 1986-1991	-0.13	Yes	4,629

**ISSP = International Social Survey Programme
Column 4: Coefficients on local unemployment variables in micro-econometric wage equations.
Column 5: Fixed effects refer to controls for region or occupations. In all equations personal variables are included as controls.

Table 3.7

Blanchflower's Wage Curves in Eastern Europe

	Years	Coefficient on LogU No region dummies	Coefficient on LogU With region dummies	No. of Regions	N
***ISSP**					
Bulgaria	1992-1997	-0.243 (6.36)	-0.260 (3.81)	9	4707
Czech Republic	1992, 1994-1997	-0.21 (4.35)	0.003 (0.41)	8	3151
GDR	1990-1993, 1995-1997	-0.107 (4.75)	-0.096(3.85)	6	5395
Hungary	1990-1997	-0.52 (2.07)	0.042(1.23)	20	6825
Latvia	1995-1996	-0.462 (5.86)	-0.52 (6.32)	5	1067
Poland	1991-1997	-0.153 (3.59)	-0.127 (2.28)	8	4747
Russia	1995-1997	-0.065 (1.84)	-0.175(3.93)	14	2633
Slovakia	1995	-0.049 (3.85)	n/a	42	877
Slovenia	1991-1997	0.013 (1.59)	-0.007(0.62)	12	4891
World Bank **HEIDE Database					
Estonia	1995	-0.291(8.67)	n/a	16	3561
Hungary	1993	-0.364(9.88)	n/a	20	8145
Kyrgyz	1993	-0.082(1.42)	n/a	7	2070
Poland	1993	-0.188(21.90)	n/a	49	16201
Russia	1993-1994	-0.258(11.25)	n/a	18	7489
Slovakia	1993	-0.186(3.50)	n/a	44	1804
All	1993-1995	-0.229(25.24)	n/a	-	39270

*ISSP International Social Survey Programme

**HEIDE uses the log of monthly wages calculated as the sum of monetary earnings and monetary value in kind.

Table 3.8

Summary Statistics of Restructuring Indicators by Lehmann-Walsh (1998) Regional Groupings

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

Source: Lehmann and Walsh (1998)

Table 3.9

Employment Restructuring Taxonomy of Polish Regions [a]

I	II	III	IV	V	VI
41. Ciechanowskie	32. Chelmskie	25. Czestochowskie	17. Walbrzyskie	8. Katowickie	1. Warsawskie
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. Leszcynskie	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 in Table 3.8***

Source: Lehmann and Walsh (1998)

Table 3.10

Correlation Matrix of Lehmann-Walsh Restructuring Indicators

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

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

Source: Lehmann and Walsh (1998)

Table 3.11

Summary Statistics of the Monthly Wage 1992-1996 by Lehmann-Walsh (1998)Taxonomy

YEAR	TAXONOMY*	Monthly Wage (thousands zloty) Summary Statistics		
		Mean	Standard Deviation	Covariance
1992	Group I	254.62	10.00	0.04
	Group II	258.80	14.16	0.05
	Group III	263.36	15.68	0.06
	Group IV	262.64	8.69	0.03
	Group V	281.90	29.13	0.10
	Group VI	297.97	26.39	0.09
1993	Group I	337.48	11.01	0.03
	Group II	342.65	26.25	0.08
	Group III	354.74	27.20	0.08
	Group IV	345.58	15.96	0.05
	Group V	379.53	43.32	0.11
	Group VI	396.61	40.82	0.10
1994	Group I	446.18	16.0	0.04
	Group II	461.27	42.54	0.09
	Group III	474.27	42.67	0.09
	Group IV	458.04	23.84	0.05
	Group V	512.84	73.38	0.14
	Group VI	530.05	59.15	0.11
1995	Group I	588.34	23.81	0.04
	Group II	610.44	48.33	0.08
	Group III	626.25	54.45	0.09
	Group IV	577.29	83.91	0.15
	Group V	677.80	94.82	0.14
	Group VI	700.85	81.46	0.12
1996	Group I	740.02	27.77	0.04
	Group II	769.70	52.26	0.07
	Group III	784.78	57.43	0.07
	Group IV	764.35	41.53	0.05
	Group V	843.96	113.62	0.13
	Group VI	897.86	106.26	0.12

*Group I is the least restructured and Group VI is the most restructured

Table 3.12

Summary Statistics of the Short-term Unemployment Rate 1992-1996 by Lehmann-Walsh (1998)Taxonomy

YEAR	TAXONOMY	Short-term Unemployment Rate (% Working Age Population) Summary Statistics		
		Mean	Standard Deviation	Covariance
1992	Group I	7.71	1.62	0.21
	Group II	7.67	1.19	0.16
	Group III	9.02	2.22	0.25
	Group IV	10.3	2.32	0.23
	Group V	9.09	2.90	0.32
	Group VI	6.69	2.00	0.30
1993	Group I	9.57	1.75	0.18
	Group II	9.34	1.43	0.15
	Group III	10.69	3.15	0.29
	Group IV	12.83	3.13	0.24
	Group V	11.06	3.41	0.31
	Group VI	7.62	2.21	0.29
1994	Group I	8.82	1.37	0.16
	Group II	9.30	1.40	0.15
	Group III	10.09	2.44	0.24
	Group IV	12.44	2.92	0.24
	Group V	10.67	2.89	0.27
	Group VI	7.40	2.26	0.31
1995	Group I	9.66	1.50	0.16
	Group II	10.03	1.61	0.16
	Group III	10.79	2.54	0.24
	Group IV	13.14	3.27	0.25
	Group V	11.28	3.44	0.31
	Group VI	7.33	2.46	0.34
1996	Group I	8.48	1.48	0.18
	Group II	8.62	1.43	0.17
	Group III	9.57	2.62	0.27
	Group IV	11.44	3.06	0.27
	Group V	9.92	3.25	0.33
	Group VI	5.90	2.29	0.39

*Group I is the least restructured and Group VI is the most restructured

Table 3.13

OLS Regressions across Polish Regional Panel

1992-1996

Specification One	OLS	OLS
	Log Wage	**Log Wage**
R^2	0.99	0.98
Constant	3.4 (18.0)*	3.3 (15.6)*
Log Short-term Unemployment Rate ($\ln UR_{jt}$)	-0.12 (7.6)*	-1.1 (6.6)*
Log Job Reallocation Rate ($\ln RES_{jt}$)	-	0.02 (2.8)*
Year Dummies	YES	YES
Regional Dummies	YES	YES
Observations	245	245
Heterosced.	X^2 (55) = 14.7	X^2 (56) = 11.8
AR1	X^2 (1) = 188.7	X^2 (1) = 188.6

T-statistics in parentheses
*indicates significance at the 5 per cent level

Table 3.14

Two Stage Least Squares Estimation

1992-1996

Specification One			
2SLS**			
	1st stage IV		**2nd stage IV**
Dependent variable	**ln UR_{jt}**	**ln RES_{jt}**	**Log Wage**
R^2	0.37	0.37	0.98
Constant	0.65 (22.1)*	0.87 (18.8)*	3.2 (15.2)*
RANK	0.05 (9.8)*	-0.02 (-3.3)*	-
RANK squared	-0.02 (-7.9)*	0.01 (2.2)*	-
RANK cubed	0.01 (6.4)*	0.01 (-2.1)*	-
Log Short-term Unemployment Rate (ln URP_{jt})**	-	-	-0.07 (5.0)*
Log Job Reallocation Rate (In $RESP_{jt}$)**	-	-	0.08 (1.1)*
Year Dummies	No	No	YES
Regional Dummies	No	No	YES
Observations	245	245	245
Heterosced.	-	-	X^2 (55) = 14.7
AR1	-	-	X^2 (1) = 188.7

T-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 3.15

Random-Effects GLS Regressions across Polish Regional Panel

1992-1996

Specification Two	GLS	GLS	GLS**
	Log Wage	Log Wage	Log Wage
R^2 (Within)	0.99	0.99	0.99
R^2 (Between)	0.19	0.19	0.48
R^2 (Overall)	0.99	0.98	0.99
Constant	3.3 (12.1)*	3.2 (9.7)*	3.2 (8.9)*
Log Short-term Unemployment Rate (ln UR_{jt})	-0.06 (2.6)*	-0.06 (2.2)*	-0.8** (2.2)
Log Job Reallocation Rate (In RES_{jt})	-	0.02 (1.6)*	0.08** (0.4)
Year Dummies	YES	YES	YES
Observations	245	245	245
Hausman Test	X^2 (6) = 4.8	X^2 (6) = 0.01	X^2 (6) = 0.01
Heterosced.	X^2 (6) = 5.4	X^2 (6) = 2.94	X^2 (6) = 2.94
AR1	X^2 (1) = 1.7	X^2 (1) = 1.7	X^2 (1) = 1.7

Z-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 3.16

OLS Regressions using separate Job Creation and Job Destruction Rates

1992-1996

	OLS	OLS
	Log Wage	Log Wage
R^2	0.98	0.99
Constant	3.6 (18.1)*	3.6 (16.8)*
Log Short-term Unemployment Rate (ln UR_{jt})	-0.14 (-7.3)*	-0.14 (-6.9)*
Log Job Creation Rate (In POS_{jt})	-0.021 (-1.9)	-
Log Job Destruction Rate (In NEG_{jt})	-	0.01 (0.9)
Year Dummies	YES	YES
Observations	245	245
Heterosced.	X^2 (6) = 245	X^2 (6) = 245
AR1	X^2 (1) = 17.6	X^2 (6) = 17.7

T-statistics in parentheses
*indicates significance at the 5 per cent level

Table 3.17

Two Stage Least Squares Estimations when separating Job Creation and Job Destruction rates

1992-1996

2SLS					
	1st stage IV			2nd stage IV	
Dependent variable	ln UR_{jt}	In POS_{jt}	In NEG_{jt}	Log Wage	Log Wage
R^2	0.37	0.25	0.29	0.99	0.99
Constant	0.65 (22.1)*	1.56 (8.46)*	1.79 (12.12)*	3.7 (11.4)*	3.62 (10.97)*
RANK	0.05 (9.8)*	0.01 (-4.35)*	-1.1 (3.75)*	-	-
RANK squared	-0.02 (-7.9)*	-0.00 (-2.3)*	0.02 (1.25)	-	-
RANK cubed	0.01 (6.4)*	0.00 (-0.79)	0.00 (0.04)	-	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-	-.22 (-6.8)*	-.21 (-6.5)*
Log Job Creation Rate (In POS_{jt})	-	-	-	-.02 (-2.2)*	-
Log Job Destruction Rate (In NEG_{jt})	-	-	-	-	.02 (1.1)
Year Dummies	No	No	No	YES	YES
Observations	245	245	245	245	245
Heterosced.				X^2 (6) = 245	X^2 (6) = 245
AR1		-		X^2 (1) = 17.6	X^2 (1) = 17.5

T-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 3.18

Random-Effects GLS Regressions across Polish Regional Panel

1992-1996

	GLS	GLS	GLS**	GLS**
	Log Wage	Log Wage	Log Wage	Log Wage
R^2 (Within)	0.99	0.99	0.99	0.99
R^2 (Between)	0.21	0.19	0.19	0.18
R^2 (Overall)	0.98	0.98	0.98	0.99
Constant	3.5 (12.4)*	3.5 (11.3)*	3.7 (5.39)*	3.6 (5.17)*
Log Short-term Unemployment Rate ($\ln UR_{jt}$)	-.09 (-3.4)*	-.09 (-3.3)*	-.22 (-3.2)*	-.21 (-3.0)
Log Job Creation Rate ($\ln POS_{jt}$)	-.02 (-0.9)	-	-.02 (-0.2)	-
Log Job Destruction Rate ($\ln NEG_{jt}$)	-	.013 (0.56)	-	.01 (0.5)
Year Dummies	YES	YES	YES	YES
Observations	245	245	245	245
Hausman Test	X^2 (5) = 2.5	X^2 (5) = 2.3	X^2 (4) = 0	X^2 (4) = 0
Heterosced.	X^2 (6) = 14.9	X^2 (6) = 6.9	X^2 (6) = 15.1	X^2 (6) = 6.37
AR1	X^2 (1) = 3.9	X^2 (1) = 3.8	X^2 (1) = 3.5	X^2 (1) = 3.4

Z-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 4.1

Change in Female Employment and Labour Force Participation in Selected Central East European Countries

1989-1997

(Percentage Points)

	Labour Force Participation Rate	Employment Rate
Estonia	-21	-27
Hungary	-27	-33
Latvia	-22	-34
Poland	-10	-10

Source: UNICEF 1999

Table 4.2

Polish Labour Force Survey Educational Categories and Two-Digit Occupational Codes

Educational Categories	
1	Not completed Primary
2	Primary Education (Hauptschule)
3	Technical Training (Meister, Geselle)
4	Technical High School (Technisches Gymnasium)
5	High School (Gymnasium)
6	Technical College
7	University
Occupational Codes	
1, 2, 3, 4	Agriculture, Fishing and Forestry
5, 6	Mining, Quarrying
7 - 20	Manufacturing
21	Electricity, Gas and Water Supply
22	Construction
23	Wholesale and Retail Trade
24	Hotels and Restaurants
25	Transport Storage and Communication
26, 27	Financial Intermediation
28	Public Administration and Defence
29	Education
30	Health and Social Work
31, 32, 33	Other Services

Table 4.3

Correlation Matrix of Age and Job Tenure for the Years 1994 to 1996

	Age	Tenure (Years)
Age	1.0000	
Tenure (years)	0.6423	1.0000

Table 4.4

Age Composition of Job Tenure by Lehmann-Walsh (1998) Regional Taxonomy

Calculations based on 1996 data

TAXONOMY	JOB TENURE	15-24 YEARS	25-34 YEARS	35-44 YEARS	>44 YEARS
I	48< 7 years	25	35	28	12
	52>7 years	0	27	38	35
II	49< 7 years	23	37	25	15
	51 >7 years	0	25	36	39
III	51<7 years	23	38	26	13
	49> 7 years	0	21	44	35
IV	55< 7 years	28	33	24	15
	45> 7 years	0	21	41	38
V	48< 7years	25	32	28	15
	52> 7 years	0	24	44	32
VI	58< 7 years	23	32	27	18
	42> 7 years	0	16	35	49

Source: Polish Labour Force Survey

Table 4.5

Two Stage Least Squares Estimation

Effect of Local Labour Market Conditions on Individual Wages

1994-1996

2SLS			
Dependent variable	1st stage IV		2nd stage IV
	ln UR_{jt} *(1)*	ln RES_{jt} *(2)*	Log Wage *(3)*
R^2	0.98	0.56	0.84
Constant	1.49 (1725.8)*	2.19 (218.4)*	8.6 (140.2)*
RANK	0.27 (915.96)*	-0.205 (-60.18)*	-
RANK squared	-0.01 (-715.87)*	0.007 (40.01)*	-
RANK cubed	0.001 (594.58)*	-0.000 (-2.1)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.17 (-9.45)*
Log Job Reallocation Rate** (ln $RESP_{jt}$)	-	-	0.06 (3.53)*
Year Dummies	Yes	Yes	YES
Regional Dummies	Yes	Yes	YES
Observations	75204	72651	26404
Ramsey Reset Test F(6, 26347)			1.60
T-statistics in parentheses *indicates significance at the 5 per cent level ** indicates instrumental variables			

Table 4.6

Two Stage Least Squares Estimation

Regression with Local Labour Market Conditions & Industry Dummies

1994-1996

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	ln UR_{jt}	In RES_{jt}	Log Wage (4)
R^2	0.98	0.56	0.86
Constant	1.49 (1725.8)*	2.19 (218.4)*	8.43 (140.4)*
RANK	0.27 (915.96)*	-0.205 (-60.18)*	-
RANK squared	-0.01 (-715.87)*	0.007 (40.01)*	-
RANK cubed	0.001 (594.58)*	-0.000 (-2.1)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.16 (-9.56)*
Log Job Reallocation Rate** (In $RESP_{jt}$)	-	-	0.06 (3.85)*
Year Dummies	Yes	Yes	YES
Regional Dummies	Yes	Yes	YES
Industry Dummies	-	-	YES
Observations	75204	72651	26404
Ramsey Reset Test F(6, 26347)			1.78

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.7

Two Stage Least Squares Estimation

Regression with Local Labour Market Conditions, Industry Dummies and Age

1994-1996

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	ln UR_{jt} *(1)*	ln RES_{jt} *(2)*	Log Wage *(5)*
R^2	0.98	0.56	0.87
Constant	1.49 (1725.8)*	2.19 (218.4)*	6.54 (64.3)*
RANK	0.27 (915.96)*	-0.205 (-60.18)*	-
RANK squared	-0.01 (-715.87)*	0.007 (40.01)*	-
RANK cubed	0.001 (594.58)*	-0.000 (-2.1)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.15 (-9.35)*
Log Job Reallocation Rate** (ln $RESP_{jt}$)	-	-	0.07 (4.28)*
Age			0.13 (18.4)*
Age^2			-0.002 (-15.7)*
Age^3			0.0000 (13.8)*
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	YES
Observations	75204	72651	26404
Ramsey Reset Test F(13, 26308)			44.1

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.8

Two Stage Least Squares Estimations

Regression Results with Age, Education and Industry Dummies (Model 4.1)

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	ln UR_{jt} *(1)*	ln RES_{jt} *(2)*	Log Wage *(6)*
R^2	0.98	0.56	0.89
Constant	1.49 (1725.8)*	2.19 (218.4)*	6.9 (6.3)*
RANK	0.27 (915.96)*	-0.205 (-60.18)*	-
RANK squared	-0.01 (-715.87)*	0.007 (40.01)*	-
RANK cubed	0.001 (594.58)*	-0.000 (-2.1)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	--0.11 (7.5)*
Log Job Reallocation Rate** (In $RESP_{jt}$)	-	-	0.07 (4.6)*
Age	-	-	0.08 (12.4)*
Age^2	-	-	-0.002 (9.6)*
Age^3	-	-	0.00002 (7.8)*
Primary Education (Hauptschule)	-	-	0.15 (2.3)*
High School (Gymnasium)	-	-	0.29 (4.4)*
University	-	-	0.65 (10.1)*
Technical Training (Meister, Geselle)	-	-	0.05 (0.8)
Technical High School (Technisches Gymnasium)	-	-	0.26 (4.1)*
Technical College	-	-	0.33 (5.0)*
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	Yes
Observations	75204	72651	26404
Ramsey Reset Test F(13, 26302			32.5

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.9

Augmented Wage Curve Regressions Across Polish Individuals

Comparison 2SLS and 2SGEE Estimation

Dependent variable	1st stage IV		2nd stage IV	
			2SLS**	2SGEE***
	ln UR_{jt} *(1)*	ln RES_{jt} *(2)*	Log Wage	Log Wage
R^2	0.98	0.56	0.89	-
Constant	1.49 (1725.8)*	2.19 (218.4)*	6.9 (6.3)*	6.9 (4.7)*
RANK	0.27 (915.96)*	-0.205 (-60.18)*	-	-
RANK squared	-0.01 (-715.87)*	0.007 (40.01)*	-	-
RANK cubed	0.001 (594.58)*	-0.000 (-2.1)*	-	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-		--0.11 (7.5)*	-0.12 (6.4)*
Log Job Reallocation Rate** (In $RESP_{jt}$)	-		0.07 (4.6)*	0.07 (3.4)*
Age	-		0.08 (12.4)*	0.08 (8.9)*
Age^2	-		-0.002 (9.6)*	-0.002 (6.8)*
Age^3	-		0.00002 (7.8)*	0.00002 (5.3)*
Primary Education (Hauptschule)	-		0.15 (2.3)*	0.16 (2.0)*
High School (Gymnasium)	-		0.29 (4.4)*	0.30 (12.7)*
University	-		0.65 (10.1)*	0.66 (8.3)*
Technical Training (Meister, Geselle)	-		0.05 (0.8)	0.05 (0.7)
Technical High School (Technisches Gymnasium)	-		0.26 (4.1)*	0.28 (3.5)*
Technical College	-		0.33 (5.0)*	0.33 (4.0)*
Year Dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
Industry Dummies	-	-	Yes	Yes
Observations	75204	72651	26404	26404

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables
***GEE, population averaged estimator. Independent correlation structure would reproduce 2SLS column. With an exchangeable correlation structure there is an estimator that is asympototically equivalent to a random effects linear regression estimator. "Semi-robust" standard errors are reported.

Table 4.10

Augmented Wage Curve Regressions for State Sector Employees

1994-1996

Sub-sample: Regressions for State Sector Workers			
	1st stage IV		2nd stage IV
Dependent variable	ln UR_{jt}	ln RES_{jt}	Log Wage
R^2	0.99	0.54	0.85
Constant	1.49 (790.67)*	2.25 (103.98)*	8.69 (102.2)*
RANK	0.27 (394.51)*	-0.23 (-29.59)*	-
RANK squared	-0.01 (-285.3)*	0.01 (21.48)*	-
RANK cubed	0.00 (231.55)*	-0.0001 (-18.09)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.18 (-7.73)*
Log Job Reallocation Rate** (ln $RESP_{jt}$)	-	-	0.03 (1.37)
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	-
Observations	16643	16147	16069
Ramsey Reset Test F(6, 16012)			0.62

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.11

Augmented Wage Curve Regressions for State Sector Employees

Comparison 2SLS and 2SGEE Estimation

Sub-sample: Regressions for State Sector Workers				
	1st stage IV		2nd stage IV	
Dependent variable			2SLS**	2SGEE***
	ln UR_{jt} *(1)*	ln RES_{jt} *(2)*	Log Wage	Log Wage
R^2	0.99	0.54	0.90	-
Constant	1.49 (790.67)*	2.25 (103.98)*	6.65 (45.4)*	6.74 (41.68)*
RANK	0.27 (394.51)*	-0.23 (-29.59)*	-	-
RANK squared	-0.01 (-285.3)*	0.01 (21.48)*	-	-
RANK cubed	0.00 (231.55)*	-0.0001 (-18.09)*	-	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.11 (-5.82)*	-0.12 (-5.57)*
Log Job Reallocation Rate** (In $RESP_{jt}$)	-	-	0.05 (2.47)*	0.04 (1.86)
Age	-	-	0.09 (11.19)*	0.09 (9.93)*
Age^2	-	-	-0.002 (-9.08)*	-0.002 (-7.96)*
Age^3	-	-	0.00 (7.78)*	0.00 (6.94)*
Primary Education (Hauptschule)	-	-	0.04 (0.49)	0.03 (0.36)
High School (Gymnasium)	-	-	0.28 (3.83)*	0.28 (3.44)*
University	-	-	0.61 (8.16)	0.61 (7.3)*
Technical Training (Meister, Geselle)	-	-	0.14 (1.93)	0.16 (1.74)
Technical High School (Technisches Gymnasium)	-	-	0.27 (3.57)*	0.28 (3.26)*
Technical College	-	-	0.33 (4.29)*	0.33 (3.75)*
Year Dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
Industry Dummies	-	-	Yes	Yes
Observations	16643	16147	16069	16.69

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables
***GEE, population averaged estimator. Independent correlation structure would reproduce 2SLS column. With an exchangeable correlation structure there is an estimator that is asympototically equivalent to a random effects linear regression estimator. "Semi-robust" standard errors are reported.

Table 4.12

Augmented Wage Curve Regressions for Private Sector Employees

1994-1996

Sub-sample: Regressions for Private Sector Workers			
	1st stage IV		2nd stage IV
Dependent variable	ln UR_{jt}	ln RES_{jt}	Log Wage
R^2	0.99	0.58	0.83
Constant	1.52 (696.51)*	2.04 (88.46)*	8.84 (154.81)*
RANK	0.24 (300.15)*	-0.06 (-5.67)*	-
RANK squared	-0.01 (-194.95)*	-0.001 (-2.06)*	-
RANK cubed	0.00 (139.83)*	0.00 (4.48)*	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.24 (-8.39)*
Log Job Reallocation Rate** (ln $RESP_{jt}$)	-	-	0.01 (0.52)
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	-
Observations	9919	9713	8884
Ramsey Reset Test F(3, 8830)			0.83

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.13

Augmented Wage Curve Regressions for Private Sector Employees

Comparison 2SLS and 2SGEE Estimation

Sub-sample: Regressions for Private Sector Workers				
			2nd stage IV	
Dependent variable	1st stage IV		2SLS**	2SGEE***
	ln UR_j	ln RES_{jt}	Log Wage	Log Wage
R^2	0.99	0.58	0.87	-
Constant	1.52 (696.51)*	2.04 (88.46)*	7.62 (38.95)*	7.53 (35.9)*
RANK	0.24 (300.15)*	-0.06 (-5.67)*	-	-
RANK squared	-0.01 (-194.95)*	-0.001 (-2.06)*	-	-
RANK cubed	0.00 (139.83)*	0.00 (4.48)*	-	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-	-	-0.19 (-7.65)*	-0.18 (-6.77)*
Log Job Reallocation Rate** (ln $RESP_{jt}$)	-	-	0.03 (1.15)	0.02 (0.83)
Age	-	-	0.05 (4.66)*	0.06 (5.06)*
Age^2	-	-	-0.000 (-2.62)*	-0.001 (-3.18)*
Age^3	-	-	0.00 (1.1)	0.00 (1.77)
Primary Education (Hauptschule)	-	-	-0.06 (-0.07)	-0.03 (-0.2)
High School (Gymnasium)	-	-	0.19 (1.41)	0.16 (1.18)
University	-	-	0.69 (5.15)*	0.68 (4.69)*
Technical Training (Meister, Geselle)	-	-	0.08 (0.63)	0.06 (0.46)
Technical High School (Technisches Gymnasium)	-	-	0.19 (1.48)	0.18 (1.23)
Technical College	-	-	0.24 (1.72)	0.23 (1.59)
Year Dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
Industry Dummies	-	-	Yes	Yes
Observations	9919	9713	8884	8884

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables
***GEE, population averaged estimator. Independent correlation structure would reproduce 2SLS column. With an exchangeable correlation structure there is an estimator that is asympototically equivalent to a random effects linear regression estimator. "Semi-robust" standard errors are reported.

Table 4.14

Two Stage Least Squares Estimation

Effect of Local Labour Market Conditions (expressed as levels)

on Individual Wages

1994-1996

2SLS			
Dependent variable	1st stage IV		2nd stage IV
	Level UR_{jt} *(1)*	Level RES_{jt} *(2)*	Log Wage *(7)*
R^2	0.99	0.60	0.84
Constant	3.07 (293.4)*	9.9 (260.6)*	8.2 (176.1)*
RANK	3.69 (1054.1)*	-1.06 (-83.6)	-
RANK squared	-0.16 (-868.29)*	0.04 (60.8)*	-
RANK cubed	0.002 (734.6)*	-0.00 (-50.2)*	-
Short-term Unemployment Rate** (URP_{jt})	-	-	-.009 (-6.2)*
Job Reallocation Rate** ($RESP_{it}$)	-	-	.033 (7.3)*
Year Dummies	Yes	Yes	YES
Regional Dummies	Yes	Yes	YES
Observations	75204	72651	26404
Ramsey Reset Test F(6, 26347)			3.21

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.15

Two Stage Least Squares Estimation

Regression with Local Labour Market Conditions (as levels) & Industry Dummies

1994-1996

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	Level UR_{jt} *(1)*	Level RES_{jt} *(2)*	Log Wage (8)
R^2	0.99	0.60	0.86
Constant	3.07 (293.4)*	9.9 (260.6)*	8.03 (175.1)*
RANK	3.69 (1054.1)*	-1.06 (-83.6)	-
RANK squared	-0.16 (-868.29)*	0.04 (60.8)*	-
RANK cubed	0.002 (734.6)*	-0.00 (-50.2)*	-
Short-term Unemployment Rate** (URP_{jt})	-	-	-.008 (-6.2)*
Job Reallocation Rate** ($RESP_{jt}$)	-	-	.03 (7.7)*
Year Dummies	Yes	Yes	YES
Regional Dummies	Yes	Yes	YES
Industry Dummies	-	-	YES
Observations	75204	72651	26404
Ramsey Reset Test F(6, 26316)			3.18

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.16

Two Stage Least Squares Estimation

Regression with Local Labour Market Conditions (as levels) Industry Dummies and Age

1994-1996

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	Level UR_{jt} *(1)*	Level RES_{jt} *(2)*	Log Wage *(9)*
R^2	0.99	0.60	0.87
Constant	3.07 (293.4)*	9.9 (260.6)*	6.17 (65.2)*
RANK	3.69 (1054.1)*	-1.06 (-83.6)	-
RANK squared	-0.16 (-868.29)*	0.04 (60.8)*	-
RANK cubed	0.002 (734.6)*	-0.00 (-50.2)*	-
Short-term Unemployment Rate** (URP_{jt})	-	-	-.009 (-6.1)*
Job Reallocation Rate** ($RESP_{jt}$)	-	-	.033 (7.8)*
Age			.13 (18.4)*
Age^2			-.003 (-15.7)*
Age^3			.00 (13.8)*
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	YES
Observations	75204	72651	26404
Ramsey Reset Test F(13, 26308)			44.7

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.17

Two Stage Least Squares Estimations

Regression Results with Age, Education and Industry Dummies

2SLS**			
Dependent variable	1st stage IV		2nd stage IV
	Level UR_{jt} *(1)*	Level RES_{jt} *(2)*	Log Wage *(10)*
R^2	0.99	0.60	0.89
Constant	3.07 (293.4)*	9.9 (260.6)*	6.58 (61.1)*
RANK	3.69 (1054.1)*	-1.06 (-83.6)	-
RANK squared	-0.16 (-868.29)*	0.04 (60.8)*	-
RANK cubed	0.002 (734.6)*	-0.00 (-50.2)*	-
Short-term Unemployment Rate** (URP_{jt})	-	-	-.006 (-4.5)*
Job Reallocation Rate** ($RESP_{jt}$)	-	-	.028 (7.5)*
Age	-	-	.078 (12.5)*
Age^2	-	-	-.002 (-9.7)*
Age^3	-	-	0.00 (7.84)*
Primary Education (Hauptschule)	-	-	0.05 (0.79)
High School (Gymnasium)	-	-	0.282 (4.4)*
University	-	-	0.65 (10.2)*
Technical Training (Meister, Geselle)	-	-	0.15 (2.3)*
Technical High School (Technisches Gymnasium)	-	-	0.27 (4.2)*
Technical College	-	-	0.33 (4.95)*
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	Yes
Observations	75204	72651	26404
Ramsey Reset Test F(13, 26302)			33.1

T-statistics in parentheses
*indicates significance at the 5 per cent level
** indicates instrumental variables

Table 4.18

Two Stage Least Squares Estimation

Regression with Job Creation and Job Destruction Rates

1994-1996

Dependent variable	1st Stage IV	2SLS	2SLS
	Level UR_{jt}	Log Wage	Log Wage
R^2	0.99	0.84	0.83
Constant	1.49 (1725.8)*	8.77 (186.8)*	8.71 (174.3)*
RANK	0.27 (915.97)*	-	-
RANK squared	-0.01 (-715.9)*	-	-
RANK cubed	0.001 (594.6)*	-	-
Short-term Unemployment Rate** (URP_{jt})	-	-0.23 (-14.4)*	-0.18 (-11.5)*
Log Job Creation Rate (POS_{jt})	-	0.04 (2.16)*	-
Log Job Destruction Rate (NEG_{jt})	-	-	0.01 (0.96)
Year Dummies	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes
Industry Dummies	-	-	-
Observations	75204	26404	26404

Table 4.19

Two Stage Least Squares Estimations

Regression Results with Job Creation and Job Destruction Rates

Dependent variable	1st stage IV	2SLS	2SLS	2SGEE	2SGEE
	Level UR_{jt}	Log Wage	Log Wage	Log Wage	Log Wage
R^2	0.99	0.89	0.89	Non-specified	Non-specified
Constant	1.49 (1725.8)*	6.9 (65.8)*	7.00 (64.8)*	7.00 ((59.6)*	7.04 (59.5)*
RANK	0.27 (915.97)*	-			-
RANK squared	-0.01 (-715.9)*	-			-
RANK cubed	0.001 (594.6)*	-			-
Short-term Unemployment Rate** (URP_{jt})	-	-0.16 (-12.1)*	-0.13 (-10.4)*	-0.16 (-10.7)*	-0.13 (-9.5)*
Log Job Creation Rate (POS_{jt})	-	0.06 (4.3)*	-	0.06 (3.64)*	-
Log Job Destruction Rate (NEG_{jt})	-	-	0.004 (0.31)	-	0.0005 (0.04)
Age	-	0.08 (12.5)*	0.08 (12.5)*	0.08 (11.3)*	0.08 (11.3)*
Age^2	-	-0.002 (-9.7)*	-0.002 (-9.69)*	-0.001 (-8.76)	-0.002 (-8.76)*
Age^3	-	0.00 (7.8)*	0.00 (7.84)*	0.08 (7.03)*	0.00 (7.03)*
Primary Education (Hauptschule)	-	0.05 (0.79)	0.05 (0.78)	0.05 (0.74)	0.05 (0.07)
High School (Gymnasium)	-	0.28 (4.43)*	0.28 (4.43)*	0.29 (4.12)*	0.29 (4.12)*
University	-	0.65 (10.2)*	0.65 (10.2)*	0.66 (9.35)*	0.66 (9.35)*
Technical Training (Meister, Geselle)	-	0.15 (2.33)*	0.15 (2.33)*	0.15 (2.2)*	0.15 (2.2)*
Technical High School (Technisches Gymnasium)	-	0.27 (4.17)*	0.27 (4.2)*	0.28 (3.93)*	0.28 (3.93)*
Technical College	-	0.32 (4.95)*	0.32 (4.95)*	0.33 (4.52)*	0.33 (4.52)*
Year Dummies	Yes	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes	Yes
Industry Dummies	-	Yes	Yes	Yes	Yes
Observations	75204	26404	26404	26404	26404

Table 4.20

Comparing 2SLS Results with a Heckman (1979) Earning Regression Conditioned on the Probability of Participating

1994 to 1996

Dependent variable	*Unconditioned Results*		*Conditioned Results*	
	2SLS***	2SGEE	Heckman	
	Log Wage	Log Wage	Log Wage Conditioned	Probit
R^2	0.89	-	-	
Constant	6.9 (6.3)*	6.9 (4.7)*	6.8 (6.4)*	1.7 (4.6)*
RANK	-	-		
RANK squared	-	-		
RANK cubed	-	-		
Log Short-term Unemployment Rate** (ln URP_{jt})	--0.11 (7.5)*	-0.12 (6.4)*	-0.11 (-3.3)*	0.09 (1.4)
Log Job Reallocation Rate** (ln $RESP_{jt}$)	0.07 (4.6)*	0.07 (3.4)*	0.06 (2.9)	0.05 (0.93)
Age	0.08 (12.4)*	0.08 (8.9)*	0.08 (12.6)*	-0.11 (-4.9)*
Age^2	-0.002 (9.6)*	-0.002 (6.8)*	-0.001 (-9.8)*	0.003 (6.4)*
Age^3	0.00002 (7.8)*	0.00002 (5.3)*	0.00002 (8.0)*	0.0000 (-8.1)*
Married	-	-	-	-0.03 (-1.1)
Primary Education (Hauptschule)	0.15 (2.3)*	0.16 (2.0)*	0.14 (2.2)*	0.46 (2.4)*
High School (Gymnasium)	0.29 (4.4)*	0.30 (12.7)*	0.28 (4.4)*	0.20 (1.1)
University	0.65 (10.1)*	0.66 (8.3)*	0.65 (10.1)*	0.19 (0.9)
Technical Training (Meister, Geselle)	0.05 (0.8)	0.05 (0.7)	0.14 (2.2)*	0.44 (2.3)*
Technical High School (Technisches Gymnasium)	0.26 (4.1)*	0.28 (3.5)*	0.28 (4.1)*	0.13 (0.7)
Technical College	0.33 (5.0)*	0.33 (4.0)*	0.31 (4.8)*	0.16 (0.8)
Year Dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Observations	26404	26404		
Rho	-	-	-0.07	
Heckman Lamba			-0.02 (0.01)	

T-values in parentheses in column two and Z values in parentheses in columns three, four and five.
*indicates significance at the 5 per cent level
** indicates instrumental variables
***First Stage IV regressions are reported in Table 4.9 above.

Table 4.21

Comparing 2SLS Results with a Heckman (1979) Earning Regression Conditioned on the Probability of Participating for State Sector Workers

1994 to 1996

Dependent variable	*Unconditioned Results*		*Conditioned Results*	
	2SLS**	2SGEE***	Heckman	
	Log Wage	Log Wage	Log Wage Conditioned	Probit
R^2	0.90	-	-	
Constant	6.65 (45.4)*	6.74 (41.68)*	6.63 (40.1)*	-2.97 (-2.96)*
RANK	-	-	-	-
RANK squared	-	-	-	-
RANK cubed	-	-	-	-
Log Short-term Unemployment Rate** (ln URP_{jt})	-0.11 (-5.82)*	-0.12 (-5.57)*	-0.12 (-2.72)*	0.11 (0.62)
Log Job Reallocation Rate** (ln $RESP_{jt}$)	0.05 (2.47)*	0.04 (1.86)	0.05 (1.68)	-0.12 (6.11)*
Age	0.09 (11.19)*	0.09 (9.93)*	0.10 (11.8)*	0.32 (6.11)*
Age^2	-0.002 (-9.08)*	-0.002 (-7.96)*	-0.002 (-9.84)*	-0.006 (-4.64)*
Age^3	0.00 (7.78)*	0.00 (6.94)*	0.00 (8.71)*	0.00 (2.43)
Married	-	-	-	0.12 (2.63)*
Primary Education (Hauptschule)	0.04 (0.49)	0.03 (0.36)	0.03 (0.39)	-0.02 (-0.05)
High School (Gymnasium)	0.28 (3.83)*	0.28 (3.44)*	0.28 (3.77)*	0.09 (0.29)
University	0.61 (8.16)	0.61 (7.3)*	0.60 (8.09)*	0.42 (1.28)
Technical Training (Meister, Geselle)	0.14 (1.93)	0.16 (1.74)	0.14 (1.85)	0.14 (0.42)
Technical High School (Technisches Gymnasium)	0.27 (3.57)*	0.28 (3.26)*	0.28 (3.53)*	0.04 (0.12)
Technical College	0.33 (4.29)*	0.33 (3.75)*	0.31 (4.07)*	0.07 (0.17)
Year Dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Observations	16069	16069	16640	16640
Rho	-	-		-0.3
Heckman Lamba				-0.09

T-values in parentheses in column two and Z values in parentheses in columns three, four and five.
*indicates significance at the 5 per cent level
** indicates instrumental variables
***First Stage IV regressions are reported in Table 4.9 above.

Table 4.22

Rates of Return to Human Capital and Occupational Characteristics

(Relative to the default in bold)

	FULL SAMPLE	STATE WORKERS
Not Completed Primary	-	-
Primary Education (Hauptschule)	0.05 (0.06)	0.03 (0.07)
Technical Training (Meister, Geselle)	0.15 (0.06)	0.13 (0.07)
Technical High School (Technisches Gymnasium)	0.27 (0.07)	0.26 (0.08)
High School (Gymnasium)	0.28 (0.06)	0.27 (0.07)
Technical College	0.32 (0.07)	0.31 (0.08)
University	0.65 (0.06)	0.60 (0.07)
Age < = 15	-	-
16-20	-0.22 (0.01)	-0.29 (0.02)
21-25	-0.11 (0.007)	-0.16 (0.01)
26-30	-0.03 (0.01)	-0.05 (0.01)
31-35	0.02 (0.01)	0.01 (0.01)
36-40	0.05 (0.01)	0.03 (0.01)
41-45	0.06 (0.007)	0.07 (0.01)
46-50	0.07 (0.01)	0.07 (0.01)
51-55	0.07 (0.01)	0.08 (0.01)
56-60	0.08 (0.01)	0.11 (0.02)
61-65	0.12 (0.03)	0.16 (0.03)
>65	0.07 (0.08)	0.1 (0.09)
Agriculture	-	
2,9,12,24,29,30,31,32,33	Value < 0	
4,7,8,10,14,15,16,17,18,20,22,23,25,27	0> Value < 0.2	
5,6,11,13,19,21,28,26	Value > 0.2	
Standard Errors in parentheses		

Table 4.23

Rates of Return to Human Capital and Occupational Characteristics

(Relative to the default in bold)

Splitting Sample by Age

	AGE < 34 YEARS	**AGE > 34 YEARS**
Not Completed Primary	-	-
Primary Education (Hauptschule)	-0.12 (0.16)	0.08 (0.07)
Technical Training (Meister, Geselle)	-0.11 (0.16)	0.18 (0.07)*
Technical High School (Technisches Gymnasium)	-0.001 (0.16)	0.31 (0.07)*
High School (Gymnasium)	0.01 (0.16)	0.34 (0.07)*
Technical College	0.02 (0.16)	0.37 (0.08)*
University	0.36 (0.16)*	0.73 (0.07)*
Agriculture	-	
2,9,12,24,29,30,31,32,33	Value < 0	Value < 0
4,7,8,10,14,15,16,17,18,20,22,23,25,27	0> Value < 0.2	0> Value < 0.2
5,6,11,13,19,21,28,26	Value > 0.2	Value > 0.2
Standard Errors in parentheses		

Table 4.24

Elasticity of Pay with respect to Local Unemployment and Local Job Reallocation by Human Capital and Occupational Groupings

	Local Unemployment	Local Job Reallocation
Age		
< 34	-0.17 (0.03)*	+0.08 (0.02)*
> 34	-0.16 (0.02)*	+0.04 (0.02)
Sector		
Agriculture	-0.08 (0.12)	+0.2 (0.08)*
Manufacturing	-0.05 (0.03)	+0.11 (0.03)*
Services	-0.18 (0.02)*	+0.08 (0.02)*
Education		
Academic	-0.17 (0.03)*	+0.06 (0.03)*
Technical	-0.08 (0.02)*	+0.05 (0.02)*
Ownership		
State Sector	-0.18 (0.02)*	+0.03 (0.02)
Private Sector	-0.09 (0.03)*	0.08 (0.03)*
Standard errors in parentheses		

Table 5.1

Pace of Structural Change in Transitional Economies and OECD Countries

COUNTRY	YEAR	STANDARD DEVIATION OF EMPLOYMENT GROWTH	SECTORAL REALLOCATION INDEX
Poland	1990-91	6.5	0.08
	1991-92	20.2	0.90
	1992-93	7.9	0.34
	1993-94	18.2	0.95
	1994-95	7.3	0.94
Czech Republic	1991-92	15.1	0.65
	1992-93	35.3	0.89
	1993-94	10.1	0.77
	1994-95	3.3	0.10
Hungary	1991-92	..	..
	1992-93	9.3	0.25
	1993-94	7.0	0.55
	1994-95	6.9	0.51
OECD Countries	1990-93	3.1	0.33

Source: Boeri (1998)

Table 5.2

Unemployment Inflow and Outflow Rates and Share of Long-term Unemployment by Lehmann-Walsh (1998) Taxonomy using Amadeus and Polish Live Register Data

YEAR	GROUP	JOB REALLOCATION RATES	INFLOW RATE	OUTFLOW RATE	LONG-TERM UNEMPLOYED	UNEMPLOYMENT RATE
1994	I	1.03	0.11	0.87	0.46	0.168
	II	2.12	0.12	0.77	0.40	0.169
	III	2.56	0.15	0.83	0.42	0.1888
	IV	3.48	0.17	0.91	0.41	0.226
	V	4.37	0.18	1.00	0.37	0.189
	VI	6.94	0.21	1.10	0.33	0.121
1995	I	2.19	0.15	0.87	0.38	0.162
	II	4.44	0.16	1.00	0.34	0.166
	III	4.45	0.17	1.04	0.35	0.177
	IV	4.63	0.20	0.97	0.34	0.210
	V	5.71	0.21	1.13	0.30	0.178
	VI	7.98	0.22	1.24	0.30	0.111
1996	I	2.57	1.14	0.35	0.35	0.141
	II	4.51	1.10	0.34	0.34	0.149
	III	4.81	1.21	0.33	0.33	0.159
	IV	5.45	1.30	0.31	0.31	0.184
	V	5.87	1.37	0.28	0.28	0.162
	VI	8.44	1.50	0.27	0.27	0.094

Source: Walsh (2000)

Table 5.3

Data Comparisons for Three Different Taxonomies using the Polish Labour Force Survey Data and Amadeus for the period 1994/1995

TAXONOMIES	JOB REALLOCATION RATES	POS	NEG	INFLOW (THOUS)	OUTFLOW (THOUS)	LONG-TERM UNE. (%)	UNE. RATE (%)
*Scarpetta and Huber (1995)**							
I	2.87	2.77	3.57	2.17	3.80	0.38	22.8
II	3.16	3.58	4.46	2.94	2.68	0.32	16.93
III	4.62	2.80	4.88	4.55	4.42	0.30	16.55
IV	3.17	2.95	4.52	4.75	4.28	0.31	16.72
V	5.74	3.31	5.56	4.97	4.21	0.23	12.11
VI	4.70	5.11	4.97	3.88	4.93	0.26	21.21
*Gora and Lehmann (1995)***							
I	3.15	3.39	4.04	2.29	2.65	0.36	15.26
II	3.14	3.58	3.88	3.35	2.88	0.28	17.36
III	4.31	2.93	5.07	3.74	3.54	0.33	17.06
IV	3.94	4.28	5.40	4.50	4.98	0.28	17.62
V	4.80	3.32	5.34	3.99	4.06	0.29	17.17
VI	6.17	3.79	5.44	5.06	5.34	0.27	16.41
Lehmann and Walsh (1998)							
I	2.60	4.13	3.74	2.32	2.24	0.36	16.22
II	3.66	2.21	5.14	3.28	2.87	0.35	16.56
III	3.50	3.50	3.30	3.76	3.81	0.33	17.74
IV	4.60	4.86	5.40	3.62	4.09	0.31	20.94
V	4.27	2.81	4.74	4.89	4.38	0.29	17.8
VI	6.61	3.74	6.04	4.59	5.34	0.26	11.11

* I - developed agricultural; II – other agricultural; III – developed heavily industrialised; IV – other industrialised; V – developed diversified and VI – other diversified.

** Each grouping represents progressive stages of economic development as discussed in chapter two. Group VI is the most economically developed.

Table 5.4

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

	1996							
	15-24		25-34		35-44		>44	
Group	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*
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
	1995							
	15-24		25-34		35-44		>44	
Group	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*
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
	1994							
	15-24		25-34		35-44		>44	
Group	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*	*Inflow*	*LTU*
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: Walsh(2000)

Table 5.5

Under a Year Average Hazard Rates for Unemployed Males by Age and Education for Lehmann-Walsh Regional Groups[a]

Three Month Hazard Rates ($a_{t\to t+1}$)

	Age				Education		
Group	15-24	25-34	34-44	>45	University	Secondary	Basic
I	.21	.17	.16	.12	.36	.18	.16
II	.25	.23	.22	.19	.39	.23	.22
III	.22	.21	.15	.15	.38	.20	.18
IV	.20	.23	.20	.16	.28	.21	.19
V	.28	.26	.24	.17	.36	.25	.24
VI	.30	.28	.29	.22	.35	.25	.31

Six Month Hazard Rates ($b_{t\to t+1}$)

	Age				Education		
Group	15-24	25-34	34-44	>45	University	Secondary	Basic
I	.37	.35	.35	.31	.52	.35	.35
II	.39	.37	.36	.31	.53	.37	.36
III	.39	.37	.35	.31	.52	.37	.35
IV	.43	.39	.35	.29	.51	.38	.37
V	.46	.43	.41	.33	.54	.43	.41
VI	.48	.48	.46	.36	.54	.44	.47

Twelve Month Hazard Rates ($c_{t\to t+1}$)

	Age				Education		
Group	15-24	25-34	34-44	>45	University	Secondary	Basic
I	.72	.67	.65	.56	.80	.69	.65
II	.74	.70	.67	.57	.82	.71	.66
III	.75	.72	.70	.58	.80	.73	.67
IV	.78	.75	.72	.60	.81	.75	.70
V	.81	.77	.75	.61	.81	.77	.72
VI	.85	.81	.78	.62	.80	.80	.76

[a] These rates are averaged over the flows between 1994-95 and 1995-96 using Live Register Data

Source: Walsh (2000)

Table 5.6

Composition of Male Unemployment Inflows and Outflows with Long-Term Unemployment by Age and Lehmann-Walsh Regional Groups

1996

	15-24			25-34			35-44			>44		
Group	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*
I	.19	.02	.38	.15	.03	.31	.12	.05	.24	.09	.03	.12
II	.12	.03	.35	.13	.03	.29	.10	.04	.26	.10	.03	.14
III	.11	.02	.33	.12	.02	.28	.09	.03	.28	.08	.02	.16
IV	.09	.03	.33	.10	.04	.27	.10	.05	.29	.07	.02	.16
V	.09	.02	.32	.08	.05	.25	.07	.06	.30	.06	.01	.21
VI	.07	.04	.30	.07	.07	.22	.06	.08	.31	.05	.01	.27

1995

	15-24			*25-34*			*35-44*			*>44*		
Group	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*
I	.20	.04	.34	.13	.04	.31	.11	.03	.26	.08	.04	.17
II	.14	.04	.33	.12	.05	.30	.11	.04	.25	.08	.05	.16
III	.11	.03	.30	.11	.04	.28	.08	.04	.25	.07	.05	.20
IV	.10	.02	.30	.09	.05	.26	.09	.04	.28	.07	.07	.21
V	.09	.03	.27	.07	.06	.23	.06	.05	.28	.08	.08	.25
VI	.08	.05	.23	.06	.06	.20	.05	.05	.29	.09	.08	.30

1994

	15-24			25-34			35-44			>44		
Group	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*	*EU Rates*	*UE Rates*	*LTU*
I	.22	.06	.31	.20	.05	.29	.17	.05	.26	.16	.04	.19
II	.15	.05	.30	.17	.05	.28	.15	.04	.25	.15	.04	.19
III	.13	.04	.27	.15	.06	.26	.15	.05	.25	.15	.06	.27
IV	.11	.05	.27	.12	.06	.24	.11	.06	.28	.12	.06	.26
V	.09	.06	.25	.10	.06	.19	.11	.06	.27	.11	.07	.29
VI	.09	.08	.20	.08	.08	.18	.06	.09	.25	. 10	.09	.35

Table 5.7

Weighted Least Squares Logit Models for

(A) Annual Male Inflow Rate and (B) Annual Exit Rate for Males

	MODEL (A) ODDS RATIO	MODEL (B) ODDS RATIO
No. of Observations	147	98
R^2	0.98	0.74
Adjusted R^2	0.96	0.70
****Regional Job Reallocation Rates**	1.23 (2.0)*	1.3 (3.6)*
Regional Dummies	Yes	Yes
Year Dummies	Yes	Yes

*Significant at the 5% level.
**Instrumented with RANK, Regional and Year Dummies
T statistics in parentheses

Source: Walsh (2000)

Table 5.8

OLS Regressions across Polish Regional Panel

1994-1996

	OLS	OLS	OLS	OLS
Dependent Variable	*Inflow rate*	*Outflow rate*	*Inflow rate*	*Outflow rate*
No. of Observations	147	147	147	147
R^2	0.24	0.26	0.68	0.55
Constant	0.03 (10.8)*	0.15 (8.9)*	0.02 (5.04)*	0.11 (5.06)*
Job Reallocation Rate (RES_{jt})	0.03 (2.1)*	0.002 (1.80)-	-	-
Job Creation Rate (POS_{jt})	-	-	-	0.13 (8.5)*
Job Destruction Rate (NEG_{jt})	-	-	0.23 (5.5)*	-
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

T-statistics in parentheses
*indicates significance at the 5 per cent level

Table 5.9

Two Stage Least Squares Estimation

1994-1996

*2SLS***				
	1st stage IV		**2nd stage IV**	
Dependent variable	**POS_{jt}**	**NEG_{jt}**	**Inflow rate**	**Outflow rate**
R^2	0.25	0.29	0.62	0.58
Constant	1.56 (8.46)*	1.79 (12.12)*	0.12 (4.98)*	0.21 (4.16)*
RANK	0.01 (-4.35)*	-1.1 (3.75)*	-	-
RANK squared	-0.00 (-2.3)*	0.02 (1.25)	-	-
RANK cubed	0.00 (-0.79)	0.00 (0.04)	-	-
Job Creation Rate (POS_{jt})			-	0.18 (7.3)*
Job Destruction Rate (NEG_{jt})			0.36 (4.4)*	-
Year Dummies	No	No	Yes	Yes
Regional Dummies	No	No	Yes	Yes
Observations	147	147	147	147

T-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 5.10

Random-Effects GLS Regressions across Polish Regional Panel

1994-1996

	GLS	GLS	GLS**	GLS**
	Inflow Rate	**Outflow Rate**	**Inflow Rate**	**Outflow Rate**
R^2 (Within)	0.62	0.58	0.55	0.50
R^2 (Between)	0.01	0.05	0.03	0.05
R^2 (Overall)	0.58	0.48	0.48	0.44
Constant	3.3 (12.1)*	3.2 (9.7)*	3.1 (11.3)*	3.2 (8.9)*
Job Creation Rate (POS_{it})		0.17 (6.2)*	-	0.15 (5.9)*
Job Destruction Rate (NEG_{it})	0.32 (3.4)*	-	0.30 (2.8)*	
Year Dummies	YES	YES	YES	YES
Observations	147	147	147	147

Z-statistics in parentheses
*indicates significance at the 5 per cent level
** Instruments include RANK, RANK squared and RANK cubed.

Table 5.11

Weighted Least Squares Logit Model for Grouped Data:

Annual Exit Rate of Males in under a Year Stock conditioned on Age

ODDS RATIO (T STAT)	AGE	AGE 15-24	AGE 25-34	AGE 35-44	AGE >44
Observations	392	98	98	98	98
R^2	0.75	0.82	0.77	0.79	0.53
Adj. R^2	0.74	0.80	0.73	0.75	0.46
Age 15-24	-	-	-	-	-
Age 25-34	0.84 (-11.1)*	-	-	-	-
Age 35-44	0.73 (-19.9)*	-	-	-	-
Age >44	0.41 (-13.1)*	-	-	-	-
**Regional Job Reallocation	1.26 (3.4)*	1.49 (3.7)*	1.32 (2.6)*	1.19 (1.7)*	1.11 (0.8)
Regional Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
*Significant at the 5 per cent level **Instrumented with RANK, RANK squared, RANK cubed, Regional and Year Dummies Coefficients are expressed as relative odds ratios					

Source: Walsh (2000)

Table 5.12

Weighted Least Squares Logit Model for Grouped Data:

Annual Exit Rate of Males in under a Year Stock conditioned on Education

ODDS RATIO (T STAT)	EDUCATION	UNIVERSITY	SECONDARY	BASIC
Observations	294	98	98	98
R^2	0.75	0.80	0.71	0.50
Adj. R^2	0.74	0.77	0.66	0.42
University	-	-	-	-
Secondary	0.77 (-5.1)*	-	-	-
Basic	0.61 (-9.5)*	-	-	-
Age >44	0.41 (-13.1)*	-	-	-
**Regional Job Reallocation	1.3 (3.7)*	1.28 (2.6)*	1.26 (2.0)*	0.75 (-1.2)*
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

*Significant at the 5 per cent level
**Instrumented with RANK, RANK squared, RANK cubed, Regional and Year Dummies
Coefficients are expressed as relative odds ratios

Source: Walsh (2000)

Table 5.13

Basic Characteristics of Males in Dynamic and Stagnant Voivodships

	1994/95			1995/96		
	Dynamic*	**Stagnant****	**Diff.**	**Dynamic***	**Stagnant****	**Diff.**
Age (years)	39.4	40.3	-0.9***	35.8	36.0	-0.2
Temporary and Part-time jobs (%)	9.4	6.3	3.1***	7.1	4.7	2.4***
Jobs started after 1989 (%)	42.8	37.9	4.8***	43.5	40.9	2.6*
Education (%)						
University	12.0	11.0	1.0	13.0	11.0	2.1**
Secondary	34.6	34.4	0.2	39.1	36.4	2.7*
Lower Vocational	32.0	34.0	-2.0***	34.0	40.0	-5.9***
Primary	19.1	22.5	-3.4***	10.7	16.0	-5.2***
Industry						
Agri. And Fisheries	20.3	25.7	-5.3	15.0	17.2	-2.1**
Mining	1.9	6.7	-4.8***	2.0	8.6	-6.6***
Manufacturing	22.5	20.4	2.1**	23.5	19.9	3.6***
Construction	5.8	6.2	-0.4	6.0	6.2	-0.3
Trade and Hotels	13.3	13.1	0.7	13.0	14.2	-1.2
Financial and Business services	4.5	4.0	0.4	4.3	4.3	0
Public Services	19.6	23.1	-3.4***	24.6	21.3	3.3***
Other Services	3.8	3.1	0.8*	3.9	3.2	0.7
Job Reallocation Rate	7.7	4.3	3.4***	7.7	4.0	3.7***
Average Unemployment Rate	9.8	17.4		8.9	16.5	

*High Job Reallocation Rates
**Low Job Reallocation Rates

Table 5.14

P.L.F.S. Logit Models of Male Unemployment Outflow Transitions

1994/95 and 1995/96

DEPENDENT VARIABLE	UE94/95	UE95/96
Observations	7619	6723
Pseudo R^2	0.61	0.55
Chi2(59)	418.4	552.3
Constant	-2.31 (-29.26)*	-1.86 (-18.1)*
Age		
Age 15-24	-	-
Age 25-34	0.03 (4.15)*	0.24 (2.86)*
Age 35-44	0.04 (0.65)	0.07 (0.82)
Age >44 years	0.31 (0.48)	0.47 (0.67)
Education		
University	0.58 (5.98)*	0.43 (3.45)*
Secondary	0.26 (5.27)*	0.16 (4.41)*
Basic	0.18 (3.92)*	0.15 (2.77)*
Not completed Education	-	-
Unemp. Spells up to 12 months	0.13 (2.53)*	0.17 (3.45)*
Previous work experience	0.05 (0.85)	0.12 (1.57)
Registration at labour office	0.12 (2.53)*	0.15 (2.24)*
Unemployment benefit	-0.9 (-6.80)*	-0.33 (-5.92)*
**Regional Job Creation Rates	0.47 (7.25)*	0.52 (6.73)*
Regional Dummies	Yes	Yes

* z statistics in parentheses
**Regional Job Creation Rates are instrumented with RANK, RANK squared and RANK Cubed as in Table 5.9

Table 5.15

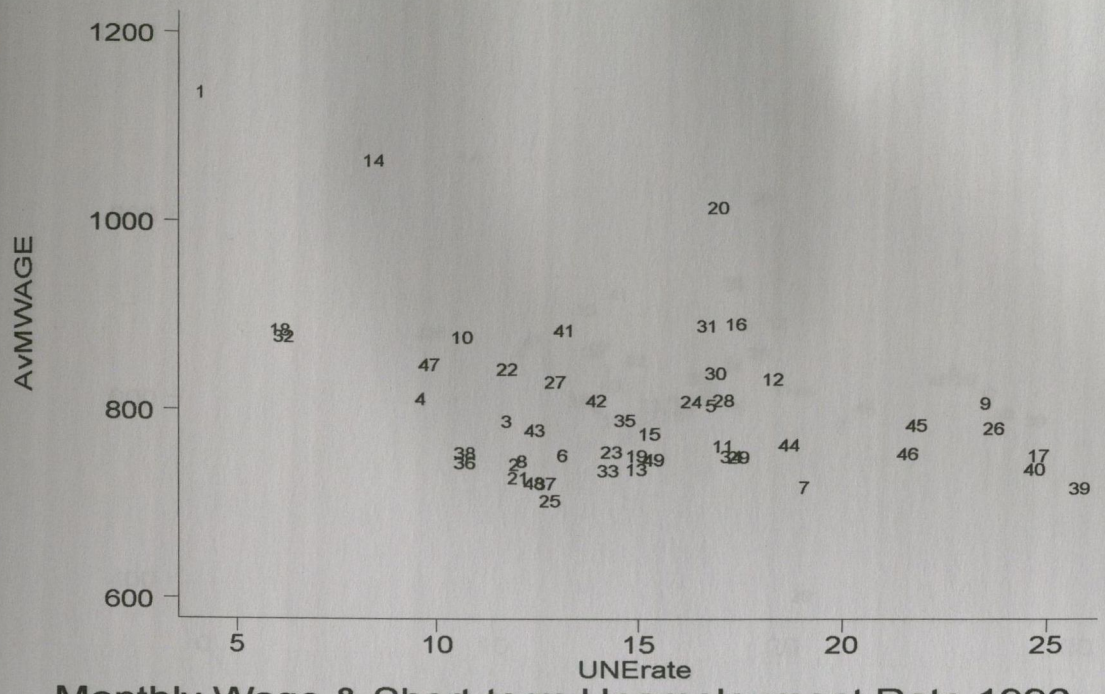
P.L.F.S. Logit Models of Male Unemployment Inflow Transitions

1994/95 and 1995/96

DEPENDENT VARIABLE	EU94/95	EU95/96
Observations	7619	6723
Pseudo R^2	0.52	0.48
Chi2(56)	519.7	482.3
Constant	-1.76 (-10.89)*	-2.00 (-14.35)*
Age		
Age 15-24	-	-
Age 25-34	0.08 (0.91)	0.05 (0.72)
Age 35-44	0.01 (0.07)	0.04 (1.52)
Age >44 years	0.47 (2.65)*	0.49 (2.58)*
Education		
University	0.27 (1.25)	0.15 (1.72)
Secondary	0.33 (1.25)	0.25 (1.05)
Basic	0.63 (7.91)*	0.57 (8.71)*
Not completed Education	-	-
Previously in State-sector Employment	0.15 (2.63)*	0.22 (1.56)
**Regional Job Destruction Rates	1.77 (3.78)*	1.85 (2.56)*
Regional Dummies	Yes	Yes

* z statistics in parentheses
**Regional Job Destruction Rates are instrumented with RANK, RANK squared and RANK Cubed as in Table 5.9

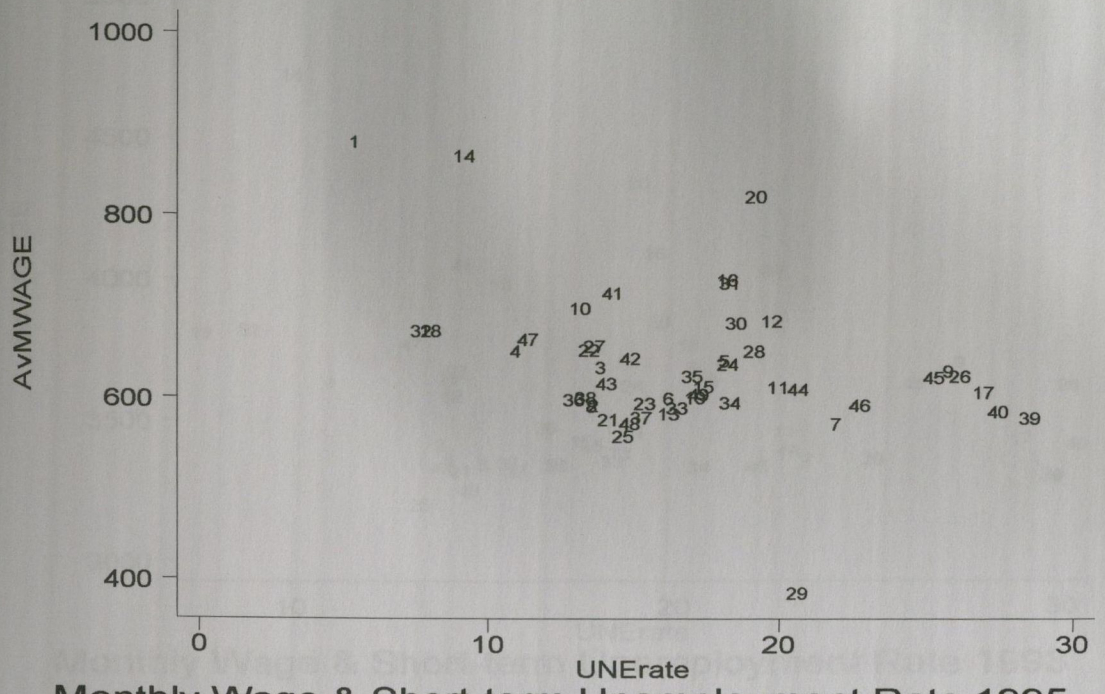
Figure 3.1



Monthly Wage & Short-term Unemployment Rate 1996

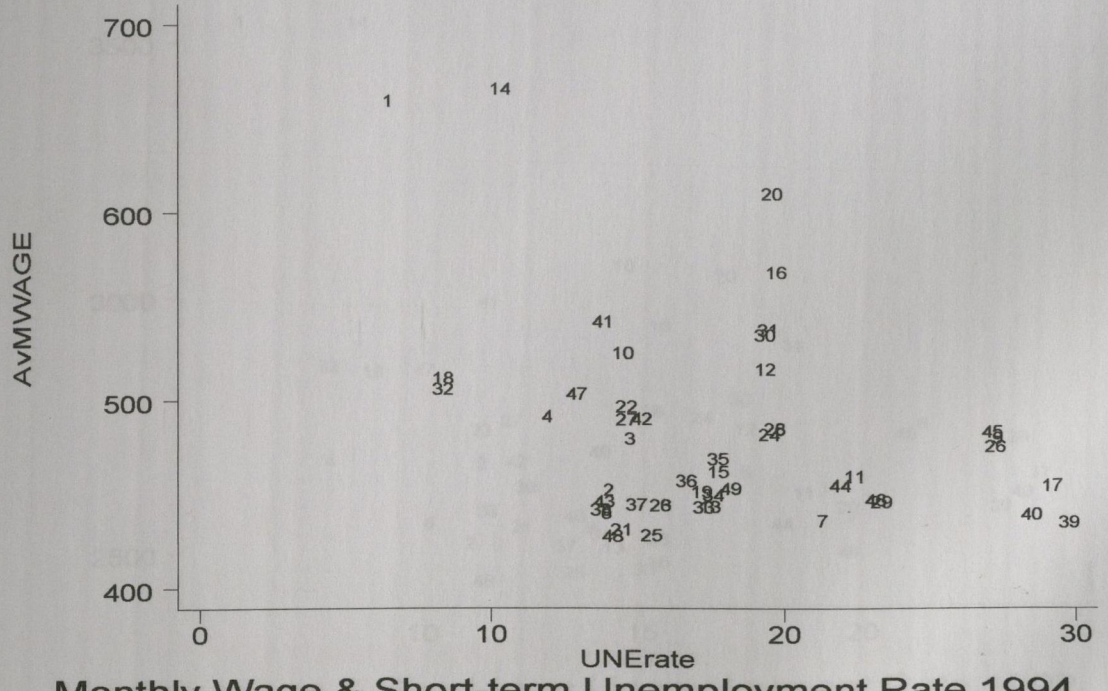
1. Warsawskie	11. Gorzowskie	21. Leszcynskie	31. Plockie	41. Szczecinskie
2. Bialskopodlaskie	12. Jeleniogorskie	22 Lubelskie	32. Poznanskie	42. Tarnobrzeskie
3. Bialostockie	13. Kaliskie	23. Lomzynskie	33. Przemyskie	43. Tarnowskie
4. Bielskie	14. Katowickie	24. Lodzkie	34. Radomskie	44. Torunskie
5.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

Figure 3.2



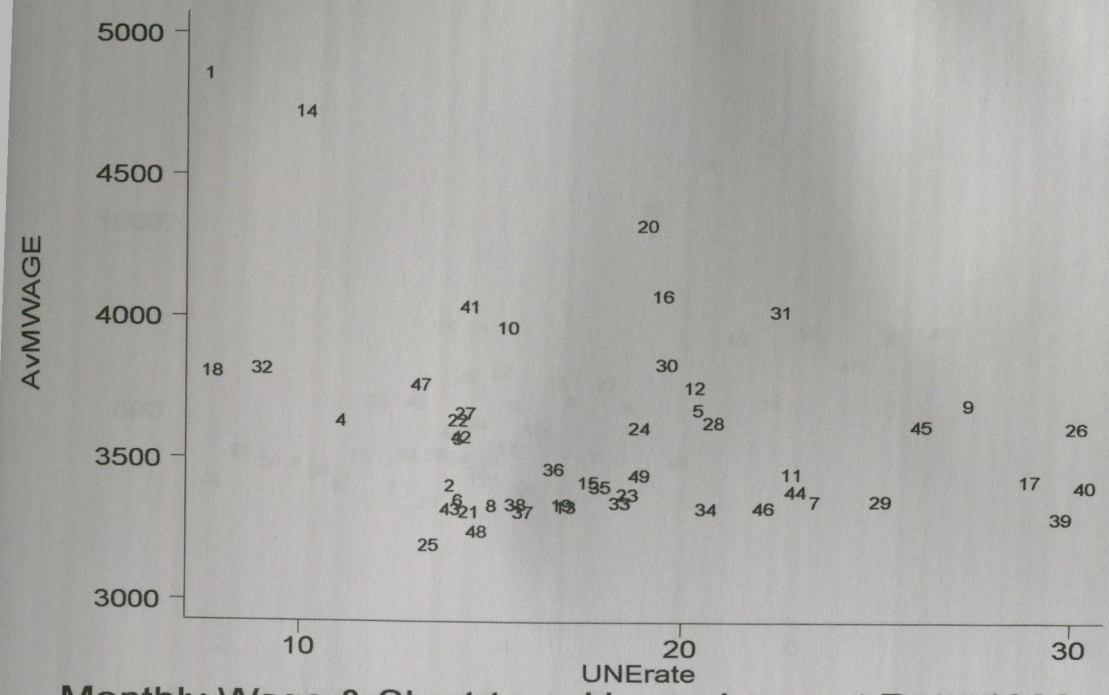
Monthly Wage & Short-term Unemployment Rate 1995

Figure 3.3



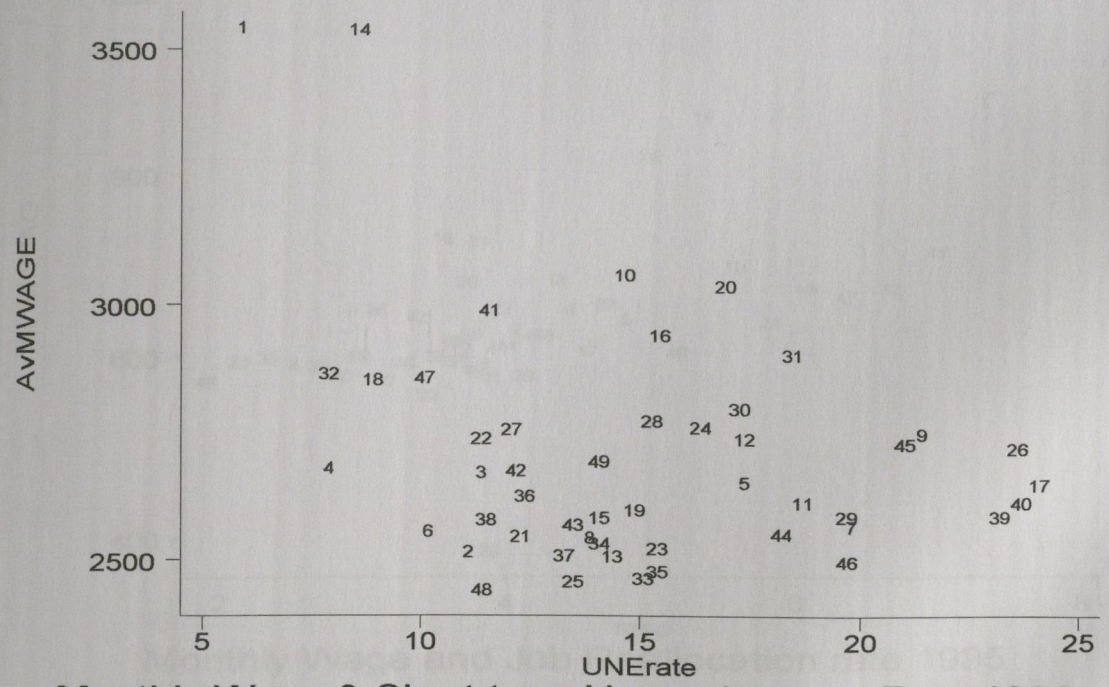
Monthly Wage & Short-term Unemployment Rate 1994

Figure 3.4



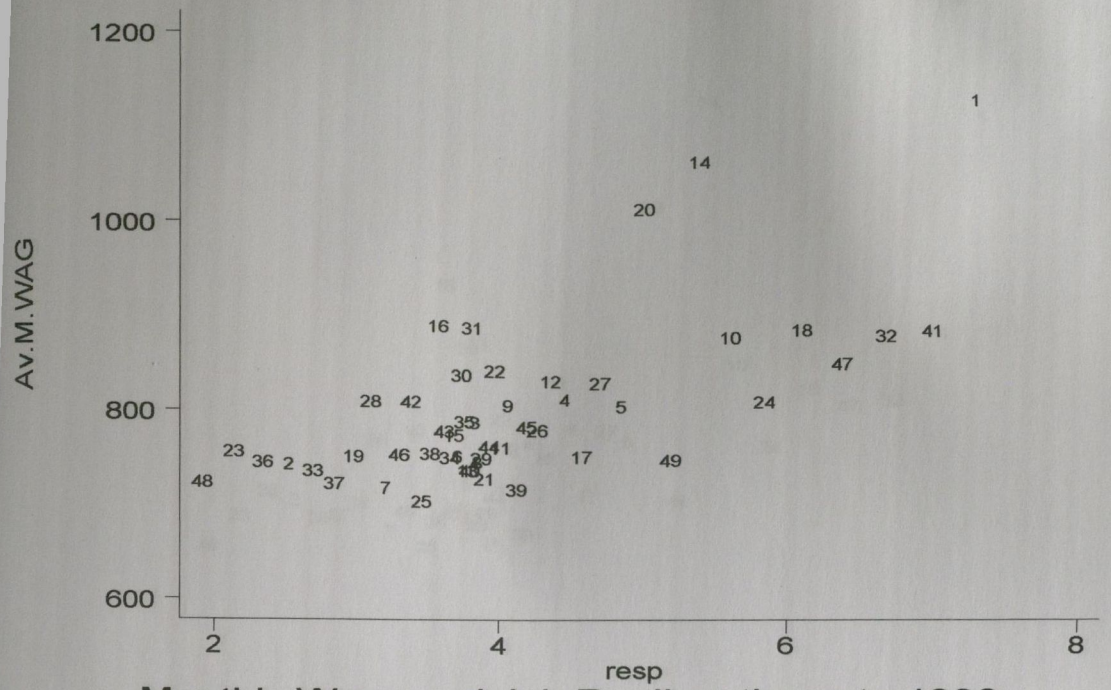
Monthly Wage & Short-term Unemployment Rate 1993

Figure 3.5



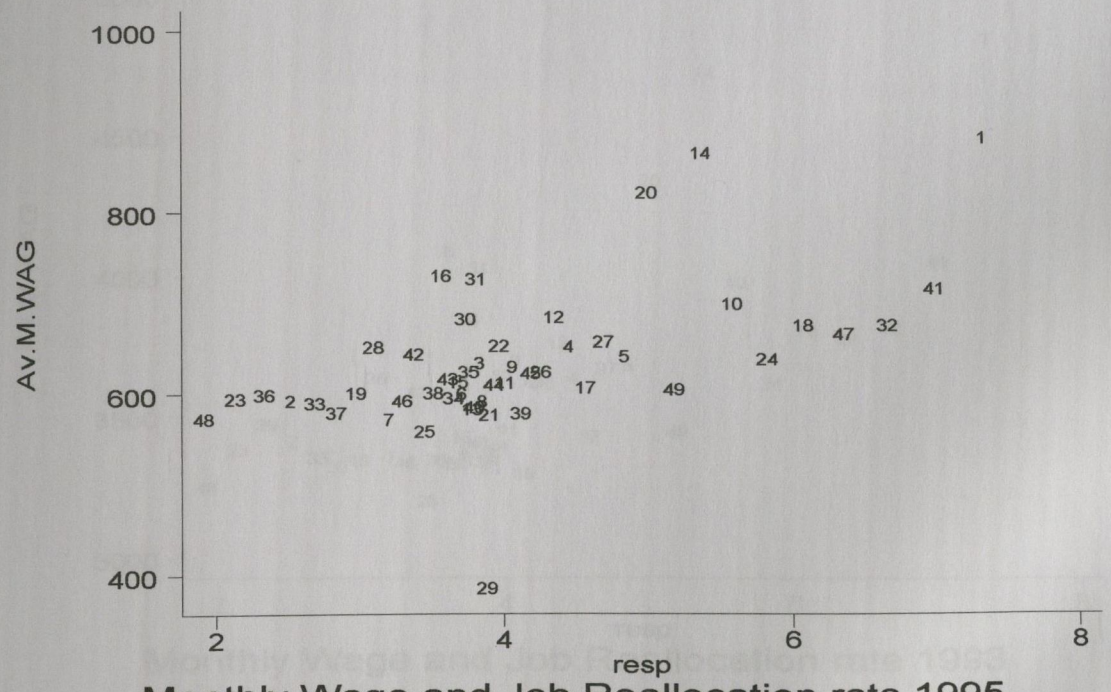
Monthly Wage & Short-term Unemployment Rate 1992

Figure 3.6



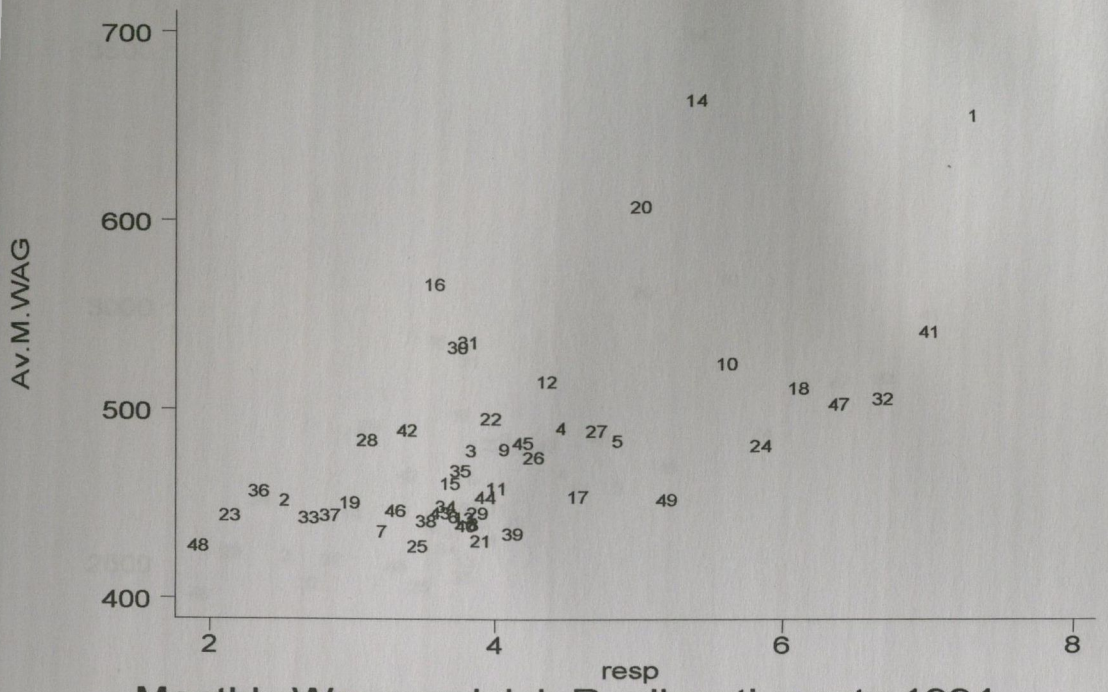
Monthly Wage and Job Reallocation rate 1996

Figure 3.7



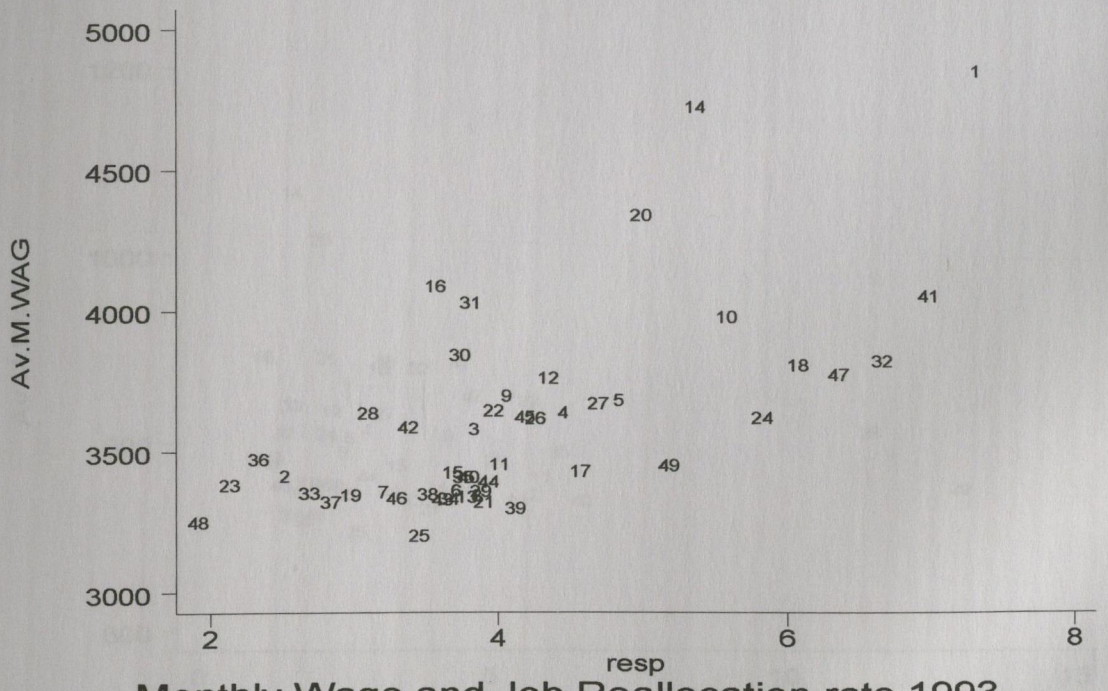
Monthly Wage and Job Reallocation rate 1995

Figure 3.8



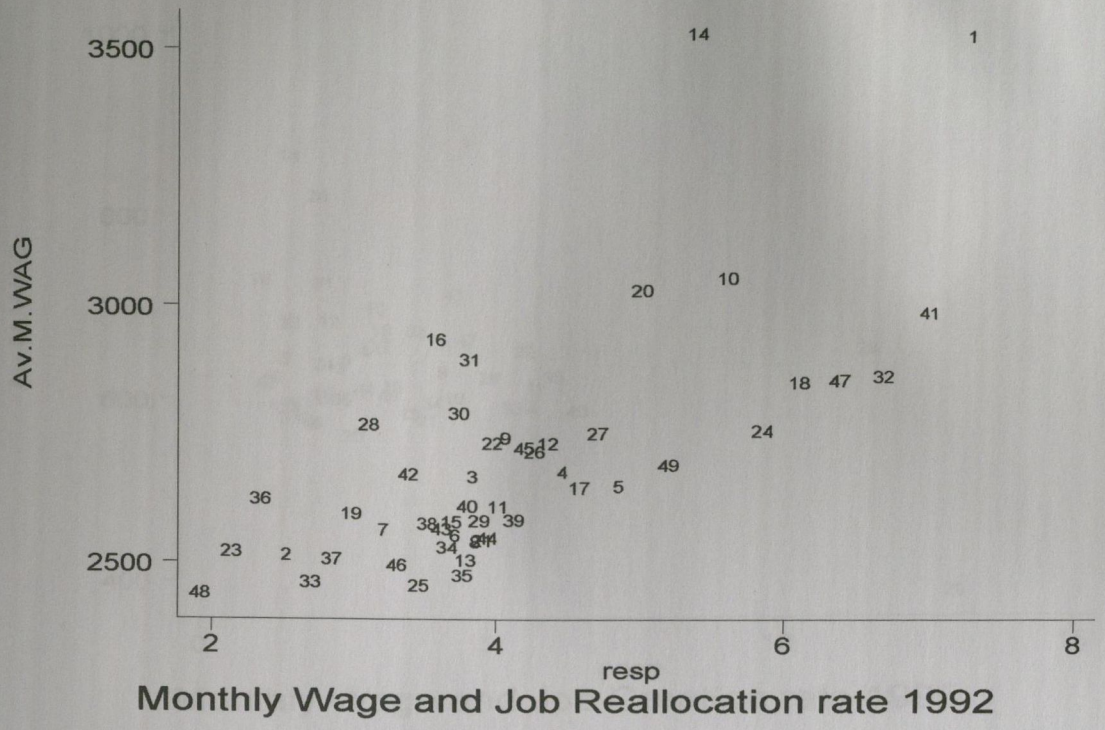
Monthly Wage and Job Reallocation rate 1994

Figure 3.9



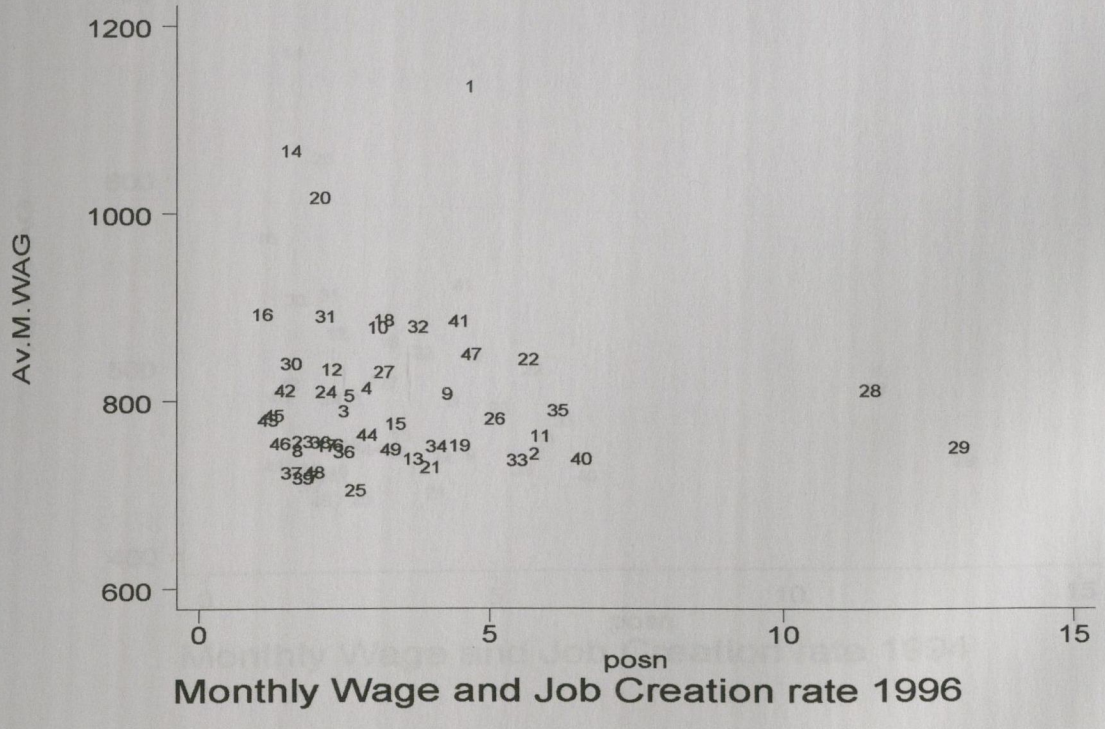
Monthly Wage and Job Reallocation rate 1993

Figure 3.10



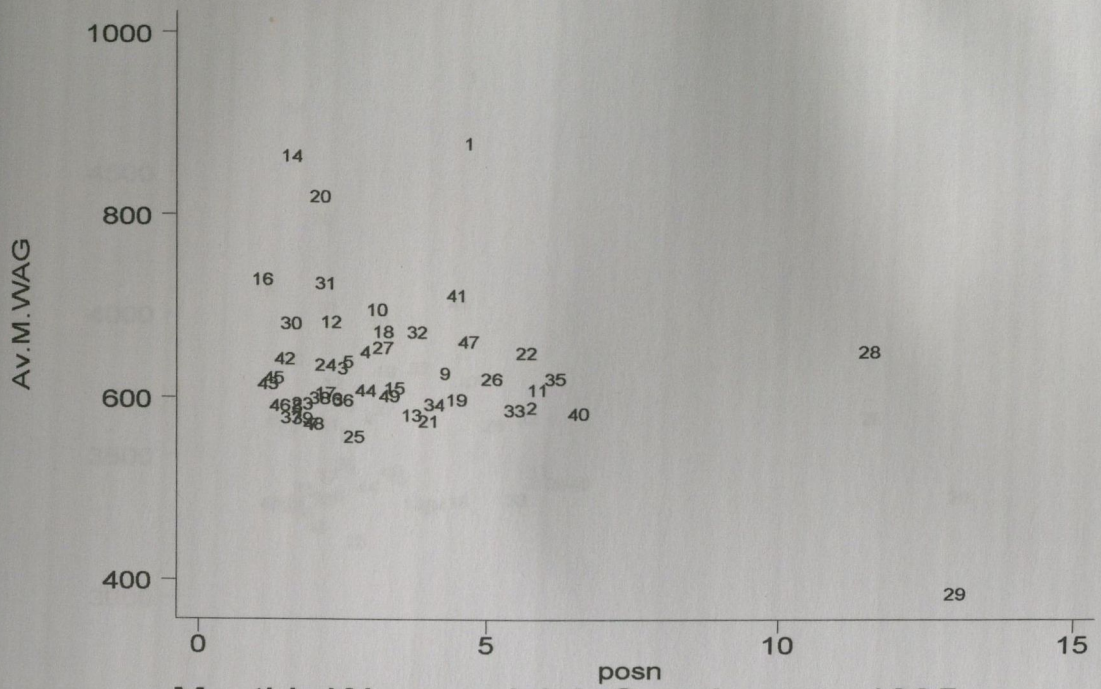
Monthly Wage and Job Reallocation rate 1992

Figure 3.11



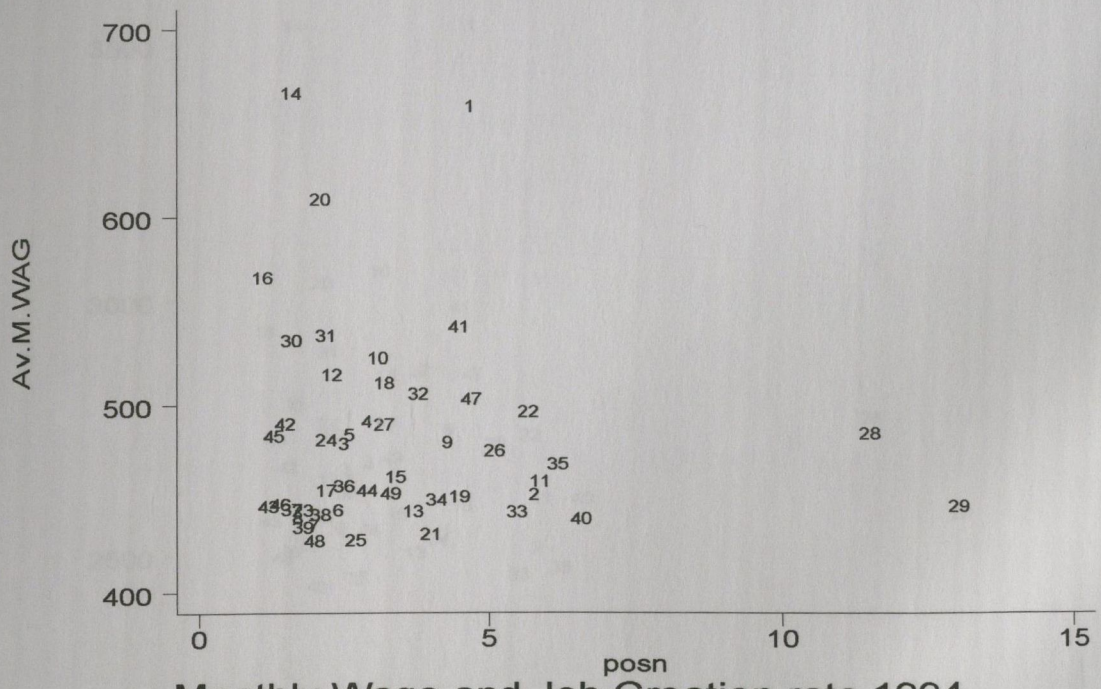
Monthly Wage and Job Creation rate 1996

Figure 3.12



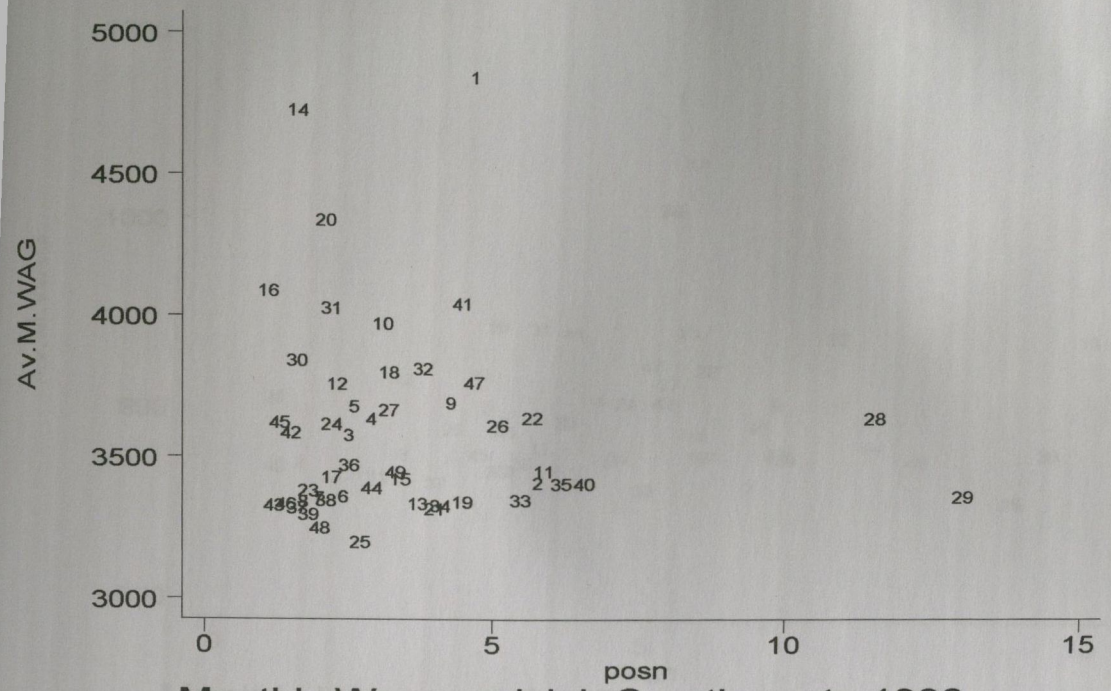
Monthly Wage and Job Creation rate 1995

Figure 3.13



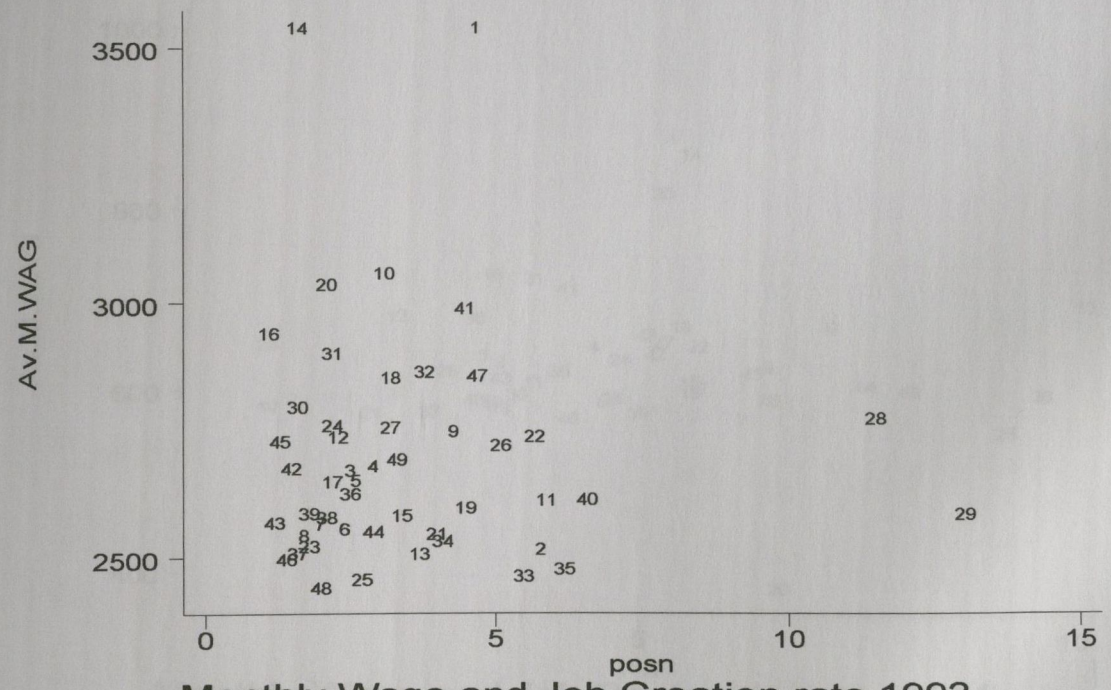
Monthly Wage and Job Creation rate 1994

Figure 3.15



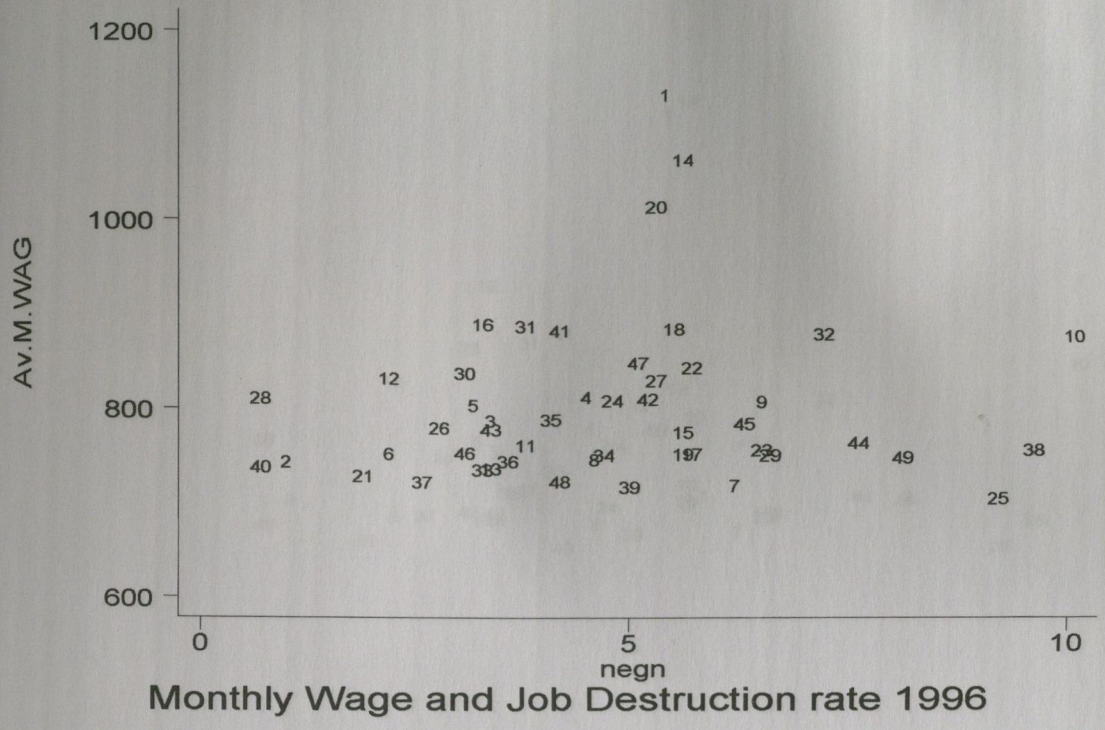
Monthly Wage and Job Creation rate 1993

Figure 3.16



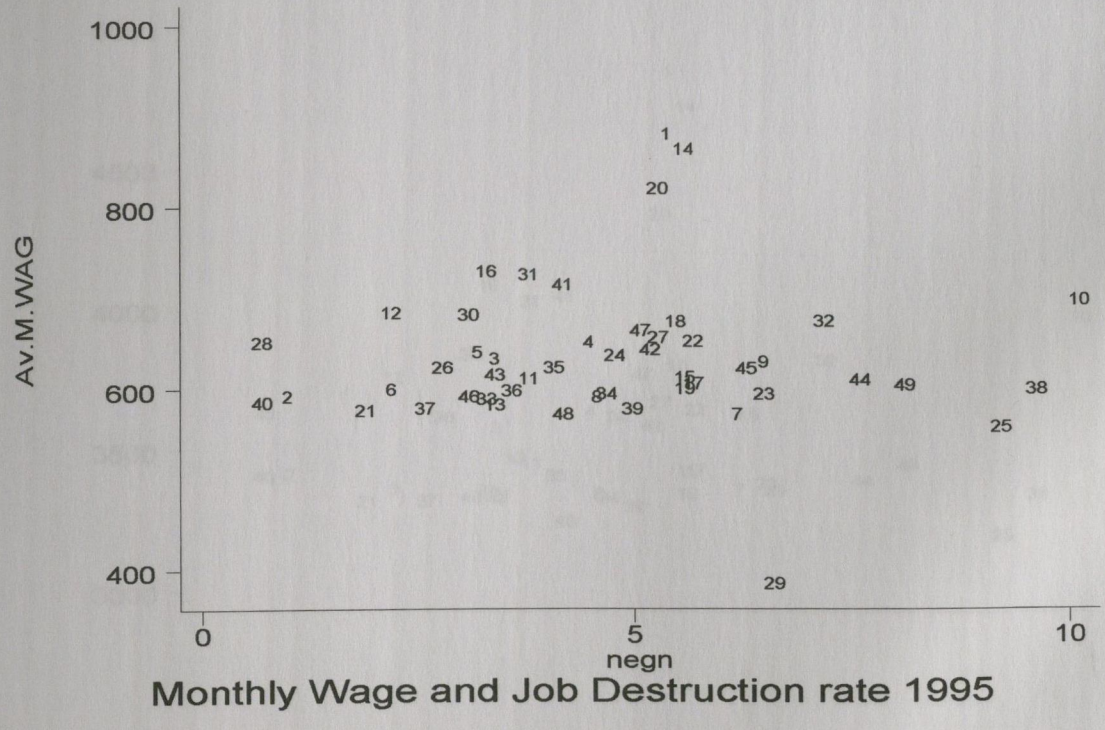
Monthly Wage and Job Creation rate 1992

Figure 3.17



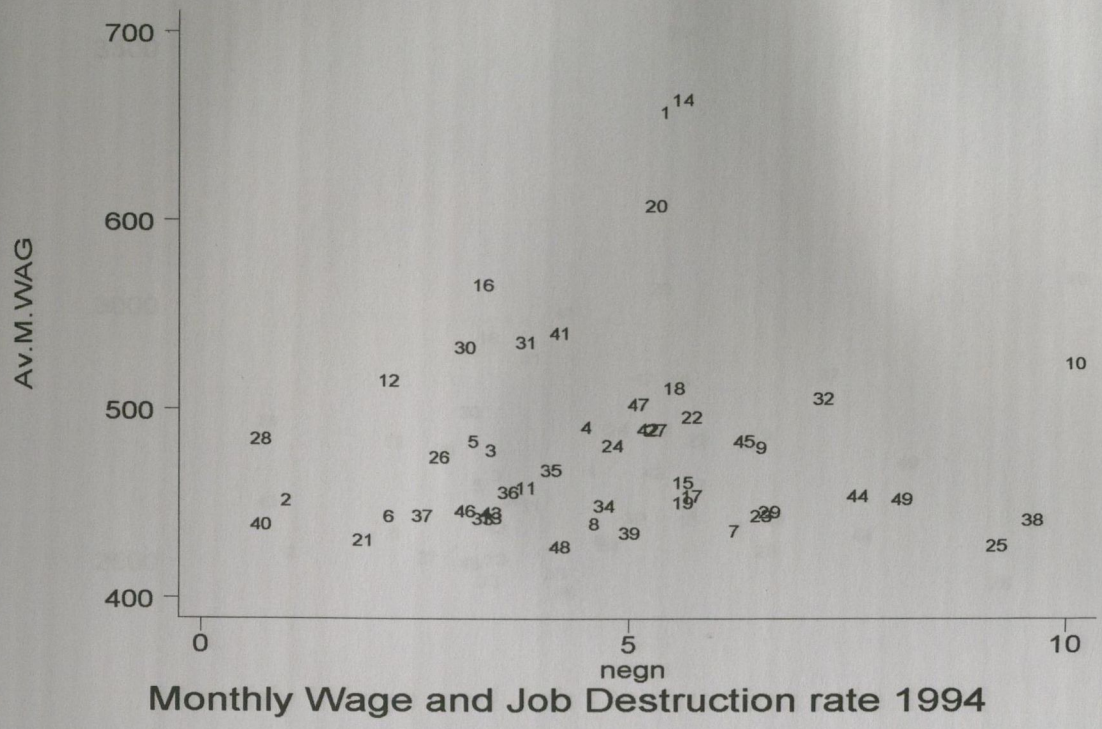
Monthly Wage and Job Destruction rate 1996

Figure 3.18



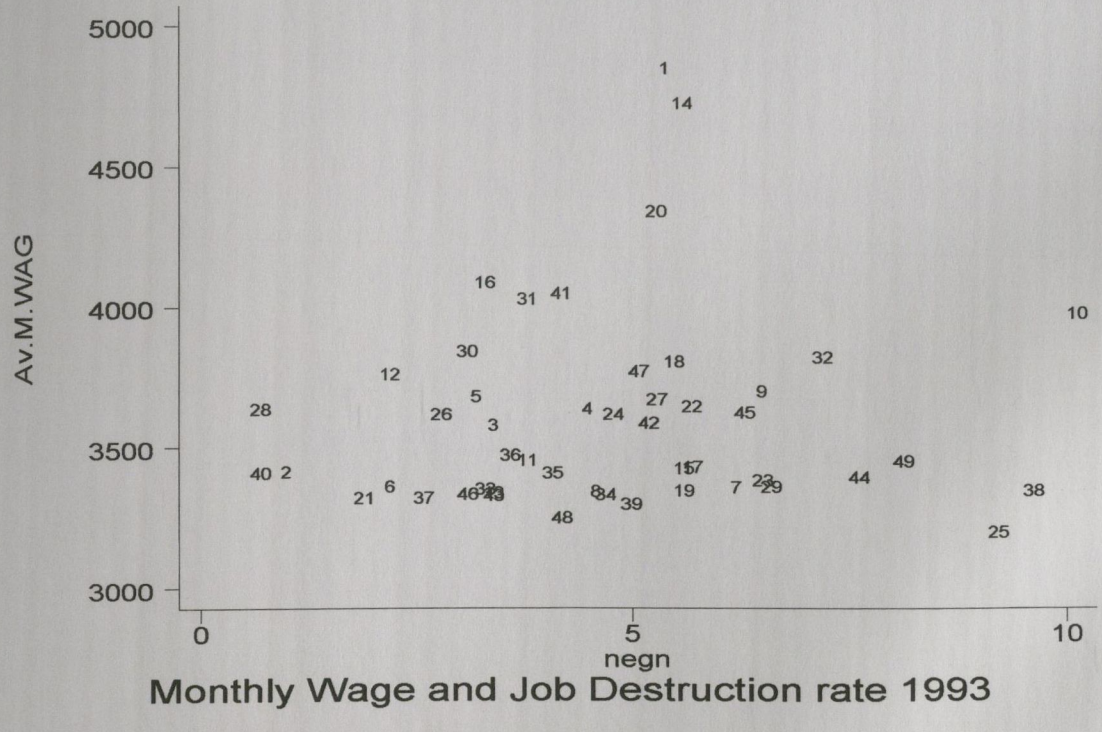
Monthly Wage and Job Destruction rate 1995

Figure 3.19



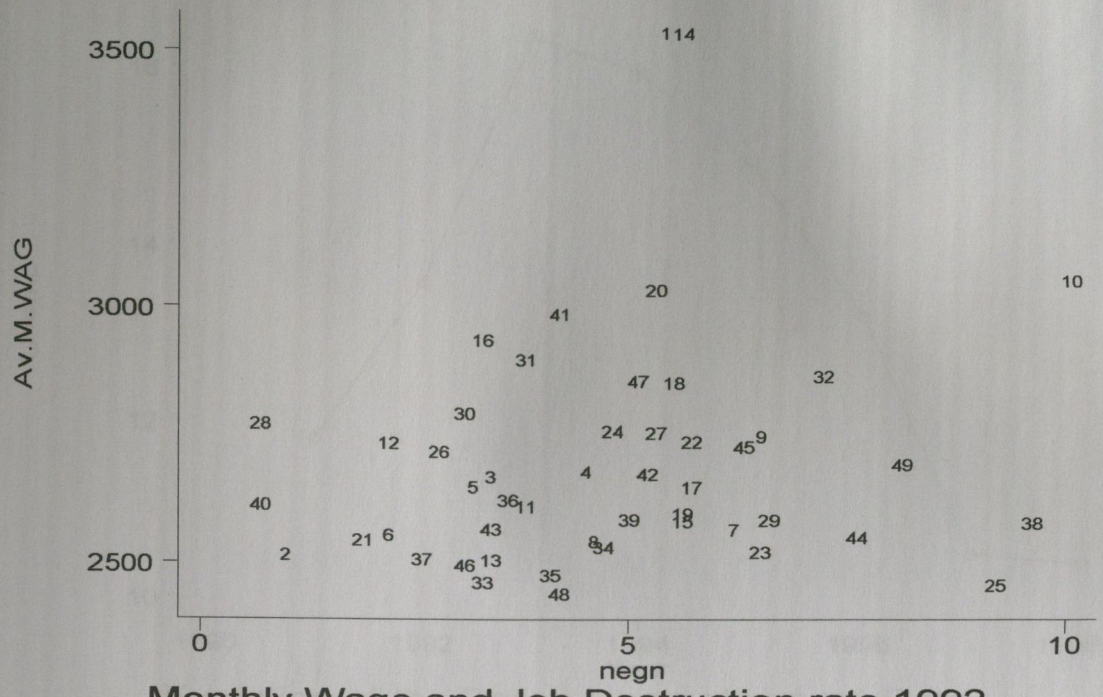
Monthly Wage and Job Destruction rate 1994

Figure 3.20



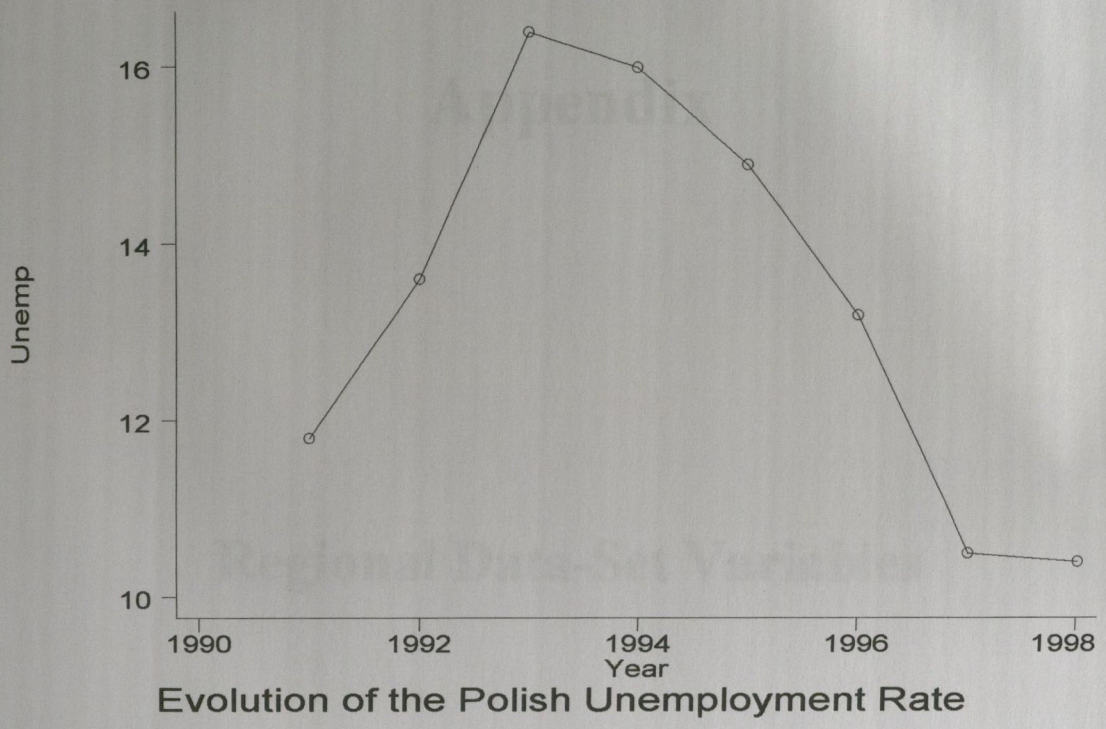
Monthly Wage and Job Destruction rate 1993

Figure 3.21



Monthly Wage and Job Destruction rate 1992

Figure 5.1



Evolution of the Polish Unemployment Rate

Appendix

Regional Data-Set Variables

Polish Wage Curve Data

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Warszawskie	1	2086.5	1	1859.6	4.2	1	3.319	3.269	0.623							
Bialskopodlaskie	2	1560.2	1	1386.7	9.6	46	3.193	3.142	0.982							
Bialostockie	3	1647.2	1	1538.9	12.2	26	3.217	3.187	1.086							
Bielskie	4	1613.2	1	1587.5	8.2	14	3.208	3.201	0.914							
Bydgoskie	5	1676.9	1	1625.7	14.6	11	3.225	3.211	1.164							
Chelmskie	6	1586.2	1	1423.9	9.2	32	3.200	3.153	0.964							
Ciechanowskie	7	1606.3	1	1542.1	17	41	3.206	3.188	1.230							
Czestochowskie	8	1658.8	1	1634.6	12.4	25	3.220	3.213	1.093							
Elblaskie	9	1750.7	1	1752.8	16.4	19	3.243	3.244	1.215							
Gdanskie	10	1877.3	1	1886.8	11.5	7	3.274	3.276	1.061							
Gorzowskie	11	1630.1	1	1504.5	16.4	20	3.212	3.177	1.215							
Jeleniogorskie	12	1705.4	1	1723.2	16.8	15	3.232	3.236	1.225							
Kaliskie	13	1545.7	1	1467.2	13.3	29	3.189	3.166	1.124							
Katowickie	14	2167.3	1	2494.4	6.6	8	3.336	3.397	0.820							
Kieleckie	15	1604.9	1	1554	12.2	33	3.205	3.191	1.086							
Koninskie	16	1790.3	1	1979	13.1	36	3.253	3.296	1.117							
Koszalinskie	17	1688.5	1	1579.5	17.9	13	3.228	3.199	1.253							
Krakowskie	18	1761.6	1	1770.2	6.2	5	3.246	3.248	0.792							
Krosnienskie	19	1614.8	1	1601.1	13.4	43	3.208	3.204	1.127							
Legnickie	20	1941.7	1	2232.8	13.9	10	3.288	3.349	1.143							
Leszcynskie	21	1582	1	1419.7	11.2	23	3.199	3.152	1.049							
Lubelskie	22	1677.9	1	1646.2	10.9	21	3.225	3.216	1.037							
Loinzynskie	23	1575.7	1	1459.3	14.6	48	3.197	3.164	1.164							
Lodzkie	24	1704.4	1	1623.4	15.4	6	3.232	3.210	1.188							
Nowosadeckie	25	1539	1	1450.6	10.7	38	3.187	3.162	1.029							
Olsztnskie	26	1690.1	1	1629.7	18.2	16	3.228	3.212	1.260							
Opolskie	27	1704.1	1	1703.4	8.8	12	3.231	3.231	0.944							
Ostroleckie	28	1688.3	1	1814.1	16.8	42	3.227	3.259	1.225							
Pilskie	29	1626.2	1	1517	15.5	24	3.211	3.181	1.190							
Piotrkowskie	30	1679.5	1	1717.1	15.8	31	3.225	3.235	1.199							
Plockie	31	1807.7	1	1990.2	15.9	27	3.257	3.299	1.201							
Poznanskie	32	1771.6	1	1707.8	5.6	3	3.248	3.232	0.748							
Przemyskie	33	1543.9	1	1506.3	13.3	45	3.189	3.178	1.124							
Radomskie	34	1586.6	1	1539.5	12.3	34	3.200	3.187	1.090							
Rzeszowskie	35	1533.8	1	1409.5	13.2	30	3.186	3.149	1.121							
Siedleckie	36	1609.6	1	1574.4	9.7	47	3.207	3.197	0.987							
Sieradzkie	37	1564	1	1432,5	11.5	44	3.194	3.156	1.061							
Skierniewickie	38	1596.8	1	1508	10.7	37	3.203	3.178	1.029							
Slupskie	39	1653.7	1	1549.2	17.8	18	3.218	3.190	1.250							
Suwalskie	40	1629.8	1	1519.2	18.6	28	3.212	3.182	1.270							
Szczecinskie	41	1826.1	1	1814	10	2	3.262	3.259	1.000							
Tarnobrzeskie	42	1658.4	1	1751.8	10.9	39	3.220	3.243	1.037							
Tarnowskie	43	1577.5	1	1606.5	10.2	35	3.198	3.206	1.009							

Polish Wage Curve Data

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Torunskie	44	1597.6	1	1528.5	15.4	22	3.203	3.184	1.188							
Walbrzyskie	45	1716	1	1786	17.1	17	3.235	3.252	1.233							
Wloclawskie	46	1590.6	1	1523.4	16.5	40	3.202	3.183	1.217							
Wroclawskie	47	1752.3	1	1691.8	7.7	4	3.244	3.228	0.886							
Zamojskie	48	1538.6	1	1516.3	11.2	49	3.187	3.181	1.049							
Zielonogorskie	49	1653.7	1	1577.2	12.8	9	3.218	3.198	1.107							
Warszawskie	1	3534.5	2	3129.9	5.9	1	3.548	3.496	0.771	3.54	0.549003	4.7	5.4	10.1	-0.6	9
Bialskopodlaskie	2	2505.8	2	2318.8	11.1	46	3.399	3.365	1.045	5.99	0.777427	5.8	1	6.8	4.8	1.8
Bialostockie	3	2661	2	2455.2	11.4	26	3.425	3.390	1.057	7.068	0.849297	2.5	3.4	5.9	-0.9	4.5
Bielskie	4	2670	2	2698.7	7.9	14	3.427	3.431	0.898	4.661	0.668479	2.9	4.5	7.4	-1.6	5.7
Bydgoskie	5	2642	2	2598.3	17.4	11	3.422	3.415	1.241	9.918	0.996424	2.6	3.2	5.8	-0.6	5.1
Chelmskie	6	2544.4	2	2419.2	10.2	32	3.406	3.384	1.009	6.528	0.81478	2.4	2.2	4.7	0.2	3.7
Ciechanowskie	7	2555.3	2	2375.7	19.8	41	3.407	3.376	1.297	10.692	1.029059	2	6.2	8.2	-4.2	3.1
Czestochowskie	8	2533.2	2	2396.1	13.9	25	3.404	3.380	1.143	8.618	0.935406	1.7	4.6	6.3	-2.9	3.4
Elblaskie	9	2738.3	2	2938.4	21.4	19	3.437	3.468	1.330	12.412	1.093842	4.3	6.5	10.8	-2.2	8.2
Gdanskie	10	3048.8	2	3103.5	14.7	7	3.484	3.492	1.167	9.408	0.973497	3.1	10.1	13.3	-7	6.3
Gorzowskie	11	2601.5	2	2400.8	18.7	20	3.415	3.380	1.272	10.285	1.012204	5.9	3.8	9.7	2	4
Jeleniogorskie	12	2725.8	2	2783.8	17.4	15	3.435	3.445	1.241	10.788	1.032941	2.3	2.2	4.5	0.1	2.2
Kaliskie	13	2496.5	2	2438.1	14.4	29	3.397	3.387	1.158	7.488	0.874366	3.7	3.4	7.1	0.4	4
Katowickie	14	3530.2	2	4065.6	8.6	8	3.548	3.609	0.934	5.16	0.71265	1.6	5.6	7.2	-4	3.2
Kieleckie	15	2571.9	2	2497.9	14.1	33	3.410	3.398	1.149	8.46	0.92737	3.4	5.6	9	-2.1	6.7
Koninskie	16	2929.6	2	3305.9	15.5	36	3.467	3.519	1.190	7.905	0.897902	1.1	3.3	4.4	-2.2	1.6
Koszalinskie	17	2639.6	2	2475.5	24.1	13	3.422	3.394	1.382	13.255	1.12238	2.2	5.7	7.9	-3.4	4.1
Krakowskie	18	2843.3	2	2864.1	8.9	5	3.454	3.457	0.949	6.408	0.806723	3.2	5.5	8.7	-2.3	4.7
Krosnienskie	19	2586.7	2	2558.3	14.9	43	3.413	3.408	1.173	7.45	0.872156	4.5	5.6	10.2	-1.1	3.3
Legnickie	20	3025.9	2	3520.6	17	10	3.481	3.547	1.230	10.13	1.005609	2.1	5.3	7.5	-3.2	4.2
Leszcynskie	21	2535.4	2	2495.3	12.3	23	3.404	3.397	1.090	7.995	0.902818	4	1.9	5.9	2.1	3.7
Lubelskie	22	2727.5	2	2691.6	11.4	21	3.436	3.430	1.057	6.156	0.789299	5.7	5.7	11.5	-0.1	5.8
Loinzynskie	23	2511.7	2	2354	15.4	48	3.400	3.372	1.188	9.086	0.958373	1.8	6.5	8.3	-4.7	1.9
Lodzkie	24	2749.2	2	2548.6	16.4	6	3.439	3.406	1.215	8.692	0.93912	2.2	4.8	7	-2.6	4.3
Nowosadeckie	25	2446.5	2	2276.5	13.5	38	3.389	3.357	1.130	7.83	0.893762	2.7	9.2	11.8	-6.5	5.3
Olsztnskie	26	2709.8	2	2663.8	23.6	16	3.433	3.426	1.373	11.8	1.071882	5.1	2.8	7.9	2.2	4.3
Opolskie	27	2745.2	2	2717.8	12.1	12	3.439	3.434	1.083	7.381	0.868115	3.2	5.3	8.5	-2.1	5.2
Ostroleckie	28	2760.7	2	3068.4	15.3	42	3.441	3.487	1.185	7.65	0.883661	11.5	0.7	12.2	10.7	1.5
Pilskie	29	2573.9	2	2345.6	19.7	24	3.411	3.370	1.294	10.244	1.01047	13	6.6	19.6	6.4	2.9
Piotrkowskie	30	2784.6	2	2932.9	17.3	31	3.445	3.467	1.238	9.169	0.962322	1.6	3.1	4.8	-1.5	2.4
Plockie	31	2891.1	2	3153.7	18.5	27	3.461	3.499	1.267	9.065	0.957368	2.2	3.8	6	-1.5	4.4
Poznanskie	32	2854.9	2	2766.6	7.9	3	3.456	3.442	0.898	5.293	0.723702	3.8	7.2	10.7	-3.4	6.8
Przemyskie	33	2451.9	2	2331.8	15.1	45	3.390	3.368	1.179	8.758	0.942405	5.5	3.3	8.8	2.2	4.4
Radomskie	34	2522.3	2	2413.3	14.1	34	3.402	3.383	1.149	7.755	0.889582	4.1	4.7	8.8	-0.6	5.1
Rzeszowskie	35	2466.3	2	2356.1	15.4	30	3.392	3.372	1.188	8.008	0.903524	6.2	4.1	10.4	2.1	4.4
Siedleckie	36	2615.5	2	2539	12.4	47	3.418	3.405	1.093	5.58	0.746634	2.5	3.6	6.1	-1	3.4
Sieradzkie	37	2498.5	2	2329.6	13.3	44	3.398	3.367	1.124	7.714	0.88728	1.6	2.6	4.2	-1	1.1

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Skierniewickie	38	2567.6	2	2426.1	11.5	37	3.410	3.385	1.061	5.98	0.776701	2.1	9.6	11.8	-7.5	4
Slupskie	39	2576.4	2	2287.8	23.2	18	3.411	3.359	1.365	13.436	1.12827	1.8	5	6.9	-3.2	3.7
Suwalskie	40	2602.6	2	2404.7	23.7	28	3.415	3.381	1.375	13.746	1.138176	6.6	0.7	7.3	5.9	1.4
Szczecinskie	41	2981	2	3059.6	11.6	2	3.474	3.486	1.064	7.308	0.863799	4.5	4.2	8.7	0.3	6.6
Tarnobrzeskie	42	2664.7	2	2852	12.2	39	3.426	3.455	1.086	6.466	0.810636	1.5	5.2	6.8	-3.7	1.9
Tarnowskie	43	2558.5	2	2695.4	13.5	35	3.408	3.431	1.130	8.235	0.915664	1.2	3.4	4.6	-2.1	2.3
Torunskie	44	2540	2	2472.5	18.2	22	3.405	3.393	1.260	10.738	1.030923	2.9	7.6	10.5	-4.6	5.9
Walbrzyskie	45	2717.8	2	2821.8	21	17	3.434	3.451	1.322	11.13	1.046495	1.3	6.3	7.6	-5	2.6
Wloclawskie	46	2486.8	2	2367.2	19.7	40	3.396	3.374	1.294	9.85	0.993436	1.4	3.1	4.5	-1.7	2.3
Wroclawskie	47	2846.2	2	2763.2	10.1	4	3.454	3.441	1.004	6.161	0.789651	4.7	5.1	9.9	-0.4	8.6
Zamojskie	48	2430.1	2	2350.5	11.4	49	3.386	3.371	1.057	6.498	0.81278	2	4.2	6.2	-2.2	2.9
Zielonogorskie	49	2682.5	2	2578.3	14.1	9	3.429	3.411	1.149	8.742	0.941611	3.3	8.1	11.4	-4.8	4.4
Warszawskie	1	4834.9	3	4605.8	7.6	1	3.684	3.663	0.881	4.56	0.658965	4.7	5.4	10.1	-0.6	9
Bialskopodlaskie	2	3395.7	3	3165.4	14	46	3.531	3.500	1.146	7.56	0.878522	5.8	1	6.8	4.8	1.8
Bialostockie	3	3562.3	3	3390.1	14.2	26	3.552	3.530	1.152	8.804	0.94468	2.5	3.4	5.9	-0.9	4.5
Bielskie	4	3620.5	3	3807.4	11.1	14	3.559	3.581	1.045	6.549	0.816175	2.9	4.5	7.4	-1.6	5.7
Bydgoskie	5	3665.3	3	3681.6	20.4	11	3.564	3.566	1.310	11.62	1.065206	2.6	3.2	5.8	-0.6	5.1
Chelmskie	6	3343.4	3	3090.4	14.2	32	3.524	3.490	1.152	9.088	0.958468	2.4	2.2	4.7	0.2	3.7
Ciechanowskie	7	3340.1	3	3070.7	23.4	41	3.524	3.487	1.369	12.636	1.10161	2	6.2	8.2	-4.2	3.1
Czestochowskie	8	3326.3	3	3133.4	15.1	25	3.522	3.496	1.179	8.909	0.949829	1.7	4.6	6.3	-2.9	3.4
Elblaskie	9	3680.8	3	4220.9	27.3	19	3.566	3.625	1.436	15.834	1.199591	4.3	6.5	10.8	-2.2	8.2
Gdanskie	10	3958.7	3	4053	15.5	7	3.598	3.608	1.190	9.92	0.996512	3.1	10.1	13.3	-7	6.3
Gorzowskie	11	3437.8	3	3261.5	22.8	20	3.536	3.513	1.358	12.084	1.082211	5.9	3.8	9.7	2	4
Jeleniogorskie	12	3742.3	3	4055.7	20.3	15	3.573	3.608	1.307	12.586	1.099888	2.3	2.2	4.5	0.1	2.2
Kaliskie	13	3320.8	3	3316.6	17	29	3.521	3.521	1.230	8.84	0.946452	3.7	3.4	7.1	0.4	4
Katowickie	14	4709.1	3	5681.1	10.1	8	3.673	3.754	1.004	6.06	0.782473	1.6	5.6	7.2	-4	3.2
Kieleckie	15	3406.4	3	3328	17.6	33	3.532	3.522	1.246	10.56	1.023664	3.4	5.6	9	-2.1	6.7
Koninskie	16	4071.4	3	4935.7	19.5	36	3.610	3.693	1.290	9.94	0.997386	1.1	3.3	4.4	-2.2	1.6
Koszalinskie	17	3412	3	3318	28.9	13	3.533	3.521	1.461	15.895	1.201261	2.2	5.7	7.9	-3.4	4.1
Krakowskie	18	3786.4	3	4080.3	7.7	5	3.578	3.611	0.886	5.621	0.749814	3.2	5.5	8.7	-2.3	4.7
Krosnienskie	19	3327.8	3	3401.3	16.9	43	3.522	3.532	1.228	8.619	0.935457	4.5	5.6	10.2	-1.1	3.3
Legnickie	20	4323.2	3	5246.8	19.1	10	3.636	3.720	1.281	11.269	1.051885	2.1	5.3	7.5	-3.2	4.2
Leszcynskie	21	3301	3	3257	14.5	23	3.519	3.513	1.161	9.425	0.974281	4	1.9	5.9	2.1	3.7
Lubelskie	22	3627.1	3	3730.4	14.2	21	3.560	3.572	1.152	7.668	0.884682	5.7	5.7	11.5	-0.1	5.8
Loinzynskie	23	3364	3	3206.8	18.6	48	3.527	3.506	1.270	11.16	1.047664	1.8	6.5	8.3	-4.7	1.9
Lodzkie	24	3598.9	3	3427.3	18.9	6	3.556	3.535	1.276	10.017	1.000738	2.2	4.8	7	-2.6	4.3
Nowosadeckie	25	3181.9	3	2977.6	13.4	38	3.503	3.474	1.127	7.772	0.890533	2.7	9.2	11.8	-6.5	5.3
Olsztnskie	26	3601.9	3	3619.6	30.1	16	3.557	3.559	1.479	15.05	1.177536	5.1	2.8	7.9	2.2	4.3
Opolskie	27	3651	3	3723.7	14.4	12	3.562	3.571	1.158	8.784	0.943692	3.2	5.3	8.5	-2.1	5.2
Ostroleckie	28	3618.9	3	4076.8	20.8	42	3.559	3.610	1.318	10.4	1.017033	11.5	0.7	12.2	10.7	1.5
Pilskie	29	3340.5	3	3142.1	25.1	24	3.524	3.497	1.400	13.052	1.115677	13	6.6	19.6	6.4	2.9
Piotrkowskie	30	3827.3	3	4319.6	19.6	31	3.583	3.635	1.292	10.388	1.016532	1.6	3.1	4.8	-1.5	2.4
Plockie	31	4012.5	3	4600.1	22.5	27	3.603	3.663	1.352	11.025	1.042379	2.2	3.8	6	-1.5	4.4

Polish Wage Curve Data

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Poznanskie	32	3800	3	3855.5	9	3	3.580	3.586	0.954	6.03	0.780317	3.8	7.2	10.7	-3.4	6.8
Przemyskie	33	3335.8	3	3279.7	18.4	45	3.523	3.516	1.265	10.672	1.028246	5.5	3.3	8.8	2.2	4.4
Radomskie	34	3312.8	3	3259.9	20.6	34	3.520	3.513	1.314	11.33	1.05423	4.1	4.7	8.8	-0.6	5.1
Rzeszowskie	35	3391.7	3	3449.4	17.9	30	3.530	3.538	1.253	9.308	0.968856	6.2	4.1	10.4	2.1	4.4
Siedleckie	36	3455.5	3	3406.9	16.7	47	3.539	3.532	1.223	7.515	0.875929	2.5	3.6	6.1	-1	3.4
Sieradzkie	37	3302.5	3	3012.4	15.9	44	3.519	3.479	1.201	9.222	0.964825	1.6	2.6	4.2	-1	1.1
Skierniewickie	38	3329.8	3	3084.7	15.7	37	3.522	3.489	1.196	8.164	0.911903	2.1	9.6	11.8	-7.5	4
Slupskie	39	3279.2	3	3011.4	29.7	18	3.516	3.479	1.473	17.226	1.236184	1.8	5	6.9	-3.2	3.7
Suwalskie	40	3390.6	3	3179.4	30.3	28	3.530	3.502	1.481	17.574	1.244871	6.6	0.7	7.3	5.9	1.4
Szczecinskie	41	4031.6	3	4397.8	14.5	2	3.605	3.643	1.161	9.135	0.960709	4.5	4.2	8.7	0.3	6.6
Tarnobrzeskie	42	3567.6	3	3872.7	14.3	39	3.552	3.588	1.155	7.579	0.879612	1.5	5.2	6.8	-3.7	1.9
Tarnowskie	43	3309.9	3	3508.9	14	35	3.520	3.545	1.146	8.54	0.931458	1.2	3.4	4.6	-2.1	2.3
Torunskie	44	3373.1	3	3362.1	22.9	22	3.528	3.527	1.360	13.511	1.130687	2.9	7.6	10.5	-4.6	5.9
Walbrzyskie	45	3606.7	3	3793.2	26.1	17	3.557	3.579	1.417	13.833	1.140916	1.3	6.3	7.6	-5	2.6
Wloclawskie	46	3314.9	3	3326.8	22.1	40	3.520	3.522	1.344	11.05	1.043362	1.4	3.1	4.5	-1.7	2.3
Wroclawskie	47	3752.3	3	3730.1	13.2	4	3.574	3.572	1.121	8.052	0.905904	4.7	5.1	9.9	-0.4	8.6
Zamojskie	48	3232.6	3	3208.3	14.7	49	3.510	3.506	1.167	8.379	0.923192	2	4.2	6.2	-2.2	2.9
Zielonogorskie	49	3432.2	3	3327.6	18.9	9	3.536	3.522	1.276	11.718	1.068853	3.3	8.1	11.4	-4.8	4.4
Warszawskie	1	657.31	4	634.72	6.5	1	2.818	2.803	0.813	3.9	0.587637	4.7	5.4	10.1	-0.6	9
Bialskopodlaskie	2	449.4	4	443.62	14.1	46	2.653	2.647	1.149	7.7	0.888293	5.8	1	6.8	4.8	1.8
Bialostockie	3	476.63	4	488.36	14.8	26	2.678	2.689	1.170	9.4	0.972559	2.5	3.4	5.9	-0.9	4.5
Bielskie	4	488.5	4	532.89	12	14	2.689	2.727	1.079	7.1	0.85123	2.9	4.5	7.4	-1.6	5.7
Bydgoskie	5	481.72	4	513.71	19.9	11	2.683	2.711	1.299	11.0	1.04006	2.6	3.2	5.8	-0.6	5.1
Chelmskie	6	441.48	4	425.55	16	32	2.645	2.629	1.204	10.4	1.018697	2.4	2.2	4.7	0.2	3.7
Ciechanowskie	7	433.23	4	400.21	21.3	41	2.637	2.602	1.328	11.2	1.050484	2	6.2	8.2	-4.2	3.1
Czestochowskie	8	437.15	4	434.6	14	25	2.641	2.638	1.146	8.6	0.935581	1.7	4.6	6.3	-2.9	3.4
Elblaskie	9	477.54	4	554.75	27.3	19	2.679	2.744	1.436	14.6	1.163034	4.3	6.5	10.8	-2.2	8.2
Gdanskie	10	522.48	4	553.84	14.6	7	2.718	2.743	1.164	9.0	0.954737	3.1	10.1	13.3	-7	6.3
Gorzowskie	11	456.71	4	458.6	22.4	20	2.660	2.661	1.350	12.5	1.097987	5.9	3.8	9.7	2	4
Jeleniogorskie	12	513.31	4	582	19.4	15	2.710	2.765	1.288	12.0	1.077526	2.3	2.2	4.5	0.1	2.2
Kaliskie	13	440.66	4	455.19	17.5	29	2.644	2.658	1.243	9.1	0.960788	3.7	3.4	7.1	0.4	4
Katowickie	14	663.65	4	828.63	10.4	8	2.822	2.918	1.017	6.1	0.786227	1.6	5.6	7.2	-4	3.2
Kieleckie	15	458.91	4	475.35	17.8	33	2.662	2.677	1.250	10.1	1.003421	3.4	5.6	9	-2.1	6.7
Koninskie	16	565.2	4	720.69	19.8	36	2.752	2.858	1.297	9.8	0.992401	1.1	3.3	4.4	-2.2	1.6
Koszalinskie	17	451.8	4	459.34	29.2	13	2.655	2.662	1.465	15.5	1.191201	2.2	5.7	7.9	-3.4	4.1
Krakowskie	18	509.08	4	574.04	8.4	5	2.707	2.759	0.924	6.2	0.792858	3.2	5.5	8.7	-2.3	4.7
Krosnienskie	19	448.45	4	467.23	17.2	43	2.652	2.670	1.236	9.0	0.956404	4.5	5.6	10.2	-1.1	3.3
Legnickie	20	606.83	4	780.69	19.7	10	2.783	2.892	1.294	11.3	1.054007	2.1	5.3	7.5	-3.2	4.2
Leszcynskie	21	428.23	4	434.77	14.5	23	2.632	2.638	1.161	9.3	0.968408	4	1.9	5.9	2.1	3.7
Lubelskie	22	493.77	4	527.78	14.7	21	2.694	2.722	1.167	7.8	0.88951	5.7	5.7	11.5	-0.1	5.8
Loinzynskie	23	441.31	4	447.45	15.8	48	2.645	2.651	1.199	9.6	0.982368	1.8	6.5	8.3	-4.7	1.9
Lodzkie	24	478.71	4	474.97	19.5	6	2.680	2.677	1.290	10.4	1.018668	2.2	4.8	7	-2.6	4.3
Nowosadeckie	25	425.37	4	401.7	15.5	38	2.629	2.604	1.190	8.6	0.934802	2.7	9.2	11.8	-6.5	5.3

Polish Wage Curve Data

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Olsztnskie	26	472.74	4	484.56	27.2	16	2.675	2.685	1.435	12.9	1.111277	5.1	2.8	7.9	2.2	4.3
Opolskie	27	486.89	4	517.07	14.7	12	2.687	2.714	1.167	9.1	0.959983	3.2	5.3	8.5	-2.1	5.2
Ostroleckie	28	482.05	4	548.7	19.7	42	2.683	2.739	1.294	9.5	0.978101	11.5	0.7	12.2	10.7	1.5
Pilskie	29	443.43	4	424.67	23.3	24	2.647	2.628	1.367	11.8	1.07055	13	6.6	19.6	6.4	2.9
Piotrkowskie	30	531.49	4	643.07	19.4	31	2.725	2.808	1.288	10.1	1.002396	1.6	3.1	4.8	-1.5	2.4
Plockie	31	534.55	4	628.82	19.5	27	2.728	2.799	1.290	9.1	0.95871	2.2	3.8	6	-1.5	4.4
Poznanskie	32	503.24	4	520.04	8.4	3	2.702	2.716	0.924	5.6	0.74628	3.8	7.2	10.7	-3.4	6.8
Przemyskie	33	440.37	4	472.67	17.3	45	2.644	2.675	1.238	9.5	0.979504	5.5	3.3	8.8	2.2	4.4
Radomskie	34	446.64	4	457.07	17.6	34	2.650	2.660	1.246	9.5	0.979252	4.1	4.7	8.8	-0.6	5.1
Rzeszowskie	35	465.91	4	504.47	17.8	30	2.668	2.703	1.250	8.8	0.945942	6.2	4.1	10.4	2.1	4.4
Siedleckie	36	454.01	4	462.87	16.7	47	2.657	2.665	1.223	6.4	0.807914	2.5	3.6	6.1	-1	3.4
Sieradzkie	37	441.68	4	424.46	15	44	2.645	2.628	1.176	8.4	0.924307	1.6	2.6	4.2	-1	1.1
Skierniewickie	38	438.85	4	416.11	13.8	37	2.642	2.619	1.140	7.5	0.875669	2.1	9.6	11.8	-7.5	4
Slupskie	39	432.12	4	418.44	29.8	18	2.636	2.622	1.474	16.9	1.228584	1.8	5	6.9	-3.2	3.7
Suwalskie	40	436.4	4	427	28.5	28	2.640	2.630	1.455	15.5	1.189206	6.6	0.7	7.3	5.9	1.4
Szczecinskie	41	538.93	4	620.79	13.9	2	2.732	2.793	1.143	8.8	0.943482	4.5	4.2	8.7	0.3	6.6
Tarnobrzeskie	42	487.16	4	546.67	15.2	39	2.688	2.738	1.182	7.8	0.88937	1.5	5.2	6.8	-3.7	1.9
Tarnowskie	43	443.43	4	486.31	13.9	35	2.647	2.687	1.143	8.2	0.912524	1.2	3.4	4.6	-2.1	2.3
Torunskie	44	451.93	4	473.15	21.9	22	2.655	2.675	1.340	12.3	1.091148	2.9	7.6	10.5	-4.6	5.9
Walbrzyskie	45	480.56	4	520.96	27.1	17	2.682	2.717	1.433	14.3	1.155604	1.3	6.3	7.6	-5	2.6
Wloclawskie	46	444.43	4	471.63	23.1	40	2.648	2.674	1.364	11.8	1.070247	1.4	3.1	4.5	-1.7	2.3
Wroclawskie	47	500.61	4	517.26	13	4	2.699	2.714	1.114	7.9	0.895243	4.7	5.1	9.9	-0.4	8.6
Zamojskie	48	425.09	4	430.6	14.2	49	2.628	2.634	1.152	8.1	0.906242	2	4.2	6.2	-2.2	2.9
Zielonogorskie	49	450.12	4	442.39	18.2	9	2.653	2.646	1.260	11.0	1.040539	3.3	8.1	11.4	-4.8	4.4
Warszawskie	1	876.71	5	844.56	5.4	1	2.943	2.927	0.732	3.7	0.572775	4.7	5.4	10.1	-0.6	9
Bialskopodlaskie	2	585.95	5	552.97	13.6	46	2.768	2.743	1.134	8.2	0.913284	5.8	1	6.8	4.8	1.8
Bialostockie	3	627.62	5	630.07	13.8	26	2.798	2.799	1.140	9.2	0.963385	2.5	3.4	5.9	-0.9	4.5
Bielskie	4	645.72	5	702.12	10.9	14	2.810	2.846	1.037	7.5	0.874306	2.9	4.5	7.4	-1.6	5.7
Bydgoskie	5	634.39	5	682.67	18	11	2.802	2.834	1.255	11.4	1.058272	2.6	3.2	5.8	-0.6	5.1
Chelmskie	6	593.47	5	582.38	16.1	32	2.773	2.765	1.207	10.2	1.007192	2.4	2.2	4.7	0.2	3.7
Ciechanowskie	7	566.27	5	505.33	21.8	41	2.753	2.704	1.338	12.8	1.106815	2	6.2	8.2	-4.2	3.1
Czestochowskie	8	585.26	5	590.99	13.5	25	2.767	2.772	1.130	9.3	0.970435	1.7	4.6	6.3	-2.9	3.4
Elblaskie	9	623.43	5	723.33	25.6	19	2.795	2.859	1.408	15.8	1.199169	4.3	6.5	10.8	-2.2	8.2
Gdanskie	10	692.43	5	739.73	13.1	7	2.840	2.869	1.117	8.6	0.933007	3.1	10.1	13.3	-7	6.3
Gorzowskie	11	606.16	5	606.36	19.8	20	2.783	2.783	1.297	13.2	1.11944	5.9	3.8	9.7	2	4
Jeleniogorskie	12	678.36	5	765.93	19.6	15	2.831	2.884	1.292	12.1	1.084058	2.3	2.2	4.5	0.1	2.2
Kaliskie	13	576.96	5	583.32	16.1	29	2.761	2.766	1.207	9.7	0.986167	3.7	3.4	7.1	0.4	4
Katowickie	14	859.57	5	1066.35	9.1	8	2.934	3.028	0.959	6.1	0.783308	1.6	5.6	7.2	-4	3.2
Kieleckie	15	606.46	5	644.37	17.3	33	2.783	2.809	1.238	11.3	1.053979	3.4	5.6	9	-2.1	6.7
Koninskie	16	724.37	5	907.14	18.1	36	2.860	2.958	1.258	10.5	1.021769	1.1	3.3	4.4	-2.2	1.6
Koszalinskie	17	600.28	5	592.97	26.8	13	2.778	2.773	1.428	17.4	1.240411	2.2	5.7	7.9	-3.4	4.1
Krakowskie	18	668.5	5	767	8	5	2.825	2.885	0.903	5.9	0.774029	3.2	5.5	8.7	-2.3	4.7
Krosnienskie	19	594.53	5	624.1	17	43	2.774	2.795	1.230	10.1	1.002483	4.5	5.6	10.2	-1.1	3.3

Polish Wage Curve Data

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Legnickie	20	816.22	5	1069.65	19.1	10	2.912	3.029	1.281	12.0	1.078522	2.1	5.3	7.5	-3.2	4.2
Leszcynskie	21	570.43	5	583.11	14.1	23	2.756	2.766	1.149	9.4	0.975075	4	1.9	5.9	2.1	3.7
Lubelskie	22	646.57	5	700.54	13.4	21	2.811	2.845	1.127	8.2	0.914963	5.7	5.7	11.5	-0.1	5.8
Loinzynskie	23	588.1	5	591.05	15.3	48	2.769	2.772	1.185	10.1	1.005123	1.8	6.5	8.3	-4.7	1.9
Lodzkie	24	630.9	5	608.81	18.1	6	2.800	2.784	1.258	10.7	1.027516	2.2	4.8	7	-2.6	4.3
Nowosadeckie	25	552.55	5	523.71	14.6	38	2.742	2.719	1.164	9.0	0.95274	2.7	9.2	11.8	-6.5	5.3
Olsztnskie	26	617.83	5	633.13	26	16	2.791	2.801	1.415	14.3	1.156088	5.1	2.8	7.9	2.2	4.3
Opolskie	27	650.38	5	710.83	13.6	12	2.813	2.852	1.134	8.9	0.949912	3.2	5.3	8.5	-2.1	5.2
Ostroleckie	28	645.36	5	752.35	19	42	2.810	2.876	1.279	10.4	1.019077	11.5	0.7	12.2	10.7	1.5
Pilskie	29	379.3	5	561.35	20.6	24	2.579	2.749	1.314	13.8	1.138871	13	6.6	19.6	6.4	2.9
Piotrkowskie	30	676.13	5	790.12	18.4	31	2.830	2.898	1.265	10.7	1.029286	1.6	3.1	4.8	-1.5	2.4
Plockie	31	720.59	5	829.41	18.2	27	2.858	2.919	1.260	10.5	1.020105	2.2	3.8	6	-1.5	4.4
Poznanskie	32	668.64	5	675.53	7.7	3	2.825	2.830	0.886	5.5	0.743278	3.8	7.2	10.7	-3.4	6.8
Przemyskie	33	583.31	5	592.48	16.4	45	2.766	2.773	1.215	9.9	0.996789	5.5	3.3	8.8	2.2	4.4
Radomskie	34	588.76	5	598.45	18.2	34	2.770	2.777	1.260	11.4	1.058533	4.1	4.7	8.8	-0.6	5.1
Rzeszowskie	35	618.08	5	663.98	16.9	30	2.791	2.822	1.228	9.7	0.988027	6.2	4.1	10.4	2.1	4.4
Siedleckie	36	592.16	5	588.61	12.9	47	2.772	2.770	1.111	7.8	0.891888	2.5	3.6	6.1	-1	3.4
Sieradzkie	37	572.57	5	544.31	15.2	44	2.758	2.736	1.182	9.1	0.956821	1.6	2.6	4.2	-1	1.1
Skierniewickie	38	594.42	5	550.66	13.3	37	2.774	2.741	1.124	7.8	0.892625	2.1	9.6	11.8	-7.5	4
Slupskie	39	571.95	5	548.03	28.4	18	2.757	2.739	1.453	18.5	1.266182	1.8	5	6.9	-3.2	3.7
Suwalskie	40	579.12	5	567.84	27.3	28	2.763	2.754	1.436	16.4	1.215357	6.6	0.7	7.3	5.9	1.4
Szczecinskie	41	709.84	5	808.57	14.2	2	2.851	2.908	1.152	9.5	0.979967	4.5	4.2	8.7	0.3	6.6
Tarnobrzeskie	42	637.73	5	717.03	14.8	39	2.805	2.856	1.170	8.4	0.925226	1.5	5.2	6.8	-3.7	1.9
Tarnowskie	43	609.79	5	688.89	14	35	2.785	2.838	1.146	9.0	0.952799	1.2	3.4	4.6	-2.1	2.3
Torunskie	44	604.16	5	620.02	20.5	22	2.781	2.792	1.312	13.0	1.114705	2.9	7.6	10.5	-4.6	5.9
Walbrzyskie	45	616.3	5	653.3	25.1	17	2.790	2.815	1.400	13.2	1.118938	1.3	6.3	7.6	-5	2.6
Wloclawskie	46	586.42	5	613.26	22.6	40	2.768	2.788	1.354	12.7	1.103278	1.4	3.1	4.5	-1.7	2.3
Wroclawskie	47	658.93	5	676.2	11.3	4	2.819	2.830	1.053	7.4	0.870789	4.7	5.1	9.9	-0.4	8.6
Zamojskie	48	566.77	5	565.14	14.8	49	2.753	2.752	1.170	8.5	0.927734	2	4.2	6.2	-2.2	2.9
Zielonogorskie	49	597.49	5	585.8	17.1	9	2.776	2.768	1.233	11.8	1.070788	3.3	8.1	11.4	-4.8	4.4
Warszawskie	1	1130.61	6	1093.26	4.1	1	3.053	3.039	0.613	2.7	0.434706	4.7	5.4	10.1	-0.6	9
Bialskopodlaskie	2	737.74	6	671.35	11.9	46	2.868	2.827	1.076	6.9	0.839486	5.8	1	6.8	4.8	1.8
Bialostockie	3	783.76	6	792.47	11.7	26	2.894	2.899	1.068	7.3	0.865893	2.5	3.4	5.9	-0.9	4.5
Bielskie	4	808.03	6	883.44	9.6	14	2.907	2.946	0.982	6.2	0.795106	2.9	4.5	7.4	-1.6	5.7
Bydgoskie	5	799.85	6	853.88	16.7	11	2.903	2.931	1.223	9.9	0.997031	2.6	3.2	5.8	-0.6	5.1
Chelmskie	6	747.59	6	750.61	13.1	32	2.874	2.875	1.117	8.4	0.92193	2.4	2.2	4.7	0.2	3.7
Ciechanowskie	7	713.42	6	655.73	19	41	2.853	2.817	1.279	11.3	1.052449	2	6.2	8.2	-4.2	3.1
Czestochowskie	8	741.11	6	754.2	12.1	25	2.870	2.877	1.083	7.9	0.900179	1.7	4.6	6.3	-2.9	3.4
Elblaskie	9	801.99	6	955.13	23.4	19	2.904	2.980	1.369	14.0	1.147455	4.3	6.5	10.8	-2.2	8.2
Gdanskie	10	872.68	6	920.43	10.6	7	2.941	2.964	1.025	6.6	0.816691	3.1	10.1	13.3	-7	6.3
Gorzowskie	11	756.74	6	746.47	17	20	2.879	2.873	1.230	11.0	1.04195	5.9	3.8	9.7	2	4
Jeleniogorskie	12	827.25	6	935.44	18.2	15	2.918	2.971	1.260	11.1	1.045199	2.3	2.2	4.5	0.1	2.2
Kaliskie	13	732.74	6	741.17	14.9	29	2.865	2.870	1.173	8.6	0.934516	3.7	3.4	7.1	0.4	4

Viovod-Area	Viovod	AvM.WAGE	YEAR	Ind.Wage	UNErate	RANK	LOG WAGE	LOG Ind Wage	LOG AggreUne	STU rate	Log STU	pos	neg	gross	net	excess
Katowickie	14	1060.62	6	1318.97	8.4	8	3.026	3.120	0.924	5.3	0.721831	1.6	5.6	7.2	-4	3.2
Kieleckie	15	770.01	6	822.11	15.2	33	2.886	2.915	1.182	9.2	0.962061	3.4	5.6	9	-2.1	6.7
Koninskie	16	886.83	6	1090.51	17.3	36	2.948	3.038	1.238	9.5	0.979478	1.1	3.3	4.4	-2.2	1.6
Koszalinskie	17	746.11	6	758.26	24.7	13	2.873	2.880	1.393	15.8	1.197951	2.2	5.7	7.9	-3.4	4.1
Krakowskie	18	880.7	6	1010.63	6.1	5	2.945	3.005	0.785	4.5	0.651501	3.2	5.5	8.7	-2.3	4.7
Krosnienskie	19	746.55	6	770.04	14.9	43	2.873	2.887	1.173	9.3	0.967062	4.5	5.6	10.2	-1.1	3.3
Legnickie	20	1010.9	6	1301.08	16.9	10	3.005	3.114	1.228	10.5	1.023183	2.1	5.3	7.5	-3.2	4.2
Leszcynskie	21	723.67	6	735.25	12	23	2.860	2.866	1.079	8.1	0.910958	4	1.9	5.9	2.1	3.7
Lubelskie	22	839.06	6	926.76	11.7	21	2.924	2.967	1.068	6.8	0.83417	5.7	5.7	11.5	-0.1	5.8
Loinzynskie	23	750.75	6	788.15	14.3	48	2.875	2.897	1.155	8.7	0.938267	1.8	6.5	8.3	-4.7	1.9
Lodzkie	24	804.03	6	774.84	16.2	6	2.905	2.889	1.210	9.1	0.956879	2.2	4.8	7	-2.6	4.3
Nowosadeckie	25	699.23	6	673.11	12.8	38	2.845	2.828	1.107	7.8	0.88959	2.7	9.2	11.8	-6.5	5.3
Olsztnskie	26	775.28	6	772.82	23.6	16	2.889	2.888	1.373	12.8	1.106905	5.1	2.8	7.9	2.2	4.3
Opolskie	27	825.16	6	897.94	12.9	12	2.917	2.953	1.111	7.7	0.884468	3.2	5.3	8.5	-2.1	5.2
Ostroleckie	28	805.12	6	914.05	17	42	2.906	2.961	1.230	9.7	0.988149	11.5	0.7	12.2	10.7	1.5
Pilskie	29	745.29	6	730.61	17.4	24	2.872	2.864	1.241	12.1	1.084262	13	6.6	19.6	6.4	2.9
Piotrkowskie	30	834.12	6	971.36	16.8	31	2.921	2.987	1.225	9.6	0.981588	1.6	3.1	4.8	-1.5	2.4
Plockie	31	884.86	6	1037.33	16.6	27	2.947	3.016	1.220	9.6	0.980717	2.2	3.8	6	-1.5	4.4
Poznanskie	32	873.44	6	881.33	6.2	3	2.941	2.945	0.792	4.2	0.618299	3.8	7.2	10.7	-3.4	6.8
Przemyskie	33	731.31	6	765.31	14.2	45	2.864	2.884	1.152	8.6	0.933088	5.5	3.3	8.8	2.2	4.4
Radomskie	34	745.89	6	752.15	17.2	34	2.873	2.876	1.236	9.8	0.992557	4.1	4.7	8.8	-0.6	5.1
Rzeszowskie	35	784.3	6	849.18	14.6	30	2.894	2.929	1.164	8.8	0.942673	6.2	4.1	10.4	2.1	4.4
Siedleckie	36	739.67	6	725.83	10.7	47	2.869	2.861	1.029	6.7	0.82372	2.5	3.6	6.1	-1	3.4
Sieradzkie	37	717.5	6	678.56	12.7	44	2.856	2.832	1.104	7.7	0.8889	1.6	2.6	4.2	-1	1.1
Skierniewickie	38	749.94	6	680.1	10.7	37	2.875	2.833	1.029	6.5	0.812579	2.1	9.6	11.8	-7.5	4
Slupskie	39	711.74	6	675.69	25.7	18	2.852	2.830	1.410	16.5	1.216423	1.8	5	6.9	-3.2	3.7
Suwalskie	40	732.59	6	714.08	24.6	28	2.865	2.854	1.391	15.2	1.182099	6.6	0.7	7.3	5.9	1.4
Szczecinskie	41	879.66	6	986.29	13.1	2	2.944	2.994	1.117	8.3	0.917535	4.5	4.2	8.7	0.3	6.6
Tarnobrzeskie	42	805.2	6	906.3	13.9	39	2.906	2.957	1.143	7.6	0.880493	1.5	5.2	6.8	-3.7	1.9
Tarnowskie	43	773.91	6	857.99	12.4	35	2.889	2.933	1.093	7.6	0.878847	1.2	3.4	4.6	-2.1	2.3
Torunskie	44	758.08	6	782.52	18.6	22	2.880	2.893	1.270	11.4	1.05849	2.9	7.6	10.5	-4.6	5.9
Walbrzyskie	45	778.23	6	818.61	21.7	17	2.891	2.913	1.336	11.6	1.063865	1.3	6.3	7.6	-5	2.6
Wloclawskie	46	748.72	6	778.8	21.5	40	2.874	2.891	1.332	11.2	1.051072	1.4	3.1	4.5	-1.7	2.3
Wroclawskie	47	843.88	6	863.35	9.8	4	2.926	2.936	0.991	5.9	0.770485	4.7	5.1	9.9	-0.4	8.6
Zamojskie	48	718.15	6	728	12.4	49	2.856	2.862	1.093	7.4	0.869895	2	4.2	6.2	-2.2	2.9
Zielonogorskie	49	742.41	6	722.75	15.3	9	2.871	2.859	1.185	10.0	1.000463	3.3	8.1	11.4	-4.8	4.4