To Study or to Work?
Education and labour market participation of Young People in Poland

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Francesco Pastore

Seconda Università di Napoli and IZA

E-mail: fpastore@unina.it

Abstract (Short)[#]. This paper proposes Heckprobit estimates of the determinants of labour market participation of a sample of young (15-30) people in Poland, controlling for the sample selection bias caused by excluding those in education. There is evidence of sample selection bias in the case of young men, suggesting that they obey more than women to economic factors in making their educational choices. Education is an important determinant of the success in the labour market. The instrumental variables used in the selection equation – the local unemployment rate, expected lifetime earnings and the opportunity cost of education – have a statistically significant impact on the probability to be in education. In contrast with several previous studies relative to mature market economies, in high unemployment voivodships young people prefer to seek a job, rather than studying. In turn, this contributes to make regional unemployment persistent.

JEL classification: C35, I2, J24, P3, P52
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Address for correspondence:
Francesco Pastore
Salita Tarsia 74
80135 – Napoli
Italy
Email: fpastore@unina.it

Abstract (Structured).

Purpose. This paper aims to contribute to the important issue of identifying subgroups of young people (15-30) with a high probability to leave school, therefore reducing their chance of finding gainful employment in the long run.

Methodology. The Heckprobit model is proposed to analyse the determinants of labour force participation, controlling for the sample selection bias caused by those who are in education.

Findings. Education is important to explain the success of young people in the Polish labour market. The evidence of sample selection bias in the case of men confirms the a priori expectation that they obey more than women to economic factors in making their educational choices. The instrumental variables used in the selection equation – the local unemployment rate, expected lifetime earnings and the opportunity cost of education – have a statistically significant impact on the probability to be in education. In contrast with several previous studies relative to mature market economies, high unemployment *voivodships* provide an incentive for job search, rather than education.

Research Implications. Overall, the analysis confirms that rural high unemployment areas contribute little to the increase in education attainment experienced recently in Poland. In turn, this concurs to make regional unemployment persistent.

Practical implications. This research provides a useful reference for similar studies in mature market economies as well as fodder for the debate on the Polish educational reform and the Lisbon strategy.

Originality/Value of the paper. This is the first study of the joint determinants of labour force participation and education in transition countries.

Type of paper. Research paper

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Introduction

Youth unemployment is a dramatic outcome of economic transition, becoming ever more worrisome with time passing. Most of the Central and Eastern European countries (CEECs), which became EU members in May 2004, experience a ratio of the youth to the adult unemployment rate higher than the EU average (1.9), approaching 3 in the case of Poland, the country this study focuses on. However, with few exceptions (Micklewright, 1999; Beleva et. al., 2001; O'Higgins, 2004; and Domadenik and Pastore, 2006), youth unemployment in transition countries has not received much attention in the literature.

Youth unemployment is worrisome, among other reasons, also because it contributes to make harder a dilemma that the Lisbon strategy defined by the Special EU Council of March 2000 aims to fight, by suggesting the importance for young people of investing in human capital accumulation for the future of Europe as "the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion". Young people in CEE have to face a trade-off between continuing to invest in their own education, therefore reducing the household's budget, on the one hand; and accessing immediately the labour market, therefore contributing to the household income, but reducing their own chance to find gainful employment in the future, on the other hand[1].

Contributing to the debate on the design of better educational and employment policy in transition countries is an important motivation of this research. More specifically, this paper aims to test how hard to face the aforementioned dilemma is for young people in Poland, the largest CEE country. The case of transition economies is interesting not only because of the high youth unemployment rate, but also because of the recent evolution of the market for human capital. This market has undergone tremendous tensions during the reform period. Several demand and supply side factors are at work. First, a rapid rate of technical change also adopted defensively to face the competition of productions imported from mature market economies has dramatically increased the demand for skilled labour.

From the supply side, two opposite phenomena are at work. On the one hand, the relatively high human capital endowment of the population, inherited from the previous regime, was not easy to adapt to the needs of the market economy, and was, therefore, partly "displaced" by the

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[1] Moreover, it is a key objective of the European Employment Strategy to provide to every young person a job or training opportunity before six months of an unemployment spell elapse.

emergence of market mechanisms and private initiative (see, for instance, Boeri, 2000; Ferragina and Pastore, 2005, and the references therein). This is to be explained also by the high share of workers holding a vocational diploma only (Boeri, Köllo and Burda, 1997). On the other hand, the investment in general secondary education and in tertiary education has dramatically increased in all erstwhile transition countries, though at a different rate across countries. This is the consequence of increased payoff for skills both in terms of earnings and of employment opportunities (see Brainerd, 2000, for a cross-country study). According to anecdotal evidence, especially high-skilled young people are the winners of the transformation.

The case of Poland is typical of these changes. Poland is the transition economy experiencing the highest degree of structural change and the highest unemployment rate in the area. It adopted a Big Bang approach to the reform process, by introducing simultaneously price and trade liberalisation, together with privatisation and macroeconomic stabilisation already in the early 1990s. A massive flow of FDI has triggered the process of technological change, on the one hand, and generated the need for skill upgrading of the workforce, especially of the youngest segments, on the other hand.

Over the years, similar to other transition countries, the share of individuals with high education attainment has dramatically increased in Poland, together with the progressive abatement of the share of people with vocational secondary degrees (Boeri, 2000). Domadenik and Pastore (2006, Tab. 5 and A5) find that from 1997 to 2002 the percentage of young teenagers (15-19) in education increased from about 84 to 88, while that of young adults (20-24) increased from 20 to 31. The corresponding figures for the early 1990s were 45 and 13 percent respectively. In both cases, Poland seems to be close to the educational targets fixed within the Lisbon strategy for the year 2010[2].

However, these figures raise two important issues. First is the contrast between the excellent (at least quantitative) achievement in educational attainment and the delay in bringing to reasonable levels employment and unemployment rates, which remain well below the Lisbon objectives. This raises in turn the following questions. Could the already high share of young people with a high school diploma and/or a university degree further increase if the benefits of education increased and the direct, indirect and opportunity costs reduced? Is the increase in

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[2] The Lisbon Strategy sets specific targets to reach by 2010: a) an overall employment rate of 70%; b) an employment rate for women of over 60%; c) an employment rate of 50% among older workers; d) annual economic growth around 3% on average. The European Employment Strategy suggests that increasing the educational level of the workforce is one of the key instruments to reach the Lisbon objectives. This requires, more specifically, to: a) bring to 12.5 the share of the adult working age population participating in lifelong learning; b) reduce to less than 10 the percentage of early school leavers; c) increase to 85 the share of 22 year-olds having completed upper secondary education; d) reduce by at least 20% (compared to 2000) the share of low-achieving 15 year-olds in reading literacy; e) raise number of graduates in the EU by at least 15%.

education attainment only a consequence of increased returns to education? Or are there other factors in place? Is it in particular the consequence of high unemployment rates? If the unemployment rate reduces will the share of young people in education shrink? Is an increase in education attainment sufficient per se to increase employment and reduce unemployment?

Second issue are the dramatic and persistent regional unemployment differences, which according to some authors depend, and are also fostered, by dramatic differences in the human capital endowment of voivodships. A recent strand of literature is addressing the question why urbanised regions have been able to exploit the advantages of trade integration and of capital flow from abroad. The hypothesised answer is that human capital concentration in urbanised regions is an important factor to attract FDI in advanced sectors and reduce the cost of restructuring (Lehamnn and Walsh, 1999). World Bank (2004, pp. 29-31) notes a strong negative correlation between regional unemployment and the share of workers with a high level of education attainment in Poland. In fact, these last have shorter unemployment spells. Moreover, complementarity between high technology industries and human capital generate persistence in unemployment differentials with respect to rural, depressed areas. And this result may be reinforced by migration flows, as noted in Firdmuc (2004). To what extent increasing educational attainment is reinforcing the regional pattern of unemployment?

To answer these questions, it is important to study the determinants of labour market and educational participation of young people in Poland. Of course, the final aim of accumulating human capital for a young person is increasing her/his chances to find gainful employment, as well as increase her/his lifetime earnings. However, working instead of studying cannot be considered a better choice. Conversely, starting to work early in a person's life, subtracting time to education might also be a dismal choice especially in a period of dramatic structural change. In other words, for a young person, education is a good alternative to unemployment, but also to low wage employment, helping to avoid, in many cases, long-term unemployment, poverty and social exclusion in the adult life (see, among others, Hammer, 2003, and the references therein).

To compare the individual determinants of education versus labour market participation of young people, this study proposes a Heckman PROBIT (Heckprobit) model. This is similar to the error correction procedure commonly used to control for sample selection bias in mincerian-types earnings equations, which is known as Heckit (see Heckman, 1979). In the latter type of model, a selectivity term is used to correct the estimates of coefficients in the earnings equations relative to employed workers, for the existence of jobless people – unemployed or inactive – with different characteristics. Only taking into account jobless people it is possible to assess the actual impact of a given characteristics, say education, on earnings.

The difference between a Heckit and a Heckprobit model is that, in the latter type of model, the dependent variable of the so-called main equation is not a continuous, but a dummy variable, which in this study takes a value of one if the individual is employed and zero if the individual is jobless (either unemployed or inactive)[3]. To control for the possible selectivity implied in excluding those involved in education, the estimates are corrected by a term simultaneously estimated by maximum likelihood using a selection equation. The dependent variable of the selection equation takes a value of one if the individual is participating to the labour market and of zero otherwise.

The study is based on the November 1997 round of the Polish labour force survey and considers a sample of individuals aged 15-30, comprising, hence, young teenagers (15-18), young adults (19-24) as well as older individuals up to the age of 30. These last are included to take into account the high share of long term unemployed and the possibility that the impact of university education was overestimated, since only the most skilled and motivated find employment shortly after obtaining their degree.

A special focus of the analysis is ascertaining the role of local labour market conditions and expected lifetime earnings on the decision to invest in further education rather than participating in the labour market. While expected lifetime earnings should affect positively the probability to invest in education, the theory and evidence on the impact of the unemployment rate on educational participation is mixed. On the one hand, some authors (Rice, 1987; 1999; Giannelli and Monfardini, 2000; and 2003) argue that the unemployment rate reduces the opportunity cost of education and therefore increases the probability that a young person is studying, rather than searching for a job. Conversely, Micklewright (1990) cannot find any significant positive effect of unemployment on education, just the opposite.

This paper innovates on the existing literature for at least two reasons. First, this is the first study to analyse the determinants of educational choices of young people in transition countries, while taking into account also the impact of local labour market conditions and expected lifetime earnings. Second, from a methodological point of view, the use of a Heckprobit model is a novelty compared to the existing literature relative to mature market economies, which generally adopts either multinomial LOGIT (MNL; see e.g. Rice, 1999) or multinomial PROBIT (MNP; see e.g. Giannelli and Monfardini, 2003) models. However, the former suffers of a serious shortcoming when analysing the youth labour market, because it assumes the hypothesis of independence of irrelevant alternatives (IIA hypothesis). This would imply that

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[3] Note that here unemployed and inactive workers are treated as behaviourally similar, because young people experience several transitions between labour market states, and especially between unemployment and non-participation (Clark and Summers, 1982). See the methodological section for details.

labour market choices be independent from education, which is hardly the case. This makes the use of MNL models inadequate to the aim. On the other hand, the MNP model does not need the assumption of independence of irrelevant alternative, but still does not allow controlling for the interdependence of the choices considered.

The rest of this paper is structured as follows. Section one gives an overview of the main features of youth unemployment in transition countries and especially in Poland. Section two describes methodology and data. A short survey of the relevant literature precedes an introduction to the Heckprobit. A discussion of the a priori about the impact of independent variables follows. Section 3 discusses the results, while the following section concludes.

1. Youth unemployment during transition

Economic transition is a system change involving dramatic shifts in labour demand across and within sectors and requiring, as a consequence, an important effort of labour supply, especially the youngest segment, to upgrade their skills to the needs of a market economy. This means, in turn, not only learning new technical notions, but, perhaps more importantly, facing a period of cultural change. In a way, the success itself of the reforms is up to the ability of the youngest generation to face the challenges of a market economy. Such ability depends not only on individual skills, but also on the system of incentives the economic environment is able to provide and the effectiveness of the education and training systems in furnishing opportunities for all. There is much evidence to believe that these incentives were sometimes missing during transition (see, for a discussion, Boeri, Köllo and Burda, 1997; and Boeri, 2000).

As a consequence also of this, in most transition countries, unemployment rates of the under-25 are twice as high as or even higher than the national average. O'Higgins (2004, Fig. 5) reports that in 2001 the ratio of the youth to adult unemployment rate was (2.2) slightly higher in transition countries than in the average EU-15 (1.9). If one excludes from EU-15 the Mediterranean countries, where it is traditionally very high, then the difference is remarkable. Poland is one of the transition countries with the highest ratio at about 2.7, just below Slovenia (3.7), Romania (3.6) and Croatia (3). However, in Poland (42%) the youth unemployment rate is the highest in the area, and much higher than in Croatia (37%), Slovenia (17%) and Romania (17%).

Domadenik and Pastore (2006, Tables 5 and A5) find similar youth (15-24) to adult (25-54) unemployment ratios of about 2.7 in 1997 and 2.4 in 2002. The recent reduction of the ratio (from 4 to 2 in the case of young teenagers, aged 15-19) is, in this case, not good news, because it is due to a two-time increase in the adult unemployment rate, caused, in turn, by the economic

crisis of the late 1990s. As a consequence, the ratio reduced despite the dramatic increase in the youth unemployment rate from 26.6% to 46.8%.

Domadenik and Pastore (op. cit.) find also that, different from other transition countries, the Polish unemployment rate declines only for those aged 25-34, while it increases dramatically for those aged 35-54, to slightly decline again for the over 55. This peculiar u-shaped distribution of the unemployment rate by age[4] is probably due to the high degree of restructuring that the Polish economy underwent in the late 1990s, when the veto power of unions on the decision to close down the remaining state-owned and commercialised enterprises was abolished. This gave rise to conspicuous mass dismissals, involving also numerous prime-aged workers (World Bank, 2001).

The picture was slightly different in 1997. Before the recent surge in unemployment, the young teenagers had double the unemployment rate of young adults and more than three times the average unemployment rate. Moreover, in 1997, the distribution of the unemployment rate by age was similar to that of other transition countries, as it decreases constantly, to increase again only for the over 55.

About 9.6 percent of workers are employed on a temporary basis, a share similar to other transition countries. In 1997, the same figure was only 4.3 percent, which is suggestive of an increasing degree of flexibility of the Polish labour market under this respect.

Typically, high youth unemployment comes along with high youth long-term unemployment, and transition countries are no exception under this respect. O'Higgins (2004) reports that, in 2001, more than 50 percent of young Poles remained unemployed for more than 6 months once entering the unemployment pool. The corresponding figure for the population aged 25-54 was almost 70 percent. Albeit lower than the adults' share of long-term unemployment, that of young people is not less worrying. In fact, on the one hand, it is true that youth long-term unemployment is to some extent physiological, since it depends on the younger age of the latter group; and, transitory, being related to the tendency of young people to search for the best match. However, in several cases it has a long-lasting effect, being conducive to social exclusion in the adult life as well as, at a macroeconomic level, contributing to make persistent a country's unemployment rate.

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[4] Newell and Pastore (1999) also find remarkable peculiarities of the age distribution of unemployment in Poland. They estimate Cox models of the probability of job loss separately for the highest and the lowest unemployment regions in 1994, a period of dramatic structural change. They allowed a spline in age with slope changes at 25, 35 and 45. One of the most important differences between the low and high unemployment *voivodships* is that middle-aged workers in high unemployment regions have almost no greater job security than young workers. This is in clear contrast to the situation in the low unemployment regions where young workers are much more likely to enter unemployment than their older colleagues are. Thus, in high unemployment regions the risk of unemployment does not diminish with age, as is normally the case in Western economies (see Arulampalam and Stewart 1995).

Unemployment is not evenly distributed among young people also in transition countries. Some groups of young persons are more likely to be unemployed than others (some classical examples are ethnic minorities, disabled individuals, unskilled workers, etc). In addition, despite the sharp decline in their participation rates, school leavers without work experience are the group hardest hit by unemployment. Last but not least, not surprisingly, the unemployment rate is inversely related and the participation and employment rates are directly related to the level of education attainment.

2. Methodology and data

2.1. The state of the art

Demand for education and school-to-work transitions of young people have received much attention from the economics of education and the labour economics literature, starting at least from the seminal contributions of Blinder and Weiss (1976) and Heckman (1976). They are among the earliest authors to adopt a simultaneous approach for the study of labour supply and educational decisions of young people. Their model assumes that the impact of education is not only on earnings, but also on employment opportunities. With the availability of longitudinal data-sets, some authors, such as Keane and Wolpin (1997), have attempted to simulate the initial career of a sample of young men provided they maximise utility coming from different states: attending school, working and choosing a given occupation.

However, in the more frequent case when only cross-section data is available, two alternative approaches dominate research in the field, namely the MNL and the MNP models. Rice (1999), Denny and Harmon (2000), Nguyen and Taylor (2003) and Caroleo and Pastore (2003), for instance, use a MNL framework to study the probabilities of being employed, rather than unemployed, inactive or in education. This approach requires the heroic assumption that the alternatives faced by young people are mutually exclusive, the hypothesis of independence of irrelevant alternatives (HIIA).

Giannelli and Monfardini (2000; and 2003) and Davia (2004) are examples of papers that release the HIIA, implicit in a MNL model, by adopting a MNP approach[5]. In particular, Giannelli and Monfardini (2003) study the decisions of Italian young adults (18-30) both related to education versus work and the option to remain at parental home. They focus on the effect of

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[5] One reason why the MNP is less frequent is its computational difficulty.

labour market conditions (affecting income and employment expectations) and family background characteristics together with housing costs.

In the only study available on transition economies, Domadenik and Pastore (2006) apply MNL analysis to the study of the determinants of labour market participation and education of young people in Poland and Slovenia in 1997 and 2002. They consider six choices: permanent employment, temporary employment, self-employment, unemployment, education, training and inactivity. Their findings point to tertiary education as an important buffer against the risk of unemployment. Participation into training programmes reduces the risk of being unemployed, but not of being inactive. Gender differences among young people in the probability to be employed on a permanent basis are important in Poland, but they tend to abate in recent years. Finally, family break-ups lower the probability to find employment in both countries.

2.2. The Heckman probit model

The assumption of the modelling strategy pursued here is that the primary decision of young people is whether to participate to the labour market or study. Only at a later stage, once decided to leave education, the young person will seek permanent employment. This would suggest refuting both a MNL and a MNP model[6], and to opt for a Heckman correction procedure, which in this case is indeed the so-called Heckman PROBIT (Heckprobit), since the variable detecting the labour market state is binary and takes a value of 1 for employment and of 0 for joblessness, where joblessness includes unemployment and inactivity. Introduced for the first time by Van de Ven and Van Pragg (1981), the Heckprobit allows estimating PROBIT models when there is suspect of sample selection bias. In the case under scrutiny, if the sample of individuals participating in the labour market is systematically different from that of those who are in education, coefficients of determinants of success in finding employment might be biased.

The unemployed and inactive individuals are pooled together because in the case of young people such labour market states are often very similar. In the seminal paper by Clark and Summers (1982), young people have a high degree of turnover and the transitions from unemployment to employment are not less sizeable than those from inactivity to employment. Also the transitions from unemployment to inactivity are high. Poterba and Summers (1995) find that the differences between unemployment and inactivity are weak, causing dramatic classification errors. This is likely to occur especially among the youngest segment of the

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[6] Other natural alternatives would be a conditional LOGIT model (which requires detailed longitudinal data able to individualise the time of exit from education) and a bivariate PROBIT model (which is generally used for evaluation of the gross impact of pro-active schemes).

population. Of course, this assumption is to be taken with the due caveats, keeping in mind the contribution by Flinn and Heckman (1983). They suggest that the behaviour of individuals who are inactive because they are disabled, retired or otherwise unable to work is different. For this reason, the group of those who declare not to work because they are unable to work have been excluded from the analysis, whereas the disabled who do not declare to be unable to work have been included in the analysis.

From an analytical point of view, the Heckprobit model assumes the existence of an underlying relationship, also called latent equation:

$$Y_j^* = X_j \beta + u_{1j}$$

such that the binary outcome is observed, which is mirrored by a PROBIT equation:

$$Y_j^{probit} = (Y_j^* > 0)$$

In this paper, this binary outcome corresponds to employment and joblessness. The dependent variable, however, is not always observed. To capture the relevant effect on the standard PROBIT results the corresponding selection equation is introduced:

$$z_j\gamma + u_{2j} > 0$$

such that

$$Y_j^{select} = (z_j\gamma + u_{2j} > 0)$$

$$u_1 \sim N(0,1)$$

$$u_2 \sim N(0,1)$$

$$corr\ (u_1\ u_2) = \rho$$

When $\rho \neq 0$, i.e. there is correlation between error terms of main and participation equation, the standard PROBIT model will produce biased results. The Heckprobit procedure instead is intended to correct for selection bias, and to provide consistent, asymptotically efficient estimates for all the parameters in the model.

2.3. Data and variables

The estimates are based on the November 1997 wave of the Polish labour force survey (LFS), a nationally representative large micro-data set providing detailed and accurate information on various aspects of labour market participation of the Polish population, such as wages and other sources of income of the individual and the household, the ILO definition of unemployment and the city of residence.

From the point of view of this study, the main shortcoming of LFS data is the lack of information on family background, which is usually found to be an important determinant of the

educational choices of young people, together with expected incomes of high education and unemployment (see e.g. Rice, 1987; 1999; Giannelli and Monfardini, 2000; and 2003). For instance, it is impossible to obtain information on the educational level of the parents of all the individuals[7]. However, the PLFS asks respondents a specific question on the main source of the household income. This allows detecting at least one important aspect of the family background able to affect, according, for instance, to Rice (1987) the decision of young men, if not women, to invest in post-compulsory education in the UK.

Table AI in the Appendix provides a detailed description of the variables used in the estimates. The sample has been restricted to about 16,000 young people aged 15-30, grouped in employed, jobless and in education[8]. These states are treated as mutually exclusive. Following the ILO definitions, employed individuals have been identified as all those declaring to have some type of paid work during the reference week, independent of whether they are also students or not[9]. A specific question allows identifying whether the individual is a student. The rest is considered jobless. As discussed in the previous section, the jobless group includes unemployed and inactive, except for a small number of individuals declaring that they do not work because they are unable to work. These last have been dropped from the sample.

The independent variables in the main and in the selection equations of the Heckprobit estimates include different types of education attainment, age (as a proxy for work experience) and its square value, gender, civil status, co-residence with parents, the main source of income of the household and the size of the town where he lives. The expectation is that the chances of successfully find a job depend on education and work experience, which are factors able to affect the productivity of individuals, controlling for the other available variables. Also the main source of income of the household is an interesting background variable able to disentangle the economic incentives the household gives to young people. The reference group in the main equation is constituted of married men aged 15-30, with primary education or below, living with their parents in rural voivodships and whose household lives out of labour income.

Similar to the Heckit, also in the Heckprobit, the selection equation should include the same independent variables that are in the main equation (and are defined also for the selection equation), plus some additional instrumental variables, which are supposed to affect the

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[7] It is indeed possible to obtain information on the family background of many young people from LFS data (as well as household survey data). This requires merging the database relative to individuals with that relative to households. However, while the percentage of attrition might by high, this strategy is unsuccessful in the case of young people living alone, whose share is high in most countries.

[8] Note that eight graduate students have been included among those in education.

[9] Note that 237 individuals study and work, while 51 study and are jobless.

dependent variable of the selection equation, but not that in the main equation. In this case, the instrumental variables should be able to affect participation in education, but not labour market participation. The variables used here as instruments to identify the selection equation include expected lifetime earnings of further education, the local unemployment rate and the opportunity cost of studying.

Expected lifetime earnings are measured for high school diploma and university degree according to the procedure suggested, among others, in Giannelli and Monfardini (2003). Two different out-of-sample earnings equations were estimated for university and high school graduates using a sample of women aged 31-60 (the retirement age) and of men aged 31-65, using the Heckit procedure to check for sample selection bias. Table A1 in the Appendix contains a more detailed description of the procedure adopted to construct these variables, while Table A2 reports the results of the Heckit estimates. The interpretation of the impact of expected earnings is straightforward. The expected sign is negative, since the higher are expected earnings of further education, the higher is the probability that a young person prefers to attend school or university programmes rather than being in search (successfully or not) for a job.

The previous literature is ambiguous as to the impact of local unemployment on educational participation. On the one hand, some authors find that the proportion of the age cohort remaining in full-time education following completion of compulsory schooling is counter-cyclical and, therefore, positively correlated with the rate of unemployment over the long-run (see Pissarides, 1981; Whitfield and Wilson 1991; McVicar and Rice, 2001). The argument is that the higher is the local unemployment rate, taken as a proxy of local labour market conditions, the lower is the opportunity cost of investing in education: as a consequence one would expect high unemployment regions to have a relatively bigger number of people enrolled into education, all other things being equal. This is sometimes called the "parking theory", since it implies that young people "park" themselves at the university while waiting for a job offer to come. Nonetheless, the evidence based on individual level data is mixed on this variable: while some studies (Rice, 1987; 1999; Giannelli and Monfardini, 2000; and 2003) confirm the results of studies based on aggregate data, others studies (see e.g. Micklewright, 1990) instead either do not find any significant effect or find a negative relationship. One reason why the local unemployment rate might not increase, but rather reduce the number of people enrolled in high education might be the lower expected earnings of post-compulsory degrees in high unemployment regions. In fact, assuming that capital and skills are complementary, if high unemployment regions are also backward, it is likely that the demand for skilled labour is lower than in low unemployment regions. As a consequence, low unemployment regions could provide not only a lower opportunity cost, but also a lower expected benefit of investment in

further education. Moreover, backward high unemployment regions might also have a lower supply of education, often also of low quality, which might increase the costs of education. Following the former (latter) hypothesis, the expected sign of the coefficient of this variable in the selection equation is negative (positive), since ceteris paribus with unemployment increasing young people should prefer to study rather than searching for a job. The overall impact of the two variables considered until now cannot be predicted ex ante and is matter of empirical investigation.

The unemployment rate has been used either as a continuous variable – the 1997 voivodship unemployment rate for those aged 30 or below – or as a set of dummy variables representing the low, medium and high unemployment voivodships. As described in more detail in Table A1 in the Appendix, the Polish voivodships have been ranked by their youth unemployment rate in 1997. Low, medium and high unemployment voivodships are the voivodships with the lowest, medium and highest youth unemployment rate, representing each about one third of the sample population. The dummy variables have been preferred to the continuous variable, following the argument that macro-variables generate bias when included in estimates based on individual level data (Moulton, 1991).

Finally, the product of the average hourly wage and the probability to find employment by age measure the opportunity cost of studying. The expected sign is positive, since the higher is the opportunity cost of studying, the higher is the probability to leave the educational system and to be in search for a job.

3. Results

Overall fit of the model and sample selection hypothesis. Table 1 reports the results of three heckprobit estimates relative to the entire sample, to men and women. Note that the main equation precedes the selection equation, while auxiliary information and main statistical tests are reported in the last rows of the table. The significance level of the coefficient of the *artrho* and the Wald test of independent equations concur to suggest that the null hypothesis of no correlation between error terms of main (participation) and selection (education) equation is rejected for the entire sample and for men, but not for women. In other words, any estimate of the determinants of the probability to successfully find a job without controlling for sample selection bias would turn biased results in the case of men, but not in that of women. This is not surprising.

The case of women is puzzling. On the one hand, one might think that the labour market decisions of women are less influenced by economic reasons, and that if they choose to study,

they do not look so much at the benefit and cost of education (see also Rice, 1987). On the other hand, it is also likely that some important determinants of the labour market decisions of young women, such as maternity, are not controlled for, since they are not included in the Polish LFS[10].

[Table 1 about here]

Main equation. Recall from the previous section that the dependent variable is a dummy equal to one for employment and zero for joblessness. Education attainment is the most important determinant of success in the labour market. University education is by far more important than other types of education, especially for men. Other educational qualifications seem to be less effective, though it is apparent that there are significant difference between those with a high secondary school diploma and those with a low secondary school diploma. All the groups fare better than the baseline group with primary education or below.

Age is an important determinant of the probability to be employed for men, but not for women. The profile is concave, since the coefficient of the squared term is negative. This suggests that the older is the worker the higher is the probability that she is employed. However, such probability exhibits decreasing returns and the advantage of the over 20 tends to decline with age.

Participation into training in the past three months is not significant.

Women are worse off, which confirms the finding of Domadenik and Pastore (2006) based on multinomial LOGIT analysis. Poland is one of the countries where women experience a disadvantage already early in their working career, which is common in catholic South European countries, but not so much in Nordic and also in Eastern European countries (O'Higgins, 2004).

All other things being equal, single women have a higher probability to find employment than married (divorced or widowed) women, but for men the opposite holds true. Single men are less likely to be working than the rest. Recall that people marry as early as just above their twenties in Poland (see Unicef for statistics relative to 1997) and soon after they have children. Though this average age of marriage and first birth is declining with time passing and it is likely that this effect is weakening in recent years.

For similar reasons, being a household head reduces the reservation wage and increases the probability of employment.

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[10] Only women on maternity leave can be identified. No information is provided on the number of children, though.

A disability pension, instead, increases the reservation wage, reducing the probability to be employed.

The smaller the city of residence, the lower is the probability to find employment. This confirms the conclusions of the literature on regional unemployment in Poland and other transition countries according to which big cities offer much greater chances to find employment than small town and rural areas, where people remain essentially because of the low cost of living and the diffusion of small family owned land plots.

Selection equation. Generally speaking, the higher the educational degree already achieved the higher is the probability to participate to the labour market. Having a vocational secondary education diploma seems to reduce the probability to participate in the labour market and to increase that of investing in further education. This coefficient might mirror the tendency of young people with vocational secondary diplomas to continue their studies to achieve a more general level of education. In the case of young people holding a post-secondary educational diploma, the probability to search for a job is lower than that of those with low secondary education.

The age profile of labour market participation is steep, with very high coefficients, when one omits the dummies for young teenagers and young adults.

Gender differences in educational choices seem to be less important than those with respect to the probability of success in the labour market. The ceteris paribus probability for a young woman to remain in education is not different in a statistically significant way from that of a man.

Single individuals prefer to continue to invest in education rather than searching for a job, a result, which is symmetric to that found when looking at the main equation. This is obviously related also to the fact that the decision to work and form a new household are strongly related to each other. Similarly, and on the opposite verge, the household head tends to search for a job, rather than investing in education. The other variables also have the expected signs, when significant.

Living in urban areas significantly increases the probability to invest in further education. This might be a supply side effect, since, in urban areas, the supply of education is greater.

Mancano I commenti sulle altre variabili

The instrumental variables. The instrumental variables have the expected sign and are generally statistically significant. Experimenting with variables[11] suggests that the estimated coefficients are also remarkably stable, as they do not importantly change when dropping other regressors.

Expected lifetime earnings of university education have a statistically significant positive impact on the probability to be in education rather than participating to the labour market. Instead, though always positive, the expected earnings of successfully completing high school is statistically significant only in the case of men. Wald tests cannot reject the null hypothesis that the two coefficients are equal. This is contrary to what one would expect considering the wage premium of university on high secondary education in Poland, especially for women, but is consistent with the idea that economic incentives to further education are evenly distributed across qualifications as expected in a well-functioning market for human capital.

Overall, these results confirm that the Polish economy provides strong economic incentives to invest in post-compulsory education, which, in turn, contributes to explain the aforementioned remarkable increase in the level of education attainment the country has recently experienced.

Nonetheless, the impact of expected earnings on investment in education is smaller in the case of women. This finding is in line with the conclusion that economic incentives are less important in the case of women, or perhaps that they should be measured in a different way.

Furthermore, the estimates proposed here suggest that, although not always highly significant, the ceteris paribus impact of unemployment on educational participation is consistently negative, not positive[12]. Note also that such impact is inversely u-shaped: with unemployment increasing, in fact, participation into education increases first and then reduces. This interesting result is confirmed by all the estimates. To further investigate on this finding, Table 3 presents several estimates, using two sets of unemployment dummies. The former uses the average youth unemployment rates for men and women, whereas the latter uses different youth unemployment rate for men and women. These regressors are used in two types of model. Model (1) is the same as in Table 2, while dummies measuring the population size of the place of residence are dropped from Model (2). Inspection of the table makes it clear that the non-linearity is especially strong in the case of women and, as shown by the results of Model (2), seems to depend only in part on interaction with the place of residence. Wald tests are used to test for statistically significance of the difference between the coefficients. They cannot always

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[11] Results of such experiments are available on request.

[12] This finding is confirmed also by use of different unemployment measures. In omitted estimates, the voivodship unemployment rate gives a coefficient of 0.49 for the entire sample, 0.95 for women and 0.11 for men. It is highly significant only in the case of women.

reject the hypothesis that differences are significant, but they do reject this hypothesis in some cases. In the estimates relative to the entire sample, differences are statistically significant between U30(2)_2 and U30(2)_4, but not in the other cases. In the case of women, the tests reject the hypothesis that U30(2)_2 and U30(2)_3 are equal. In the case of men, the tests cannot reject the hypothesis that the coefficients of U30(2)_3 and U30(2)_4 are equal and of U30(2)_2 and U30(2)_5 are equal, but rejects the hypothesis that these two pairs are equal to each other.

[Table 3 about here]

In other words, in high youth unemployment voivodships, the probability for a young person to be in education is lower than in low youth unemployment voivodships, suggesting that unemployment causes a reduction in the benefit of education which overweigh that in the opportunity cost of education. This finding goes contrary to expectations based on part of the literature relative to some mature market economies (see the already mentioned Rice, 1987; 1999 for the UK; and Giannelli and Monfardini, 2000; and 2003 for Italy)[13].

Consider again the interaction between local unemployment and the urban/rural divide. High unemployment areas are often also rural areas, and nevertheless the coefficient of high local unemployment is still statistically significant even after controlling for the size of the place of residence. Therefore, the incentive to invest in education is the lowest in rural high unemployment areas. This is likely to contributes to increase the spatial unemployment gap, if the level of human capital endowment is to be taken as an important factor of economic growth. This is a major reason of concern: without interventions aimed at equilibrating the educational divide between rural high unemployment and urban low unemployment voivodships, pursue of the Lisbon strategy is bound to reinforce the already dramatically persistent regional unemployment pattern.

Finally, the opportunity cost of education is positive as expected and highly significant in the case of the entire sample (with a coefficient of 0.52) and in the case of women (0.56), and only significant at the 10% in the case of men (0.38). However, this variable is not included in the estimates of Table 2 because of suspect of collinearity with the unemployment rate.

Concluding remarks

This paper aims to contribute to the important issue of identifying subgroups of young people with high probability to leave school, therefore reducing their chance of finding gainful

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[13] One possible explanation of this difference might be the absence here of controls for family background. Nonetheless, if family background is more favourable to investment in education in low unemployment areas, this is already suggestive of a negative impact of unemployment on education attainment.

employment in the long run. Fine targeting educational reforms and ALMP on these specific groups would enhance their effectiveness, in a time of hard state budget constraint.

To reach the aim, this paper proposes Heckprobit estimates of the probability to find employment rather than being jobless of a sample of Polish young (15-30) people, controlling for sample selection bias caused by the presence of people involved in further education. There is evidence of sample selection bias in the case of young men (but not of women), confirming the a priori expectation that the two choices: employment/joblessness and job search/investment in education are not independent.

The results confirm the role of education in explaining the success in the labour market of young people. Also factors that reduce (increase) the reservation wage tend to increase (reduce) the probability of employment. Being a household head, for instance, increases the chances of being employed, while being a woman reduces it.

The instrumental variables used in the selection equation – the local unemployment rate, expected lifetime earnings and the opportunity cost of education – have a statistically significant impact on the probability to be in education. In contrast with several previous studies relative to mature market economies, high unemployment voivodships provide a disincentive to further education, and an incentive for job search. Overall, the analysis confirms that rural high unemployment areas contribute very little to the increase in education attainment experienced recently in Poland also under the auspices of the Lisbon strategy. In turn, this contributes to make regional unemployment persistent. Less surprising is the positive impact on the decision to invest in further education provided by expected lifetime earnings.

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Tables

Table 1. Descriptive statistics (15-30)

Variable	All	Women	Men
Employed/jobless	71.3	60.3	81.9
Employed	44.1	36.8	51.2
Jobless	17.7	24.2	11.3
Students	38.2	39.0	37.5
Education attainment			
University degree	3.9	4.7	3.1
Post-secondary school diploma	2.4	3.8	1.0
General high secondary school	17.4	18.8	15.9
Vocational high secondary school	9.0	12.6	5.5
Low secondary school	28.3	22.1	34.4
Primary school	37.7	36.9	38.4
Below primari	1.4	1.1	1.6
Age	21.7	21.7	21.7
Age^2	491.6	492.9	490.2
Training in the past three months	1.2	1.3	1.2
Women	49.7	--	--
Civil status			
Single	69.3	62.9	75.7
Married	30.0	36.0	24.1
Divorced or in separation	30.7	37.1	24.3
Widow	0.6	0.9	0.2
Disabled	0.1	0.2	0.0
Relation to the household head			
Household head, man	8.6	--	17.1
Household head, single woman	0.8	1.7	--
Household head, non-single woman	1.9	3.8	--
Wife/husband	12.3	22.6	2.0
Son/daughter, living with parents	68.9	64.4	73.3
Soninlaw	3.6	3.7	3.4
Other members of the household	4.0	3.8	4.2
Main source of income of the household			
Labour incombe	63.9	65.2	62.5
Disability pension	15.0	13.8	16.2
Unemployment benefit	1.1	1.3	0.9
Non-earning source of incombe	2.1	2.5	1.7
Private farm	11.3	11.0	11.5
Self-employment	6.7	6.2	7.1
Size of the place of residence			
More than 100,000 inhabitants	25.9	26.3	25.5
50 through 99,000 inhabitants	9.4	9.6	9.2
20 through 49,000 inhabitants	11.2	11.2	11.2
10 through 19,000 inhabitants	6.7	6.9	6.5
5 through 9,000 inhabitants	3.5	3.4	3.5
0 through 4,000 inhabitants	2.3	2.2	2.4
Living in rural areas	41.1	40.3	41.8
Low unemployment voivodship[1]	11.2	13.6	8.7
Medium unemployment voivodship[1]	17.9	21.4	14.5

High unemployment voivodship[1]	26.3	31.3	21.3
Ureg30[1]	19.2		
U30(1)_1[1]	8.7		
U30(1)_2[1]	13.0		
U30(1)_3[1]	14.6		
U30(1)_4[1]	16.8		
U30(1)_5[1]	18.8		
U30(1)_6[1]	21.5		
U30(1)_7[1]	24.3		
U30(1)_8[1]	27.6		
U30(2)_1[1]		12.5	7.5
U30(2)_2[1]		17.3	11.8
U30(2)_3[1]		21.4	14.5
U30(2)_4[1]		25.6	18.1
U30(2)_5[1]		34.5	23.0
Expected lifetime earnings for university degree	5.2	6.3	4.1
Expected lifetime earnings for high secondary school diploma	4.0	3.2	4.9
Opportunity cost of studying	1.2	1.2	1.2

Note: [1] *the figures represent the unemployment rate*

Table 1. Heckman PROBIT estimates of labour force participation (15-30; Poland, 1997)

Variable	All	Women	Men
Education			
(Reference category: primary or below)			
University degree or above	1.1074***	1.0999***	0.9157***
	0.089	0.1082	0.1664
Post-secondary diploma	0.6578***	0.6784***	0.1931
	0.0859	0.1035	0.1712
General secondary school	0.48***	0.4826***	0.351***
	0.0531	0.0733	0.0766
Vocational secondary school	0.252***	0.3435***	-0.0476
	0.0664	0.0809	0.1443
Low secondary school	0.34***	0.2148***	0.4075***
	0.0516	0.0738	0.0917
Age	0.2006***	0.0298	0.3575***
	0.0687	0.0974	0.1304
Age^2	-0.0028**	0.0006	-0.0059**
	0.0014	0.0019	0.0026
Training in the past three months	0.1088	0.0434	0.1278
	0.1091	0.1487	0.1754
Women	-0.5293***	--	--
	0.0334	--	--
Civil status			
(Married)			
Single	0.3126***	0.6275***	-0.2847***
	0.0398	0.054	0.0701
Divorced or in separation	0.0673	0.1071	-0.2882
	0.1493	0.1691	0.3239
Widow	-0.0367	0.1547	-0.8777
	0.3717	0.4049	0.5723
Disabled	-0.3943***	-0.5855***	-0.2644
	0.133	0.1957	0.1877
Relation to the household head			
(living with parents)			
Household head, single man	-0.0081	--	0.1972
	0.1604	--	0.168
Household head, non-single man	0.3093***	--	-0.0433
	0.0918	--	0.123
Household head, single woman	-0.5653***	-0.4517***	--
	0.1446	0.105	--
Household head, non-single woman	-0.4363***	-0.8746***	--
	0.0949	0.1548	--
Main source of income of the household			
when the individual is not household head			
(Private farm)			
Labour income	-0.663***	-0.7613***	-0.5322***
	0.0596	0.0752	0.0951
Disability pension	-0.8418***	-0.8986***	-0.8079***
	0.0662	0.0874	0.0978
Unemployment benefit	-1.6599***	-1.7632***	-1.5173***
	0.1627	0.2295	0.2601
Non-earning source of income	-1.636***	-1.7674***	-1.5315***
	0.1432	0.1888	0.2001

Self-employment	-0.7361***	-0.8699***	-0.5468***
	0.0863	0.1103	0.1361
Size of the place of residence *(Living in rural areas)*			
More than 100,000 inhabitants	-0.0219	0.0815	-0.1402**
	0.0404	0.054	0.0641
50 through 99,000 inhabitants	-0.1193**	-0.1003	-0.152*
	0.0548	0.0689	0.0862
20 through 49,000 inhabitants	-0.1348***	-0.0139	-0.2744***
	0.0502	0.0669	0.0773
10 through 19,000 inhabitants	-0.0905	-0.0581	-0.1228
	0.0611	0.0795	0.0939
5 through 9,000 inhabitants	-0.2326***	-0.1122	-0.3458***
	0.0813	0.1068	0.1203
0 through 5,000 inhabitants	-0.2574**	-0.1133	-0.4123***
	0.1042	0.1425	0.1338
Constant	-2.2891***	-0.6943	-3.8387**
	0.8528	1.2208	1.6618

Selection equation

Education *(Reference category: primary or below)*			
Post-secondary degree or above	1.8147***	1.8127***	1.698*
	0.4483	0.4093	0.9377
General secondary school	1.7796***	1.8435***	1.8754**
	0.4049	0.3703	0.8434
Vocational secondary school	0.7619*	0.6389*	0.9157
	0.4048	0.3727	0.8414
Low secondary school	2.116***	2.0692***	2.6014***
	0.3535	0.5709	0.5656
Age	0.7217***	0.7908***	0.5565***
	0.1035	0.1203	0.1998
Age^2	-0.0092***	-0.0118***	-0.004
	0.0027	0.0029	0.0054
Training in the past three months	1.3483***	1.3122***	1.392***
	0.217	0.3145	0.3133
Women	-0.0566	--	--
	0.0366	--	--
Civil status *(Married)*			
Single	-1.1557***	-1.2508***	-0.7909***
	0.08	0.0895	0.1865
Widow	-1.1117*	-1.0233	--
	0.6472	0.704	--
Disabled	0.5998***	0.4197*	0.7348***
	0.1678	0.2467	0.2164
Relation to the household head *(living with parents)*			
Household head, single man	0.0159	--	-0.0721
	0.1708	--	0.1766
Household head, non-single man	-0.0036	--	0.2055
	0.2464	--	0.3117
Household head, single woman	0.3297	0.4376**	--
	0.2063	0.2139	--

Household head, non-single woman	-0.0046	0.0718	--
	0.3619	0.3904	--
Main source of income of the household when the individual is not household head (Private farm)			
Labour income	-0.4058***	-0.2552***	-0.5169***
	0.066	0.0906	0.0923
Disability pension	-0.2953***	-0.1389	-0.4041***
	0.0749	0.1055	0.1023
Unemployment benefit	0.0058	0.1037	0.018
	0.2155	0.2602	0.3452
Non-earning source of income	-0.2214	-0.2606	-0.1124
	0.1612	0.2278	0.2126
Self-employment	-0.4926***	-0.305**	-0.6113***
	0.0917	0.1267	0.1236
Size of the place of residence (Living in rural areas)			
More than 100,000 inhabitants	-0.4979***	-0.4253***	-0.5164***
	0.0497	0.0703	0.0669
50 through 99,000 inhabitants	-0.2532***	-0.1766	-0.2949***
	0.0641	0.0909	0.0885
20 through 49,000 inhabitants	-0.4036***	-0.3184	-0.4279***
	0.059	0.0825	0.0799
10 through 19,000 inhabitants	-0.2946***	-0.2974	-0.2414**
	0.0741	0.1056	0.103
5 through 9,000 inhabitants	-0.2856***	-0.3835	-0.2131
	0.0996	0.1249	0.1362
0 through 5,000 inhabitants	-0.2187*	-0.1222	-0.2944*
	0.1133	0.1371	0.1763
Regional unemployment of the under-30 (group U30(2)_1)			
U30(2)_2	0.0431	0.0636	0.0257
	0.0568	0.0812	0.0791
U30(2)_3	0.1279**	0.0186	0.1739**
	0.0547	0.08	0.0746
U30(2)_4	0.1724***	0.1605*	0.1636**
	0.0566	0.0827	0.0803
U30(2)_5	0.1197**	0.1045	0.0956
	0.0585	0.0811	0.0901
Expected lifetime earnings of university degree	-0.0852***	-0.0582**	-0.1193**
	0.0274	0.0246	0.0579
Expected lifetime earnings of high secondary school	-0.0523	-0.0246	-0.1137**
	0.0328	0.0535	0.0534
Constant	-9.3367***	-9.987***	-8.2222***
	1.0108	1.2487	1.843
Athrho	0.2111***	-0.0817	0.4241***
	0.0741	(0.1046)	(0.1889)
Rho	0.2081	-0.0816	0.4004
	(0.0709)	(0.1039)	(0.1586)
Wald test (indep. Equs)(rho = 0): chi2(1) =	8.13*** (Pr.=0.00)	0.61 (Pr.=0.4346)	5.04** (Pr.=0.02)
Nobs	16018	7956	8062
Censored Nobs	6122	3100	3022
Uncensored obs	9896	4856	5040

Log pseudo-likelihood	-8708	-4599	-3967
Wald chi2	1295.75 Pr(0.00)	553.37 Pr(0.00)	420.88 Pr(0.00)

Note: * p<0.1; ** p<0.05; *** p<0.01. Standard errors are between brackets.

The sample includes young people aged 15 through 30.

The dependent variable of the main equation takes a value of 1 for employment and 0 for joblessness (unemployment and inactivity). It is missing in case the respondent is involved into education. The dependent variable of the selection equation takes a value of 1 for selection in the main equation and zero for participation into education. For the definition of independent variables see Table A.I. in the Appendix.

The reference group in the main equation is constituted of married men aged 15-30, with primary education or below, living with their parents in rural voivodships and whose household lives out of labour income.

The Huber/White/sandwich estimator of variance and clustering by household are used to correct for heteroskedasticity.

Source: own elaboration on the Polish LFS.

Table 2. Local unemployment and participation into education

	All	Women	Men	All	Women	Men
Variable		Model (1)			Model (2)	
U30(1)_2	0.0445	0.0284	0.0488	0.0127	0.0040	0.0120
U30(1)_3	0.0453	0.0419	0.0129	0.0331	0.0370	-0.0054
U30(1)_4	0.0942	0.0297	0.1326	0.0990	0.0339	0.1376
U30(1)_5	0.1233*	0.1204	0.1033	0.1300*	0.1262	0.1110
U30(1)_6	0.1396*	0.1266	0.1399	0.1239*	0.1090	0.1278
U30(1)_7	0.1663**	0.1593	0.1419	0.1755**	0.1529	0.1597
U30(1)_8	0.0533	0.1445	-0.0669	0.1070	0.1858	-0.0091
U30(2)_2	0.0434	0.0693	0.0208	0.0564	0.0651	0.0541
U30(2)_3	0.1240**	0.0186	0.1735**	0.1253**	-0.0115	0.2173***
U30(2)_4	0.1734***	0.1630**	0.1624**	0.2124***	0.1758**	0.2227***
U30(2)_5	0.1183**	0.1083	0.0832	0.1595***	0.1309	0.1365

*Note: * p<0.1; ** p<0.05; *** p<0.01.*

The coefficients have been obtained using the same estimation method as in Table 1 (see selection equation). Model (1) has the same specification as in Table 1, whereas the set of dummies relative to the city of residence is dropped from Model (2).

Note that for the first set of dummies the youth (15-30) unemployment rate is the same for men and women, whereas in the second set of estimates the youth unemployment rate is different for men and women. For a detailed definition of the two sets of dummies see Table A1 in the Appendix

Source: own elaboration on the Polish LFS.

Appendix A

Table A1. Definition of independent variables

Variables	Definition
Educational variables	Baseline – primary education or below *(years of education = 5 or below)*
University education	University attainment (*19*) or above (Philosophy doctorate, *22*)
Post-secondary diploma	Post-secondary attainment (*17*)
General high secondary	General secondary attainment (*13*)
Vocational secondary	Vocational secondary attainment (*10*)
Low secondary	Low secondary attainment (*8*)
Low, medium and high unemployment voivodships	Voivodships have been ranked according to their unemployment rate. Subsequently, they have been divided in three groups, each representing one third of the sample. In the Heckprobit estimates, the same procedure has been applied using the unemployment rate of people aged 15-30
Ureg30	The voivodship youth (15-30) unemployment rate
U30(1)_1	Voivodships included (the youth [15-30] unemployment rate is between brackets): 3 [8.6], 19 [9.7], 41 [7.8], 55 [10.0], 63 [8.0], 75 [8.7]
U30(1)_2	1 [12.6], 7 [12.8], 35 [13.3], 95 [13.4]
U30(1)_3	11 [14.3], 25 [14.8], 27 [14.7], 59 [14.7], 71 [14.5]
U30(1)_4	13 [17.8], 29 [17.6], 45 [15.6], 53 [17.3], 93 [15.6]
U30(1)_5	9 [18.7], 43 [18.0], 61 [19.1], 83 [19.3], 85 [19.5], 87 [18.4]
U30(1)_6	5 [20.7], 21 [21.9], 31 [22.0], 39 [21.8], 47 [20.5], 57 [22.4], 73 [20.4], 97 [22.4]
U30(1)_7	15 [23.8], 17 [24.2], 49 [24.1], 67 [24.6], 81 [24.8], 89 [24.4]
U30(1)_8	23 [26.1], 33 [26.7], 37 [27.0], 51 [26.3], 65 [27.2], 69 [28.4], 77 [28.3], 79 [28.3], 91 [29.9]
U30(2)_1	Voivodships included: Men: 3, 11, 19, 27, 41, 55, 63, 75; Women: 3, 7, 19, 35, 41, 45, 55, 63, 75, 95.
U30(2)_2	Men: 1, 7, 35, 53, 57, 59 and 71; Women: 1, 25, 47, 59, 61, 71, 83 and 93.
U30(2)_3	Men: 9, 13, 25, 29, 43, 85, 93, 95, 97; Women: 5, 11, 21, 27, 29, 43 and 87.
U30(2)_4	Men: 5, 15, 31, 37, 39, 45, 61, 73, 77, 79, 81, 87 and 89; Women: 9, 13, 17, 31, 39, 49, 53, 67, 73, 85 and 89.
U30(2)_5	Men: 17, 21, 23, 33, 47, 49, 51, 65, 67, 69, 83 and 91; Women: 15, 23, 33, 37, 51, 57, 65, 69, 77, 79, 81, 91and 97.
Expected lifetime earnings for university degree	Expected lifetime earnings have been computed for individuals aiming to attain a university degree or a high secondary school diploma. Separate out of the sample earnings equations have been estimated considering only the sample of individuals holding a university degree and individuals holding a high school diploma aged 31-60 if women and 31-65 if men (see Table A2). Based on the results of these estimates, the expected lifetime earnings (ELE) were computed for these two groups, as follows: $$ELE_i = \frac{EE_i(31)}{(1-r)^{31-age}} + \ldots + \frac{EE_i(65)}{(1-r)^{65-age}}$$ where *i= 1(University degree) and 2(high school diploma)*. ELE are calculated by discounting the expected earnings (EE) for certain age by the interest rate. Expected earnings are attained using means of the predicted value of earnings for certain age, within the Heckit specifications. In turn, the average annual interest rate, declared by the Warsaw Stock Exchange for the year 1997, is used as a discount factor.
Expected lifetime earnings for high secondary school diploma	See the explanation above
Opportunity cost of studying	The product of the average hourly wage and the probability to find employment by age, defined for each individual according to his/her age.

Table A2. Earnings equations of individuals holding a university degree or a high school diploma, based on Maximum likelihood sample selection procedure (women aged 31-60; men aged 31-65; Poland; 1997)

Variables	University graduates		High school graduates	
	b	s.e.	b	s.e.
Work experience	-0.0107	0.0077	-0.0007	0.005
Work experience squared	0.0004**	0.0002	0.0001	0.0001
Job tenure	0.0002	0.0001	0.0004***	0.0001
Women	-0.0754***	0.028	-0.1894***	0.0133
Civil status (Reference category: Married):				
Single	-0.0834*	0.0459	-0.0668*	0.0268
Divorced or in separation	-0.0697	0.0666	-0.0057	0.0301
Widow	-0.0469	0.0799	0.0441	0.0323
Training in the last three months	0.067	0.074	0.1427***	0.0384
Temporary contract	-0.2154	0.2293	-0.2702***	0.0498
Firm's ownership (State sector)				
Local authority	0.0915***	0.0306	0.1285***	0.0263
Cooperative organisation	0.0193	0.0855	-0.0954**	0.0307
Private firm	0.2144***	0.0552	-0.0114	0.0201
Firm's size (More than 100 employees)				
Less than 5 people	-0.1788***	0.0668	-0.0719***	0.0291
From 6 to 20 people	-0.0813**	0.0389	-0.0322	0.0199
From 21 to 50 people	-0.0254	0.0408	-0.011	0.0186
From 50 to 100 people	-0.0343	0.0364	-0.0171	0.0212
Does not know the size of the firm	-0.0105	0.0862	-0.0085	0.0563
Industry (State services)				
Private farms	-0.0362	0.0829	0.0215	0.0394
Cooperative farms			0.4313***	0.0338
Mining and Quarrying	0.1549	0.1032	0.1893***	0.03
Manufacturing	-0.0724	0.0529	-0.023	0.022
Electricity, gas and water supply	0.1702*	0.0958	0.1513***	0.0346
Construction	-0.1222	0.0985	0.0147	0.0362
Trade and repair	-0.2272***	0.0697	-0.0862***	0.0285
Hotels and Restaurants	-0.3110***	0.0941	-0.0006	0.0842
Transports, storage and communication	0.1044	0.0917	-0.0567**	0.0233
Financial services	0.0015	0.0513	0.0842**	0.0257
Other services	-0.2127***	0.0779	0.0202	0.0341
Region (Low unemployment voivodships)				
Medium unemployment voivodships	-0.0756**	0.0359	-0.0801***	0.0163
High unemployment voivodships	-0.0459	0.0341	-0.0605***	0.0158
Constant	2.0119***	0.0882	1.5486***	0.063

Selection equation

Work experience	0.0254	0.0158	0.0831***	0.0108
Work experience squared	-0.0010***	0.0004	-0.0019***	0.0002
Women	0.3002***	0.111	0.2202***	0.0592

Civil status (Married):				
Single	-0.28*	0.1494	0.2347***	0.093
Divorced	0.1583	0.1394	-0.1363*	0.0771
Widow	-0.0498	0.1712	-0.1455*	0.0841
Training in the last three months	0.4032**	0.1869	0.079	0.1333
Regions (Low unemployment voivodships)				
Medium unemployment voivodships	0.5379***	0.067	0.3304***	0.0386
High unemployment voivodships	0.2595***	0.0666	0.1094***	0.038
Relation to the household head (Wife/husband)				
Household head (man)	0.1729	0.112	0.341***	0.0616
Household head (single woman)	0.6433***	0.2011	-0.0383	0.1343
Household head (non single woman)	-0.2236**	0.0966	0.2311***	0.0501
Other type of relation (sun/daughter; uncle; grands)	0.277*	0.1483	0.1848***	0.0738
Living in rural areas	-0.0716	0.0754	-0.2921***	0.0368
Main source of income of the household (Labour income)				
Disability pension	-1.0105***	0.1085	-0.8216***	0.054
Unemployment benefit	-1.1812**	0.557	-1.4748***	0.2657
Non earning source of income	-7.1918***	0.1863	-1.6844***	0.26
Self employment	-1.1166***	0.0902	-1.244***	0.059
Constant	-0.3907**	0.1875	-1.1432***	0.148
Athrho	-0.1448	0.087	-0.2585***	0.0445
Lnsigma	-0.8304***	0.0352	-1.0297***	0.0277
Rho	-0.1438	0.0852	-0.2529	0.0416
Sigma	0.4359	0.0153	0.3571	0.0099
Lambda	-0.0627	0.0375	-0.0903	0.0155
Nobs		2773		8310
Censored Nobs		1523		4952
Uncensored obs		1250		3358
Wald test (indep. Equs)(rho = 0): chi2(1) =		2.77 (Pr=0.096)		33.77 (Pr=0.0)
Wald chi2(29)		127.13		-
Log pseudo-likelihood		-2388.356		-6186.593

*Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$.*

The sample includes men aged 31 through 65 and women aged 31 through 60. The dependent variable is the log of hourly wages (monthly wages divided by weekly hours of work times 4.3).

For the definition of the independent variables see Table A.I in the Appendix.

The reference group in the main equation is constituted of married men with a permanent labour contract in a large organisation (more than 100 employees) in the state service sector, leaving in a high unemployment voivodship. The reference group in the selection equation is made of married men living in a high unemployment voivodship, who are not household head, whose main source of income is neither a disability pension, nor an unemployment benefit.

The Huber/White/sandwich estimator of variance and clustering by household are used to correct for heteroskedasticity.

Source: own elaboration on the Polish LFS.