UNIVERSITA' COMMERCIALE "LUIGI BOCCONI"

Dottorato di Ricerca in Economia
XVI Ciclo

Ph.D. in Economics

ESSAYS IN APPLIED LABOUR ECONOMICS

Tesi di dottorato di:
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Ph.D. Thesis by
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ABSTRACT

This thesis is a collection of four articles. The first two deal with the labour market of college graduates in Italy and their university-to-work transition, focusing in particular on the returns to subject degree and on the implications of attending college in different regions for early occupational earnings. The third paper studies the different patterns of welfare participation among native and foreign born population in Sweden, while the remaining chapter is a comparative study of poverty entry and exit during later stages of life in eleven European Countries.

In the first chapter, I address the issues related to the economic returns associated to the choice of different subject degrees in Italy, trying to identify "winners and losers" among college graduate students in terms of wages and employment opportunities. Using a representative cross-sectional sample of the national population of college of graduates who competed their studies in 1998 and have been interviewed in a survey carried out by the National Statistical Institute (ISTAT) in 2001, I find evidence of significant returns to degree subject on male early occupational earnings, with considerable wage premia for students of engeneering and economics. College graduates in humanities subjects are worse off looking both at wages and at transitions from university into labour market status and into occupational groups.

The second paper investigates the inter-regional mobility of Italian college graduates and estimates the effect of attending college in Northern versus South-

ern regions of the country on early career earnings and in particular on the North-South wage gap. The data consist of the same survey analysed in chapter one. Differently from existing studies, I use a double-selection model to estimate earnings outcomes jointly with the sequential decisions 1) to migrate from Southern regions in order to attend university in Northern regions and 2) to work in Northern versus Southern regions, allowing for selection on both observables and unobservables factors. The endogeneity of the decision of attending college in Northern versus Southern regions is taken into accout, and the identification strategy uses indicators of supply of undergraduate degree subjects, of "congestion" (students/teachers ratio) in the province of residence and of geographic residence *before* university enrolment as instrumental variables. I show that "early movers" (students from Southern regions who moved to attend a university in Northern regions and found a job in Northern regions afterwards) not only earn on average around 25% more than "stayers" (students from Southern regions who attended a university in the South and found a job in the South) but also earn on average around 7% more than "late movers" (students from Southern regions who attended a university in the South and moved later to find a job in the North). Finally, I use the Oaxaca-Blinder wage decomposition technique to compute the estimated wage differentials between early (and late) movers and stayers, and I show that large part of the differentials can be imputed to endowments, suggesting that students with better potential and background gain from leaving Southern

regions earlier.

The third chapter confronts the participation of immigrants and native population in welfare programmes (mainly unemployment benefits and social assistance) in Sweden and their consequences on labour market participation of the two population subgroups. Sweden represents an ideal case study of these issues given the generosity of its welfare system and the rapid increase in the immigrant population occurred at the beginning of the 1990s. The main contribution of this paper is first to extend the scope of the analysis of existing studies to a longer time span, covering the periods both before and after the economic crisis experienced by the country in the early 1990s. With this purpose, a unique data source has been used, the Swedish Income Panel, an administrative database linking information from income tax record to population registers available at Statistcs Sweden, built up in the 1970s to study the degree of assimilation of immigrants in the Swedish labor market Second, the availability of a longer temporal dimension, enables us to model not only state probabilities, but also entry and exit from/into different states and the degree of persistence in each state among natives and foreign-born. We therefore use a competing risk discrete time hazard model, to model explicitly how the *time* spent in employment, unemployment and social assistence affects the transitions between different states, and to predict the mean duration in each state for the population subgroups of interest. Our main findings confirms that immigrants are more likely to participate in unemployment

and social assistance than natives; in addition, we show that the persistence of unemployment for the foreign born population has increased more than for the native population *after* the early 1990s crisis. Third, we find a sharp increase in the expected duration of social assistance recipiency much higher for immigrants (both refugess and non-refugees) starting exactly in the early 1990s.

The last paper of the thesis deals with the issue of elderly poverty, a theme which has gained great attention from both researchers and policy makers in the last years. The reforms of social protection systems currently ongoing in many European countries, in fact, and the associated phenomena of early exits from the labour market and of an increasing development of private pensions schemes, are at the origin of a growing variability of income sources during later stages of life. Empirical evidence on relative income poverty in Europe during the late nineties shows the absence of a clearcut convergence in poverty rates for older people; rather, an upward tendency can be registered in countries formerly with low-middle poverty incidence, in particular in Ireland, Denmark, UK, Greece and Portugal. Further, these patterns also display quite striking gender disparities. Research on income dynamics during later stages of life in a comparative perspective, though, cannot be considered exhaustive. A number of empirical studies have been carried out mainly from a country-specific perspective or on the basis of comparisons between two or three countries. The chapter investigates income dynamics during old age from a cross-country comparative perspective using the

longitudinal information on activity status and household incomes cointaind in the European Community Household Panel (1994-2001). Adopting an approach which has become standard in the econometric literature on income poverty, I use a multivariate discrete-time piecewise constant hazard rate model to estimate separately the major determinants of poverty entry and exit focusing on the older age groups. The methodology enables to assess the impact of personal characteristics, household characteritics, and other labour market factors on individuals' probability to leave and to enter poverty, and to make predictions about the mean durations of poverty spells for specific population subgroups. Particular attention has been devoted to investigate how changes in households' disposable income composition after retirement impact on poverty spells. Further, the econometric specification allows to distinguish the impact of observables characteristics from individual unobserved heterogeneity on duration dependence. The main results show that widowhood and single-person household are among the major factors decreasing the hazard of leaving poverty in all the countries considered. Further, the employment status of other household members is another key factor for insuring the elderly against the risk of poverty.

CONTENTS

CHAPTER 1

SUBJECT DEGREE CHOICE AND THE LABOUR MARKET OUTCOMES OF ITALIAN COLLEGE GRADUATES

1.1 Introduction

Little attention has been dedicated so far to the analysis of the labour market effects and to the wage premium associated to the choice of different university subject degree in Italy. Most of the existing empirical studies have focussed on on the wage premia associated to attending tertiary versus secondary and primary education and one of the main data sources at the national level employed for this purpose has been the Bank of Italy Survey on Household Income and Wealth. Such survey, nevertheless, is not based on a sample large enough to allow a more detailed investigation of the wage premia by degree choice. In this study, I use a valuable dataset based on a survey carried out by the National Statistical Institute (ISTAT) on the labour market outcomes of Italian graduates which has not been extensively employed yet in applied research. The dataset reports monthly net wages and contains very detailed information on labour market characteristics and history, demographics, and family background of a cross-section of 1998 college graduates interviewed in 2001, and represents an ideal tool to estimate the returns to degree choice. I show that even after controlling for a large numberof observable characteristics and proxies of individual unobserved ability, subject degrees represent an important source of heterogeneity affecting both employment probabibilities and wages. In particular, I show that, using both standard and selectivity-correceted OLS estimation, college graduates from humanities fields earn on average around 15% less than graduates in economic subjects and around

25% less than graduates in engeneering subjects, and exhibit higher probabilities of experiencing unemployment, labour market non-participation and to end up taking non qualified jobs. The paper is organized as follows. The next section reviews some of the most recent litarature on the evidence and the estimation methods of the returns to subject degree; section three illustrates the data used in this study; section four reports the results of the estimation of the wage premia by subject chosen; the final section focuses on the transition from university to work and the occupational outcomes of university graduates and concludes.

1.2 Relevant literature

The existing literature on wage premia by degree refers mainly to the UK evidence. Dolton and Makepeace (1986, 1990) studied several cohorts of UK graduates during the 1980s, showing the existence of a wage premium of graduates in economics ranging between 10-15% with respect to other degrees. Bratti and Mancini (2003) provide evidence on the occupational earnings of UK university graduates between 1980 and 1993 using different modelling approaches; they find out that OLS estimation of graduates earnings yields a significant wage premium associated to different degree choice, in particular graduates in economics and business subjects show positive earnings gain widening at the end of the 1980s, in the order of 8.3%, 8% and 9.7% compared to Science, Hi-tech and Humanities respectively. On the other hand, they also find out that OLS estimates become less

significant when self-selection effects associated to the influence of unobservables factors on the probability of enrolling into different subjects are taken into account. Among the studies existing at the international level, Brunello, Comi and Lucifora (2000) compare the wage gap between college and lower-than college education for a panel of ten OECD countries during the 1980s and the 1990s, but without distinguishing between university degree. With respect to the Italian case, one of the few studies investigating at length the returns to degree choice is the one by Boero et al. (2001), carried out on a sample of graduates who completed university in 1995 and were interviewed by the national statistical instute (ISTAT) in 1998. Further, the existing literature relevant to Italy, refers mainly to the labour market performances of graduates from a single region or from a single univerisity, using for instance the information provided by administrative university records.

1.3 The data

The sample is a cross section of college students from both public and private universities who obtained their university degree in 1998 and have been interviewed at the end of 2001. The survey has been carried out by the National Statistical Institute (ISTAT) for several years starting from the mid '80s, usually with intervals of 3 years between each survey. Individuals are sampled first at the university level, among the student population. The questionnaire contains detailed information of individual characteristics both before and after university

enrolment, namely family background (father and mother education and occupational status), region (and province) of residence, region (and province) of study during university, a series of indicators of performance, both at the university and high school level (high school leaving mark, final assessment of graduate thesis etc), together with a number of information on the labour market career of the students after graduation, unemployment experience, occupational status and sector of economic activity. The original sample counts 20844 individuals randomly sampled among the population of college graduates. It is important to point out that the survey includes only those students who completed successfully their university studies and do not report any information on drop-outs. The sample dimension is considerable, since the ratio between sampled person and the universe is roughly 1:5. Basic sample descriptive statistics are shown in Table 1.

Tables 2a and 2b instead focus on the geographical mobility of Italian college graduates, an apsect that will be explored in greater details in the second chapter of the thesis. The detailed information available in the dataset enables identifying the province (and therefore the region and the macro-region) of residence of the student before university enrolment, during the attendance of university, and at the end of university. The tables show a high degree of immobility in all macro-regions considered (North, Centre, South), both from regions of residence *before* university enrolment to regions where university was attended, and from residence *during* university to residence of work. In other words, graduate students tend

to both study and work in their region of origin and the region of study during university, has great influence on the choice of the region of work. This emerges clearly by looking at the outcomes of students coming from Southern Italy: for those who migrate to the North during their university studies, it is easier to find a job in the North, while among the residents from the South who also studied in universities in the South, only about 10% end up working in the North. The low degree of mobility towards employment in Northern regions of graduates from universities in the South has important implications for the understanding of the regional wage differentials and will be explored at length in the following chapter.

1.4 Estimation strategy

1.4.1 OLS

The ISTAT survey groups university subject degrees in 13 categories: 1) math-science, 2) chemistry-pharmacy, 3) geo-biology, 4) medicine, 5) engeneering, 6) architecture, 7) agrarian, 8) economics-statistics, 9) political science, 10) law, 11) humanities, 12) teaching, 13) psychology. A considerable improvement with respect to other available data sources is given therefore by the high level of disaggregation of the data by degree subjects. The equation we estimate is:

$$w_i = \sum_{j=1}^{k} \alpha_j S_{ij} + X_i\beta + \epsilon_i \tag{1.1}$$

where w_i indicates the logarithm of net monthly wage earned by individual i, $j = 1, 2...k$ is an index associated to the subject degree, S_{ij} is a dummy variable

taking value 1 if the subject j is chosen by individual i, and 0 otherwise, the a_j are the coefficients capturing the premium of chosing a given degree subject with respect to the reference group (in our case, economics and statistics). An alternative specification has been estimated using as dependent variable the hourly wage but the results didn't vary significantly. The same equation has been estimated separately for both men and women, but the results shown refer to men only; estimates relative the sample of women pointed out similar results to male wage equations, but gender differences in returns within degree subject appeared less striking than between degree-subjects differentials. Table 3 reports on the left column OLS estimates of earnings equations of male college graduates. The coefficients of the dummy variables capture the returns associated to different degree subjects with respect to economics and statistics, the reference category. The coefficient of the dummy variables, under the assumption of no correlation between the explanatory variables and the error term in equation 1.1, can be interpreted as unbiased and consistent estimates of the wage premia associated to economics with respect to other subjects. In the specification chosen, the graduates from medicine were excluded from the sample, since it is likely for them to be still involved in post-graduate specialization training three years after completing undergraduate studies. Sensitivity checks were also carried out to ascertain the robustness of the results to the choice of the reference category.

Bratti and Mancini (2003) adopt different approaches to assess the effects of

both endogeneity of and selection into degree subject on the bias of OLS estimates. The idea of multiple selection have been recently applied also by Dimova and Nang (2004) on wage differentials across sectors, where workers are considered to self-select into different occupational sectors, and relies on the extension by Lee (1983) of the Heckman's.(1979) single selection model.

In order to control for unobserved ability, we introduce among the set of observable controls, the score of the college degree ("voto di laurea"), the score of the high school diploma ("voto di maturità"), the type of high school chosen, a dummy indicating whether the student obtained the highest score ("cum laude"), and a dummy indicating whether the student ended his studies after the number of years envisaged by the normal length of the degree chosen. The approach is quite standard in the literature on the returns to schooling, (Card, 1999, Angrist and Krueger, 1999), and we deem that the set of controls included is rich enough to account for the potential bias induced by neglected unobserved ability on the OLS estimates of wage premia. Furthermore, we include a relevant set of standard controls for family background, namely mother and father education (at the student's age of 14), mother and father occupation, region of residence during university attendance, together with a set of controls for local labour market conditions, namely the local unemployment rate, the local employment rate, the regional relative GDP per capita. Among family background variables, mother's university education has positive influence on earnings, a finding already pointed

out in the literature (Brunello and Checchi 2003).

1.4.2 Selectivity issues

OLS estimates of the wage differentials are usually referred to as the "conditional wage differentials" (conditional on the wage beingobserved), while the wage differentials corrected for selectivity are reffered to as "unconditional" wage differentials. A problem arising when estimating wage equations only on a sample of individual at work (for whom wages are observable) is that such sample may be not random in the population. Following a standard approach in applied labour economcs (see among others Dearden, 1999, and Denny and Harmon, 2000, for the UK), we correct the potential bias of OLS estimates by estimating an Heckman-type selection equation of the probability for men of being in employment versus non-employment.

We therefore run in the first step a probit equation separately for both sexes over the full sample to estimate the probability of an individual to be in employment versus non-employment. In the second step, we estimate an augmented version of equation 1.1 as in Heckman (1979), corrected by the selectivity terms obtained in the first step. The wage equation conditional on participation therefore reads:

$$E(w_i \mid X_i, P_i = 1) = \sum_{j=1}^{k} \alpha_j S_{ij} + X_i\beta + \phi\hat{\lambda}_i + \varepsilon_i \qquad (1.2)$$

Where $\hat{\lambda}_i(X_i\gamma\psi)$ is the inverse Mills ratio. The results of the corrected wage equa-

tion are reported in the right column of Table 3. The coefficients are not significantly affected by the different specification, and the estimate of the correlation between the unobservable term in the selection equation and in the wage equation was not statistically significant. The results show that using both standard and selectivity-correceted OLS estimation, college graduates from humanities fields earn on average around 15% less than graduates in economic subjects and around 25% less than graduates in engeneering subjects, keeping everything else constant. Young workers in full time jobs, with permanent contracts and in highly-qualified professions, as could be easily expected, experience higher wages, and performance during university career in terms of final leaving degree and terminating studies on time also display a positive effect on wages. Interestingly, job experience during college years has a positive effect on earnings, while among the family background variables, only the educational background of the mother seems an important predictor of earnings under both specifications.

1.5 Esitmation of occupational choices and labour market outcomes

A study of the OECD in 1998 showed that in 1996, Italy ranked among the countries with the lowest employment probability of school leavers one year after leaving education, by different level of educational attaiment for both men and women (OECD, 1998). In this section we investigate the outcomes on the labour

market of Italian graduates 3 years after the end of their studies. First of all, we estimate a multinomial logit model of labour market status, considering three categories: employment, unemployment and out of the labour force.

According to the multinomial logit specification, the utility enjoyed by an individual associated to the choice j among a set of alternatives $\{1, ...j, ...k\}$ is labelled U^j; such "true" utility is unobservable to the econometrician, which instead observes V^j. The utility associated to the choice j is therefore modelled linearly as:

$$U^j = V^j + \varepsilon^j$$

An alternative j is selected rather alternative k if the following condition is satisfied:

$$U^j > U^k \text{ which implies } V^j + \varepsilon^j > V^k + \varepsilon^k \text{ for each } j \neq k$$

If the error terms $\varepsilon^j ....\varepsilon^k$ are distributed according to a Gumbel-type I distribution, the difference $(\varepsilon^j - \varepsilon^k)$ follows a logistic distribution (McFadden, 1973), and the multinomial probability that the alternative J is chosen is determined by:

$$P\{j\} = \frac{\exp(V^j)}{\sum_{i=1}^{k} \exp(V^i)} \tag{1.3}$$

Where $V^j = g^j(X_i\beta)$, and X_i is a set of regressors.

The results are shown in table 4 for the full sample (both sexes), where employment is chosen to be the base category. Multinomial logit estimation is common

in the literature on the school-to-work transition, and previous evidence on Italy can be found in Flabbi (2001) and Boero et al. (2001). A debatable assumption behind this model is the indipendence of irrelevant hypothesis (IIA): the choice made among two alternatives maximazes individuals' utility and is supposed to be independent from the existence of other alternatives.

The coefficients reported in the table are the odds ratio for each university degree. In this case, the estimation was carried out on the full sample, including a dummy variable for gender. The table should be read as follows: each cofficient can be interpreted as the risk of experiencing each condition (out of the labour force and unemployment) rather than employment for a graudate in degree i relative to a graduate in economics, conditional on a set of observables factors. The remaining regressors are not shown, but each eqiuation included information on family background (education and profession of both parents), university and high school performance, region of origin before university enrollment, region of study during university and finally some basic demographic characteristics (age, marital status etc.).

The results show that graduates in humanities subjects are faring worse than graudates in economics or in scientific disciplines, other things held constant. The performance of graduates in scientific areas, instead, is not significantly different from that of economists, and the only degree showing better outcomes is engeneering. Table 5 reports the results obtained following the same approach to

estimate a model of occupational choice (for both sexes), where the four occupational categories are defined as "high skill white collar" (*professioni intellettuali*), which is the base category, "low skill white collar" (professioni intermedie o tecnici specialzzati), "skilled blue collar" (*tecnici generici e amministrativi*) "low skilled blue collar" (*professioni non specializzate*). The figures show that the graduates in humanities seem again worse off than graduates in economics and scientific subjects in particular they are more exposed to the risk of ending up in menial or low qualified jobs.

1.6 Conclusions

Using a survey carried out by the National Statistical Institute (ISTAT) in 2001 on a sample of the cohort of graduates of 1998, I have shown evidence of significant returns to university degree choice, with considerable wage premia for students of engeneering and economics. Graduates in humanities subjects are worse off also looking at transitions from university into the labour market and into occupational groups. Further research is planned in particular to improve the estimation methodology in order to take into account the potential endogeneity of the subject degree dummies. By the same token, it is likely that students self-select into degrees, occupations and professions non-randomly which could be another sources of the potential inconsistency of simple OLS estimates. Finally, both endogeneity and sample selection issues might arise with respect to the dummies

relative to the region where niversity was attended and the region of work, but these issues will be dealt with in the next chapter.

1.7 References

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Table 1
Sample characteristics

	Females	Males	Total
Degree subject			
math-scientific	535	546	1,081
chemistry-pharmacy	560	471	1,031
geo-biology	681	463	1,144
medical	635	624	1,259
engineering	595	1,775	2,370
architecture	564	575	1,139
agrarian	383	402	785
economics-statistics	1,563	1,655	3,218
political-science	842	674	1,516
law	1,361	971	2,332
humanities	1,349	573	1,922
linguistic	992	263	1,255
teaching	631	245	876
psychology	596	320	916
Total	11,287	9,557	20,844
Economic activity			
employed	8,003	7,514	15,517
unemployed	1,343	590	1,933
out of the labour force	1,812	1,314	3,126
Professional groups			
intellectual professions	3,465	3,712	7,177
technical specialized professions	3,315	2,977	6,292
administrative professions	873	417	1,290
profession with no specialization	336	387	723
Other individual variables			
age	30.1	31.2	30.7
university leaving grade	104.3	101.7	103.0
high school leaving grade	49.5	48.1	48.8
Average wage by degree subject			
math-scientific	1118.4	1297.7	1208.0
chemistry-pharmacy	1108.7	1271.5	1190.1
geo-biology	978.5	1145.9	1062.2
medical	1421.0	1673.2	1547.1
engineering	1268.6	1363.2	1315.9
architecture	1032.4	1193.6	1113.0
agrarian	1055.5	1172.2	1113.8
economics-statistics	1121.3	1318.6	1219.9
political-science	1064.9	1328.3	1196.6
law	948.7	1089.8	1019.2
humanities	931.2	1066.9	999.0
linguistic	959.4	1050.7	1005.0
teaching	948.8	1177.1	1062.9
psychology	915.7	1123.5	1019.6

Table 2a
Residence before and during university enrolment

Residence during university	Region of residence before university			
	North	Centre	South	Italy
same province	48.9	61.0	48.3	51.2
same region	32.6	23.9	24.8	28.3
same macro-region	15.9	7.9	7.3	11.5
other macro-region	2.7	7.1	19.7	9.1
Total	100	100	100	100

Table 2b
Geographic mobility of Italian college graduates

During university	Before university											
	North				Centre				South			
	During work				During work				During work			
	North	Centre	South	Total	North	Centre	South	Total	North	Centre	South	Total
North	98.7	1.0	0.3*	100								
Centre	84.9	13.8*	1.2*	100								
South	-	-	-	-								
North					35.6	63.7	0.6*	100				
Centre					6.2	92.6	1.2*	100				
South					-	-	-	-				
North									62.2	8.2*	29.5	100
Centre									12.8	38.4	48.8	100
South									10.7	6.1	83.2	100

Table 3

Wage equation, dependent variable: male net monthly wage

	OLS			Heckman		
	Coff.	s.e.	z	Coff.	s.e.	z
Degree subject						
math-scientific	0.0057	0.0172	0.33	0.0067	0.0170	0.40
chemistry-pharmacy	-0.0064	0.0204	-0.31	-0.0071	0.0202	-0.35
geo-biology	-0.0780 ***	0.0222	-3.52	-0.0805 ***	0.0219	-3.67
engineering	0.0698 ***	0.0170	4.11	0.0708 ***	0.0168	4.21
architecture	-0.0840 ***	0.0307	-2.74	-0.0875 ***	0.0304	-2.87
agrarian	-0.0840 ***	0.0296	-2.83	-0.0860 ***	0.0293	-2.93
political-science	-0.0532 ***	0.0171	-3.12	-0.0535 ***	0.0169	-3.17
law	-0.1597 ***	0.0231	-6.92	-0.1640 ***	0.0227	-7.23
humanities	-0.1513 ***	0.0249	-6.09	-0.1532 ***	0.0246	-6.22
linguistic	-0.1423 ***	0.0277	-5.14	-0.1455 ***	0.0275	-5.30
teaching	-0.1459 ***	0.0319	-4.58	-0.1461 ***	0.0315	-4.63
psychology	-0.0308	0.0315	-0.98	-0.0339	0.0313	-1.09
reference group: economics-statistics						
Individual controls						
age	0.0056 ***	0.0016	3.40	0.0055 ***	0.0016	3.37
tenure	0.0006	0.0004	1.43	0.0006	0.0004	1.39
employed full-time	0.5815 ***	0.0261	22.31	0.5818 ***	0.0258	22.56
permanent contract	0.0738 ***	0.0104	7.08	0.0738 ***	0.0103	7.16
dependent employee	-0.0267	0.0189	-1.41	-0.0272	0.0187	-1.45
university leaving grade ("voto di laurea")	0.0034 ***	0.0006	5.31	0.0035 ***	0.0006	5.50
high school leaving grade ("voto di maturità")	0.0000	0.0006	0.01	0.0000	0.0006	-0.06
degree obtained on time ("in corso")	0.0325 *	0.0163	1.99	0.0325 **	0.0162	2.01
"cum laude"	0.0314 **	0.0119	2.65	0.0300 ***	0.0118	2.55
professional certification	-0.0185	0.0120	-1.54	-0.0176	0.0119	-1.47
private university	0.0186	0.0197	0.95	0.0163	0.0194	0.84
training	0.0293 ***	0.0075	3.92	0.0298 ***	0.0074	4.04
married	0.0489 ***	0.0101	4.83	0.0490 ***	0.0100	4.89
children	0.0361 **	0.0178	2.03	0.0380 **	0.0177	2.15
Working experience						
occasionally working during university	0.0316 ***	0.0082	3.87	0.0326 ***	0.0081	4.03
working during university	0.0857 ***	0.0154	5.58	0.0847 ***	0.0152	5.55
previously interrupted job	0.0245 ***	0.0082	3.00	0.0257 ***	0.0081	3.16
ref. group: never worked before						
Professional groups						
technical specialized professions	-0.0384 ***	0.0087	-4.42	-0.0374 ***	0.0086	-4.35
administrative professions	-0.0858 ***	0.0159	-5.40	-0.0852 ***	0.0157	-5.42
professions with no specialization	-0.0905 ***	0.0204	-4.43	-0.0901 ***	0.0202	-4.46
ref. group: intellectual professions						
Family background						
mother's education: lower secondary	0.0194	0.0118	1.64	0.0190	0.0117	1.63
mother's education: upper secondary	0.0220	0.0134	1.64	0.0211	0.0133	1.59
mother's education: tertiary	0.0391 **	0.0185	2.12	0.0397 **	0.0183	2.17
ref: primary education						
father's education: lower secondary	-0.0043	0.0126	-0.34	-0.0036	0.0125	-0.29
father's education: upper secondary	0.0185	0.0141	1.32	0.0195	0.0139	1.41
father's education: tertiary	0.0136	0.0176	0.77	0.0117	0.0174	0.67
ref: primary education						
Other controls						
Dummies for local labour demand	yes			yes		
Dummies for labour market tightness	yes			yes		
Dummies for high-school type	yes			yes		
Dummies for current region of work	yes			yes		
Dummies for regions where university was attended	yes			yes		
Dummies for sector of economic activity	yes			yes		
Observations	4406			6988		
R^2	0.41			-		

Table 4

Multinomial logit model: labour market outcomes by subject degree

	Odds Ratios (ref. group: employment)					
	Unemployment			Out of the labour force		
	Coff.	s.e.	z	Coff.	s.e.	z
Degree subject						
math-scientific	0.8432	0.1257	-1.14	1.0727	0.1186	0.64
chemistry-pharmacy	0.8519	0.1463	-0.93	1.3349 ***	0.1648	2.34
geo-biology	2.0822 ***	0.2697	5.66	2.0324 ***	0.2195	6.57
engineering	0.4685 ***	0.0763	-4.66	0.5887 ***	0.0727	-4.29
architecture	1.2491	0.1943	1.43	0.9432	0.1333	-0.41
agrarian	1.8238 ***	0.2914	3.76	1.5895 ***	0.2139	3.44
political-science	1.6278 ***	0.1908	4.16	0.6308 ***	0.0796	-3.65
law	3.3838 ***	0.3284	12.56	3.0402 ***	0.2493	13.56
humanities	2.8134 ***	0.2986	9.75	0.9797	0.1036	-0.19
linguistic	1.8942 ***	0.2273	5.32	0.8943	0.1113	-0.90
teaching	1.3530 *	0.2075	1.97	0.6421 ***	0.1017	-2.80
psychology	2.5301 ***	0.3741	6.28	1.2711	0.1846	1.65
reference group: economics-statistics						
Observations	19047			19047		

Table 5
Multinomial logit model: occupational outcomes by subject degree

	Odds Ratios (ref. group: intellectual professions)								
	technical specialized professions			administrative professions			professions without specialization		
	Coff.	s.e.	z	Coff.	s.e.	z	Coff.	s.e.	z
Degree subject									
math-scientific	0.43 ***	0.04	-9.7	0.08 ***	0.02	-10.1	0.40 ***	0.11	-3.3
chemistry-pharmacy	0.23 ***	0.02	-14.1	0.07 ***	0.02	-8.0	1.11	0.27	0.4
geo-biology	0.34 ***	0.03	-11.0	0.22 ***	0.04	-7.7	1.54 *	0.33	2.0
engineering	0.58 ***	0.05	-6.9	0.19 ***	0.04	-8.9	1.16	0.23	0.7
architecture	0.15 ***	0.02	-17.4	0.08 ***	0.02	-8.9	0.64	0.17	-1.7
agrarian	0.40 ***	0.04	-8.3	0.24 ***	0.06	-5.6	2.28 ***	0.52	3.7
political-science	0.83 **	0.07	-2.2	1.05	0.12	0.4	2.16 ***	0.40	4.2
law	0.24 ***	0.02	-17.5	0.43 ***	0.05	-7.2	0.99	0.18	-0.1
humanities	0.51 ***	0.04	-7.8	0.78 *	0.10	-2.0	3.23 ***	0.58	6.6
linguistic	0.74 ***	0.07	-3.1	1.22	0.16	1.5	2.93 ***	0.59	5.4
teaching	1.18	0.13	1.5	0.66 **	0.12	-2.2	4.15 ***	0.93	6.4
psychology	0.46 ***	0.05	-7.1	0.69 **	0.12	-2.1	4.21 ***	0.85	7.1
reference group: economics-statistics									
Observations	14934			14934			14934		

CHAPTER 2

DOES IT PAY TO STUDY FAR FROM HOME? EXPLAINING THE RETURNS TO GEOGRAPHIC MOBILITY OF ITALIAN COLLEGE GRADUATES

2.1 Introduction and motivation

Italy has been characterised historically by wide regional labour market imbalances, in particular between Northern and Southern regions. The attempt of understanding and explaining such disparities has fuelled economic research from both micro and macro perspectives in the last years. In this paper, I consider a specific and, so far, not extenisvely explored aspect related to this picture, and I focus on the internal regional mobility of Italian college graduates. One of the arguments in the current national policy debate is that the Italian labour market should gain more flexibility. The population group under study, university students, can be expected to be among the most "mobile" social groups. I will try to explore to which extent this is true and which are the factors affecting the decisions of students to move for purpose of studying and working in regions different from the area of origin. I show that the "early movers", students who leave from Southern regions to study in universities in the North have higher probabilities of finding a job in the North, and receive higher earnings (in the order of 20%) than the "stayers", students whose region of origin is the South but never migrate. Besides, the early movers also earn more (around 7%) than the "later movers", students who attend university in the South and migrate to work in the North only at the end of college. In this paper, I model this sequential process when both decisions, to migrate for study and to migrate for work, are considered endogenous; using standard wage decompositions techniques, I also show to which

extent the resulting wage differentials can be attributable to observable (endowments) rather than unobservable characteristics (discrimination). The paper is organised as follows. The next section summarizes the relevant literature related to this work; the third section describes the data used, a representative survey of college students who completed university in 1998 and have been interviewed by the national statistical institute (ISTAT) in 2001. The fourth section presents the econometric framework adopted, discusses identification conditions and the choice of instruments, and comments the results of the wage decomposition. The fifth section discusses the set of results obtained following an alternative approach based on propensity score matching estimators, the last section concludes.

2.2 Related literature

This work relates to a recent paper by Brunello and Cappellari (2005), which investigates the impact of college-specific quality on employment probabilities and wages, using the same data source and, less closely, to the work by Card (1993) on . Audas and Dolton (2003) have studied the internal regional mobility of college graduates in the UK, taking into account return-migration decisions; Dolton and Makepeace (1990), Naylor and Smith (2001), McKnight, Naylor and Smith (2000) and Boero, McKnight, Naylor and Smith (2000) have studied the effects of attending different subject degrees on employability and wages of college graduates. Similarly, Bratti and Mancini (2003), focus on the early occupational

earnings of young UK graduates by adopting different methodological approaches, and confronting results obtained on the estimation of wage premia associated to attend different subject degrees. Hilmer (2001) used a double-selection rule to account for the effects of selection into tertiary education and into labour force participation on wages while Brewer, Eide and Ehrenberg (1999), with a similar approach, have focussed on the returns to attending private universities. Among the studies on Italy, Checchi, Ichino and Rustichini (1999) have shown the determinants of different degree of social mobility in the North and in the South; a description of the main features associated to the Italian education systems can be found in Brunello and Checchi (2003), while Checchi (2003), studies the effects on wages of private vs. public college attendance.

2.3 The data

In this study, I use a unique data source based on a survey carried out by the National Statistical Institute (ISTAT) on the labour market outcomes of a representative sample of Italian former university students. The dataset reports monthly net wages and contains information on labour market characteristics and histories, demographics, and family background of the cohort of 1998 college graduates interviewed in 2001. Some basic descriptive statics of the sample are reported in Table 1 in the Annex. The survey has been carried out by ISTAT for several years starting from the mid '80s, usually with intervals of 3 years be-

tween each survey. Individuals are sampled first at the university level, among the population of university students. The questionnaire contains very detailed information on individual characteristics both before and after university enrolment, namely family background (father and mother education and occupational status), region (and province) of residence, region (and province) of study during university, a series of indicators of performance, both at the university and high school level such as university and high school leaving grade (normally used as very good proxy of individual unobserved ability), together with information on the labour market careers of the students after the end of their studies: unemployment experience, occupational status, profession and sector of economic activity. The original sample includes 20844 individuals randomly sampled among the total graduate population. The sample dimension is considerable, since the ratio between sampled person and the population is roughly 1:5. Tables 1 and 2 provide some evidence on the geographical mobility of the population under study. The detailed information available in the dataset, in fact, enables identifying the province (and therefore the region and the macro-region) of residence of the student before university enrolment, during the attendance of university, and at the end of university. The tables show a high degree of immobility in all macro-regions considered (North, Centre, South), both from pre-university to university residence, and from residence during university to residence of work. In other words, graduate students tend to both study and work in their region

of origin. In particular, the region of study during university has great influence on the choice of the region of work. This is evident looking at students coming from Southern Italy: for those who migrate to the North during their university studies, it is easier to find a job in the North, while among the residents from the South, who attended also a university in the South, only about 10% will be able to work in the North. Mobility patterns are not sensibly affected after controlling for sector of work, as shown in tables 3a and 3b: students ending up working in the private sector exhibit a mobility slightly higher than students working in the public sector, but the difference in the shares doesn't seem sufficiently relevant to justify a separate analysis. The low degree of mobility towards employment in Northern regions of graduates from universities in the South, might be imputed to different factors: on the one hand it could be too costly for students to move, given also the low (if not inexistent) generosity of the Italian public transfers system towards students; on the other, family and other informal ties and preferences for living close to the parents' place could play an important role as well. As far as the "early movers" are concerned (those who move to study in the North and end up finding a job in the North), they might be advantaged by the opportunity to find a better job match once they are in a more dynamic labour market, and they might also have the chances to rely on better networks for job search purposes.

2.4 A double selection model of migration for study and migration for work

In this section I formulate an econometric framework in order to model explicity the decisions to migrate to study and to migrate for work, taking into account the potential self-selection processes associated to both choices. The estimation strategy relies on a double sample selection model intorduced by Tunali (1986), which has found recent applications in the fields of estimation of public-private sector wage differentials (Heitmueller, 2004) and of motherhood and employment decisions of women (Wetzels and Zorlu, 2003).

2.4.1 Econometric framework

At the beginning of and during the course of their university career, individuals face the following sequential choices: 1) where to study: to attend university in the same region of origin (residence before university) or to migrate to study in another region; 2) where to work: this choice is made after the completion of university studies; students now face the decision whether to look for a job in the same region where university was attended or to migrate to work in another region (which may or may not be their same region of residence before university enrolment). I consider hereby the decisions of individuals whose region of origin is "South", and who decide before enrolling into university whether to study in the South or migrate to study in the North, and after the conclusion of university

whether to work in the North or in the South. The same structure can be extended to individuals resident before university enrolment in the North and in the Centre and migrating to study or work to other regions. The sequential decision process described yields to the four types of outcomes illustrated in Figure 1.

The two sequential decisions can be modelled according to the following reduced-form latent variable formulation. Let the two latent variables , Y_{1i}^{*} and Y_{2i}^{*} define the individual utility associated to the decisions to study in Northern regions rather in Southern regions, and the utility associated to work in the North rather than in the South, respectively:

$$Y_{1i}^{*} = X_{1i}^{'}\beta_1 + \varepsilon_1 \tag{2.1}$$

$$Y_{2i}^{*} = X_{2i}^{'}\beta_2 + \varepsilon_2 \tag{2.2}$$

The two error terms in both equations are assumed to be normally distributed both with zero mean and variance equal to 1, and to be correlated with covariance equal to ρ. The correlation between the disturbance terms in equations 1 and 2 is supposed to capture the correlation between the two decisions. The set of covariates included in both X_{1i} and X_{2i} capture individual's specific attributes, family background and region-specific characteristics (e.g. local labour market conditions) which are likely to influence the two migration decisions. If the choices of migrating to study and to work were independent, then the covariance between the two error terms would be zero, and the two equations could have been estimated separately using two standard probit models. Separate estimations of

equations 2.1 and 2.2 ignoring the correlation between error terms would lead to biased estimates of the parameters of interest.

In a latent variable formulation, the utilities Y_{1i}^* and Y_{2i}^* are unobservable to the econometrician, who can observe only whether the decisions to migrate to study ot to work actually took place. I therefore indicate with the dummy variable Y_{1i} the decision to migrate to study and with the dummy variable Y_{2i} the decision to migrate to work: Y_{1i} takes value 1 if the individual migrates from the South to study in a university in the North, and takes value 0 if he attends university in the South, while Y_{2i} takes value 1 if after the end of university the student decides to work in the North, and value 0 if the student decides to work in the South. More formally, the two sequential decisions can be described by the following index functions:

$$Y_{1i} = \begin{cases} = 1 \;\; if \; Y_{1i}^* > 0 \\ = 0 \text{ otherwise} \end{cases} \tag{2.3}$$

$$Y_{2i} = \begin{cases} = 1 \;\; if \; Y_{2i}^* > 0 \\ = 0 \text{ otherwise} \end{cases} \tag{2.4}$$

The probabilty for individual i of being in one of the four outcomes S_1, S_2, S_3, S_4 shown in Figure 1, is therefore determined by:

$$\begin{aligned} \Pr\{i \in S_1\} &= \Pr(Y_{1i} = 1, Y_{2i} = 0) = \Pr(\varepsilon_1 > -X_{1i}'\beta_1, \varepsilon_2 < -X_{2i}'\beta_2) = \\ &= \Phi_2(X_{1i}'\beta_1, -X_{2i}'\beta_2, -\rho) \end{aligned} \tag{2.5}$$

$$\Pr\{i \in S_2\} = \Pr(Y_{1i} = 1, Y_{2i} = 1) = \Pr(\varepsilon_1 > -X_{1i}\beta_1, \varepsilon_2 > -X_{2i}\beta_2) =$$
$$= \Phi_2(X'_{1i}\beta_1, X'_{2i}\beta_2, \rho) \tag{2.6}$$

$$\Pr\{i \in S_3\} = \Pr(Y_{1i} = 0, Y_{2i} = 1) = \Pr(\varepsilon_1 < -X'_{1i}\beta_1, \varepsilon_2 > -X'_{2i}\beta_2) =$$
$$= \Phi_2(-X'_{1i}\beta_1, X'_{2i}\beta_2, -\rho) \tag{2.7}$$

$$\Pr\{i \in S_4\} = \Pr(Y_{1i} = 0, Y_{2i} = 0) = \Pr(\varepsilon_1 < -X'_{1i}\beta_1, \varepsilon_2 < -X'_{2i}\beta_2) =$$
$$= \Phi_2(-X'_{1i}\beta_1, -X'_{2i}\beta_2, \rho) \tag{2.8}$$

where $\Phi_2(.)$ indicates the cumulative distribution of a normal bivariate distribution function.

In general, the two migration decisions might not be independent, since students who move to study in a university in Northern regions might have higher chances to find a job in the North, given that after the end of uiversity their job search activity might have started at the local level. From the econometric standpoint, this means estimating equations 2.3 and 2.4 using a sequential probit model with full observability (since wages are observed in all four final outcomes). This approach is justified by the sequential nature of the two processes, which cannot be considered to take place contemporaneously (e.g. the information sets of the agents at both decision nodes might be different). Simultaneous processes could have been estimated using a bivariate probit model. For estimation purposes, a sequential probit model is equivalent to a bivariate probit model where

the explanatory variables on the right hand side of equation include as a dummy the dependent variable of the second selection equation.

For each of the four outcomes S_1 to S_4 outlined in table 8, the associated wage equation is:

$$\ln w_{ji} = Z'_{ji}\gamma_j + \eta_{ji} \qquad \text{with} \quad j = 1,2,3,4 \tag{2.9}$$

The error terms in equations 2.1, 2.2 and 2.9 are assumed to be jointly distributed according a trivariate normal distribution, with mean zero and covariance matrix given by:

$$\Sigma_j = \begin{bmatrix} var(\eta_j) & cov(\eta_j,\varepsilon_1) & cov(\eta_j,\varepsilon_2) \\ & var(\varepsilon_1) & cov(\varepsilon_1,\varepsilon_2) \\ & & var(\varepsilon_2) \end{bmatrix} \qquad j = 1,2,3,4 \tag{2.10}$$

$$\Sigma_j = \begin{bmatrix} \sigma_j^2 & \sigma_{j,\varepsilon_1} & \sigma_{j,\varepsilon_2} \\ & 1 & \sigma_{\varepsilon_1,\varepsilon_2} \\ & & 1 \end{bmatrix} \qquad j = 1,2,3,4 \tag{2.11}$$

The correlation between the error term η_{ij}, $j = 1,2,3,4$ in each wage equation and the error term in each of the two selection equations 2.1 and 2.2 is defined ρ_{j,ε_k}, with $j = 1,2,3,4$ and $k = 1,2$, and is supposed to capture unobservable factors or individual characteristics which might affect at the same time the decisions to migrate and the wage: for instance, individuals with high unobserved ability might be more willing to move to better labour market opportunities in the North and self-select into the "early migrants" group, and at the same time might be

more likely to find highly paid jobs.

In equation 2.9, $E(\eta_{ij}|Z_i') \neq 0$, therefore in order to estimate consistently γ_j, the wage equation needs to be corrected for the selectivity terms obtained from estimating equations 2.3 and 2.4 using a sequential probit model. The estimation procedure follows a two-step approach in line with Heckman (1979). In the first step, the sequential probit is estimated using maximum likelihood on the basis of equations 2.3 and 2.4 and the double-selection correction terms (corresponding to the inverse Mills ratios in the univariate selection case) are derived; in the second step, the correction terms are included in the wage equation to obtain consistent estimates. The expressions of the four selectivity terms (two for the "migration to study" equation and two for the "migration to work" equation) are obtained following Tunali (1986):

$$\hat{\lambda}_{i,s_1} = \varphi(X_{i1}'\hat{\beta}_1)\Phi\left(\frac{X_{i2}'\hat{\beta}_2 - \rho X_{i1}'\hat{\beta}_1}{\sqrt{1-\rho^2}}\right)\frac{1}{\Phi_2(X_{i1}'\hat{\beta}_1, X_{i2}'\hat{\beta}_2, \rho)} \tag{2.12}$$

$$\hat{\lambda}_{i,w_1} = \varphi(X_{i2}'\hat{\beta}_2)\Phi\left(\frac{X_{i1}'\hat{\beta}_1 - \rho X_{i2}'\hat{\beta}_2}{\sqrt{1-\rho^2}}\right)\frac{1}{\Phi_2(X_{i1}'\hat{\beta}_1, X_{i2}'\hat{\beta}_2, \rho)} \tag{2.13}$$

$$\hat{\lambda}_{i,s_0} = \varphi(X_{i2}'\hat{\beta}_2)\Phi\left(-\frac{X_{i1}'\hat{\beta}_1 - \rho X_{i2}'\hat{\beta}_2}{\sqrt{1-\rho^2}}\right)\frac{1}{\Phi_2(X_{i1}'\hat{\beta}_1, -X_{i2}'\hat{\beta}_2, -\rho)} \tag{2.14}$$

$$\hat{\lambda}_{i,w_0} = -\varphi(X_{i2}'\hat{\beta}_2)\Phi\left(\frac{X_{i1}'\hat{\beta}_1 - \rho X_{i2}'\hat{\beta}_2}{\sqrt{1-\rho^2}}\right)\frac{1}{\Phi_2(X_{i1}'\hat{\beta}_1, -X_{i2}'\hat{\beta}_2, -\rho)} \tag{2.15}$$

Where $\varphi(.)$ denotes the univariate standard normal density function, $\Phi(.)$ the univariate distribution function, and $\Phi_2(.)$ the bivariate standard normal distribution function.

For each of the four outcomes S_1 to S_4 outlined in Figure 1, therefore, the associated corrected wage equations are:

$$E(\ln w_{1i}|Z_i', Y_{1i}=1, Y_{2i}=1) = Z_{1i}'\gamma_1 + \sigma_1\rho_{1,\varepsilon_1}\hat{\lambda}_{i,s_1} + \sigma_1\rho_{1,\varepsilon_2}\hat{\lambda}_{i,w_1} \iff i\epsilon S_1 \tag{2.16}$$

$$E(\ln w_{2i}|Z_i', Y_{1i}=1, Y_{2i}=0) = Z_{2i}'\gamma_2 + \sigma_2\rho_{2,\varepsilon_1}\hat{\lambda}_{i,s_1} + \sigma_2\rho_{2,\varepsilon_2}\hat{\lambda}_{i,w_0} \iff i\epsilon S_2 \tag{2.17}$$

$$E(\ln w_{3i}|Z_i', Y_{1i}=0, Y_{2i}=1) = Z_{3i}'\gamma_3 + \sigma_3\rho_{3,\varepsilon_1}\hat{\lambda}_{i,s_0} + \sigma_3\rho_{3,\varepsilon_2}\hat{\lambda}_{i,w_1} \iff i\epsilon S_3 \tag{2.18}$$

$$E(\ln w_{4i}|Z_i', Y_{1i}=0, Y_{2i}=0) = Z_{4i}'\gamma_4 + \sigma_4\rho_{4,\varepsilon_1}\hat{\lambda}_{i,s_0} + \sigma_4\rho_{4,\varepsilon_2}\hat{\lambda}_{i,w_0} \iff i\epsilon S_4 \tag{2.19}$$

Outcome 1 corresponds to the condition of "early movers", outcome 3 to "late movers" and outcome 4 to "stayers"; outcome 2 potentially identifies return-migration, but for this cell the sample size is too small to enable any analysis.

2.4.2 Identification

The identification conditions for the sequential probit model outlined in the previous sub-section require that at least one element in each vector of explanatory variables in each selection equation is not included in the wage equation. Further, given the non zero correlation between the two selection equations, there must be at least one explanatory variable in the first selection equation 2.1 which does not appear on the right hand side of the second selection equation 2.2 (Poirier,

1982). In order to identify the dummy "university attended in the north" (or north/centre) in the second selection equation, I introduce among the control variables in the first selection equation a number of covariates which are supposed to capture factors affecting the decision to attend university in different regions at the time of enrolment into university but can be considered uncorrelated with the individual wage observed after the end of the college. Other than the dummies for the region of origin before university enrolment, I introduce four instrumental variables: the first instrument is given by a dummy indicating whether the student was living in the main city (*capoluogo*) in the region of origin before enrolling into university. One can expect in fact a higher concentration of univeristies in main cities, which means a higher supply of education available at the local level; further, it is more likely that big cities host universities with longer traditions, which might be perceived as good quality colleges by students; both aspects are likely to be negatively correlated with the probability to move to other regions for students living in the main city of each region, and can also be gauged as independent for the observed individual wage. The second instrumental variable used is a dummy capturing whether a university was recently built in the province (*provincia*) of origin (or in neighbouring provinces for areas where no university was present) *before* the time of enrolment into university (beginning of the 90s). One can expect also this factor to be negatively correlated with geographic mobility, since it represents an increase in the supply of tertiary education at the local

level which might be attractive to student facing budgetary constraints (or other sort of restrictions) to study elsewhere. The third instrumental variable is given by the total number of undergraduate courses supplied by the universities located in each province (or in neighbouring provinces for areas where no university is present) at the time when students in the sample enrolled into unversity. Given that the sample contains individuals who completed their education in 1998, I consider the number of courses offered in the academic year 1992-1993 by universities located in the province of residence of each individual (CRUI, 1997). This instrument is supposed to reflect the education supply available at the local level, or the study opportunities each individual can benefit from by studying in the province of origin. Again, one can expect that in areas with a high concentration of available undergraduate courses, students benefit form a higher variety in the supply of education and might have less incentive to move to other provinces or regions to choose their preferred subject. The fourth instrument is related to the previous one, and consists in a dummy capturing whether a technical university (*politecnico*, which in Italy normally offer a greater variety of engeneering courses than standard universities) was present in the province of origin before university enrolment. A complete list of the variables used in the estimation is provided in Table 3. Two additional instruments have been also used originally but they didn't result significant: namely, a potential measure of "congestion" given by the ratio between the number of students enrolled over the number of academic

teachers computed at the province level (or in neighbouring provinces for the areas without university) and a dummy indicating the presence of a university in the province of origin of each student before university enrolment. The results associated with these latter instruments are not shown. The wage equation instead is identified by the dummy accounting for the presence of children in the second selection equation: it can be expected in fact that students with children are less likely to move to work in other regions, since they might face additional budgetary constraints and might take advantage of the proximity to parents or family for child-rearing purposes. Using the presence of children as an exclusion restriction is also a standard practice in the estimation of wage equations correcting for selectivity, though one should be aware of the potential endogeneity of this variable with respect to earnings as well.

2.4.3 Wage decomposition

After estimating the wage equations with and without correction terms for each of the outcomes under study, we can investigate which factors account for the wage differentials. We follow hereby the decomposition technique introduced by Oaxaca (1973) and Blinder (1973), and implemented using the programs *decomp* and *oaxaca* (Jann, 2005) written in STATA (the latter allows also computing standard errors). A generic wage differential between two population subgroups

1 and 2:

$$\Delta = \overline{\ln w_1} - \overline{\ln w_2} = \overline{Z_1}'\hat{\gamma}_1 \quad \overline{Z_2}'\hat{\gamma}_2$$

can be decomposed in the sum of the components related to endowments (observable characteristics) and coefficients (how the observable characteristics are valued and compensated by the market). I will therefore focus on the wage differentials between the following population subgroups of interest: "early movers" and "stayers"; early movers and "late movers", and between "late movers" and "stayers", using the following decomposition:

$$\begin{array}{rcccc} \Delta & = & (\overline{Z_1} - \overline{Z_2})'\hat{\gamma}_1 & + & \overline{Z_2}'(\hat{\gamma}_1 - \hat{\gamma}_2) \\ & - & \text{explained part} & & \text{unexplained part} \\ & & \text{(E)} & & \text{(U)} \end{array}$$

2.4.4 Results

Table 4 reports the estimates of the sequential probit model for both Model I and Model II. Among the explanatory variables, the instruments used to identify the endogenous dummy "Study in the North (or North/Centre)" in the second selection equation (right column under both Model I and II) are highlighted in bold. We notice that in both specification, (Model I and II), the instruments chosen are highly significant and with the expected negative sign; only the number of courses supplied in the province of origin before enrolment is weakly significant under Model I, which might also be due to the low number of observations available

when the macro-region "North" is not pooled with the macro-region "Centre". Interestingly, proxies for individual ability have the expected sign in influencing positively students' decisions to migrate to study in Northern regions. In general we can draw that male students, with higher ability, coming from more selective schools (classic or scientific high school types, *liceo*) are more likely to migrate to study in the North, other factors being equal. Variables capturing parental background, instead, do not show the expected significant effect on mobility for study purposes. The coefficient on the endogenous dummy in the second selection equation is positive and highly significant under both Model I and II, showing that students who moved to study in colleges in the North (or North/Centre) are more likely to work in the same macro-region than students who attended college in the South. Students of economics and engeneering and with poorer familiar background (only the coefficient on father's education is significant) are more likely to stay in the North (or North/Centre) to work, while having children, completing university too late and having chosen humanities and languages as degree subject negatively affects the probability of work in the North (or North/Centre). The estimates shown under Model II display in general better statistical significance, most probably due to the increased number of observations. Both size and signs of the coefficients are in line with those obtained under model I, and the fit is generally improved. The main differences are that according to model II, attending a private university has a positive and significant impact on the probability

of working in the North/Centre, and the parental background variables display now mixed effects in opposite directions. It is important to point out that the coefficient ρ, the correlation between the error terms in the two selection equations, which is assumed to capture eventual selection effects due to unobservable factors, is not statistically significant neither under Model I nor under Model II. It is possible, therefore, to draw that the specification chosen is sufficient to capture selection effects through the controls for observable characteristics included in the two selection equations of the sequential probit model.

Tables 5a and 5b show the estimated wage equations for the three outcomes of interest with and without selction corrections, for Model I and II respectively. The cofficients reported under the column "without selection" are obtained from simple OLS estimation of the wage equations for each outcome, while those reported under the column "with selection" are obtained from an OLS estimation of the wage equation corrected for the two selectivity terms obtain from the sequential probit model (two-step estimation). Interestingly, the selection effects, which are supposed to capture the effects of unobservable factors on the sequential decision process, are never significant with the exception of the "stayers" equation under model II. On the one hand this could derive from the small saple size, on the other, it could indicate that the specification of the model is accurate enough to capture all the potential selection effects due to observable characteristics, ruling out in nearly all cases of interest the presence of a significant selection on unobservables.

As a consequence, we also notice that the fit of the model does not improve when selection terms are included. The stayers equation displays the best fit given the relatively higher number of observations. In general, the controls included have the expected sign. We notice that full time employee, with permanent contracts, working in bigger firms, receiving firm specific training and having studied economics or engeneering receive higher wages, other things equal. Attending private university displays a positive effect on wages mainly in the case of the "stayers" equation, and there is no strong significant evidence of a gender premium (with the exception of the "stayers" equation). On the contrary, there is a strong and significant penalizing effect on earnings for attending humanities, political science and law subjects in colleges located in Southern regions. Finally, among family background variables, students whose father is in low-skilled profession also receive on average lower earnings,other things equal. Among the measures of individual ability, the college leaving grade and the capacity to read currently in foreign languages exhibit a positive premium mainly in the "pooled" estimation (North/Centre vs. South, table 5b).

Tables 6a and 6b show the results of the decomposition exercise: the diferrences in expected earings for the three population subgroups are always significant. Early movers earn on average nearly 25% more than stayers and more than 6% than late movers. The table shows also that large part of such differences is imputable to endowment rather than to discrimination (unobservable factors).

This implies that the students with on average better endowments leave early and that the market is actually rewarding such endowments.

2.5 Propensity score matching estimation

The detailed information available in the dataset at geographic level, enables the identification of the the two effects of interest. Knowing the place of residence of the students before, during and after university attendance allows building up appropriate treatment and controls groups for both effects. Table 7a illustrates treatment and control groups in the case of students resident in the South before university enrolment, while table 7b shows the characteristics of the two groups along some relevant characteristics. In particular, the wage premium due to the "Job place effect" is defined as the premium associated to working in the North for students coming from the South and studying in the South, relative to students coming from, studying and working in the South. While the wage premium due to the "University location effect" in this case is defined as the premium associated to studying in the North for students coming from the South and working in the North, relative to students coming from the South, studying in the South and working in the North. More formally, both effects can be considered as two "Average Treatment on the Treated" effects (ATT) in the language of the program evaluation literature:

$$ATT = E[(Y_{1i}|D = 1) - (Y_{1i}|D = 0)]$$

where Y_{1i} denotes the outcome (in our case, the wage) of individual i conditional on participation in the program, while Y_{0i} indicates the alternative outcome for the same individual if he hadn't participated into the program. The problem faced by the program evaluation approach is that the theorical ATT is not measurable since the counterfactual outcome $(Y_{1i}|D=0)$ is not observable and that approximating $(Y_{1i}|D=0)$ with $(Y_{0i}|D=0)$ might generate selection bias. A standard solution to the problem is building up a counterfactual to approximate $(Y_{1i}|D=0)$. This can be achieved by matching individuals who are similar according to a number of observable characteristics, X, affecting both participation and outcomes; one method is matching individuals on the basis of their "propensity score" to participate into the program, $p(X) = \Pr ob(D=1|X_i)$, conditional on a number of observables. The aim of the matching approach is to build up a treatment and control group consisting of individuals similar along a high number of observable dimensions, such that their participation into the program can be considered random (Conditional Independence Assumption). As shown by Rosenbaum and Rubin (1983), if the conditional independence assumption holds after conditioning on a set X of observables, then it holds also after conditioning on a function of X, the propensity score $p(X)$. In the case under study, identifying the appropriate treatment and control groups would be equivalent to ask the following counterfactual questions: 1) which wage would have been earned by a student resident in the South, attending university in the South and then working

in the North if he had worked in the South (top panel, table 7a)? 2) which wage would have been earned by a student resident in the South, attending university in the North and working in the North if he had attended the university in the South (bottom panel, table 7a)? The estimation results are provided in Table 8a and 8b. The ATTs have been obtained using the Stata program "pscore2" by Becker and Ichino (2002). The estimation of the propensity score was based on a set of observables relative to individual ability (high school and university leaving grade, type of high school attended), family background (parental education and profession) and local labour market conditions. Tables 8a and 8b show that both effects are sizeable and significant, though the size obtained for the "job place effect" is smaller in magnitude than those obtained using parametric techniqes. The first one, around 12% is similar, in the interpretation, to the regional wage differential usually estimated in the literature (even if unconditional to university attendance), the second one, between 5% and 8% is the wage effect purely due to attending university in the North rather than in the South.

2.6 Conclusions

In this paper I have estimated the wage premium associated to study and work in different regions in Italy for college graduates, when both decisions, to migrate to study and to migrate for work, are considered as endogenous. Estimation has been carried out using a two-step approach, estimating a sequential probit

mobit with an endogenous dummy for the region of study in the first step, and a wage equation for different population subgroups of interest corrected for double selectivitity terms in the second step. Identification of the endogenous dummies of interest has been achieved using a number of instruments introduced to capture factors affecting the decision to attend university in different regions at the time of enrolment into university but uncorrelated with the individual wage observed after the end of the college. The instruments adopted can be grouped into two categories: geographic residence before college enrolment and education supply at the local level before college enrolment; they are highly significant and with the expected negative sign. From the sequential double-selection model, we can draw that among the students coming from Southern regions, male students with higher ability, coming from more selective schools (classic or scientific high school types, *licco*) are more likely to migrate to study in the North. The correction terms in the wage equations in the second step equation did not result significant: full time employee, with permanent contracts, working in bigger firms, receiving firm specific training and having studied economics or engeneering receive higher wages, other things equal. Attending private university displays a positive effect on wages mainly in the case of the "stayers" equation, and there is no strong significant evidence of a gender premium (with the exception of the "stayers" equation). On the contrary, there is a strong and significant penalizing effect on earnings for attending humanities, political science and law subjects in colleges located in

Southern regions. Family background variables and measures of individual ability are also significant predictors of the individual wage. The decomposition of the estimated wages show that early movers earn on average nearly 25% more than stayers and more than 6% than late movers, and that large part of such differences is imputable to endowment rather than to discrimination (unobservable factors). This implies that the students with on average better endowments leave early from southern regions. The findings are in general confirmed using a non-parametric propensity score matching approach, though in this case the premium purely associated to work in northern regions is smaller.

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Table 1
Sample characteristics

Residence before university			
	Female	Male	Total
north	5,263	4,535	9,798
centre	2,286	1,946	4,232
south	3,726	3,059	6,785
Residence during university			
	Female	Male	Total
north	5,502	4,776	10,278
centre	2,691	2,318	5,009
south	3,094	2,463	5,557
Residence during work			
	Female	Male	Total
north	4,392	4,128	8,520
centre	1,665	1,564	3,229
south	1,520	1,574	3,094

Table 2
Geographic mobility

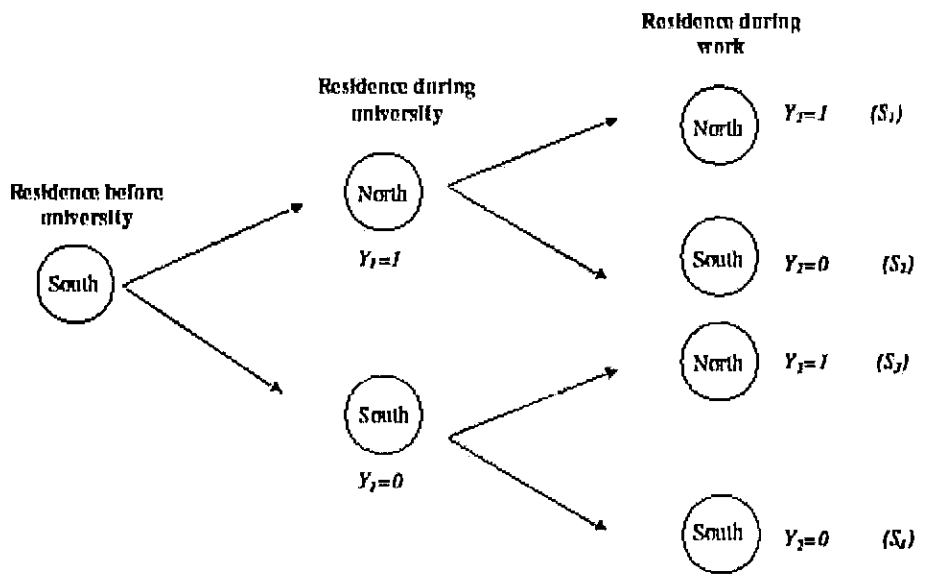
	Region of residence before university		
Residence during university	North	Centre	South
North	97.3	5.4	7.3
Centre	2.3	92.9	12.4
South	0.4*	1.7	80.3
Total	100	100	100

	Region of residence during work		
Residence during university	North	Centre	South
North	95.9	2.5	1.6
Centre	11.0	80.6	8.4
South	10.8	6.9	82.3
Total	100	100	100

	Region of residence before university		
Residence during work	North	Centre	South
North	98.3	7.8	15.4
Centre	1.3	90.6	10.5
South	0.5*	1.6	74.1
Total	100	100	100

Figure 1

Model (I)



Model (II)

Replace "North" with "North or Centre" in the figure above

Table 3. Summary of explanatory variables and identification

Selection equation 1: Study in the North vs. study in the South	Selection equation 2: Work in the North vs. work in the South	Wage equation
		Experience
		Profession (white collar)
		Private vs. public sector
		Employee vs. self-employed
		Full-time vs. part-time employment
		Type of contract: permanent vs. temporary
		Firm size
		Firmspecific training
		Professional certification
		Common use of PC at work
		Common use of foreign language at work
		Dummies for region of work
	Age at time of college graduation	Age at time of college graduation
	College leaving grade (laurea)	College leaving grade (laurea)
	Presence of children	-
	Attended private vs. public university	Attended private vs. public university
Gender	Gender	Gender
High school leaving grade	High school leaving grade	High school leaving grade
High school type: scientific/classic vs others	High school type: scientific/classic vs others	High school type: scientific/classic vs others
Mother's education	Mother's education	Mother's education
Father's education	Father's education	Father's education
Mother's profession	Mother's profession	Mother's profession
Father's profession	Father's profession	Father's profession
-	Subject degree chosen	Subject degree chosen
Dummies for region of origin	-	-
Living in main city before university enrolment	-	-
University recently built in the province of origin	-	-
Faculty of engeneering in the province of origin	-	-
Number of courses available in the province of origin	-	-

Table 4 Sequential Probit Model

	Model (I)		Model (II)	
	Study in the North vs. study in the South	Work in the North vs. work in the South	Study in the North/Centre vs. study in the South	Work in the North/Centre vs. work in the South
Explanatory variables				
Attended University in the North		1.916 ***		
Attended University in the North or in the Centre				1.38 ***
Gender (Male)	0.178 **	0.008	0.163 ***	0.069
High school leaving grade	0.014 ***	-0.002	0.01 ***	-0.001
High school type: scientific/classic vs others	0.38 ***	0.002	0.29 ***	0.063
Mother with primary education	0.036	0.039	0.075	0.002
Father with primary education	-0.018	0.168 **	-0.067	0.186 ***
Mother blue collar	0.061	-0.018	-0.107	-0.01
Father blue collar	-0.016	-0.127	-0.001	-0.13 *
Living in main city before university enrolment	-0.258 ***		-0.239 ***	
University recently built in the province of origin	-1.558 ***		-1.171 ***	
Faculty of engeneering in the province of origin	-1.036 ***		-0.927 ***	
Number of courses available in the province of origin	-0.005 **		-0.006 ***	
Engeneering/ economics		0.426 ***		0.451 ***
Biology et al.		0.072		-0.029
Language and Humanities		-0.268 **		-0.251 ***
Political Science, law		0.002		-0.063
(Ref. scientific subjects)				
Age at time of college graduation		-0.027 *		-0.024 *
College leaving grade (laurea)		0.004		0.006
Presence of children		-0.235 *		-0.335 ***
Attended private university		0.144		0.342 ***
Professional certification		-0.407 ***		-0.431 ***
Regional dummies: region of origin	YES		YES	
Constant	-2.304 ***	-0.664	-1.605 ***	-0.883
Rho		-0.208		-0.142
Observations		2777		3411
Wald test of rho =0 (Prob > Chi2)		0.205		0.178

p<0.10, ** p<0.05, *** p<0.01

Table 5a. Wage Regressions
Dependent variable: log of net monthly wages: North vs. South

	Early Movers		Late Movers		Stayers	
	Without selection	With selection	Without selection	With selection	Without selection	With selection
Explanatory variables						
Experience	0.001	0.001	0.001	0.002	0.002 ***	0.002 ***
Whitecollar	0.004	0.003	0.057 **	0.061 **	0.018	0.019
Private vs. public sector	0.026	0.01	0.026	0.023	-0.104 ***	-0.104 ***
Employee vs. self-employed	0.038	0.056	-0.057	-0.055	0.01	0.014
Full-time vs. part-time employment	0.412 ***	0.389 ***	0.371 ***	0.324 ***	0.644 ***	0.647 ***
Permanent vs. temporary contract	0.116 **	0.123 **	0.074 **	0.073 **	0.08 ***	0.081 ***
Small firm	-0.089 *	-0.089 **	-0.069 **	-0.077 **	-0.046 ***	-0.047 ***
Firmspecific training	0.025	0.003	0.005	0.006	0.064 ***	0.064 ***
Professional certification	-0.044	0.161	-0.043	-0.248	-0.013	-0.011
Common use of PC at work	0.012	0.013	0.002	0.004	0.059 ***	0.056 ***
Common use of foreign language at work	0.053	0.055	0.061 **	0.056 *	0.018	0.02
Age at time of college graduation	-0.016	-0.004	-0.011	-0.026	0.00	0.00
College leaving grade (lauren)	0.002	0.00	0.001	0.004	0.006 ***	0.006 ***
Attended private university	-0.093	-0.163	-0.14	-0.052	0.093 *	0.096 *
Gender (Male)	-0.014	-0.037	0.048 *	0.055	0.079 ***	0.078 ***
High school leaving grade	0.001	0.001	0.00	0.001	0.00	0.00
High school type: scientific/classic vs others	0.025	0.041	-0.014	-0.019	0.00	0.00
Mother with primary education	0.074	0.064	-0.085 **	-0.067	0.022	0.019
Father with primary education	0.065	0.043	-0.02	0.069	-0.015	-0.011
Mother blue collar	-0.037	-0.047	0.089 **	0.083	0.008	0.007
Father blue collar	-0.198 ***	-0.11	-0.033	-0.085	-0.028 *	-0.027
Engeneering/economics	0.06	-0.137	0.105 **	0.336	0.041 *	0.042
Biology et al.	0.055	0.016	-0.049	0.001	-0.016	-0.013
Language and Humanities	-0.178 **	-0.047	-0.085 *	-0.217	-0.095 ***	-0.092 ***
Political Science, law	-0.041	-0.034	-0.066	-0.059	-0.147 ***	-0.15 ***
Ref. (scientific disciplines)						
Regional Dummies	YES	YES	YES	YES	YES	YES
LambdaS1		0.095				
LambdaW1		-0.943		0.605		
LambdaS0				-0.15		-0.009
LambdaW0						0.005
Constant	6.622 ***	6.92 ***	6.638 ***	5.909 ***	5.46 ***	5.633 ***
Observations	127	127	235	235	1122	1122
R^2	0.483	0.517	0.397	0.384	0.68	0.686

p<0.10, ** p<0.05, *** p<0.01

Sample: individuals aged below 35

Table 5b. Wage Regressions

Dependent variable: log of net monthly wages: North/Centre vs. South

	Early Movers		Late Movers		Stayers	
	Without selection	With selection	Without selection	With selection	Without selection	With selection
Explanatory variables						
Experience	-0.002 *	-0.001	0.001	0.001	0.002 ***	0.002 ***
Whitecollar	-0.006	0.007	0.047 **	0.047 **	0.018	0.018
Private vs. public sector	0.025	0.025	0.02	0.02	-0.104 ***	-0.108 ***
Employee vs. self-employed	-0.039	-0.029	-0.041	-0.042	0.01	0.018
Full time vs. part time employment	0.485 ***	0.49 ***	0.505 ***	0.505 ***	0.644 ***	0.651 ***
Permanent vs. temporary contract	0.118 ***	0.114 ***	0.074 ***	0.075 ***	0.08 ***	0.08 ***
Small firm	-0.055 **	-0.055 **	-0.039 *	-0.04 *	-0.046 ***	-0.047 ***
Firmspecific training	0.033	0.035	0.02	0.019	0.064 ***	0.063 ***
Professional certification	0.017	-0.242	-0.021	-0.259	-0.013	0.059
Common use of PC at work	0.036	0.034	-0.013	-0.013	0.059 ***	0.062 ***
Common use of foreign language at work	0.099 ***	0.096 ***	0.033	0.033	0.018	0.02
Age at time of college graduation	0.001	-0.012	-0.012 **	-0.025	0.00	0.00
College leaving grade (laurea)	0.004 *	0.01 **	0.001	0.004	0.006 ***	0.005 ***
Attended private university	0.038	0.228	-0.066	0.121	0.093 *	0.036
Gender (Male)	0.043 *	0.071 *	0.093 ***	0.13	0.079 ***	0.069 ***
High school leaving grade	0	0	0.00	0.002	0.00	0.00
High school type: scientific/classic vs others	0.012	0.047	0.003	0.037	0.00	-0.01
Mother with primary education	0.02	0.021	0.035	0.033	0.022	0.019
Father with primary education	0.012	0.104	0.002	0.103	0.015	-0.042
Mother blue collar	-0.009	-0.014	0.024	0.018	0.008	0.009
Father blue collar	-0.057 *	-0.124 *	-0.064 **	-0.134	-0.028 *	-0.008
Engeneering/economies	0.059	0.324 *	0.061 *	0.309	0.041 *	-0.037
Biology et al.	-0.003	-0.015	-0.039	-0.054	-0.016	-0.009
Language and Humanities	-0.088 **	-0.231 **	-0.082 **	-0.221	-0.095 ***	-0.057
Political Science, law	-0.06	-0.088 *	-0.106 ***	-0.14	-0.147 ***	-0.137 ***
Ref. (scientific disciplines)						
Regional Dummies	YES	YES	YES	YES	YES	YES
LambdaS1		-0.132 *				
LambdaW1		1.089		0.667		
LambdaS0				-0.082		0.021
LambdaW0						0.52
Constant	6.024 ***	5.574 ***	6.571 ***	5.6 ***	5.46 ***	5.304 ***
Observations	294	294	364	364	1121	1123
R^2	0.511	0.523	0.471	0.468	0.686	0.688

p<0.10, ** p<0.05, *** p<0.01

Sample: individuals aged below 35

Table 6a Oaxaca-Blinder Decomposition of wage differentials
(North vs. South)

	Early movers vs. Stayers (Outcome 1 vs. Outcome 4)		Early movers vs. Late movers (Outcome 1 vs. Outcome 3)		Late movers vs. stayers (Outcome 3 vs. Outcome 4)	
	without selection correction	with selection correction	without selection correction	with selection correction	without selection correction	with selection correction
Total Wage Differential (%)	24.4. ***	23.3 ***	6.2 ***	6.2 ***	18.2 ***	18.3 ***
1) Explained component (endowments)	15.4	-55.6	-15.6	-15.6	10.3	144.5
2) Unexplained component	9.0	78.9	21.7	21.7	7.9	-126.2
Coefficients	-107.2	-49.8	23.3	23.3	-109.9	-153.9
Constant	116.2	128.7	-1.6	-1.6	117.8	27.7

p<0.10, ** p<0.05, *** p<0.01

Source: table 5a

Table 6b Oaxaca-Blinder Decomposition of wage differentials
(North/Centre vs. South)

	Early movers vs. Stayers (Outcome 1 vs. Outcome 4)		Early movers vs. Late movers (Outcome 1 vs. Outcome 3)		Late movers vs. stayers (Outcome 3 vs. Outcome 4)	
	without selection correction	with selection correction	without selection correction	with selection correction	without selection correction	with selection correction
Total Wage Differential (%)	22.4 ***	22.2 ***	4.1 ***	3.4 **	19.6 ***	19.9 ***
1) Explained component (endowments)	10.3	111.5	-12.2	-118.6	13.8	143.1
2) Unexplained component	12.2	-89.2	16.3	122	5.8	-123.3
Coefficients	-44.2	-116.1	51.8	123.6	-105.3	-152.9
Constant	56.4	26.9	-35.5	-1.6	111.1	29.6

p<0.10, ** p<0.05, *** p<0.01

Source: table 5b

Table 7a

Region of residence			
Before university	During University	During Work	
South	South	North	(treatment)
South	South	South	(control)

Region of residence			
Before university	During University	During Work	
South	North	North	(treatment)
South	South	North	(control)

Table 7b

	Mean age		Mean university leaving grade	
Blocks of the propensity score	Treatment	Control	Treatment	Control
1	28.4	28.9	83.4	85.0
2	27.6	28.1	94.0	94.3
3	28.1	28	101.0	101.5
4	27.9	27.9	107.6	107.6
5	27.5	28.1	109.5	109.5

Table 8a
"Job place effect"

Model	Matching Estimator	Treatment (obs.)	Control (obs.)	ATT	% average wage (control)	s.e. (boots.)	t
I	Nearest neighbor	305	284	127.9	12.4	41.00	3.12

Table 8b
"University location effect"

Model	Matching Estimator	Treatment (obs.)	Control (obs.)	ATT	% average wage (control)	s.e. (boots.)	t
II	Nearest neighbor	196	151	97.28	8.2	49.06	1.98
II	Radius	196	305	61.63	5.2	42.27	1.46
II	Kernel	196	305	103.56	8.7	38.21	2.71

Dependent variable: net monthly wage. Quantities are expressed in thousands of Italian Liras.

CHAPTER 3

WELFARE PARTICIPATION AMONG IMMIGRANTS AND NATIVES: EVIDENCE FROM THE SWEDISH INCOME PANEL

3.1 Introduction and motivation

The participation of immigrants in welfare programs is a widely investigated topic in economic research. Existing studies, mainly with reference to the US, have shown that the immigrant population is over-represented among the pool of welfare recipients (in particular social assistance recipients), which generates pressures on the state budget. On the other hand, social assistance is often the main source of income for those migrants who are not entitled to contributory benefits (e.g. unemployment benefits) since they have not accumulated enough labour market experience in the host country. Sweden represents an ideal case study to analyse the patterns of welfare participation among the native and foreign born population, given the generosity of its welfare system and the rapid increase in the immigrant population occurred at the beginning of the 1990s. According to Hansen and Lofstrom (2001a), the huge increase in welfare costs between the late 1980s and the mid 1990s in Sweden is largely attributable to immigration. The authors, using a longitudinal panel covering the period 1990 to 1996 show that immigrants have higher propensity to participate in social assistance and that welfare participation declines with the time spent in the host country. In a parallel paper (Hansen and Lofstrom, 2001b), the authors show that immigrants are more likely to receive both unemployment benefits and social assistance than natives, and that these differences are mainly explained by permanent unobserved differences. The contribution of our paper is first to extend the scope of the analysis to

a longer time span than the one considered by Hansen and Lofstrom. The period considered by the authors in fact might be too narrow to capture structurally different labour market participation patterns before and afer the economic crisis of the early 1990s in Sweden. With this respect we use a similar administrative database, the Swedish Income Panel, linking information from income tax record to population registers available at Statistcs Sweden, built up in the 1970s to study the degree of assimilation of immigrants in the Swedish labor market Second, the availability of a longer temporal dimension, enables us to model not only state probabilities, but also entry and exit from/into different states and the degree of persistence in each state among natives and foreign-born. We therefore use a competing risk discrete time hazard model, to model explicitly how the *time* spent in employment, unemployment and social assistence affects the transitions between different states, and to predict the mean duration in each state for the population subgroups of interest. Our main findings confirms that immigrants are more likely to participate in unemployment and social assistance than natives; in addition, we show that the persistence of unemployment for the foreign born population has increased more than for the native population *after* the early 1990s crisis. Third, we find a sharp increase in the expected duration of social assistance recipiency much higher for immigrants (both refugess and non-refugees) starting exactly in the 1990s.

The chapter is organised as follows. The next section illustrates the main fea-

tures of the Swedish Income Panel and the variable choice, while the third section review some of the most relevant literature related to immigrants participation in welfare programs and immigrants labour market behaviour; the fourth section summarizes the most relevant features of the Swedish benefits systems relevant to our analysis. In the fifth section, we use a multivariate probit model to estimate participation in employment, social asssitance and unemployment, while the sixth section presents the results from the estimation of the competing risk discrete time hazard model of welfare participation. The last section concludes.

3.2 Related Literature

The study of determinants of welfare spells relies on the studies by Blank (1989), and by Engberg, Gottschalk and Wolf (1990). In the context of immigrants' participation in welfare programmes, in addition to the above mentioned studies, relevant contributions include the work by Borjas and Trejo (1991), Borjas and Hilton (1996), and Borjas (2002); Corak *et al.* (2000) studied the intergenerational transmission of unemployment benefits receipiency in Denmark and Sweden, while Riphan (1998) has focussed on the participation in welfare programs by "guest workers" in Germany. Edin, La Londe and Aslund (2000) has investigated to which extent participation in welfare programmes increase immigrants assimilation in the destination country showing that ignoring emigration lead to an overestimation of the degree of assimilation. One of the crucial ques-

tions addressed by the literature is whether immigrants participation in welfare programs is explained by observed characteristics or mainly driven by unobserved heterogeneity. In the first case, the phonomenon of so-called "structural" state dependence is observed, while if the latter is true, then the type of welfare state dependence is defined as "spurious". Identifying which regime is driving immigrants welfare participation has important consequences for policies: if transitions in and out of welfare are mainly determined by unobserved factors, after controlling for a set of observable characteristics, then public policies are likely to have little impact on immigrants behaviour. On the contrary, if the type of dependance is mainly driven by observable factors, then policies targeted for instance at pushing foreing born individuals out of unemployment are more likely to generate the desired effects. Our paper is placed in the strand of literature studying welfare dependance, since past labour market status (participation in unemployment, social assistance or employment) is used to predict the current one. Given the high number of observations at hand, it has been computationally impossible so far to model unobserved heterogeneity, but we address this problem in the section on estimation. Further, our work investigates as well the determinants of different *spells* in various states of the labour market and uses the longitudinal dimension of the panel to estimate persistence and mean duration in each spell for both native and foreign born population, aspects which are normally more difficult to assess given the lack of availability of long representative panel for the foreign

born population.

3.3 Overview of welfare system and reforms in Sweden

Since the beginning of the 1980s there has been a sequence of reforms in both the taxes and benefits systems in Sweden. Major income tax reforms have been implemented in 1983 and in 1991 (Aronsson and Palme, 1998). The main outcomes of the income tax reforms in the early 90s were the reduction of the progressivity of the tax-benefit system obtained by lowering the marginal tax rates on high income levels, the increase in the value added taxes, and the inclusion of a number of social benefits into the tax base (unemployment benefits, in particular, became taxable while social assistance remained exempted from taxation). With respect to benefits, child allowance for families with three or more children was introduced in 1983; in 1989 the allowances were increased for the third, fourth and fifth child as a percentage of the basic allowances; in 1991 the size of the increase was again reduced (Aronsson and Palme, 1998). An important component of the benefit system is the housing allowance, which depends on household incomes, housing costs and number of children; it is means tested on the basis of the sum of spouses incomes two years before the application for the allowance.

The Swedish *unemployment insurance* system consists of two parts: *unemployment benefits* which are contributory and related to past earnings, and *unemployment assistance*, which is available for those workers who do not meet the

requirements for being entitled to unemployment benefits. The eligibility rules for unemployment benefits require the payment of at least 12 months of contribution to the Unemployment Benefits Fund and an employment spell of at least 75 days before the start of the current unemployment period; eligible workers are entitled to receive unemploment compensation for a maximum of 300 working days. The replacement rates of contributory unemployment benefits in Sweden are among the most generous in the European welfare systems and amounts approximately to 75% of the average earnings. Workers not eligible to unemployment benefits can apply to unemployment assistance, which does not require a contributory period before the start of the unemployment spell, but is less generous both in terms of duration of the payment and in terms of replacement rates.Individuals become eligible to *social assistance* once they have exhausted entitlement to other available social benefits: unemployment benefits, housing allowance, child allowance, maintenance allowance and some pensions (Hansen and Lofstrom, 2001). In the Swedish system, social assistance has the same eligibility rules for both the native born and immigrant population. Social assistance is subject to means testing at the household level: household total income must fall below some reference basic income known as "norms". The levels of the "norms" have been determined by local municipalities until January 1998 (in Sweden there are 288 municipalities), while from January 1998 onwards their level has been set uniformly on the whole national territory. An increase in household income implies a corresponding equiv-

alent reduction in the amount of benefit paid. In 1996, the annual "basic amount" used as a reference for benefits entitlement was equal to 36,200 Swedish Crowns, approximately equivalent to 4000$.

3.4 Data and choice of variables

The Swedish Income Panel (SWIP) consists of a large longitudinal database originally set up to study the assimilation of migrants in the Swedish labour market. The sample is taken from the Register of the Total Population kept by Statistics Sweden and covers all persons residing in Sweden excluding asylum seekers waiting for a residence permit. Each person has a unique identifier number which enables merging the information contained in the Register of the Total Population, mainly demographic information, with other registers, in particular income registers, containing information on disposable income, taxes and benefits, available at Statistics Sweden. The database has been built up extracting from the 1978 register a 1% sample of the native born population (around 77.000 individuals) and a 10% sample of the foreign born population (around 60.000 individuals). For each year between 1979 and 1998, an additional 10% of the number of new immigrants was added to the original design (between 3000 and 7000 individuals each year). For years 1999 and 2000 the database contains not a sample but the whole population of immigrants arriving in Sweden (Information available from the Swedish Social Data web site: http://www.ssd.gu.se/kid/swe/SWIPintro.html). SWIP in-

cludes data for the sample person and the present spouse of the sample person; cohabiting couples are considered as spouses in the case they are mother and father to the same child. Information from income registers is available for the sample person, the present spouse, the mother and father of the sample person as well as their present spouses for each year from 1968 until 1999. The number of observations available in the total unbalanced panel is shown in table 1. Our classification of different population subgroups among the migrants is based on a question relative to country of birth. We define as migrants all the individuals in the sample who declare their country of birth being different from Sweden. The dataset does not contain information on the country of residence before arrival to Sweden, so the migration trajectory (whether migrants were previously living in another country, or whether they moved directly to Sweden from their country of origin) remains unknown. The database contains instead information on the year of immigration, which combined with the information on individual's age, yields the age of the individual at his/her arrival in Sweden, a crucial factor influencing labour market behaviour. We are able therefore to classify the total population in the following 6 subgroups according to the country of birth: 1) Swedish Born; 2) foreign born from the Nordic countries (Denmark, Finland, Norway); 3) foreign born from Western Europe and other industrialised countries (e.g. United States, Canada, New Zealand, Australia); 4) foreign born refugees from Eastern European countries, including former Soviet Union countries; 5)

foreign born refugees from other countries, including some African Sub-Saharian countries (e.g. Ethiopia, Somalya), some Latin American countries (e.g. Chile, Cuba, Peru) and some Asian countries (e.g. India, Pakistan, Bangladesh, Sri Lanka); 6) other non-refugees countries. The Swedish Immigration Board defines as "refugees" immigrants coming from the following countries: Ethiopia, Afghanistan, Bulgaria, Bangladesh, Bosnia, Chile, Sri Lanka, Cuba, Iraq, Iran, India, Yugoslavia, China, Croatia, Lebanon, Moldavia, Peru, Pakistan, Poland, Russia, Soviet Union, Romania, Somalia, Syria, Togo, Turkey, Ukraine, Uganda and Vietnam. A distinction between refugees from Eastern European and former Soviet Union countries and refugees from other countries is allowed to capture the higher educational background of the former group. The dataset does not include asylum seekers and does not report whether migrants have obtained or not a permit to stay or to work, or whether they are waiting to receive any. Since recently arrived migrants are not entitled to unemployment benefits and are more likely to be over-represented in the pool of social assistance recipients, we excluded from our sample of interest migrants who had been living in the country for only one year or less. The composition of our sample of interest by migrant status is given in table 2.

3.5 Modelling state dependence

In this section we outline the estimation method chosen to estimate welfare and labour market participation for the foreign and the native born population. We use a multivariate probit model in order to allow the possibility of correlation between different states (employment, unemployment and social assistance), which would be ruled out using a standard multinomial logit approach. The model is also dynamic, since among the explanatory variables we introduce lagged values of the dummy variables defining participation into labour market or welfare which are supposed to capture the state dependence phenomenon. For each time t corresponding to the calendar year (t therefore varies between 1986 and 1999), any individual i can belong to three mutually exclusive states, defined by $m = 1, 2, 3$, where $m = 1$ if an individual is employed, $m = 2$ if an individual is receiving social assistance, and $m = 3$ if an individual is unemployed. We use the detailed income definition available in SWIP to determine the labour market status of individuals, since, to our knowldege, no self-reported information on economic activity status is available from the tax records. We define an individual in social assistance if she has spent at least 6 months of the year receiving social assistance; an individual is defined as unemployed if she receives a yearly amount of unemployment benefits greater than "basic" reference income which determines eligibility for social assistance; an individual is defined as employed if she receive positive earnings and does not fall into the two former groups. Since we are not modelling early retire-

ment at this stage, we consider in our analysis only the population aged between 25 and 55. Table 3 shows in detail the composition of our sample according to the three labour market states over time, which is able to replicate quite closely the pattern of the unemployment rate for both native and foreign born over the time period considered.

The latent utility associated for each individual to each state, at each time, is unobservable to the econometrician and is indicated by V^*_{imt}. V^*_{imt} is assumed to depend linearly on a number of observable explanatory variables, which include: individual specific characteristics (age, gender, highest educational attainment, marital status, number of children, health status, dummies for county of residence, years since migration and cohort dummies) summarized in the vector X_{it} which includes also a constant; a number of time dummies, T_{it}; the vector LM_{it-1}, which includes two dummy variables indicating whether the individual was receiving social assistance or unemployment benefits during the past year, respectively, and the vector IMM_{it}, which includes dummy variables defining the individual's status as an immigrant according to the six categories outlined above determined by the self-reported country of birth. The model also allows a number of interaction effects, in particular: between time dummies and immigrants' country of birth ($T_{it} * IMM_{it}$), so that the patterns of welfare participation and the eventual effects of the economic cycle are allowed to exhibit heterogenous effects for different foreign-born population subgroups; the interaction between country of

origin dummies and labour market status in the previous year ($LM_{it-1} * IMM_{it}$) is supposed to capture differential patterns of welfare dependence among different subgroups of the immigrants population; finally the interaction between the variable relative to the years since immigration and the dummies for the country of origin ($yearsmig * IMM_{it}$), is supposed to capture .

We estimate the model described in equation 3.1:

$$\begin{aligned} V^*_{itm} &= T'_{it}\beta_{1m} + X'_{itm}\beta_{2m} + IMM'_{it}\beta_{3m} + LM'_{it-1}\beta_{4m} + (T_{it} * IMM_{it})'\beta_{5m} \\ &+ (LM_{it-1} * IMM_{it})'\beta_{6m} + (yearsmig_{it} * IMM_{it})'\beta_{7m} + \varepsilon_{itm} \end{aligned} \tag{3.1}$$

where for each state m, we observe the outcome V_{itm} if the latent variable V^*_{itm} is positive.

$$\begin{aligned} V_{itm} &= \begin{cases} 1 & if \quad V^*_{itm} > 0 \\ 0 & \text{otherwise} \end{cases} \\ \text{with } m &= 1, 2, 3 \text{ and } \varepsilon_{it1}, \varepsilon_{it2}, \varepsilon_{it3} \sim N_3(0, \Sigma) \\ \text{and } \Sigma &= \begin{bmatrix} 1 & \rho_{12} & \rho_{13} \\ & 1 & \rho_{23} \\ & & 1 \end{bmatrix} \end{aligned} \tag{3.2}$$

The error terms in the binary equation for each outcome are assumed to be jointly normally distributed according to a trivariate normal distribution with mean zero and variance-covariance matrix Σ, which has ones as elements on the main diagonal and as off-diagonal elements.the correlation coefficients ρ_{jk}, $j \neq k$, between the error terms in each of the three binary outcome equation $\varepsilon_{it1}, \varepsilon_{it2}, \varepsilon_{it3}$. The

multivariate probit model described above is estimated using simulated maximum likelihood based on the Geweke-Hajivassiliou-Keane (GHK) smooth recursive conditioning estimator. The estimator expresses the multivariate normal distribution associated to each outcome of interest as a product of univariate normal distributions sequentially conditioned on explanatory variables (Cappellari and Jenkins, 2003) which are evaluated using approximation methods. The model relies on the assumption that the lagged values of the labour market status variable, LM_{it-1}, are strictly exogenous with respect to the error terms in each equation.

The main results are shown in table 5 and figures 1a and 1b. The estimates show the existence of state dependence in both states, and confirm that among the foreign born population, the non-Eastern European refugees and the other refugees are more likey to be in unemployment and social assistance than the native population. The level of the benefits included among the explanatory variables has also the expected positive sign on the dependence behaviour. Figures 1a and 1b show instead the predicted probabilities of leaving unemployment to employment and social assistance, respectively, from year t to $t+1$, computed using the coefficients in Table 5. The shape of the predicted probability of leaving unemployment in Figure 1a seems in line with the trend observed in unemployment rates for both foreign and native born population. Interestingly, after the crisis, the probability of leaving unemployment recovered again for both the native and the foreign born population but at higher level for the Swedish born population,

suggesting that in particular refugees and other non Western immigrant groups have suffered most by the crisis. Figure 1b shows instead that the probability of leaving unemployment to social assistance has remained roughly constant for the Swedish born population, showing instead more cyclical pattern for the foreing born, reflecting probably difficulties in re-entering the labour market during the years of the crisis.

3.6 Transitions in and out of welfare

In this section we illustrate the general framework used to estimate welfare *spells* and transition in and out of welfare participation. The estimation approach followed here is based on a competing risk discrete-time hazard model. The hazard of leaving one labour market status to another in discrete time can be intuitively interpreted as the "risk" of leaving the state in time j conditional on having survived in that state until the period $j-1$ (formally, though, the hazard is not a probability). We model welfare participation as in Enberg, Gottschalck and Wolf (1990): the true spells in employment or welfare occur in continuous time, but we identify individuals' labour market status using a categorical variable which is defined according the income registered by the tax record. Following Jenkins (2005) and Allison (1982), we consider for the purpose of illustration the alternative destinations of unemployed individuals. For each individual i, each unemployment spell can last for j periods (in our case j varies between 1986 and

1999) and then terminate either in employment, E, or in social assistance SA, or it can be censored, C (the individual is still unemployed at the end of the observation period, or drops out of the sample before the end of the observation period). Given that time is considered intrinsecally discrete (if there is an exit to a given destination at a given survival time, there cannot be an exit to another destination at the same survival time), the contribution of each destination specific likelihood to the overall likelihood for an individual with observed spell of j periods is given by:

$$\begin{aligned} \mathcal{L}_i^E &= h_E(j)S(j-1) \\ &= \frac{h_E(j)}{1-h(j)}S(j) \\ &= \frac{h_E(j)}{1-h_E(j)-h_{SA}(j)}S(j) \end{aligned} \tag{3.3}$$

where $\mathcal{L}^E$ is the likelihood associated to leaving unemployment to employment for an individual staying unemployed until time j, $h_E(j)$ is the hazard rate specific to the destination "employment", $S(j-1)$ the survivor function for surviving in the current state until period $j-1$ and $h(j)$ is the hazard rate for leaving to any destination at time j. Similarly, we can obtain the likelihood contributions for the other destination specific hazards:

$$\begin{aligned} \mathcal{L}_i^{SA} &= \frac{h_{SA}(j)}{1-h_E(j)-h_{SA}(j)}S(j) \\ \mathcal{L}_i^C &= S(j) \end{aligned} \tag{3.4}$$

The individual contribution for the overall likelihood is therefore given by:

$$\mathcal{L}_i = (\mathcal{L}_i^E)^{y_E}(\mathcal{L}_i^{SA})^{y_{SA}}(\mathcal{L}_i^C)^{1-y_E-y_{SA}} \tag{3.5}$$

where y_E and y_{SA} are indicator functions taking value 1 when individuals leave unemployment to employment and social asssitance respectively, and 0 otherwise. Substituting the expressions of the destinations-specific likelihoods in equation (3.5) and rearranging terms, the individual likelihood can be expressed as:

$$\mathcal{L}_i = \left[\frac{h(j)}{1-h(j)}\right]^{y_E+y_{SA}} \left[\frac{h_E(j)}{h(j)}\right]^{y_E} \left[\frac{h_{SA}(j)}{h(j)}\right]^{y_{SA}} S(j) \tag{3.6}$$

At this point we can notice that if we assume that each destination-specific hazard function follows a logistic distribution, the above likelihood function takes the same form of the likelihood of a standard multinomial logit model where individual observations are oganised in person-period observations (the units of analysis are spells and not individuals, and each spell represent an observation). Therefore, the destination-specific hazards for each spell of length j can be expressed as:

$$\begin{aligned} h_{SA}(j) &= \frac{\exp(X_i'\beta_{SA})}{1+\exp(X_i'\beta_{SA})+\exp(X_i'\beta_E)} \\ h_E(j) &= \frac{\exp(X_i'\beta_E)}{1+\exp(X_i'\beta_{SA})+\exp(X_i'\beta_E)} \\ h_C(j) &= 1-h_{SA}(j)-h_E(j) = \frac{1}{1+\exp(X_i'\beta_{SA})+\exp(X_i'\beta_E)} \end{aligned} \tag{3.7}$$

where X_i' are observable expanatory variables, β_E and β_{SA} are the parameters to be estimated, and j varies between 1 and the maximum spell length. The above specification applies as well to the other transitions between the states considered: from employment to unemployment and social assistance and from social

assistance to employment and unemployment.The results of the maximum likelihood estimation for transitions between all possible states are shown in Table 6 and figures 3a to 4b. The coefficients reported express the relative-risk ratios with respect to the reference category. At the bottom of the table, the coefficients on duration dependence terms are also reported. Looking at the left panel, we notice that, as expected, the risk of leaving employment to both social assistance and unemployment is higher for various categories of the foreing born population than for the Swedish born. In both cases, nearly all the group considered exhibit higher risk than the reference, with the exception of married women in the case of transition frm E to SA. The positive coefficients on the dummy for housheolds with housing benefits might capture households who are more income contrained (this type of benefits are means tested) and therefore might be more likely to rely on social assistance or to have a weaker position in th labour market. Finally, the probabilities of leaving employment increase non linearly with age and decrease with educational attainment, which is what might be expected. Also the coefficients of the duration dependence have the expected sign:the probability of leaving employment decreases the longer the current employment spell. The central panel of table presents the results for the competing risk of leaving unemployment towards employment versus social assitance. Refugees and extra-european migrants are more likely to move to social assistance then back to employment compared to the native-born population. In this equation we control whether unemployed are

unionised versus non-unionised, and we found that unionised individuals persist more into unemployment, given probably the higher level of the benefit The other demographic controls and education variables have the expected sign. Figures 2a and 2b show the expected mean duration in unemployment and social assistance, respectively, by the initial year of the respective spells, while figures 3a, 3b, 4a and 4b display the estimated hazard and survivor functions for unemployment and social assistance. Interestingly, we notice that duration in both states increased sharply after the early nineties crisis, in particular as far as participation in social assistance for refugees and non Western-European migrants are concerned.

3.7 Conclusions

Our work confirms the existing empirical evidence that immigrants exhibit higher state dependence in welfare programs and sheds new ligth on the consequences of the early nineties economic crises on labour market attachment and welfare participation of the native and the foreign born population. We therefore use a competing risk discrete time hazard model, to model explicitly how the *time* spent in employment, unemployment and social assistence affects the transitions between different states, and to predict the mean duration in each state for the population subgroups of interest. Our main findings confirms that immigrants are more likely to participate in unemployment and social assistance than natives; in addition, we show that the persistence of unemployment for the

foreign born population has increased more than for the native population *after* the early 1990s crisis. Third, we find a sharp increase in the expected duration of social assistance recipiency much higher for immigrants (both refugess and non-refugees) starting exactly in the early 1990s. In future work, we plan to extend the current analysis to participation into early retirement schemes, and to investigate in greater details the role played by the changes in the definition of refugee status over time in influencing welfare and labour market participation of the foreign born population.

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Table 1
Observations in the original sample, by years spent in the panel

Years in the panel	Observations	%	Cumulative %
1	56,609	2.68	2.68
2	85,492	4.05	6.73
3	26,607	1.26	7.99
4	33,524	1.59	9.58
5	36,465	1.73	11.3
6	58,020	2.75	14.05
7	54,740	2.59	16.64
8	51,728	2.45	19.09
9	60,552	2.87	21.96
10	67,050	3.17	25.13
11	76,813	3.64	28.77
12	78,528	3.72	32.49
13	83,005	3.93	36.42
14	1,342,852	63.58	100
Total	2,111,985	100	

Table 2
Sample composition by country of birth over time (age group: 25-55)

Year	Swedish	Nordic Countries	Western Europe	Refugees Eastern Europe	Refugees Other countries	Other Non Refugees	Total
1986	31,981 45.91	18,308 26.28	6,790 9.75	5,583 8.01	3,632 5.21	3,364 4.83	69,658 100
1987	32,392 45.37	18,369 25.73	6,820 9.55	5,766 8.08	4,369 6.12	3,679 5.15	71,395 100
1988	32,898 44.72	18,457 25.09	6,919 9.4	5,988 8.14	5,193 7.06	4,115 5.59	73,570 100
1989	33,548 43.93	18,640 24.41	7,116 9.32	6,223 8.15	6,146 8.05	4,690 6.14	76,363 100
1990	34,218 43.39	18,731 23.75	7,212 9.14	6,510 8.25	6,837 8.67	5,358 6.79	78,866 100
1991	34,834 42.94	18,642 22.98	7,257 8.95	6,742 8.31	7,493 9.24	6,155 7.59	81,123 100
1992	35,411 42.61	18,510 22.27	7,265 8.74	6,924 8.33	8,099 9.75	6,899 8.3	83,108 100
1993	35,952 42.03	18,244 21.33	7,224 8.44	8,090 9.46	8,888 10.39	7,145 8.35	85,543 100
1994	36,071 42.37	17,756 20.86	6,997 8.22	8,046 9.45	9,014 10.59	7,255 8.52	85,139 100
1995	36,176 42.86	17,146 20.31	6,686 7.92	7,957 9.43	9,066 10.74	7,374 8.74	84,405 100
1996	36,373 43.44	16,492 19.7	6,417 7.66	8,008 9.56	10,916 13.04	5,525 6.6	83,731 100
1997	36,485 44.07	15,737 19.01	6,092 7.36	7,819 9.44	11,019 13.31	5,637 6.81	82,789 100
1998	36,404 44.53	15,167 18.55	5,774 7.06	7,631 9.34	11,082 13.56	5,687 6.96	81,745 100
1999	36,255 44.98	14,549 18.05	5,488 6.81	7,439 9.23	11,147 13.83	5,728 7.11	80,606 100
Total	488,998 43.74	244,748 21.89	94,057 8.41	98,726 8.83	112,901 10.1	78,611 7.03	1,118,041 100

Table 3
Labour market status by country of birth over time (age group 25-55)

	Swedish				Nordic				Western Europe				Refugees - Eastern Europe				Refugees - Other				Other Non Refugees			
Year	E	SA	U	Total	E	SA	U	Total	E	SA	U	Total	E	SA	U	Total	E	SA	U	Total	E	SA	U	Total
1986	29,335	438	513	30,286	15,930	529	442	16,901	5,818	115	97	6,030	4,475	277	120	4,872	2,330	620	82	3,032	2,371	383	104	2,838
	96.86	1.45	1.69	100	94.25	3.13	2.62	100	96.48	1.91	1.61	100	91.85	5.69	2.46	100	76.85	20.45	2.7	100	83.54	12.79	3.66	100
1987	29,783	387	591	30,761	15,994	442	496	16,932	5,823	106	122	6,051	4,628	268	152	5,048	2,782	801	105	3,688	2,656	384	129	3,149
	96.82	1.26	1.92	100	94.48	2.61	2.93	100	96.23	1.75	2.02	100	91.68	5.31	3.01	100	75.3	21.84	2.88	100	84.34	11.58	4.1	100
1988	30,366	369	521	31,256	16,083	432	410	16,905	5,852	109	122	6,083	4,792	284	146	5,202	3,206	981	140	4,387	3,011	378	134	3,521
	97.15	1.18	1.67	100	95.02	2.56	2.43	100	96.2	1.79	2.01	100	92.12	5.07	2.81	100	74.79	22.01	3.21	100	85.52	10.68	3.81	100
1989	31,177	338	408	31,923	16,332	395	317	17,044	5,972	120	103	6,195	4,973	247	134	5,354	4,027	1,092	125	5,244	3,413	448	120	3,981
	97.68	1.06	1.28	100	95.82	2.32	1.86	100	96.4	1.94	1.68	100	92.88	4.61	2.5	100	76.79	20.82	2.38	100	85.73	11.25	3.01	100
1990	31,727	342	452	32,521	16,272	380	350	17,002	5,985	100	108	6,193	5,132	234	135	5,501	4,602	1,070	230	5,902	3,803	568	134	4,505
	97.56	1.05	1.39	100	95.71	2.24	2.06	100	96.64	1.61	1.74	100	93.29	4.25	2.45	100	77.97	18.13	3.9	100	84.42	12.61	2.97	100
1991	31,771	388	863	33,022	15,656	451	655	16,762	5,757	114	189	6,060	5,032	258	288	5,576	4,742	1,103	443	6,288	3,958	715	288	4,959
	96.21	1.17	2.61	100	93.4	2.69	3.91	100	95	1.88	3.12	100	90.24	4.69	5.16	100	75.41	17.54	7.05	100	79.77	14.42	5.81	100
1992	30,907	470	1,919	33,296	14,504	535	1,350	16,389	5,417	147	357	5,921	4,799	326	485	5,610	4,442	1,328	881	6,651	3,972	1,014	531	5,517
	92.82	1.41	5.76	100	88.5	3.26	8.24	100	91.49	2.48	6.03	100	85.54	5.81	8.65	100	66.79	19.97	13.25	100	72	18.38	9.62	100
1993	29,829	563	2,923	33,315	13,139	575	1,937	15,651	4,918	184	523	5,625	4,224	410	732	5,366	4,017	1,723	1,279	7,019	3,695	1,053	782	5,530
	89.54	1.69	8.77	100	83.95	3.67	12.38	100	87.43	3.27	9.3	100	78.72	7.64	13.64	100	57.23	24.55	18.22	100	66.82	19.04	14.14	100
1994	29,808	552	2,932	33,290	12,693	370	1,918	15,181	4,755	173	567	5,495	4,282	945	783	6,010	4,102	1,721	1,345	7,168	3,341	1,023	839	5,702
	89.53	1.66	8.81	100	83.61	3.75	12.63	100	86.53	3.15	10.32	100	71.25	15.72	13.03	100	57.23	24.01	18.78	100	67.36	17.94	14.7	100
1995	29,975	502	2,931	33,408	12,388	517	1,748	14,651	4,813	154	560	5,327	4,373	850	809	6,032	4,175	1,607	1,443	7,225	3,922	1,009	927	5,858
	89.72	1.5	8.77	100	84.54	3.53	11.93	100	86.8	2.89	10.51	100	72.5	14.09	13.41	100	57.79	22.24	19.97	100	66.95	17.22	15.82	100
1996	30,008	601	2,925	33,534	11,891	567	1,636	14,094	4,413	181	486	5,070	4,430	858	841	6,127	4,949	2,090	1,655	8,694	3,109	638	635	4,382
	89.49	1.79	8.72	100	84.37	4.02	11.61	100	87.04	3.18	9.78	100	72.3	13.97	13.73	100	56.92	24.04	19.04	100	70.95	14.56	14.49	100
1997	30,061	819	2,942	33,822	11,201	525	1,645	13,371	4,138	183	492	4,793	4,321	800	902	6,023	4,986	2,046	1,725	8,757	3,140	646	675	4,461
	89.41	1.84	8.75	100	83.77	3.93	12.3	100	86.33	3.4	10.26	100	71.74	13.28	14.98	100	56.94	23.36	19.7	100	70.39	14.48	15 13	100
1998	30,435	498	2,560	33,493	11,017	462	1,363	12,842	4,028	130	424	4,580	4,498	644	772	5,914	5,446	1,825	1,834	8,905	3,348	564	643	4,555
	90.87	1.49	7.64	100	85.79	3.6	10.61	100	87.9	2.84	9.26	100	78.06	10.89	13.05	100	81 16	20.49	18.35	100	73.5	12.38	14.12	100
1999	30,647	460	2,304	33,411	10,744	385	1,221	12,350	3,385	97	389	4,371	4,671	473	740	5,884	5,923	1,559	1,540	9,022	3,536	520	628	4,684
	91.73	1.38	8.9	100	87	3.12	9.89	100	88.88	2.22	8.9	100	79.38	8.04	12.58	100	65.65	17.28	17.07	100	75.49	11.1	13.41	100
Total	425,827	6,527	24,784	457,138	193,822	8,765	15,488	218,075	71,372	1,873	4,549	77,794	64,630	8,850	7,039	78,519	59,769	19,546	12,827	91,942	47,773	9,301	8,568	63,642
	93.15	1.43	5.42	100	89.7	3.13	7.17	100	91.74	2.41	5.85	100	82.31	8.72	8.96	100	65.01	21.28	13.73	100	75.07	14.61	10.32	100

Table 4
Empirical transitions matrices between labour market sates: 1986-1999

Native born (age 25-55)

	Employment	Social Assistance	Unemployment	
Employment	97.08	0.38	2.54	100
Social Assistance	30.64	63.54	5.82	100
Unemployment	39.47	1.59	58.94	100
Total	93.19	1.28	5.52	100

Foreign born (age 25-55)

	Employment	Social Assistance	Unemployment	
Employment	94.24	1.37	4.39	100
Social Assistance	23.03	72.81	4.16	100
Unemployment	33.48	3.34	63.17	100
Total	83.45	7.27	9.28	100

Table 5
Labour market status: multivariate probit estimation

	Social Assitance	Unemployment
Age		
Age	0.024	-0.007
Marital status and household type		
Married man without children	0.581 ***	0.192 ***
Married woman without children	-0.009	0.096 *
Married woman with children	-0.255 ***	0.16 ***
Unmarried man	0.991 ***	0.344 ***
Unmarried woman	0.782 ***	0.204 ***
Other - without children	0.834 ***	0.268 ***
Other - with children	0.416 ***	0.284 ***
(Ref. group: married man with children)		
Household size	-0.196 ***	0.006
Education		
Secondary	-0.394 ***	-0.011
Tertiary	-0.874 ***	-0.134 ***
(Ref. group: primary or lower)		
Labour market status in the previous year		
Social assistance	1.949 ***	0.11
Unemployment	-0.078	0.268 ***
Citizenship (country of birth)		
Nordic countries	0.324 ***	-0.009
Western Europe	-0.24	-0.029
Refugees - Eastern Europe	0.123	-0.058
Refugees - other	0.578 ***	0.411 **
Other- non refugees	0.446 **	0.375 *
(Ref. group: Swedish born)		
Age at time of migration	0.005 *	-0.002
Benefits		
Unemployment compensation		0.029 ***
Social assistance	0.026 ***	
Household with housing benefits	0.520 ***	0.084 ***
Other controls		
Year Dummy	yes	yes
Regional (county) dummies	yes	yes
Cohort dummies for year of immigration	yes	yes
Int. year*citizenship	yes	yes
Int. labour market status (t-1) *citizenship	yes	yes
Observations	919013	919013

Reference group: employment

Figure 1a
Conditional probability of leaving unemployment to employment

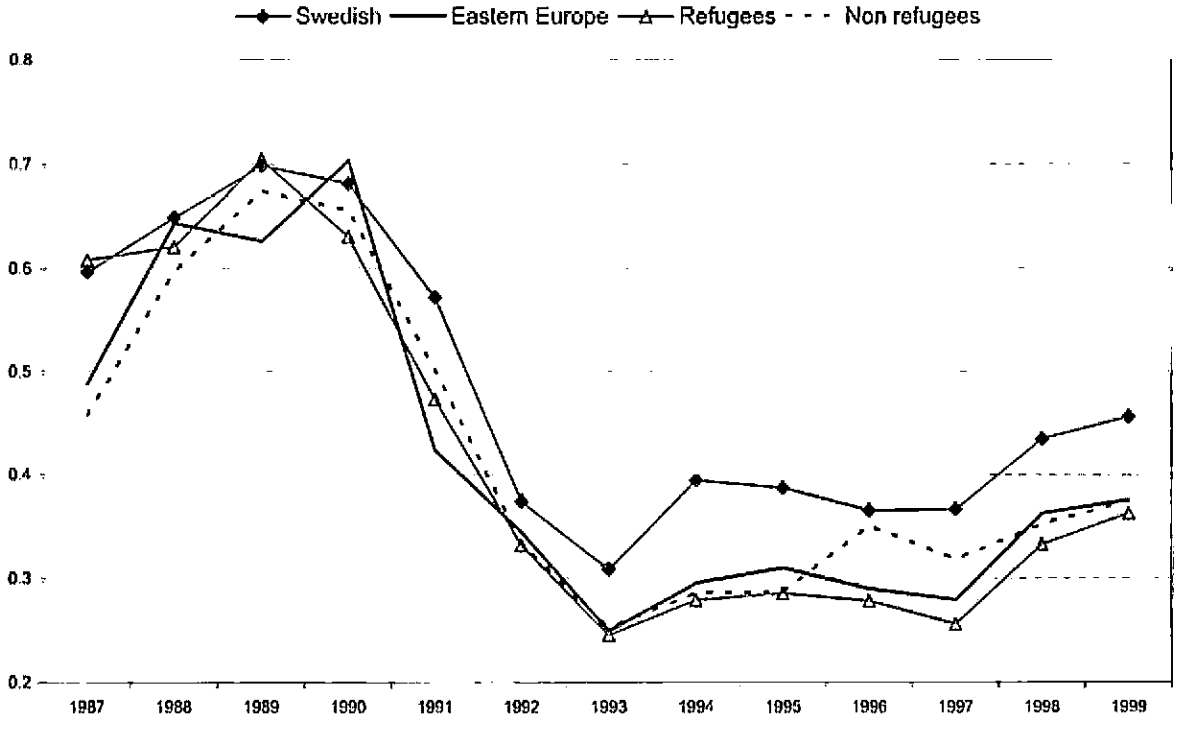


Figure 1b
Conditional probability of leaving unemployment to social assistance

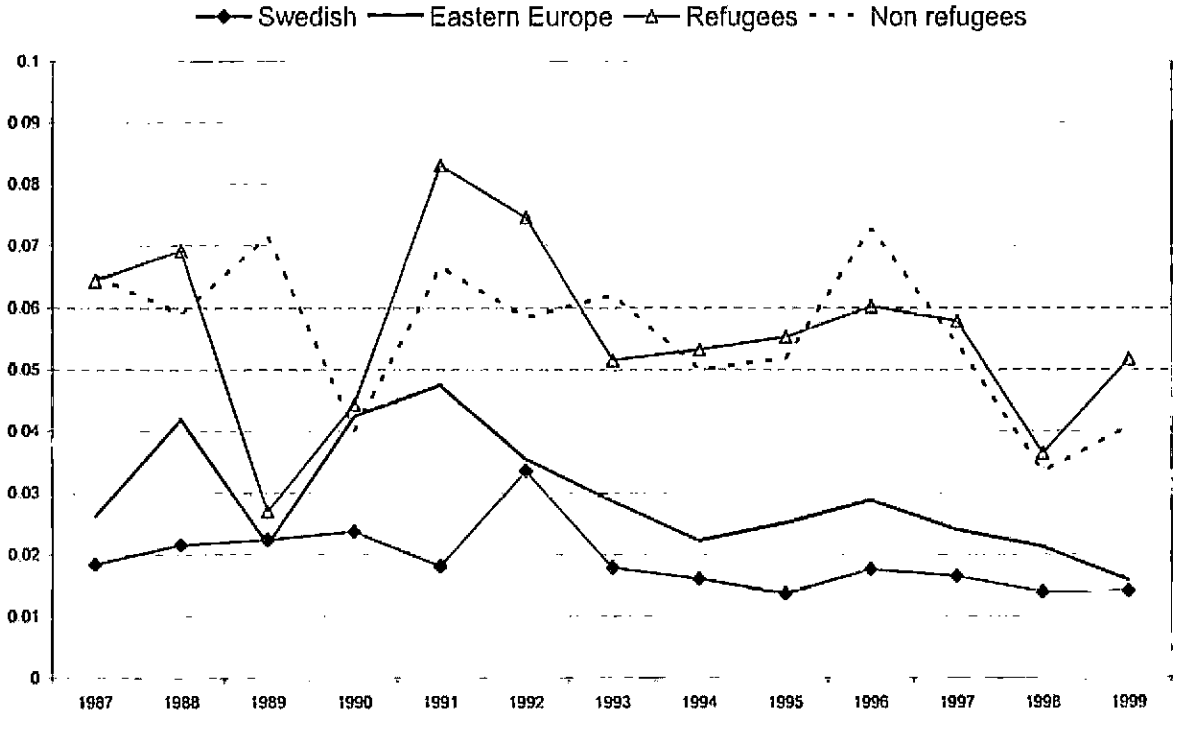


Table 6
Competing risk hazard model: maximum likelihood estimation

	E-SA	E-U	U-SA	U-E	SA-E	SA-U
Year of arrival						
Before 1970	0.858	0.925	0.819	0.889 *	0.868	1.110
1970-1975	0.862	1.027	0.673 **	0.871 **	0.818 *	0.675 *
1975-1980	0.795	1.192 **	0.602 ***	0.893 *	0.837	0.896
1980-1985	0.867	1.215 **	0.592 **	0.897 *	0.721 **	0.863
1985-1990	0.821	1.319 ***	0.815	0.841 ***	0.699 ***	0.894
1990-1999	1.446 *	1.027	1.179	0.889	0.700 **	0.525 **
Age						
Age	1.510 ***	1.355 ***	1.097 **	0.924 ***	1.027	1.117 **
Age squared	0.995 ***	0.996 ***	0.999 ***	1.001 ***	0.999 *	0.998 ***
Marital Statusand household						
Married man without children	1.817 ***	1.490 ***	1.587 ***	0.883 ***	0.852 *	0.946
Married woman without children	0.678 **	1.288 ***	0.618 **	0.956	0.914	0.574 **
Married woman with children	0.723 ***	1.225 **	0.312 ***	1.115 ***	0.917	0.558 ***
Unmarried man	1.887 ***	1.444 ***	1.244 **	0.650 ***	0.653 ***	0.557 ***
Unmarried woman	1.447 ***	1.391 ***	0.904	0.874 ***	0.716 ***	0.397 ***
Other - without children	2.147 ***	1.580 ***	1.436 ***	0.788 ***	0.767 ***	0.594 ***
Other - with children	1.317 ***	1.404 ***	0.899	0.912 **	0.748 ***	0.555 ***
(Ref. group: married man with children)						
Household size	0.766 ***	0.978	0.815 ***	1.001	1.054 **	1.115 **
Education						
Secondary	0.601 ***	1.010	0.745 ***	1.112 ***	1.375 ***	1.577 ***
Tertiary	0.328 ***	0.612 ***	0.630 ***	1.390 ***	1.627 ***	1.515 ***
(Ref. group: primary or lower)						
Citizenship (country of birth)						
Nordic countries	1.610 ***	1.247 ***	1.130	0.948	1.068	1.135
Western Europe	1.101	1.127	0.789	0.935	1.147	1.141
Refugees - Eastern Europe	1.440 ***	1.330 ***	1.210	0.830 ***	1.061	1.028
Refugees - other	2.039 ***	1.810 ***	1.854 ***	0.714 ***	0.936	1.249
Other- non refugees	1.900 ***	1.403 ***	1.907 ***	0.759 ***	0.974	1.015
(Ref. group: Swedish born)						
Age at time of migration	0.993	0.993 ***	1.003	0.998	1.005 *	1.008
Benefits						
Unemployment compensation			1.000	0.999 ***		
Social assistance					0.998 ***	0.996 ***
Household with housing benefits	3.345 ***	1.223 ***	3.245 ***	0.937 ***	1.046	1.100
Other controls						
Unionised			0.179 ***	0.455 ***		
Year Dummy	yes	yes	yes	yes	yes	yes
Regional (county) dummies	yes	yes	yes	yes	yes	yes
Duration dependence						
2 years in employment	0.618 ***	0.643 ***				
3 years in employment	0.367 ***	0.486 ***				
4 years in employment	0.308 ***	0.382 ***				
5 years in employment	0.255 ***	0.302 ***				
6 years in employment	0.146 ***	0.188 ***				
(Ref. group: 1 year in employment)						
2 years in unemployment			1.071	0.910 ***		
3 years in unemployment			0.911	0.793 ***		
4 years in unemployment			0.716 ***	0.645 ***		
(Ref. group: 1 year in unemployment)						
2 years in social assistance					0.750 ***	0.775 ***
3 years in social assistance					0.547 ***	0.493 ***
(Ref. group: 1 year in social assistance)						
Observations	64523	64523	196765	196765	22148	22148

E: employment; SA: social assistance; U: unemployment. Age group: between 25 and 55. Years: 1986-1999.

Figure 2a

Mean unemployment duration (years) by country of origin and initial year of unemployment spell

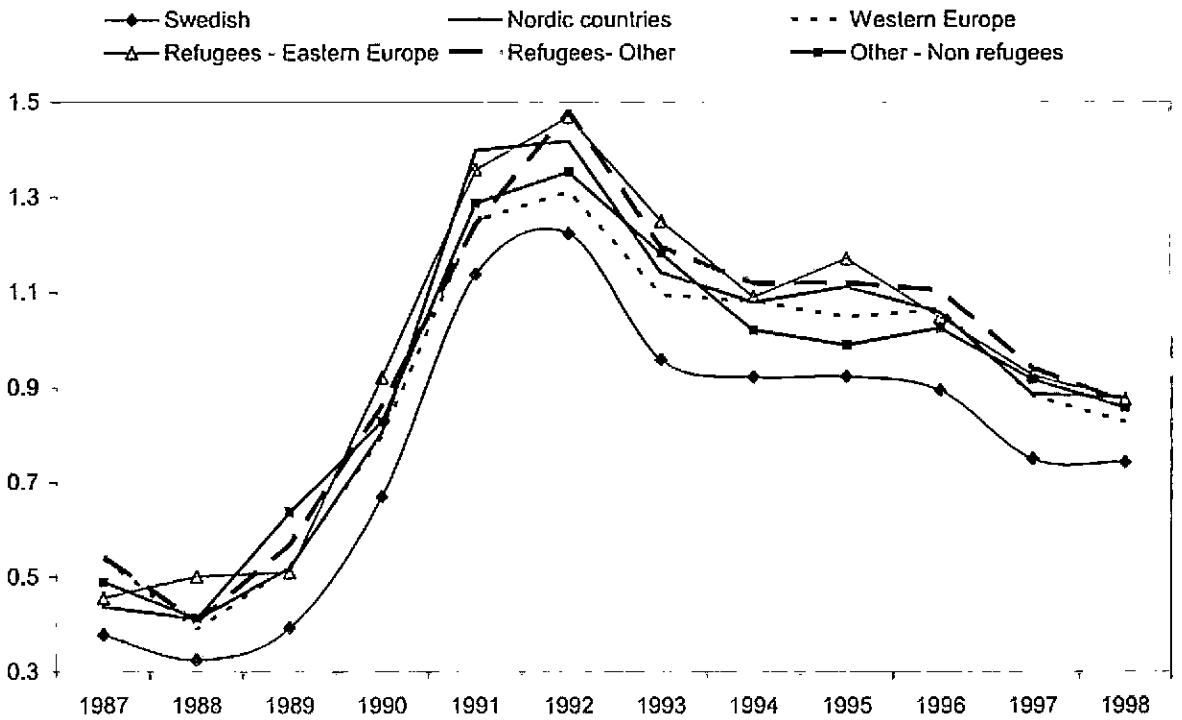


Figure 2b

Mean social assistance duration (years) by country of origin and initial year of social assistance spell

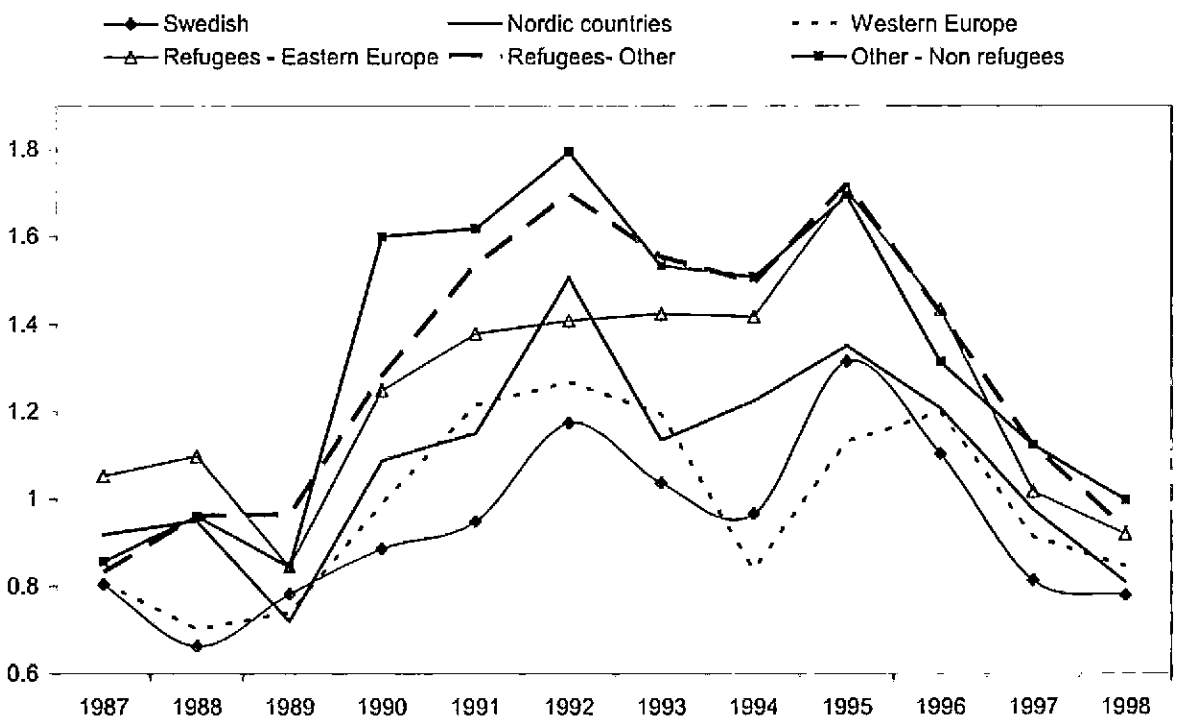


Figure 3a
Hazard function: unemployment

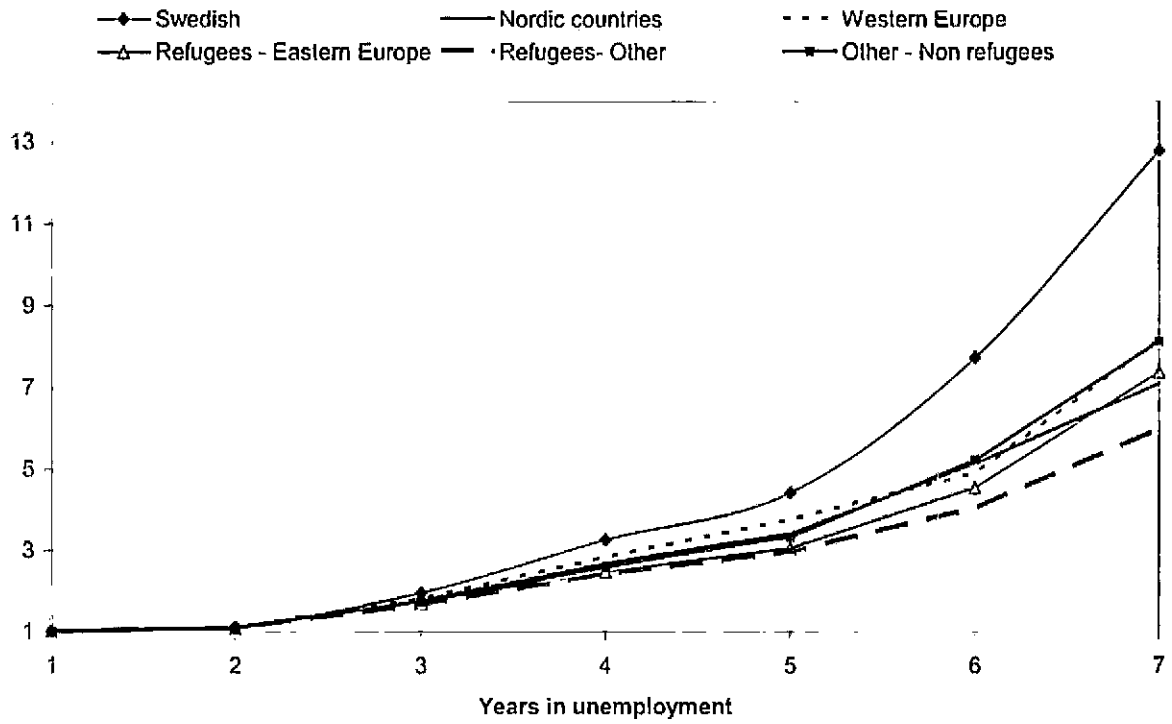


Figure 3b
Hazard function: social assistance

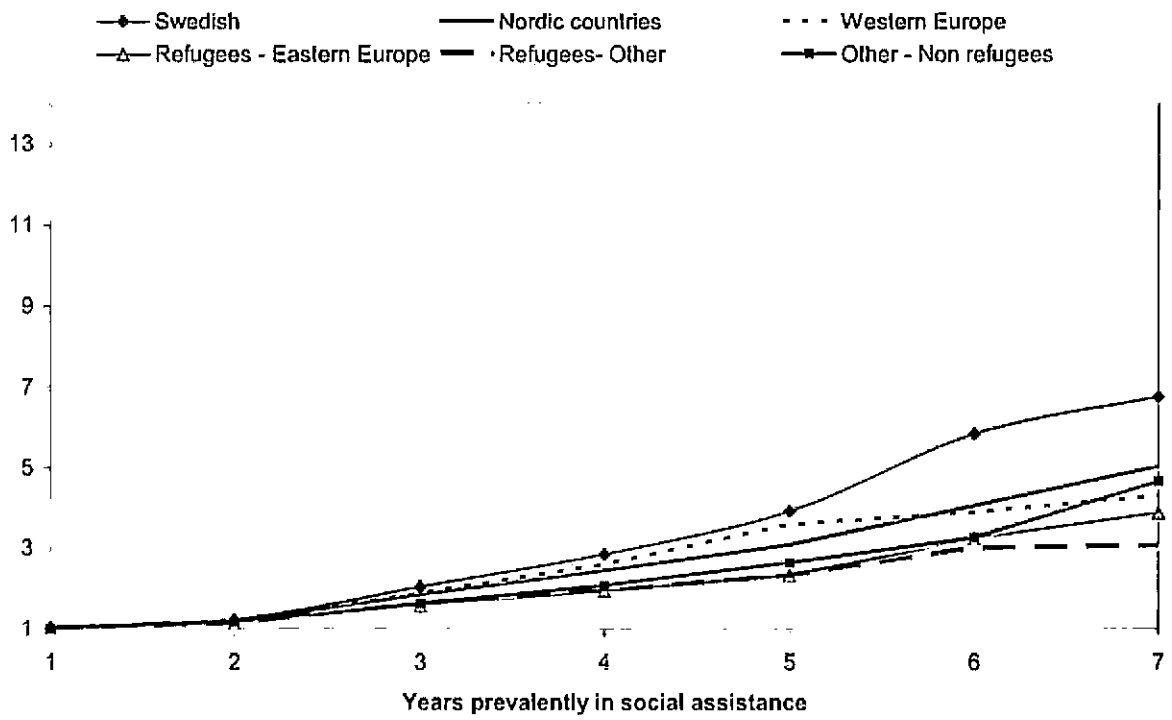


Figure 4a
Survivor function: unemployment

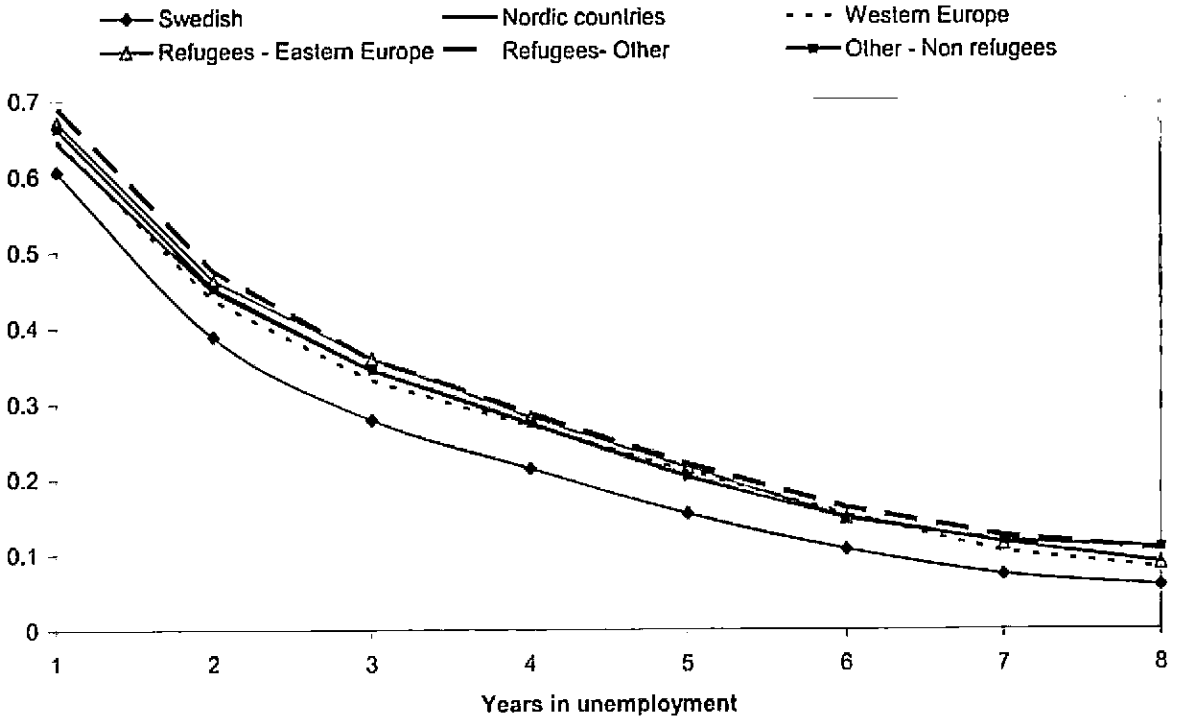
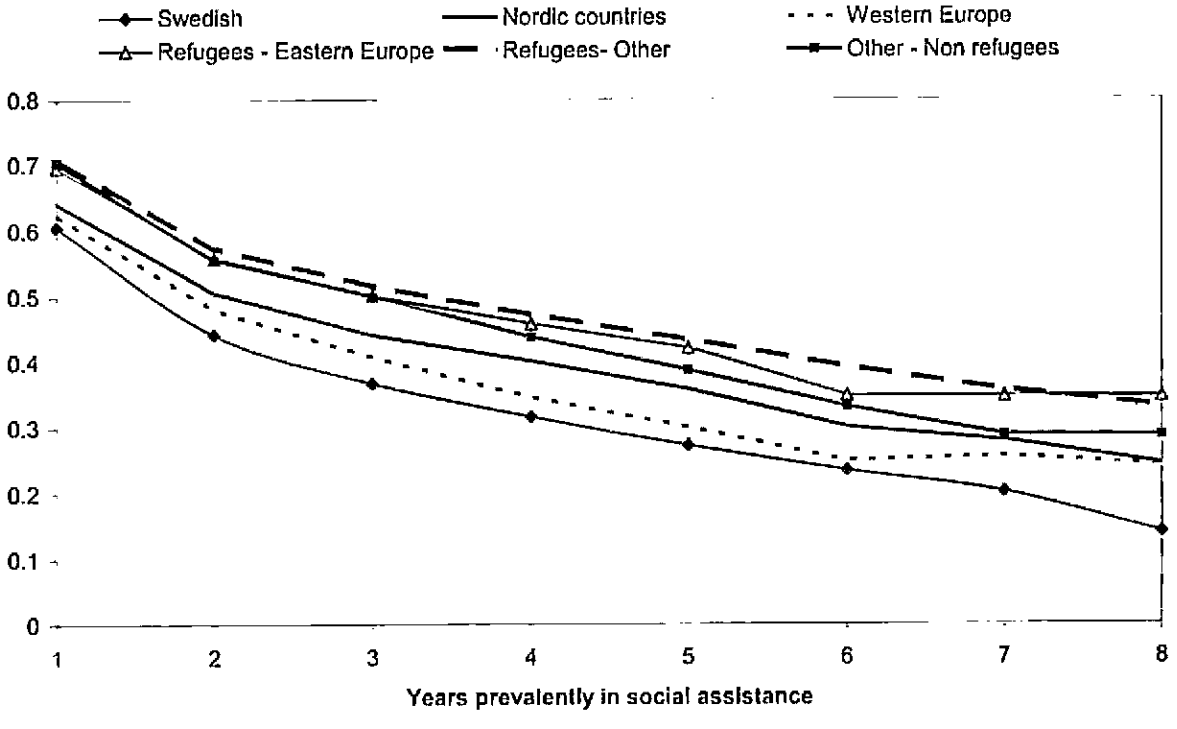


Figure 4b
Survivor function: social assistance



CHAPTER 4

POVERTY ENTRY AND EXIT DURING OLD AGE: COMPARATIVE EVIDENCE FROM THE EUROPEAN COMMUNITY HOUSEHOLD PANEL

4.1 Introduction and motivation

The reforms of social protection systems currently ongoing in many European countries and the associated phenomena of early exits from the labour market and of an increasing development of private pensions schemes are at the origin of a growing variability of income sources during later stages of life. These aspects make the analysis of income patterns of the elderly of the lifetime changes associated to them particularly relevant for both researchers and policy-makers. With this respect, the motivations at the origin of this work are three- fold. First, the elderly represent one of the social groups at higher risk of poverty and social exclusion with respect to other population subgroups, as can be noticed from Figure 1, illustrating recent developments in poverty rates by age groups during the late nineties: in most EU-15 countries, poverty rates for old aged people are well above national poverty rates (the 2001-EU 15 average poverty rate was around 15%), and, in a number of countries, the elderly are at higher risk of poverty than other traditionally vulnerable population subgroups (e.g. children). The second motivation is "institutional": the EU has adopted since 2001 an Open Method of Coordination in the field of social policy and social protection, which, in the specific domain of "pensions" (one of the largest items of total social protection expenditure in the European Union, as shown by table 1), set explicit common objectives to preclude the exclusion of older peole. Third, the need of improving on previous research based on national-specific studies in terms of cross-country

comparability justifies the focus on the countries for which the longest longitudinal information from the European Community Household Panel is available. The chapter is organized as follows: the next section summarizes the related relevant literature; the third section briefly describes the data; the fourth section illustrates the methodology followed in the analysis of poverty spells, while the results are presented and commented in the fifth sections; the last section concludes.

4.2 Related literature

The empirical evidence on income poverty during later stages of life cannot be considered exhaustive. Existing comparative indicators focusing on ageing and income included in the current official publications by the EU and the OECD are limited to reporting measures of income levels and headcount poverty rates (OECD, 2001). A number of empirical studies have been carried out mainly from a country-specific perspective or on the basis of comparisons between two or three countries. The studies by Zaidi et al. (2001, 2002 and 2003) can be numbered among the most relevant works in this field. Zaidi, Frick and Büchel (2003), for instance, compare income mobility patterns during old age in the UK and in West Germany; Zaidi, Rake and Falckingham (2001) provide a set of mobility measures for British pensioners' incomes between 1991 and 1997; finally, Zaidi and De Voos (2002) investigate income mobility among the elderly in the UK and in the Netherlands. One of the purposes of this work is to extend the scope of

the analysis to a broader range of countries, and this motivates the choice of the European Community Household Panel (ECHP).

4.3 Data: the European Community Household Panel (ECHP)

The ECHP is a panel survey based on a standardised questionnaire that involves annual interviewing of a representative panel of households and individuals, covering a wide range of topics: income (including the various social benefits), health, education, housing, demographics and employment characteristics. It was developed by Eurostat in association with Member States as of 1994. The data are collected at annual intervals, and so build up an historical record of 60,500 nationally representative households. For the UK and Germany, the files relative to the British Houshold Panel and to the German Socio-economic Panel have been considered. The analysis has focussed on the following countries: Denmark, Netherlands, Belgium, France, Italy, Ireland, Spain, Greece, Portugal, Germany and United Kingdom.

4.4 Multivariate analysis of poverty entry and exit

The methodology of the study of poverty dynamics can be considered following two main streams: one focusing on the so-called hierarchy of "trigger events" (Bane and Elwood, 1986) which might be associated to poverty exit/entry; the other instead (Stevens, 1989) for which it is crucial the modelling of the time spent

into (or out of) poverty and how it will influence the probability of leaving poverty (or falling back in). The methodology adopted hereby follows closely the works by Jenkins and Rigg (2001) and Devicienti (2001) and is based on a multivariate frawework, in which transition out of and into poverty depend not only on personal characteristics or particular events but also crucially on the time spent into (or out of) poverty. This approach faces the problem of left-censoring: since it is not possible to observe the true beginning of poverty spells for individuals who are observed poor at the start of the sample period, the analyis can be limited only to the deteminants of poverty persistence conditional on the first poverty spell being observed. Similarly, since it is not possible to observe for how long individuals have been non-poor before beginning a poverty spell, it is possible only to estimate the probability of entering poverty conditional on the first non-poor spell being observed, which can happen only after a transition out of poverty is observed during the period under study. With this respect, the study of poverty entry can be only based on poverty re-entries of individuals who already left poverty during the length of the period of investigation.

In this frawework, a crucial concept is the hazard rate. The hazard rate can be intuitively considered as a conditional probabilty: the probability of leaving poverty at time t conditional on having been poor until time $t-1$, and on the first poverty spell being observed; similarly, the probability of becoming poor at time t conditional on having been non-poor until time $t-1$, and on the first of the spells

before poverty occurs being observed. The definition of poverty adopted herby is quite standard: individuals are defined poor if they live in households whose equivalised income is below the 60% of the national median equivalised income; all household members are assgned the same equivalised household income, assuming that resources are equally shared within household; the equivalence scale adopted is the modified-OECD, which assigns a weight of 1 to the household head, 0.5 to any other adult in the household and 0.3 to children.

Given the nature of the data and the methodology of income measurement in the ECHP, true poverty (or out-of-poverty) spells cannot be observed, since it is possible to observe poverty spells occurring within in interval (of length of 1 year). With this respect, a continuous time model for the hazard rate would be inappropriate, since transitions between different states of interest can be observed only during time intervals and not at any point in time.

Omitting for simplicity subscripts relative to individulas, the hazard rate during a given spell j can be defined by $[h(j, X \mid v)]$: it depends on the current spell j, on a set of individual observable characterisitcs, X, and on individual-specific unobserved characteristic v , with a given parametric distribution, known as unobservered heterogeneity or frailty. More specifically, the model chosen to estimate poverty exit and poverty re-entry is a discrete-time proportional hazard model with Gamma-unobserved heterogeneity. As shown by Jenkins (1995, 2004), the complementary log-log transformation of the proportional discrete-time

representation of an underlying continuous hazard rate can be expressed as:

$$\text{c log log}[h(j, X \mid v)] = f(j) + \beta' X + u \tag{4.1}$$

This expression means that the clog-log transformation of the hazard rate during spell j is function of the following elements. $f(j)$ is a general function of duration dependence and represents the baseline hazard, the risk of leaving a given state common to all individuals.which determines how the hazard rate varies over time. $f(j)$ can have different specifications: I will adopt hereby a piece-wise constant specifications of the baseline hazard, according to which $f(j) = \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + ... \alpha_j D_j$ where D_j are dummies corresponding to survival until spell j. $\beta' X$: is the effect of a set of observable characteristics which might vary or not over time; a positive value of the coefficients β' indicates that the relevant characteristics increase the hazard rate (shorten the spells), while a negative value implies that the hazard rate is lower (spells are longer). $u = \log(v)$, where v is th unobserved heterogeneity parameter following a Gamma distribution with mean equal to 1 and variance equal to σ^2.The choice of the functional form of the heterogeneity is related as well to the need of obtaining a closed functional form of the hazard. Under the assumption of u distributed according tho a Normal distribution with zero mean , then the model will be equivalent to a fixed-effects using data in person-period form.

The estimation of both the hazard of leaving poverty and re-entering poverty has been performed using the *pgmhaz8* stata program by Stephen Jenkins. The

dependent variable is derived from equation (1):

$$\log(-\log[1 - h(j, X \mid v)]) = f(j) + \beta' X + u \tag{4.2}$$

which is equivalent to:

$$h(j, X \mid v) = 1 - \exp[-\exp(f(j) + \beta' X + u)] \tag{4.3}$$

The hazard rate is the dependent variable. The program used requires the data to be organized in person-period form, and performs clog-log regression on a binary dependent variable indicating whether the individual is experiencing failure (a transition between states) or not during a given spell. The relevant sample considered consists of all individuals begining a non left-censored spell at the age of 55 or more.

The variables X considered to influence exit from poverty conditional on past poverty experience include the following. Gender, age, a number of household specific controls, namely: a dummy to indicate whether individuals leave alone in single person households; a dummy to indicate whether individuals live in 2-persons houshold, where both individuals are aged below 65; a dummy to indicate whether individuals live in 2-persons houshold, where one or both are aged above 65; a dummy indicating whether the person has become widow; a dummy for primary education as highest educational attainment verus all other educational levels; a dummy capturing economic activity status: being employed versus non employed; a dummy to take into accoount whether other employed members are

living in the houseold; a dummy to indicate whether the person has health problems, illness or disability; a dummy relative to tenure status whether the person is renting or is owner of its current dwelling; whether there has been a positive year-to-year change in old-age survivors benefit or invalidity benefits; a number of dummies has also been included to capture duration dependence in a non-parametric form, indicating the length of the poverty spell before poverty exit, from one to four or more years. The same set of variables has been included in the estimation of poverty entry, with the exception of a dummy for "never married" replacing "becoming widow" and negative change in work-income and in sickness/invalidity benefits. A number of alternative specifications were chosen, and the results reported have been selected after sensitiviy analyis.

4.5 Results

The results of the multivariate discrete-time hazard models for re-entry and poverty exit for the countries considered are shown in Table 2 and Table 3 respectively. For each country, the results of model estimation with and without Gamma-unobserved heterogeneity are reported in the right-column (2) and in the left-column (1) respectively. At the bottom of each table, a likelihood test of the model with versus without unobserved heterogeneity shows that Gamma-unobserved heterogeneity is always significant for both poverty exit and re-entry: for each country in fact, the null hypothesis that the variance of the unobserved

heterogeneity parameter is equal to zero is always rejected by the likelihood ratio test statistic, whose p-value is constantly equal to zero. The results reported under column (2) therefore should be considered corresponding to the correct model. All the coefficients in both table 1 and 2 are reported in their non-exponentiated format.

Let's consider first the results relative to the poverty exit model (table 3). The variables indicating different household typologies are those showing the most significant impact on the hazard rate in nearly all countries. In particular, single-person households and couples where at least one member is aged above 65 exhibit lower hazard rates, and therfore longer poverty spells, than the reference category (the residual other type of households, both with and without children); the magnitute of the coefficients is particularly relevant in Ireland, UK and in Soutern European countries. Further, widowhood, defined here as becoming widow during the poverty spell, unambiguously reduces the hazard rate of leaving poverty in all countries, with the exception of Denmark, Belgium and Germany; such finding suggests that survivors' benefits might not represent a sufficient safety net, other things being equal, for individuals already experiencing poverty *before* such events. Living in houseolds where other members are economically active and employed increases the hazard of leaving poverty in the majority of the countries considered, and its impact is in general more significant than being employed as such. Poor health or disability status reduces the hazard rateof leaving poverty

only in a few number of countries such as France, Ireland and Portugal, while low educational attainment is associated with longer poverty spells in the majority of countries, in particular in Portugal. Among the explanatory variables considered, tenure status seems to impact significantly and negatively on the hazard rate only in Italy, while its association with shorter poverty spells in countries such as Denmark and the UK. does not find a a straightforward explanation and requires further investigations. Finally, another set of explanatory variables has been considered to take into account the eventual impactof the benfits system on the probablity of leaving poverty: the events considered are a positive change registered in income from old age and survivors benefits registered during the poverty spell, and a positive change in the income from disability or sickness benefits. Such events are likely to occur when individuals are moving from work into retirement: a negative coefficients on thea bove dummies indicates that the income change generated by the benefits is not sufficient to bring individual out of poverty, the opposite if a positive sign is observed. The evidence on the effectiveness of such instruments is mixed: benefits impact positively on the hazard in Belgium and Denmark, while they seem ineffective in the Netherlands, Italy, Irelad,Greece and UK. Further invstigation to check robustness of such results is required. In nearly all the countries we find evidence of strong negative duration dependence, with the exception of Denmark , Portugal and Germany. In general, poverty persistence decreases the chances of leaving poverty as the time spent in poverty increases,

as shown by the absolute value of the coefficients on the dummy "4 to 6 years in poverty".

Table 2 reports the estimates relative to the multivariate discrete-time proportional hazard model of poverty re-entry. The findings parallel the results shown in table 1. In general, the factors hampering the hazard rate of leaving poverty influence also positively the probability of falling back into poverty after having escaped it. Differently form the specification of the hazard rate of leaving poverty, though, I introduced some other specific variables: in place of the dummy "become widowed", I introduced the dummy "never married", which turns out to impact positively on the probability of going back to poverty after having left it, in paticular in Denmark, Italy, and Spain. With respect to the sources of income changes impacting on the risk of poverty re-entry, it is possible to notice now that negative changes in income from work account for an increase of the hazard of re-entering poverty in nearly half of the countries, with the exception of Denmark, Netherlands, Belgium , Greece, Spain , Portugal. Gender and age do not seem instead conditions which reduce the probability of leaving poverty as such, once the impact of other factors has been taken into account. In conclusion , it should be added that the significance of unobserved heterogeneity is consistent with the larger coefficients exhibited in general under model (2)

Finally, tables 4a and 4b shows the estimated hazard ratio of falling into poverty conditional for having survived out of poverty for a given number of con-

secutive years, by gender and different age groups in the countries considered (the coefficients used are those from table 2 in the presence of unobserved heterogeneity). The charts show that the age profile of the hazard exhibit a higher variability than the gender dimension. Interestingly, table 4b points out that in a number of countries, the probability of falling into poverty seems higher when associated to the retirement period and for younger cohorts (age group 55-64): this is true in particular for Belgium, Greece and Denmark; in another group of countries instead (Ireland, Portugal, and the UK), risk of becoming poor is higher for the older cohorts (aged 75+), most likely stemming from the insufficient coverage of occupational pensions in the anglo-saxon countries, the low levels of the basic state pensions and the weak role of minimum income protection schemes for the elderly as anti-poverty instruments.

4.6 Conclusions

Adopting an approach which has become standard in the econometric literature on income poverty, I use a multivariate discrete-time piecewise constant hazard rate model to estimate separately the major determinants of poverty entry and exit focusing on the older age groups. The methodology enables to assess the impact of personal characteristics, household characteritics, and other labour market factors on individuals' probability to leave and to enter poverty, and to make predictions about the mean durations of poverty spells for specific popula-

tion subgroups. Particular attention has been devoted to investigate how changes in households' disposable income composition after retirement impact on poverty spells. Further, the econometric specification allows to distinguish the impact of observables characteristics from individual unobserved heterogeneity on duration dependence. The main findings show that single-person elderly households are the most exposed to both highest risk of poverty entry and lowest rates of poverty exit in the majority of European countries, in particular in Ireland and other Southern European countries. Further, the labour market attachment of other household members play a major role both in stimulating poverty exit and in preventing poverty re-entry of older people. Further research steps will envisage:1) estimating jointly poverty exit and poverty re-entry; 2) pooling observations across countries in order to estimate the impact of country-specific effects on poverty exit and re-entry: in particular, the effects of different compositions of social protection expenditure and of major policy reforms in the European social protection systems will be investigated.

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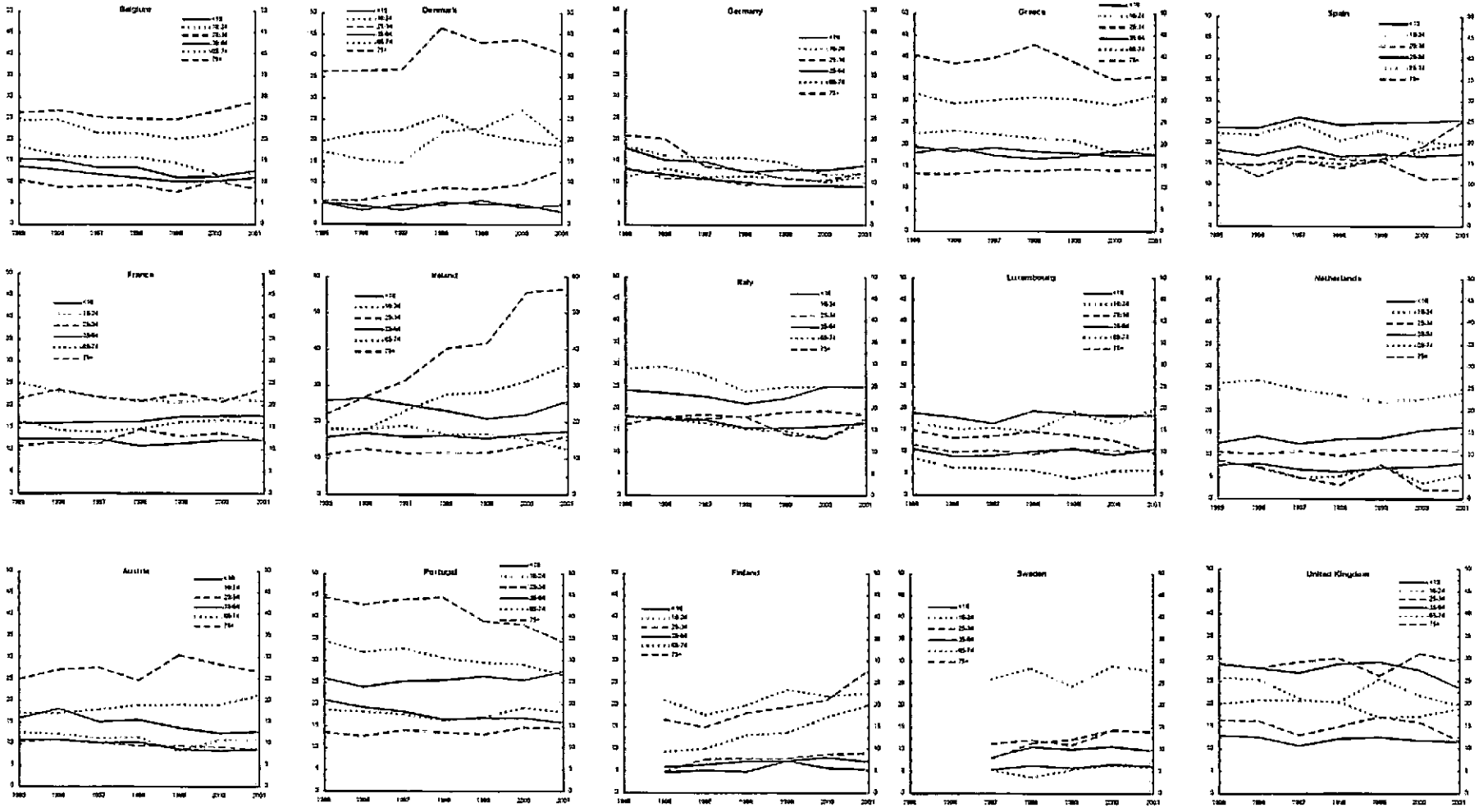
Figure 1: poverty rates by age groups (1995-2001)



Source: EUROSTAT, Newcronos database (2005).

Table 1
Social expenditure in old age and survivors benefits (both cash and in-kind): 2001

	Old age and survivors benefits			
	GDP		Social Expenditure	
	%	Rank	%	Rank
Austria	13	3	49.5	3
Belgium	11.2	5	43.7	7
Denmark	6.5	13	38	13
Finland	8	11	36.6	14
France	11.9	4	43.7	7
Germany	11.2	5	42.4	9
Greece	13.4	2	51.3	2
Ireland	3.2	15	24.8	15
Italy	15.2	1	62.3	1
Luxembourg	8.1	10	39.4	11
Netherlands	6.4	14	41.8	10
Portugal	9.1	7	45.8	5
Spain	8.7	8	45.3	6
Sweden	7.4	12	39.1	12
UK	8.3	9	46.5	4
EU 15 Average	9.4		43.3	

Source: OECD, Social Expenditure Database (2004)

Table 2. Poverty entry equation

	Denmark		Netherlands		Belgium		France		Ireland		Italy	
Explanatory Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.087	0.203	0.289	0.446	0.065	-0.095	-0.037	-0.153	0.096	0.032	0.046	0.00
	0.216	*0.252*	*0.272*	*0.35*	*0.183*	*0.208*	*0.149*	*0.167*	*0.274*	*0.322*	*0.124*	*0.147*
Age	-0.01	0.013	-0.012	0.018	0.017	0.01	0.009	0.014	-0.038 **	-0.028	-0.001	-0.002
	0.014	*0.016*	*0.021*	*0.025*	*0.015*	*0.018*	*0.011*	*0.011*	*0.017*	*0.019*	*0.008*	*0.01*
Single person household	1.461	1.174	-1.962 ***	-1.755 ***	-0.512	-0.774 **	-0.047	0.346	0.167	0.526	-0.411 **	-0.232
	1.065	*1.104*	*0.474*	*0.664*	*0.367*	*0.393*	*0.266*	*0.309*	*0.462*	*0.538*	*0.191*	*0.223*
2-persons household, both aged below 65	1.408	0.822	-0.861 **	0.227	-0.334	-0.809 *	0.106	0.174	0.182	0.255	-1.107 ***	-1.48 ***
	1.081	*1.151*	*0.424*	*0.557*	*0.407*	*0.46*	*0.254*	*0.307*	*0.562*	*0.778*	*0.263*	*0.373*
2-persons household, at least one aged above 65	1.47	1.112	-0.936 **	-0.487	0.025	-0.281	-0.069	0.165	0.495	0.637 *	-0.433 **	-0.462 **
	1.051	*1.082*	*0.365*	*0.532*	*0.309*	*0.33*	*0.242*	*0.284*	*0.315*	*0.38*	*0.172*	*0.204*
Never married	0.517	0.787 **	_	-12.58	0.282	0.497	0.597 **	0.366	0.462	0.301	0.538 **	0.47 *
	0.331	*0.368*		*740.923*	*0.454*	*0.462*	*0.287*	*0.329*	*0.383*	*0.434*	*0.218*	*0.262*
Primary education	-0.129	-0.115	-0.052	0.189	0.02	0.045	0.558 **	0.608 **	0.355	0.404	0.5 **	0.675 **
	0.201	*0.234*	*0.281*	*0.391*	*0.217*	*0.242*	*0.225*	*0.258*	*0.35*	*0.418*	*0.233*	*0.298*
Employed	-0.366	-0.106	-0.626	-0.27	0.236	-0.176	0.251	0.36	-0.298	-0.228	0.419 ***	0.311
	0.386	*0.433*	*0.474*	*0.58*	*0.39*	*0.501*	*0.261*	*0.3*	*0.383*	*0.373*	*0.16*	*0.193*
Other household members employed	-0.284	-0.21	-1.069 **	-0.987 *	0.307	0.241	-0.052	-0.028	-0.518 *	-0.784 **	-0.518 ***	-0.472 ***
	0.473	*0.563*	*0.424*	*0.579*	*0.337*	*0.393*	*0.223*	*0.264*	*0.294*	*0.364*	*0.145*	*0.173*
Person with health problems, illness or disability	0.268	0.348	-0.11	0.159	-0.15	-0.057	0.17	0.131	0.035	0.369	-0.02	-0.085
	0.21	*0.246*	*0.256*	*0.318*	*0.19*	*0.21*	*0.143*	*0.162*	*0.259*	*0.279*	*0.126*	*0.15*
Renting current accomodation	-0.378 *	-0.609 **	-0.246	-0.174	-0.004	-0.087	-0.256	-0.297	0.446	0.583	-0.057	0.118
	0.217	*0.256*	*0.255*	*0.334*	*0.216*	*0.269*	*0.171*	*0.195*	*0.398*	*0.458*	*0.179*	*0.204*
Negative change in income from work	-0.324	-0.242	0.182	0.238	-0.197	-0.377	0.683 ***	0.717 ***	1.167 ***	1.071 ***	0.338 *	0.581 **
	0.415	*0.49*	*0.428*	*0.566*	*0.419*	*0.507*	*0.243*	*0.277*	*0.299*	*0.337*	*0.182*	*0.261*
Negative change in sickness/invalidity benefits	0.273	-0.034	-0.028	0.207	-0.259	-0.315	-0.551	-0.597	0.577	0.634	0.085	-0.11
	0.382	*0.474*	*0.451*	*0.493*	*0.433*	*0.476*	*0.395*	*0.426*	*0.364*	*0.403*	*0.211*	*0.248*
1 year before entering poverty	-1.383	-3.539 **	0.345	-3.573 **	-2.149 **	-1.697	-2.34 ***	-3.265 ***	0.627	-0.851	-1.384 **	-2.116 ***
	1.435	*1.589*	*1.495*	*1.507*	*1.018*	*1.207*	*0.728*	*0.9*	*1.167*	*1.314*	*0.591*	*0.768*
2 years before entering poverty	-2.38 *	-3.923 **	-0.451	-3.517 *	-2.454 **	-1.735	-2.626 ***	-3.298 ***	0.284	-0.735	-1.919 ***	-2.21 ***
	1.446	*1.598*	*1.544*	*1.857*	*1.021*	*1.205*	*0.731*	*0.902*	*1.187*	*1.332*	*0.605*	*0.72*
3 years before entering poverty[1]	-2.539 *	-3.949 **	-0.875	-3.949 **	-2.677 ***	-1.848	-3.924 ***	-4.452 ***	0.202	-0.571	-2.519 ***	-2.619 ***
	1.45	*1.603*	*1.547*	*1.863*	*1.032*	*1.211*	*0.783*	*0.947*	*1.247*	*1.391*	*0.628*	*0.74*
4-6 years before entering poverty					-4.025 ***	-3.189 **	-3.914 ***	-4.456 ***	0.351	-0.42	-3.111 ***	-3.216 ***
					1.093	*1.362*	*0.76*	*0.924*	*1.251*	*1.399*	*0.64*	*0.754*
Variance of Gamma		0.00		0.00		0.00		0.00		0.00		0.00
LR test of Variance of Gamma=0 (Chibar2)		72.4		95.3		67.16		116.4		51		274
Prob.>=Chibar2		0.00		0.00		0.00		0.00		0.00		0.00
Observations	451	451	700	719	606	606	1226	1226	394	394	2314	2314
Log likelihood	-233.64	-202.71	-197.78	-149.05	-290.67	-259.82	-506.99	-450.85	-193.04	-162.61	-858.56	-713.97

* p<0.10, ** p<0.05, *** p<0.01

Table 2 (continued)

	Greece		Spain		Portugal		Germany		United Kingdom	
Explanatory Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.021	0.021	-0.014	0.035	0.078	0.068	0.145	-0.04	0.174	-0.015
	0.103	*0.123*	*0.101*	*0.12*	*0.1*	*0.113*	*0.184*	*0.224*	*0.193*	*0.213*
Age	0	0.001	-0.013 *	-0.006	0.009	0.011	-0.001	-0.002	0.003	0.015
	0.007	*0.011*	*0.007*	*0.008*	*0.007*	*0.008*	*0.014*	*0.017*	*0.011*	*0.012*
Single person household	-0.177	-0.26	-0.149	-0.228	-0.266	-0.325	-0.829 ***	-0.469	1.03 **	1.305 **
	0.191	*0.226*	*0.187*	*0.209*	*0.183*	*0.207*	*0.297*	*0.365*	*0.473*	*0.562*
2-persons household, both aged below 65	0.199	0.09	0.031	0.149	0.25	0.268	-0.926 ***	-0.63 **	1.634 ***	2.076 ***
	0.156	*0.189*	*0.211*	*0.245*	*0.169*	*0.191*	*0.253*	*0.315*	*0.483*	*0.572*
2-persons household, at least one aged above 65	-0.144	-0.443 **	0.307 **	0.26	0.052	0.002	-1.041 ***	-0.883 **	0.925 **	1.094 **
	0.146	*0.176*	*0.147*	*0.168*	*0.129*	*0.146*	*0.298*	*0.373*	*0.463*	*0.549*
Never married	0.194	0.313	0.327	0.559 **	0.394 **	0.371	0.702 *	0.678	0.296	0.479
	0.277	*0.312*	*0.214*	*0.225*	*0.199*	*0.229*	*0.395*	*0.456*	*0.271*	*0.303*
Primary education	0.73 **	0.784	-0.079	0.112	-0.027	0.434	0.516 ***	0.686 ***	0.014	0.049
	0.341	*0.53*	*0.27*	*0.329*	*0.507*	*0.712*	*0.173*	*0.211*	*0.216*	*0.241*
Employed	0.009	0.062	-0.418 **	-0.595 ***	0.271 **	0.247 *	-0.409	-0.364	-0.026	-0.226
	0.131	*0.161*	*0.179*	*0.228*	*0.112*	*0.127*	*0.257*	*0.319*	*0.339*	*0.399*
Other household members employed	-0.227 *	-0.317 **	-0.234 *	-0.597 ***	-0.044	-0.116	-0.139	-0.172	-0.427	-0.445
	0.13	*0.154*	*0.135*	*0.163*	*0.12*	*0.136*	*0.234*	*0.297*	*0.4*	*0.428*
Person with health problems, illness or disability	-0.026	0.054	-0.044	-0.106	0.014	0.075	-0.209	-0.007	0.03	0.083
	0.102	*0.119*	*0.103*	*0.119*	*0.096*	*0.108*	*0.173*	*0.216*	*0.185*	*0.211*
Renting current accomodation	-0.658 **	-0.744 **	-0.446 **	-0.278	0.237 *	0.018	0.086	0.1	0.025	-0.292
	0.287	*0.343*	*0.202*	*0.221*	*0.128*	*0.155*	*0.172*	*0.212*	*0.177*	*0.205*
Negative change in income from work	0.154	0.186	0.18	0.212	0.164	0.072	0.47 *	0.428	0.547 **	0.844 ***
	0.183	*0.2*	*0.154*	*0.174*	*0.165*	*0.184*	*0.24*	*0.298*	*0.273*	*0.286*
Negative change in sickness/invalidity benefits	0.066	-0.086	-0.081	0.021	-0.164	-0.247	0.277	0.011	0.3	0.42
	0.169	*0.204*	*0.18*	*0.193*	*0.185*	*0.212*	*0.311*	*0.401*	*0.314*	*0.324*
1 year before entering poverty	-1.385 **	-2.007 *	-0.029	-1.204 *	-1.866 ***	-2.723 ***	-1.184	-2.078 *	-2.91 ***	-4.377 ***
	0.593	*1.065*	*0.536*	*0.632*	*0.7*	*0.896*	*0.925*	*1.12*	*0.865*	*0.999*
2 years before entering poverty	-2.127 ***	-2.368 **	-0.558	-1.252 *	-2.626 ***	-3.239 ***	-1.487	-1.947 *	-3.237 ***	-4.179 ***
	0.605	*1.075*	*0.549*	*0.643*	*0.707*	*0.903*	*0.939*	*1.131*	*0.886*	*1.014*
3 years before entering poverty	-2.595 ***	-2.639 **	-0.72	-1.292 **	-2.858 ***	-3.293 ***	-2.853 ***	-3.038 ***	-3.645 ***	-4.597 ***
	0.62	*1.081*	*0.563*	*0.655*	*0.717*	*0.91*	*0.987*	*1.172*	*0.908*	*1.033*
4-6 years before entering poverty	-3.264 ***	-3.314 ***	-1.194 **	-1.763 ***	-3.33 ***	-3.785 ***	-3.226 ***	-3.418 ***	-3.663 ***	-4.585 ***
	0.634	*1.091*	*0.561*	*0.651*	*0.72*	*0.913*	*0.987*	*1.177*	*0.9*	*1.026*
Variance of Gamma		0.00		0.00		0.00		0.00		0.00
LR test of Variance of Gamma=0 (Chibar2)		253		280		246		141		130
Prob.>=Chibar2		0.00		0.00		0.00		0.00		0.00
Observations	2049	2049	1990	1990	2466	2466	1712	1712	962	962
Log likelihood	-1000.6	-864.03	-949.98	-811.89	-1124	-1002.9	-441.36	-352.44	-400.06	-341.24

* p<0.10, ** p<0.05, *** p<0.01

Table 3. Poverty exit equation

	Denmark		Netherlands		Belgium		France		Ireland		Italy	
Explanatory Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	-0.025	0.079	0.125	0.135	-0.067	-0.052	0.152	0.164	0.115	0.221	0.016	0.041
	0.14	*0.161*	*0.139*	*0.145*	*0.142*	*0.138*	*0.102*	*0.112*	*0.126*	*0.145*	*0.087*	*0.1*
Age	-0.019 **	-0.03 ***	0.02 *	0.022 *	-0.002	-0.001	0.009	0.012	-0.01	-0.011	-0.002	-0.001
	0.01	*0.011*	*0.011*	*0.011*	*0.01*	*0.011*	*0.007*	*0.008*	*0.01*	*0.011*	*0.006*	*0.007*
Single person household	0.037	0.398	0.392	0.448 *	-0.471 *	-0.614 **	-0.283 *	-0.351 *	-1.066 ***	-1.079 ***	-0.402 **	-0.45 **
	0.351	*0.425*	*0.248*	*0.26*	*0.277*	*0.295*	*0.168*	*0.184*	*0.223*	*0.271*	*0.157*	*0.183*
2-persons household, both aged below 65	0.077	0.27	0.12	0.279	-0.035	-0.157	-0.249	-0.294 *	-1.083 ***	-1.065 ***	-0.47 **	-0.594 **
	0.365	*0.441*	*0.229*	*0.238*	*0.258*	*0.28*	*0.16*	*0.176*	*0.262*	*0.311*	*0.19*	*0.233*
2-persons household, at least one aged above 65	0.496	0.84 **	0.502 **	0.491 **	0.006	-0.192	-0.29 *	-0.303 *	-0.615 ***	-0.407 **	-0.149	-0.16
	0.339	*0.411*	*0.223*	*0.233*	*0.229*	*0.246*	*0.148*	*0.161*	*0.172*	*0.199*	*0.123*	*0.141*
Become widow	-0.462 *	-0.521	-1.467 **	-1.39 **	-0.08	-0.831	-0.676 ***	-1.118 ***	-0.97 **	-1.093 **	0.067	-0.434 *
	0.274	*0.321*	*0.724*	*0.726*	*0.406*	*0.592*	*0.252*	*0.325*	*0.416*	*0.503*	*0.197*	*0.258*
Primary education	0.018	-0.014	-0.262 *	-0.201	-0.119	-0.257	-0.352 ***	-0.318 **	-0.156	-0.36 **	-0.18	-0.19
	0.142	*0.162*	*0.152*	*0.158*	*0.145*	*0.159*	*0.131*	*0.143*	*0.15*	*0.162*	*0.123*	*0.143*
Employed	0.428 *	0.191	0.388 *	0.422 *	-0.201	-0.406	0.25	0.136	0.655 ***	0.601 ***	0.115	0.087
	0.227	*0.269*	*0.235*	*0.241*	*0.24*	*0.289*	*0.157*	*0.176*	*0.158*	*0.181*	*0.115*	*0.131*
Other household members employed	0.446 *	0.619 **	0.484 **	0.584 **	0.137	-0.001	-0.187	-0.271 *	0.313 **	0.557 ***	0.177 *	0.257 **
	0.26	*0.295*	*0.227*	*0.234*	*0.218*	*0.24*	*0.141*	*0.157*	*0.147*	*0.173*	*0.099*	*0.114*
Person with health problems, illness or disability	0.015	-0.097	-0.069	-0.068	-0.158	-0.066	-0.359 ***	-0.43 ***	-0.249 **	-0.258 *	-0.005	-0.046
	0.136	*0.156*	*0.138*	*0.142*	*0.155*	*0.171*	*0.105*	*0.115*	*0.125*	*0.145*	*0.092*	*0.105*
Renting current accomodation	0.563 ***	0.646 ***	-0.099	-0.047	-0.188	-0.129	0.043	-0.106	-0.094	-0.07	-0.202 *	-0.279 **
	0.136	*0.178*	*0.15*	*0.156*	*0.184*	*0.203*	*0.124*	*0.141*	*0.257*	*0.305*	*0.119*	*0.142*
Positive change in old age/survivors benefits	-0.055	-0.237	-0.602 **	-0.59 *	-0.036	0.236	0.14	0.078	0.112	-0.134	0.01	0.07
	0.2	*0.235*	*0.305*	*0.316*	*0.242*	*0.252*	*0.14*	*0.152*	*0.184*	*0.219*	*0.114*	*0.124*
Positive change in sickness/invalidity benefits	0.828 **	0.942 **	-0.246	-0.574	2.142 ***	1.632 ***	-0.555	-0.516	-1.45 **	-10.669	-0.06	0.071
	0.372	*0.39*	*0.388*	*0.436*	*0.666*	*0.587*	*0.417*	*0.457*	*0.586*	*66.385*	*0.293*	*0.322*
1 year in poverty	0.043	0.026	-1.616 **	-2.055 ***	-0.112	-0.328	-0.55	-1.027 *	0.14	-0.277	-0.118	-0.424
	0.706	*0.819*	*0.753*	*0.784*	*0.723*	*0.795*	*0.49*	*0.538*	*0.657*	*0.764*	*0.404*	*0.482*
2 years in poverty	-0.033	0.322	-1.761 **	-2.114 ***	-1.109	-1.16	-0.949 *	-1.151 **	-0.476	-0.435	-0.745 *	-0.768
	0.725	*0.84*	*0.766*	*0.797*	*0.746*	*0.816*	*0.504*	*0.551*	*0.669*	*0.77*	*0.41*	*0.529*
3 years in poverty[1]	-1.006	-0.496	-1.374 *	-1.62 *	-1.678 **	-1.558 *	-1.712 ***	-1.859 ***	-1.042	-0.914	-1.368 ***	-1.262 **
	0.761	*0.875*	*0.803*	*0.83*	*0.815*	*0.877*	*0.541*	*0.584*	*0.713*	*0.809*	*0.445*	*0.577*
4 to 6 years in poverty					-2.54 **	-2.464 **	-1.808 ***	-1.959 ***	-2.863 ***	-2.703 ***	-2.21 ***	-2.104 ***
					0.92	*0.98*	*0.555*	*0.595*	*0.96*	*1.034*	*0.505*	*0.636*
Variance of Gamma		0.00		0.00		0.00		0.00		0.00		0.00
LR test of Variance of Gamma=0 (Chibar2)		95		5.48		53.58		75.98		151.9		70.24
Prob.>=Chibar2		0.00		0.01		0.00		0.00		0.00		0.00
Observations	777	777	446	446	715	715	1239	1239	1443	1443	1822	1822
Log likelihood	-441.81	-393.64	-285.13	-292.47	-387.89	-364.31	-756.19	-716.29	-583.14	-510.86	-1069.9	-1023.3

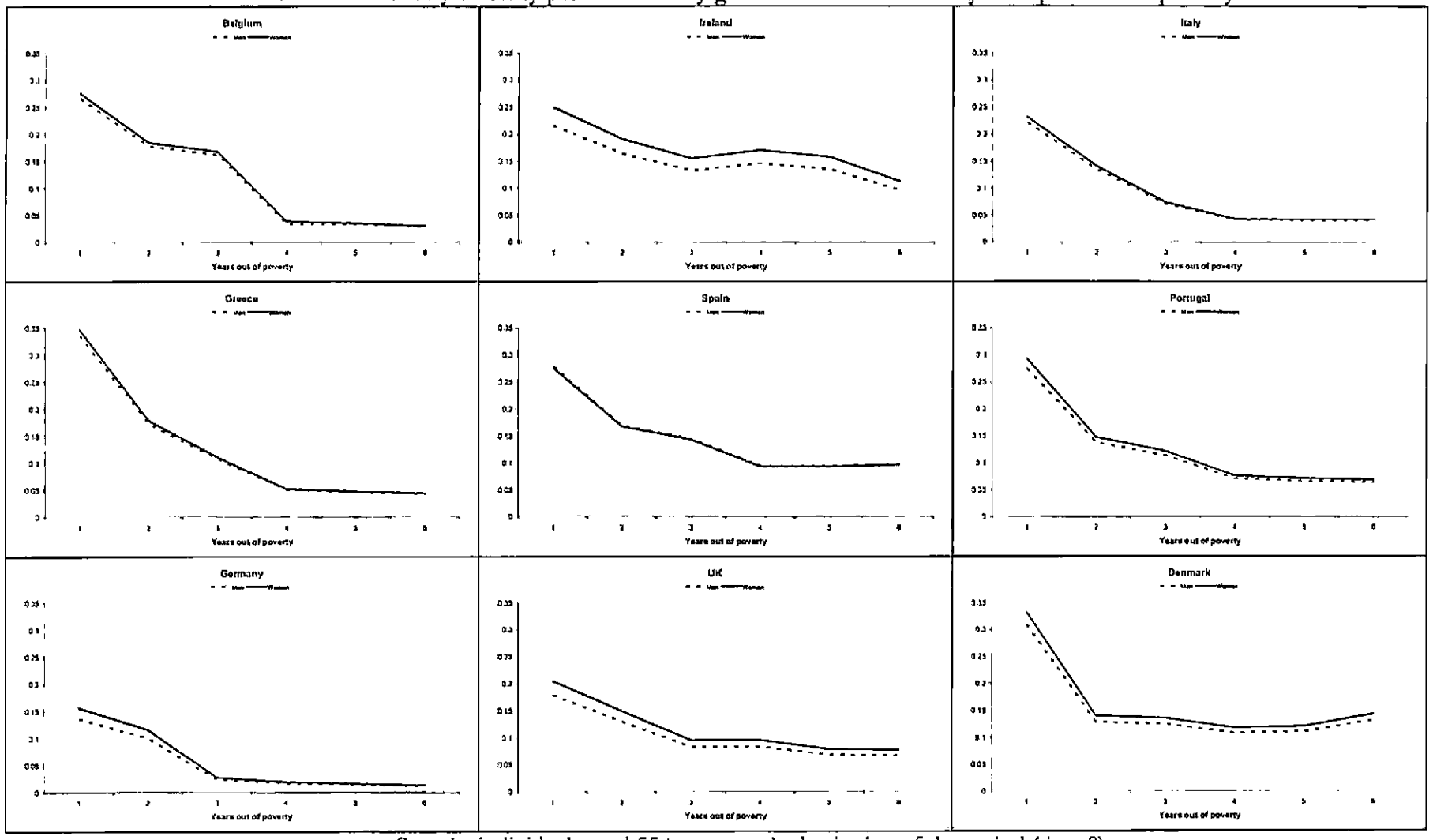
* p<0.10, ** p<0.05, *** p<0.01

Table 3 (continued)

	Greece		Spain		Portugal		Germany		United Kingdom	
Explanatory Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.124	0.115	0.043	0.052	0.066	0.016	0.166	0.19	0.12	0.06
	0.082	*0.09*	*0.079*	*0.088*	*0.091*	*0.101*	*0.112*	*0.191*	*0.111*	*0.122*
Age	0.000	0.006	-0.009 *	-0.005	-0.015 **	-0.013 *	-0.009	-0.012	-0.01	-0.005
	0.005	*0.006*	*0.005*	*0.006*	*0.006*	*0.007*	*0.009*	*0.016*	*0.008*	*0.009*
Single person household	0.022	0.003	-0.734 ***	-0.842 ***	-0.053	-0.229	-0.368 *	-0.792 *	-0.857 ***	-1.114 ***
	0.163	*0.176*	*0.147*	*0.169*	*0.167*	*0.192*	*0.21*	*0.425*	*0.213*	*0.231*
2-persons household, both aged below 65	0.114	-0.015	-0.506 ***	-0.494 ***	-0.202	-0.146	-0.331 **	-0.598 *	-0.763 ***	-0.81 ***
	0.136	*0.158*	*0.158*	*0.176*	*0.163*	*0.183*	*0.154*	*0.318*	*0.211*	*0.227*
2-persons household, at least one aged above 65	0.054	0.02	-0.364 ***	-0.431 ***	-0.061	-0.097	-0.073	-0.378	-0.826 ***	-0.999 ***
	0.107	*0.118*	*0.105*	*0.116*	*0.115*	*0.131*	*0.184*	*0.308*	*0.195*	*0.211*
Become widow	-0.408 **	-0.495 **	-0.081	-0.492 **	-0.814 ***	-0.925 ***	-0.731 *	-0.787	-0.397 *	-0.513 **
	0.201	*0.227*	*0.187*	*0.242*	*0.219*	*0.267*	*0.417*	*0.521*	*0.22*	*0.248*
Primary education	-0.215	-0.475 ***	-0.322 *	-0.201	-1.027 ***	-1.348 ***	-0.204 *	-0.246	-0.112	-0.219
	0.171	*0.174*	*0.196*	*0.224*	*0.345*	*0.405*	*0.112*	*0.183*	*0.133*	*0.142*
Employed	0.095	0.028	0.114	0.056	0.092	0.039	0.263 *	0.177	-0.13	-0.115
	0.104	*0.119*	*0.118*	*0.134*	*0.105*	*0.119*	*0.141*	*0.213*	*0.209*	*0.225*
Other household members employed	0.189 *	0.055	0.093	0.059	0.261 **	0.216 *	-0.111	-0.151	-0.078	-0.187
	0.101	*0.113*	*0.089*	*0.099*	*0.108*	*0.126*	*0.146*	*0.214*	*0.201*	*0.224*
Person with health problems, illness or disability	-0.04	-0.049	0.006	-0.05	-0.18 **	-0.229 **	0.033	-0.083	0.09	0.14
	0.083	*0.092*	*0.076*	*0.085*	*0.086*	*0.097*	*0.109*	*0.194*	*0.113*	*0.125*
Renting current accomodation	-0.32	-0.11	-0.051	-0.073	0.016	0.071	-0.031	-0.131	0.249 **	0.286 **
	0.205	*0.21*	*0.144*	*0.162*	*0.116*	*0.131*	*0.107*	*0.182*	*0.117*	*0.129*
Positive change in old age/survivors benefits	-0.203 **	-0.314 ***	-0.06	0.001	-0.224 *	-0.212	0.127	0.002	0.151	0.297 **
	0.094	*0.105*	*0.116*	*0.125*	*0.13*	*0.143*	*0.151*	*0.216*	*0.142*	*0.149*
Positive change in sickness/invalidity benefits	1.052 ***	0.465	0.002	-0.067	0.146	0.34	0.411	1.005	-0.113	-0.836 **
	0.291	*0.363*	*0.26*	*0.297*	*0.228*	*0.237*	*0.385*	*0.736*	*0.307*	*0.422*
1 year in poverty	-0.77 *	-1.206 ***	0.444	-0.267	1.227 **	1.162 *	0.304	1.15	0.568	0.161
	0.397	*0.431*	*0.396*	*0.441*	*0.551*	*0.7*	*0.609*	*1.348*	*0.554*	*0.613*
2 years in poverty	-0.945 **	-1.136 ***	-0.11	-0.585	0.719	0.963	-0.184	1.427	0.25	-0.027
	0.403	*0.438*	*0.404*	*0.451*	*0.56*	*0.765*	*0.617*	*1.731*	*0.568*	*0.629*
3 years in poverty	-1.23 ***	-1.266 ***	-0.364	-0.707	0.373	0.724	-0.633	1.416	0.039	-0.053
	0.417	*0.45*	*0.423*	*0.466*	*0.571*	*0.798*	*0.645*	*2.02*	*0.578*	*0.633*
4 to 6 years in poverty	-1.899 ***	-1.957 ***	-0.953 **	-1.292 ***	0.067	0.425	-2.307 ***	-0.017	-1.158 *	-1.263 *
	0.436	*0.468*	*0.461*	*0.501*	*0.587*	*0.86*	*0.836*	*2.265*	*0.643*	*0.695*
Variance of Gamma		0.00		0.00		0.39		*1.48*		0.00
LR test of Variance of Gamma=0 (Chibar2)		229		222		207		24.4		100
Prob.>=Chibar2		0.00		0.00		0.00		0.00		0.00
Observations	2432	2432	2262	2262	2078	2078	977	977	1285	1285
Log likelihood	-1421	-1309.2	-1334.6	-1237.7	-1144	-1050.5	-602.58	-591.32	-727.14	-671.78

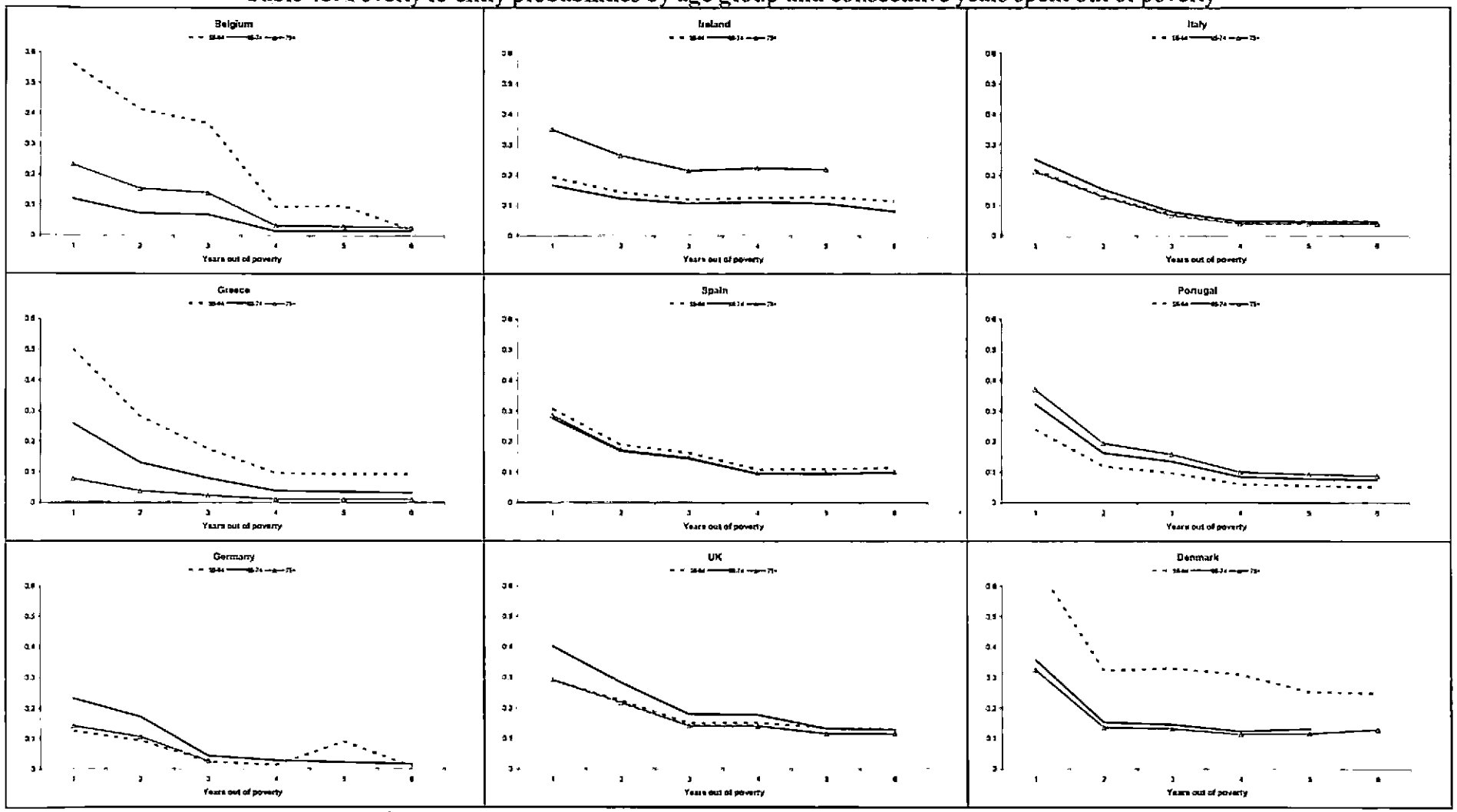
* p<0.10, ** p<0.05, *** p<0.01

Table 4a. Poverty re-entry probabilities by gender and consecutive years spent out of poverty



Sample: individuals aged 55+, poor at the beginning of the period (time 0)

Table 4b. Poverty re-entry probabilities by age group and consecutive years spent out of poverty



Sample: individuals aged 55+, poor at the beginning of the period (time 0)