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# Process of transition from school-to-work: generator for the initial stage of path dependence in career development

by

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**Abstract** The major objective of the project was accomplished through building life-table of survival analysis (event history analysis or duration analysis or transition analysis) for describing transitions from school-to-work using longitudinal micro-data. It is important to mention that we built a longitudinal data base, using the ECHP data base for all the 8 waves, with the SPSS program. The discrete model's approach for this transition is described as the process of entering on the labour market, between two moments/points in time. The observed subjects are viewed as a cohort, a homogenous one. The selective final sample included the people over 16 years old who responded to the interviews in all the 8 waves, within the same household and who achieved the highest level of education one year before 1994. So, the entrance point is 1994 and the exit point is represented by the year of obtaining the main activity status - self defined as 'working with an employer in paid employment (15+ hours/week).' There are some intermediary results obtained for 10 countries: Belgium, Denmark, France, Ireland, Italy, Greece, Spain, Portugal, Germany (ECHP - from national sources), United Kingdom (ECHP - from national sources). Transition process from school-to-work is described as the distribution of time-to-event variables, where the 'event' is considered 'to be employed' (in the conditions already specified) in opposition to the state of not experiencing this event. Additionally, we compared the distribution by levels of a factor variable represented by 'gender'/sex and 'the highest level of general or higher education completed' (stated in ISCED levels). The main results of the study are expressed through: Median Survival Time, Cumulative Proportion Surviving at End of Interval, Probability Density, Hazard Rate - for the aggregate sample and also for the selected countries: Italy, Portugal and Spain.

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# Process of transition from school-to-work: generator for the initial stage of path dependence in career development*

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"Success is the ability to go from failure to failure without losing your enthusiasm."

Winston Churchill

## Our **main achievements**

*The main objective of the project was accomplished through building life-table of survival analysis (event history analysis or duration analysis or transition analysis)[1] for describing transitions from school-to-work using longitudinal micro-data.*

*It is important to mention that we built a longitudinal data base, using the ECHP data base for all the 8 waves, with the SPSS program.*

*The discrete model's approach for this transition is described as the process of entering on the labour market, between two moments/points in time. The observed subjects are viewed as a cohort, a homogenous one. The selective final sample included the people over 16 years old who responded to the interviews in all the 8 waves, within the same household and who achieved the highest level of education one year before 1994. So, the entrance point is 1994 and the exit point is represented by the year of obtaining the main activity status – self defined as "working with an employer in paid employment (15+ hours/week)".*

*There are some intermediary results obtained for 10 countries: Belgium, Denmark, France, Ireland, Italy, Greece, Spain, Portugal, Germany (ECHP – from national sources), United Kingdom (ECHP – from national sources).*

*Transition process from school-to-work is described as the distribution of time-to-event variables, where the 'event' is considered 'to be employed' (in the conditions already specified) in opposition to the state of not experiencing this event.*

*Additionally, we compared the distribution by levels of a factor variable represented by 'gender'/sex and 'the highest level of general or higher education completed' (stated in ISCED levels).*

*The main results of the study are expressed through: Median Survival Time, Cumulative Proportion Surviving at End of Interval, Probability Density, Hazard Rate - for the aggregate sample and also for the selected countries: Italy, Portugal and Spain.*

**Key words:**
**J2 - Demand and Supply of Labour**
J21 - Labour Force and Employment, Size, and Structure
J22 - Time Allocation and Labour Supply
J23 - Labour Demand
J24 - Human Capital; Skills; Occupational Choice; Labour Productivity

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[1] **Jenkins, Stephen P**. (2004). Survival Analysis. Unpublished manuscript, Institute for Social and Economic Research, University of Essex, Colchester, UK. Downloadable from http://www.iser.essex.ac.uk/teaching/degree/stephenj/ec968/pdfs/ec968lnotesv6.pd

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## 1. General Framework presentation

The starting point for our paper is the **evolutionary economics theory.** The approach of this theory is focused on the historical processes which cannot be avoided. We argue the special attention requested for **the initial steps** of the young people's transition after schooling finalised through the desired stage of employment, based on the hypothesis that this transition ***is more complex then the transitions inside the labour market*** *because*:

a) initial steps may cut off other trajectories of future development;
b) first transition after the education ending is an special/irreversible transition process and possibly undesirable dynamics regarding the development of career path;
c) it is difficult to re-orientate the transition into a new direction determined by the fact that school-to-work transitions may show state (or path) dependence;
d) a specific transition between two systems (school period vis-à-vis working period), defined by the two different paradigms[2]:

**Figure 1**

becomes more and more complicated, postponed or yo-yo alternating: the change of frame from 'learning to know' to 'learning to do' (learning by doing) goes by different steps, described by different stages, like successive entrances in active or inactive phases (less then 15 working hours/week, including vocational and life long learning benefits) in the economy.

## 2. Some approaches concerning transitions school-to-work in literature

The theme of transitions school-to-work is not new, "the longer-term process of settling into the labour market, and how and whether that varies across countries and group of young people"[3] represents the subject for various longitudinal studies. Recently in the IRISS series it was treated as "transitions from education and into the labour market among youths under a simultaneous framework in order to control for the interdependency of such relevant events" using ECHP data. "The empirical strategy has aimed at reflecting the independent and simultaneous determination of both labour market and education transitions"[4].

There are a lot of empirical facts released thought longitudinal studies, pointed to:

° identify the "childhood and adolescent predictors of youth unemployment"[5] in the transition to adulthood;

[2] Composite Learning Index includes 4 pillars: *Learning to Know, to Do, to Live Together, to Be*; http://www.ccl-cca.ca/CCL/Reports/CLI2007/?Language=EN
[3] ***, OECD (1998). Chapter 3, 'Getting started, settling in: the transition from education to the labour market', in OECD: Employment Outlook 1998, pg.81.
[4] María A. Davia1, Universidad de Castilla-La Mancha (UCLM), The transition out of education and the initial steps into the labour market in the European Union, IRISS WORKING PAPER SERIES, No. 2004-01
[5] Avshalom Caspi; Bradley R. Entner Wright; Terrie E. Moffitt; Phil A. Silva Early Failure in the Labor Market: Childhood and Adolescent Predictors of Unemployment in the Transition to Adulthood, *American Sociological Review*, Vol. 63, No. 3. (Jun., 1998), pp. 424-451. Stable URL: http://links.jstor.org/sici?sici=0003-1224%28199806%2963%3A3%3C424%3AEFITLM%3E2.0.CO%3B2-7

- model "training preferences" formed at school by young people and "training destination" measured by the occupation of the first job/training scheme; and also to build the model of "the individual's first unemployment spell"[6];
- analyse the prevalence, timing, sequencing and inter-relations between the transitions in young adulthood, considering that „becoming an adult usually involves a number of key transitions: finishing full-time education; entry into the labour market; leaving home; establishment of an independent household; and entry into marriage and parenthood. Not everyone experiences all these transitions nor by any means follows such a sequence. Some transitions may be by-passed altogether and others may coincide."[7] From this study conclusions we preserve that "the most important transitions made by young adults and the ones largely regarded as symbols of adulthood by the young themselves (D.E.S., 1983) are the entries into employment, marriage and parenthood"[8];
- view the "school-to-work" as a single process at national level and cross countries[9]. The nowadays boundaries of school-to-work transition, as part of a single process, are defined as the "period between the end of compulsory schooling and the attainment of full-time, stable employment"[10]. Another important approach considers the integration of young people only after they have left the educational system[11];
- see transitions between different labour market states, like transition from school to unemployment, or long-term unemployment, and inactivity among young workers, in different countries. The Thierry Magnac' study uses the 1990-2 wave of the French Labour Force Survey to study the employment histories of young people transitions between six labour market states: employment contracts, whether permanent or temporary, unemployment, training, education and non-participation. He used "a fixed effect estimator in a dynamic multinomial logit model which can accommodate any form of unobserved heterogeneity in levels. This analysis can be extended to Markov processes of any order. I relate heterogeneity components to individual and family characteristics by using simulated maximum likelihood methods. These procedures allow evaluation of the effects training schemes on youth employment histories"[12];
- other researches regarding this topic are drawn from micro-econometric studies, which examine "the functioning of youth labour markets, in terms of pay, employment and mobility", "labour market policies, including deregulation and labour market programs", "educational policies, primarily vocationalism and apprenticeship" [13].

---

[6] M. J. Andrews; S. Bradley; D. Stott, Matching the Demand for and Supply of Training in the School-to-Work Transition, *The Economic Journal*, Vol. 112, No. 478, Conference Papers. (Mar., 2002), pp. C201-C219.Stable URL: http://links.jstor.org/sici?sici=0013-0133%28200203%29112%3A478%3CC201%3AMTDFAS%3E2.0.CO%3B2-2

[7] Kathleen E. Kiernan, Transitions in Young Adulthood in Great Britain, *Population Studies*, Vol. 45, Population Research in Britain: Supplement. (1991), pp. 95-114.Stable URL: http://links.jstor.org/sici?sici=0032-4728%281991%2945%3C95%3ATIYAIG%3E2.0.CO%3B2-U, pg.95

[8] Kathleen E. Kiernan, Transitions in Young Adulthood in Great Britain, *Population Studies*, Vol. 45, Population Research in Britain: Supplement. (1991), pp. 95-114.Stable URL: http://links.jstor.org/sici?sici=0032-4728%281991%2945%3C95%3ATIYAIG%3E2.0.CO%3B2-U, pg.132

[9] Paul Ryan, The School-to-Work Transition: A Cross-National Perspective, Journal of Economic Literature, Vol. 39, No. 1. (Mar., 2001), pp. 34-92., Stable URL: http://links.jstor.org/sici?sici=0022-0515%28200103%2939%3A1%3C34%3ATSTACP%3E2.0.CO%3B2-6

[10] (OECD 1996a, 1998 c) cited in Paul Ryan, The School-to-Work Transition: A Cross-National Perspective, *Journal of Economic Literature*, Vol. 39, No. 1. (Mar., 2001), pp. 34-92., Stable URL: http://links.jstor.org/sici?sici=0022-0515%28200103%2939%3A1%3C34%3ATSTACP%3E2.0.CO%3B2-6

[11] ***, OECD (1998). Chapter 3,'Getting started, settling in: the transition from education to the labour market', in OECD: Employment Outlook 1998

[12] Thierry Magnac, Subsidised Training and Youth Employment: Distinguishing Unobserved Heterogeneity from State Dependence in Labour Market Histories, *The Economic Journal*, Vol. 110, No. 466. (Oct., 2000), pp. 805-837., Stable URL: pg.805 http://links.jstor.org/sici?sici=0013-0133%28200010%29110%3A466%3C805%3ASTAYED%3E2.0.CO%3B2-9

[13] Paul Ryan, The School-to-Work Transition: A Cross-National Perspective, Journal of Economic Literature, Vol. 39, No. 1. (Mar., 2001), pp. 34-92., Stable URL:http://links.jstor.org/sici?sici=0022-0515%28200103%2939%3A1%3C34%3ATSTACP%3E2.0.CO%3B2-6

## 3. The entrance on the labour market and the labour market perspective. Why to study the entrance on the labour market?

The starting point of our research questions are based on the current literature recent problems revealed:

a) „However, serious mismatches are also emerging between the qualifications produced by the intermediate level of the education system and the needs of the labour market. The rates of unemployment among young people are extremely worrying in most countries, especially among those without higher education qualifications, even though rapid expansion of access to higher education and demographic decline are reducing the numbers leaving education at this level"[14];

b) the need for developing organic links (particularly in terms of funding) between schools and enterprises;

c) the growing demand for adequate analysis of the labour market needs and of future skills requirements.

The **entrance of the young people on the labour market** represents our main subject of interest, and it is regarded *as a process and not as an event*. The transition school-to-work, from the employment status changes point of view, might be treated:

- as a distinct transition period (school-to-work transition) or
- as an transfer period from inactive stage, at the time when the highest level of general or higher education is completed, to active stage, defined in our model as "working with an employer in paid employment (15+ hours / week)".

Describing this transition we shape **the process of entrance on the labour market** in reference at **the time when the highest level of general or higher education is completed.**

The time when the highest level of general or higher education is completed influences *the average **entrance** age in the labour market*, and this one could influence very much *the average **exit** age from the labour market.*

The working life span is strongly determined by the entrance age and exit age in from labour market and it has strong influences for public finance sustainability and especially with contributor agents; actually the entire socio-economic sustainability system is functional with the activity developed during the working life span.

**Table 1**

**Average exit age from the labour market, by gender**; *Average exit age from the labour force - weighted by the probability of withdrawal from the labour market*

| years | 2001 | | |
|---|---|---|---|
| geo\time | total | females | males |
| *EU (27 countries)* | *59,9* | *59,4* | *60,4* |
| *EU (25 countries)* | *59,9* | *59,4* | *60,4* |
| ***EU (15 countries)*** | ***60,3*** | ***59,9*** | ***60,7*** |
| Belgium | 56,8 | 55,9 | 57,8 |
| Denmark | 61,6 | 61 | 62,1 |
| Germany | 60,6 | 60,4 | 60,9 |
| Ireland | **63,2** | **63** | **63,4** |
| Greece | : | : | : |
| Spain | 60,3 | 60 | 60,6 |
| France | 58,1 | 58 | 58,2 |
| Italy | 59,8 | 59,8 | 59,9 |
| Portugal | 61,9 | 61,6 | 62,3 |
| United Kingdom | 62 | 61 | 63 |
| *max from selected countrie* | *63,2* | *63,0* | *63,4* |
| *min from selected countries* | *56,8* | *55,9* | *57,8* |

:=Not available

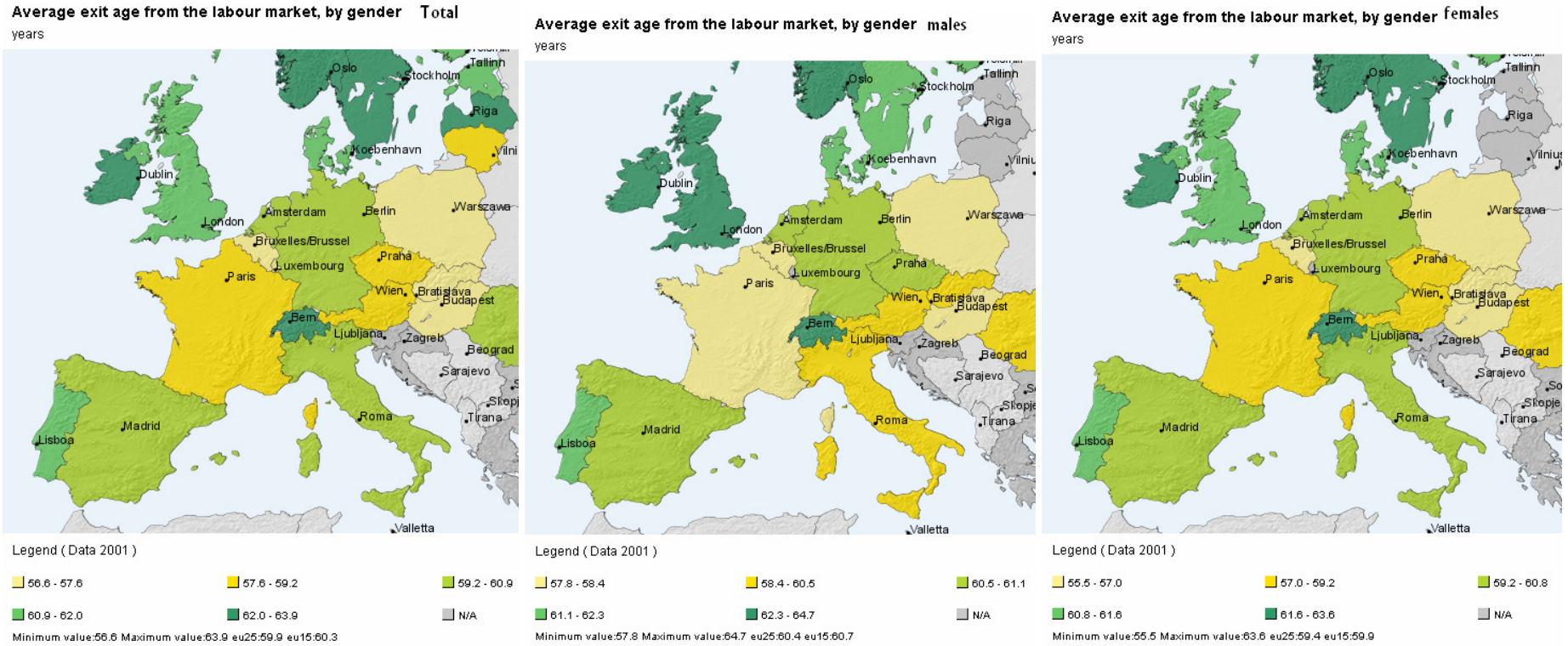
| | |
|---|---|
| **Source of Data:** | **Eurostat** |
| Last Update: | 06.12.2007 |
| Date of extraction: | 15 May 2008 10:40:54 GMT |
| Hyperlink to the table: | http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=0&language=en&pcode=tsdde420 |
| General Disclaimer of the EC: | http://europa.eu/geninfo/legal_notices_en.htm |

| | Absolute variation of the Average exit age from the labour market between years 2006 and 2001 | | |
|---|---|---|---|
| geo\time | total | females | males |
| EU (27 countries) | 1,3 | 1,3 | 1,3 |
| EU (25 countries) | 1,1 | 1,1 | 1,1 |
| EU (15 countries) | 1,1 | 1,2 | 0,9 |

[14] Jean-Raymond Masson Senior expert, European Training Foundation – ETF (Turin), Implementation of the Lisbon Objectives by the acceding and candidate countries An evaluation of the state of lifelong education and training and lifelong learning strategies, EUROPEAN JOURNAL, VOCATIONAL TRAINING NO 33;

**Figure 2**

## Average exit age from the labour market, by gender, in selected countries, in 2001



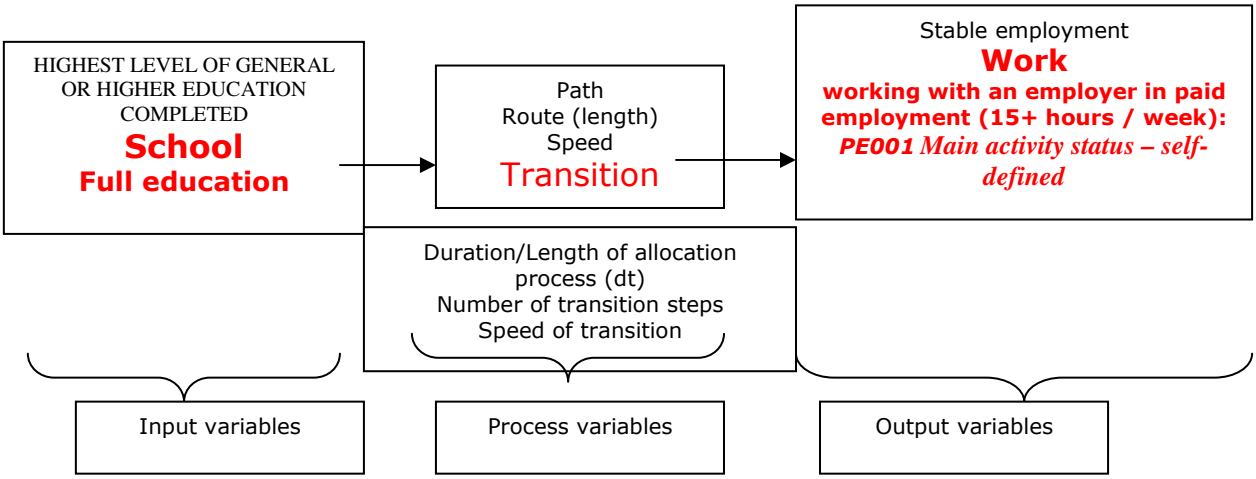

Average exit age from the labour market, by gender
(from Sustainable development indicators: Demographic changes, Public finance sustainability; European Commission, Eurostat)

"This indicator is currently under revision and new improved estimates for present and previous years are expected during 2008.
The indicator gives the average age at which active persons definitely withdraw from the labour market. It is based on a probability model considering the relative changes of activity rates from one year to another at a specific age. The activity rate represents the labour force (employed and unemployed population) as a percentage of the total population for a given age. The indicator is based on the EU Labour Force Survey. The survey covers the entire population living in private households. The definitions used follow the guidelines of the International Labour Office."
Source: http://epp.eurostat.ec.europa.eu/tgm/web/table/description.jsp

The ECHP Survey (presented in the series Employment in Europe 2004, 2003, 2002) has the most relevant experience in the area of: quantitative analyses regarding labour market dynamic in particular the employment transition.

In our paper, we define the **initial stage** of the historical evolution of the individual on his participation in the economy as the event of "*highest level of general or higher education completed*" and the **final stage** (for a successful transition indicator) is expressed by a "stable employment", under *the requirement of considering a person entered in the labour market after the event of "working with an employer in paid employment, at least 15 hours/week".*

**Figure 3**




From the labour market perspective the importance of understanding and monitor the greatly changed **process of transition from school-to-work**, as generator for the initial stage of path dependence in career development, could be treated in two main planes:

A. The **dynamic perspective** of describing **the process** from **school-to-work transition**, where the event of interest, getting into "stable employment", is strongly linked with the entrance on the labour market, in the hypothesis that the event depend only on the time within the first order factor – sex and second order factor - level of education.

From the duration analysis perspective this process of transition should be described in some estimated results for the observed cohort (build with specific assumptions, presented in R2):

- **number of persons** from the selected cohort[15] **still searching** to enter on work/ the labour market at the beginning of every year between 1994 and 2001. In our specific case this number is equal with the number of persons exposed to the risk of entering to work/the labour market;
- **number of persons** from the selected cohort having experienced the event of **entering on work/the labour market**;
- **proportion of persons** from the selected cohort **entering on work/the labour market in every year (1994-2001)** which represent an **estimate of the probability** of the event of **entering on work/the labour market occurring in each** year between 1994-2001, at the beginning of the respective year;
- **proportion of persons** from the selected cohort **not entering on work/the labour market in every year (1994-2001),** persons still searching to enter on work/labour market in every year;
- **percentage of persons which are still searching to enter on work/the labour market** by the end of the given year *is an estimate of the probability of*

[15] We try to avoid the censored cases and the cohort is build including this condition. The only exception is signalled in the first interval for the people who leave the household from w1, cases that are not different in nature from the uncensored cases.

*searching to enter on work/ labour market to the end of an year. Could be a speed…..of searching;*

- the estimated probability per unit time of experiencing the event of **entering on work/the labour market** during the given interval year. Could be a speed of allocation of the labour force, an indicator of the absorbent power of the labour market for the new entrants;
- the estimate of the probability per year that a person that has still searching to the beginning of an interval will experience the event **entering on work/the labour market** in that year, conditional on still searching to the start of the given year;
- the time point by which half of the persons included in cohort are expected to experience the event of enter on work/labour market, named also the **median period of this transition process** or the average searching period; it is a measure of searching duration;
- the "average age" of entrance on the labour market;
- *discussion regarding the age borders for the young people's definition.*

B. **The shaping of working life span**[16] or work-life expectancy of the population. Some of the intended result could be useful in estimation of the working life span through different methods, using the average exit age on the labour market and the average age of entrance on the labour market at the cohort level.

## 4. Results & Problems of studying duration of the transition school-to-work

Foremost, we would like to highlight the distinctiveness of our research goal: the study of **transitions school-to-work,** using the **Survival analysis** / Event History Analysis / Duration Analysis / Transition Analysis / Time to Event Analysis, by means of **longitudinal microdata.**

The main source was the article „Discrete Time Event History Models for Higher Education Research"[17] and for the use of discrete time event analysis there are mentioned also some recommendations:

a) Management duration data problems, including: special designs required by the duration date treatment for data collection procedures, data sets construction, variable coding, treatment of cases;

b) Conceptual Problems for duration data, including: defining the clear transitions between states/statuses, for excluding unambiguous measurement of the duration for the events / states of existence / state transitions.

From the Stevenson perspective there are *special problems when applying Life Table* regarding: the dimensions of intervals and the scale of the population survey (sample dimensions):

*„The life table method assumes that subjects are withdrawn randomly throughout each interval … therefore, on average they are withdrawn half way through the interval. This is not an important issue when the time intervals are short, but bias may introduced when time intervals are long. This method also assumes that the rate of failure within an interval is the same for all subjects and is independent of the probability of survival at other time periods. Life tables are produced from large scale population surveys (e.g. death registers) and are less-frequently used these days (the Kaplan-Meier method being preferred because it is less prone to bias)."*[18]

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[16] Seymour L. Wolfbein, The Length of Working Life, *Population Studies*, Vol. 3, No. 3. (Dec., 1949), pp. 286-294. Stable URL: http://links.jstor.org/sici?sici=0032-4728%28194912%293%3A3%3C286%3ATLOWL%3E2.0.CO%3B2-Y

[17] Yaffee RobertA., J. T. (1995, March 8). Discrete Time Event History Models for Higher Education Research. HYPERLINK "http://www.nyu.edu/its/statistics/Docs/dteha/dteha.htm"

[18] Mark Stevenson, An Introduction to Survival Analysis, EpiCentre, IVABS, Massey University, December 2007, pg.3;

# Results:

## R1. Constructing the database in view of obtaining the data set for applying Life table in SPSS 15.0 (Survival)

### -Brief description and importance of data source selected-

1. using ECHP[19] - this complex source of information, it was possible to describe the **transition** between school and labour market by means of the Survival analysis / Event history analysis / Duration analysis / Transition analysis perspective, expressed through the **duration between two moments/points in time**: the moment a - when the highest level of general or higher education is completed and the moment b - when the individuals fail to "survive" and reach the terminal event: of getting into paid employment (+15h /week).

2. we used a **retrospective longitudinal designs** (versus prospective designs)
*"In the ECHP, questions related to individual labour market histories are asked in the form of month-by-month main activity status calendar obtained retrospectively for the preceding year. By combining calendars from consecutive waves it is possible to get information on individual labour market histories during several years."*[20]

The ECHP data availability offers the opportunity to develop a complex interrelationship between different **Coverage** dimensions like:

D1: **Geographical** dimension - at country level [21] and also at the aggregate level for the countries included in the sample;
D2: **Household dimension** (demographic dimension) - the selected individuals are from the same household;
D3: **Individual characteristics**:
D3.1. Demographic: sex, age;
D3.2. Education and training: the highest level of general or higher education is completed;
D4: **Time dimension** - running from 1994 to 2001, at annual intervals;
D5: Major area> **Economic activity** under the **getting into paid employment** (+15h /week); (see: next paragraph, R2)

[19] http://circa.europa.eu/irc/dsis/echpanel/info/data/information.html: „The European Community Household Panel (ECHP) is a survey based on a standardised questionnaire that involves annual interviewing of a representative panel of households and individuals in each country, covering a wide range of topics: income, health, education, housing, demographics and employment characteristic, etc. The total duration of the ECHP was 8 years, running from 1994 to 2001. In the first wave, i.e. in 1994, a sample of some 60,500 nationally represented households - i.e. approximately 130,000 adults aged 16 years and over - were interviewed in the then 12 Member States. Austria (1995) and Finland (1996) have joined the project since then. Data for Sweden is available as of 1997, and has been derived from the Swedish Living Conditions Survey and transformed into ECHP format."
[20] Marjo Pyy-Martikainen, Ulrich Rendtel, The Effects of Panel Attrition on the Analysis of Unemployment Spells, CHINTEX Working Paper #10, work – package 6, date: 16 April 2003;
[21] For Germany and UK are used national sources;

## R2. Designing the Longitudinal data base, under some specific assumptions:

1. Purpose of interrogate: the use of **SPSS 15.0 program** on the **ECHP** users' database (UDB), the anonymised version of this one, in view to:
   1.1. Design a **Longitudinal (panel) data base**.
   1.2. Keep and valorise the **Cross-national** comparability, which the harmonised ECHP questionnaire permission.
2. **Unit of Analysis**/Unit of observation: the individual, observed at a particular moment/time (for longitudinal work)[22], being in the same household and in the same country(from the first wave, w1);
3. Selection of the **input variables**: Wi, country, HID, PID, BIRTHYY, sex, PE001, PT023, PT022:

**WAVE** - Wave number - Wi; W1 - first wave, 1994;
**COUNTRY -** Country code of **the selected countries:**
Denmark (Dk), Belgium (B), France (F), Ireland (Irl), Italy (I), Greece (El), Spain (E), Portugal (P), Germany (D) and the United Kingdom (Uk).

We mention that there are some **differences between data sources for the selected countries**; respectively they are also National sources for Germany (Soep) and the United Kingdom (Bhps).

**Box 1**

*Example for the transition variable PE001:*

| ***PE001[23]*** | ***Main activity status – self-defined*** |
|---|---|

*Base: all persons with a completed personal questionnaire in wave i.*
*National differences and changes between waves*

| | *Sub-sample* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *DK* | *D* | | *EL* | *E* | *F* | *Irl* | *I* | *P* | *UK* | |
| | | | *Echp* | *Soep* | | | | | | | *Echp* | *Bhps* |
| *1994* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* | *(a) (b)* |
| *1995* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* | *(a)* |
| *1996* | | | | | | | | | | | | |
| *1997* | | | | | | | | | | | | |
| *1998* | | | | | | | | | | | | |
| *1999* | | | | | | | | | | | | |
| *2000* | | | | | | | | | | | | |
| *2001* | | | | | | | | | | | | |

*(a) Code 12 is not available in 1994 and 1995: Persons working less than 15 hours are automatically classified in categories 6 to 11.*
*(b) Code 3 (training under special schemes related to employment) is not available for 1994.*

**HID** - Household identification number; with the condition: HID=HID1, respectively the individual is followed only while it lives always, in all waves, in the household from wave w1;
**PID -** Personal identification number;
**BIRTHYY[24]** - Year of birth of the individual (from Longitudinal link file variables a_uLink.sav, Link - fixed variables);
**SEX** - Sex of the individual;
**PE 001 -** Main activity status – self-defined (see the next point 8, with some discussions about this variable);

[22] Dorothy Watson, Bertrand Maitre, Bernadette Ryan, an Introduction to the ECHP for New Users, EPUNET EUROPANEL Users Network
[23] ***, ECHP UDB, Description of variables, Data Dictionnary, Codebook and Differences between Countries and Waves, DOC. PAN 166 / 2003-12, EUROPEAN COMMISSION, EUROSTAT, Directorate D: Single market, employment and social statistics, Unit D-2: Living conditions and social protection, pag.210
[24] Team, E. (July 07 2007). EPUNet ECHP USE GUIDE . EPUNET Europanel Users Network Connecting ECHP Users.

**PT023 -** Age when the highest level of general or higher education was completed (from PT - Training and education, Personal file variables)

| PT023 | Age when the highest level of general or higher education was completed |
|---|---|
| Codes | Labels |
| sep.75 | Age |
| -8 | Still at school |
| -9 | Missing |

**PT022**[25] **-** Highest level of general or higher education completed, (see the Annex the comparison between KILM level, ISCED-97 Level and ISCED-76 Level for Education attainment description)

| PT022 |
|---|
| 3rd level (ISCED 5-7) |
| 2nd stage of 2nd L (ISCED 3) |
| Less than 2nd of 2nd L(ISCED 0-2) |
| Total |

The recent development in the EU–LFS add to or improve the original quality-in-work indicators: „The variable on the highest level of completed education was also revised, and the field of education was added."[26] In this perspective the educational attainment is described under **Commission Regulation (EC) No 2104/2002**[27]: "highest successfully completed **level** of education or Training, **field** of this highest level of education and training, **year** when this highest level was successfully completed".

4. Special reference to ECHP' specific context, connected with the selected variable; so: **The minimum age of ECHP interviewed persons is of 16 years**; that fact explains why the **minimum age** of **being included into the sample is 16 years old**, even if into national legislations is stipulated that the minimum age of entering on the labour market, as employed[28] persons, is of **15 years and over.**

Regarding the minimum age stipulated in national labour market legislation in view to access the unemployment income, we point some exceptions from the mentioned age: Spain, the United Kingdom and Denmark[29]:

**Table 2**

| | Field of application (selection regarding main condition to get unemployment insurance and assistance) |
|---|---|
| **Belgium** | All employees covered by social security.Young persons who are unemployed following their training. |
| **Denmark** | Persons between the age of **18** and 63 may be admitted as members to an unemployment fund |
| **Germany** | All employees |
| **Ireland** | Insurance: With some exceptions, all persons aged **16** years and over employed under a contract of service or apprenticeship.Assistance: Persons aged 18 years and over. |
| **Greece** | Employees who are insured against sickness with a social security institution. Youngsters between **20 - 29** years of age who have never worked before. |
| **Spain** | to be over **16** years of age and under ordinary retirement age for pension purposes, except the cases where the worker would not credit sufficient contributions |
| **France** | to be under the age of 60. |
| **Italy** | (The general condition is to have registered at the unemployment agency. For the special unemployment benefit it is to have been made redundant on grounds of cessation of completion of work, cuts in personnel, recession etc). |
| **Portugal** | All insured employees. |
| **United Kingdom** | special rules may apply to claimants under **18** years old. |

[25] Concepts and Definitions Database (CODED), http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=DSP_GLOSSARY_NOM_DTL_VIEW&StrNom=CODED2&StrLanguageCode=EN&IntKey=16950713&RdoSearch=CONTAIN&TxtSearch=education&CboTheme=&IntCurrentPage=1, 6.05.2008.
Term: Education attainment
Definition:The highest grade completed within the most advanced level attended in the educational system of the country where the education was received, even if the education and training were provided outside of the regular school and university system. The highest grade completed and/or the highest level of education attained or completed by the person in the system of regular, special and adult education of his own or some other State.
Source: United Nations Common Database (UNCDB), based on United Nations, "Principles and Recommendations for Population and Housing Censuses, Revision 1", Series M, No. 67, Rev. 1, United Nations, New York, 1998, http://unstats.un.org/unsd/cdb/cdb_list_dicts.asp

[26] ***, THE EU LABOUR FORCE SURVEY AND INDICATORS OF QUALITY IN WORK, UNECE/ILO/Eurostat Seminar on the Quality of Work, (Geneva, 11-13 May 2005), Working Paper No.7, 4 May 2005, p.4.

[27] OJ L 324, 29.11.2002, p.14.

[28] Eurostat, "Measuring progress towards a more sustainable Europe. Sustainable development indicators for the European Union. Data 1990-2005", Office for Official Publications of the European Communities, Luxembourg, 2005.

[29] http://ec.europa.eu/employment_social/missoc/2003/missoc_229_en.htm, Main conditions: unemployment;

5. **Matching across all waves** in view of identifying individuals interviewed in all waves from 1 to 8. We used as a control the results mentioned as "from wave 1, 2,3,4,5,6,7,8 from a maximum of 65,622 Number of personal interviewed"[30].

6. **Extracting the sub sample** of all persons, **continuing to live in the same household**, who reached the highest level of general education *or* higher education level was completed in **1993,** by applying the FILTER (Figure 4).

   The filter condition: **1994-birthyy=pt023w1+1**

   Where:

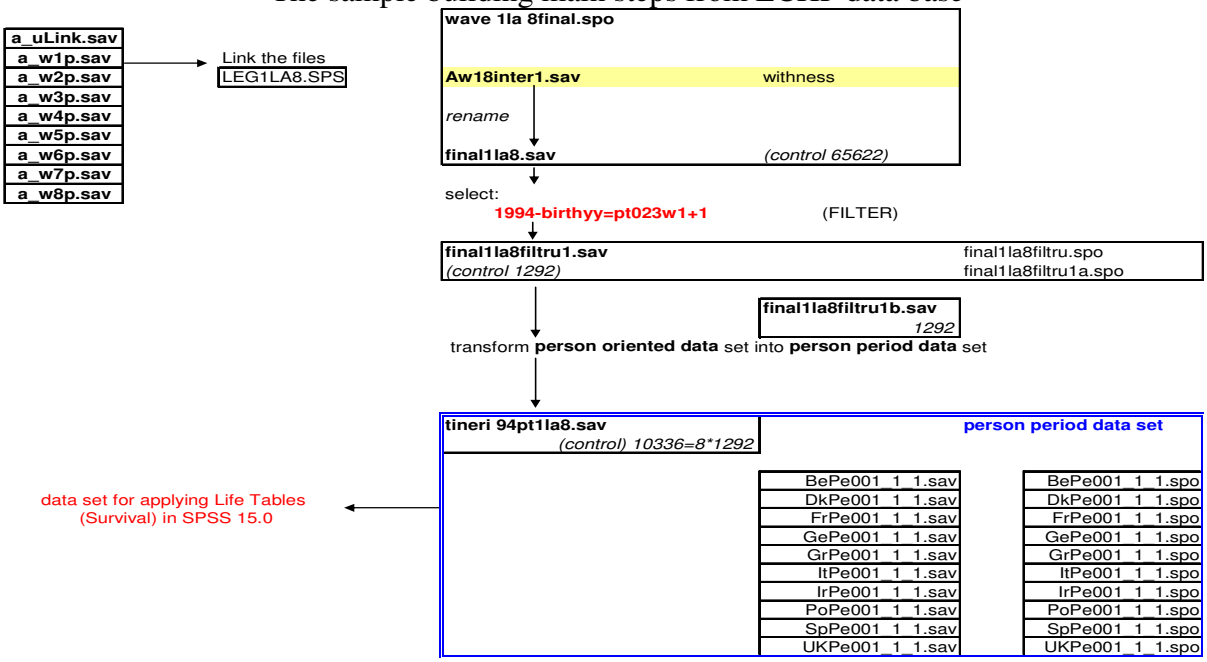
   ***1994*** *- Year;*

   ***BIRTHYY*** *- Year of birth of the individual;*

   ***PT023w1*** *- Age when the highest level of general or higher education was completed in the first wave, w1.*

Figure 4

The sample building main steps from ECHP data base




| | ECHP | persons interviewed in all waves 1 to 8 | | |
|---|---|---|---|---|
| | | | person oriented data set | person period data set |
| Country Code | total | FILE='AW18inter1s.sav'. | Filter 1: 1994-birthyy=pt023w1+1 | FILE='tineri94pt1la8.sav'. |
| Denmark | | 2558 | **37** | 296 |
| The Netherlands | | 4673 | | |
| Belgium | | 3156 | **39** | 312 |
| France | | 7312 | **77** | 616 |
| Ireland | | 2948 | **39** | 312 |
| Italy | | 9704 | **341** | 2728 |
| Greece | | 6384 | **95** | 760 |
| Spain | | 7674 | **312** | 2496 |
| Portugal | | 7399 | **162** | 1296 |
| German-National source | | 7743 | **167** | 1336 |
| Uk-National source | | 6071 | **23** | 184 |
| Total | 282615 | 65622 | **1292** | 10336 |

| | | |
|---|---|---|
| % total | | 23,2 |

| | | |
|---|---|---|
| m | | 30503 |
| f | | 35119 |

[30] Team, E. (July 07 2007). EPUNet ECHP USE GUIDE. EPUNET Europanel Users Network Connecting ECHP Users.

7. Based on the point 6, we have made the assumption that the reached education level is **constant** over the entire period of time (1994-2001). The reference is made to the *moment when* the interrogated person reached **the highest level of general or higher education was completed**.
   Under this assumption we made the hypothesis:
   7.1. *this **moment** represents the step stone*, the miles of ending the education and starting the life long learning process (LLL).
   LLL and vocational learning should be a constant activity in entire active life; simultaneous with working, the learning becomes "a continual presence" for the entire working life span.
   *"Youths would go on in education for longer and longer and acquire qualifications above the level required to **access the available jobs in the market in order to achieve any of them**. Their demand for education would no more follow a strict human capital model, and would not adjust itself to signals from the labour market. The demand for education will probably be defined by the availability of the financial resources to "acquire" as much education as possible"*[31].
   7.2. that the **first step/event** (the initial stage of transition school-to-work) for a "valid entering on the labour market" of the labour force *is the completing the education*; and, based on the age of completing the education, we intend to estimate, in terms of probabilities, the *age of entering on the labour market;*
   7.3. to identify *the age of entering on the labour market* under the perspective of **quality in work**; actually, we intend to realise a **high homogeneous cohort**, in terms of labour market theory, thinking in the offer of labour force's allocation/use.

8. The **second step/event** (final stage of transition) for a *stable employment* or *the "credible entering on the labour market"* for the labour force is that of attaining the status of **working with an employer in paid employment (15+ hours/week)**. In this perspective we build the work variable: **ocda** - from the variable PE 001

   **PE 001** Main activity status - self-defined (this construction is explained by the conceptual and methodological comments, see R3)

**Figure 5**

| **PE001** | **Main activity status – self-defined** |
|---|---|
| *Codes* | *Labels* |
| 1 | working with an employer in paid employment (15+ hours / week) |
| 2 | working with an employer in paid apprenticeship (15+ hours / week) |
| 3 | working with an employer in training under special schemes related to employment (15+ hours / week) |
| 4 | self-employment (15+ hours / week) |
| 5 | unpaid work in a family enterprise (15+ hours / week) |
| 6 | in education or training |
| 7 | unemployed |
| 8 | retired |
| 9 | doing housework, looking after children or other persons |
| 10 | in community or military service |
| 11 | other economically inactive |
| 12 | working less than 15 hours |
| -8 | not applicable |
| -9 | missing |

| **ocda** |
|---|
| 1 |
| 0 |

Source:
***, ECHP UDB, Description of variables, Data Dictionnary, Codebook and Differences between Countries and Waves, **DOC. PAN 166 / 2003-12**, EUROPEAN COMMISSION, EUROSTAT, Directorate D: Single market, employment and social statistics, Unit D-2: Living conditions and social protection, pag.210

[31] María A. Davia1, Universidad de Castilla-La Mancha (UCLM), The transition out of education and the initial steps into the labour market in the European Union, IRISS WORKING PAPER SERIES, No. 2004-01. pag. 20.

## R3. Some conceptual and methodological comments

### R3.1. ECHP self-declared activity status

The ECHP definition of self-declared activity status is pointed on a more "substantial" frontier between employed and unemployed/inactive persons.

The *main* reference is the "working time duration" - the *same* concept used in ILO definition.

The difference between the two of them is on the *level* of the reference: the ILO definition of employed people is according to the minimum level of working time of at least **one hour** of work, during a specific period of reference; while the ECHP definition refers to the minimum period of working time of at least **15 hours per week**.

**Box 2**

**Activity status: ECHP Self-declared activity status compared with the Conventional ILO concept[32]**

**Conventional ILO activity status**: In accordance with the recommendations of the International Labour Organisation (ILO), the conventional activity status is defined with reference to a short period such as one week, giving precedence to activity over inactivity, and to employment over unemployment.
According to this classification, the **employed** comprise all persons above a certain age who, during a specified reference period, were in paid employment or self-employment, whether at work (for one hour or more during the period) or with a job or enterprise without actually being at work.
The **unemployed** are persons who, during the same period, were without work, and were available for and seeking work. The **economically inactive** are persons not classified as employed or as unemployed.

***ECHP self-declared activity status**:* This approach focuses on those engaged in work in a more substantial manner. The **employed** are persons classified as such according to the ILO framework, provided they normally work for at least 15 hours per week.
In addition to employment and self-employment, paid apprenticeship, training under special schemes related to employment, and unpaid family work are explicitly included in this category.
For the remaining, the status is determined according to the respondent's own declaration, presumably on the basis of the most time spent. This includes those declaring themselves to be unemployed, and those economically inactive (in education or training, housework, retirement etc.). Persons normally working for fewer than 15 hours a week are also classified as economically inactive, unless they regard themselves as unemployed.

In relation to activity status at the time of the interview, the ECHP covers both the ILO and self-declared concepts. Retrospective information on job histories and the activity calendar is obtained in relation to the self-declared activity concept.
The **self-declared approach is more suitable for measurement in a longitudinal enquiry**, which aims at tracing significant changes over time, and relates better to other variables such as income which are normally measured with reference to a long period such as a whole year.

In the perspective of *quality in work* approaches –which we are interested in, as mentioned before- we add also few comments about the *working time concept* and some useful distinctions between *paid employment* and *self employed*.

### R3.2. The employment criteria and working time implications

Our principle of selection for the employment criteria/category, as the "event" of finishing transition school-to-work for individuals of our homogeneous designed cohort, was significantly influenced by the **European model of sustainable development**. This one is centred on the *promotion of more and better jobs* (as stated in the 2005 renewed Lisbon Strategy) and, from this perspective, *the quality in work* represents an important component for the social policy agenda implementation.

At this point of the paper, we think appropriate to examine the implications of using the variable **PE001** and to explain *why to use only **the first level**, characteristic of this variable,* in our study.

[32] Eric Marlier, Dynamic Measures of Economic Activity and Unemployment: 1. Patterns and Transitions over Time, Statistics in Focus, Population and Social Conditions, THEME 3- 17/1999, Population and Living conditions, EUROSTAT, 1999, pg. 2.

The employment state/status could be described under a large diversity of categories (see Figure 5), but we think that the employment category defined as "working with an employer in paid employment (15+ hours / week)" is the most representative for the desirable employment type (in this case).

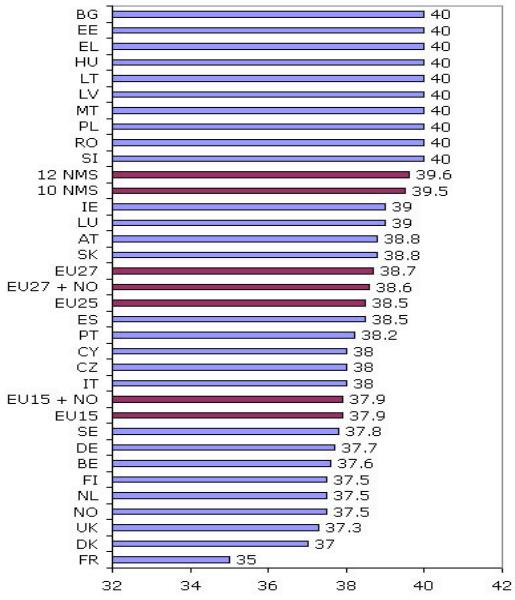
Also, we stress our intention to make a clear distinction between *education period* and *labour market entrance after the ending of education*. From this point of view we assume that the categories/labels 2, 3 and 6 (see Table 3) are referring to education participation and are not eligible for the desirable/final employment state.

Table 3

| | |
|---|---|
| 2 | working with an employer in paid apprenticeship (15+ hours / week) |
| 3 | working with an employer in training under special schemes related to employment (15+ hours / week) |
| 6 | in education or training |

Furthermore, regarding the working time duration we add some comments. So: the length of working time is/should be important in determining the categories of labour market, in a statistical standardization; but it has different dimensions in different situations, as for: the active/inactive state (1 hour, 15 hours /week); the boundary between full-time and part-time employment; also for employment, unemployment, underemployment definitions (the estimate of time-related underemployed by threshold is 40 h/week, known as the *normal working week*).

Average collectively agreed normal weekly working hours, metalworking sector, 2006




Source: Working time developments – 2006, EIRO http://www.eurofound.europa.eu/eiro/

Actually the working time duration is a core issue in collective bargaining and social dialog, where it is present in the area of employment conditions; generally, the labour market protection is realised through the special legislation (particularly now, it refers to the flexibility/flexicurity of labour market issues); e.g.: the 1993 ILO Directive on certain aspects of the organisation of working time **set a maximum 48-hour working week;** but the labour law is also subject for regulation at the national level:

**Table 4**

Statutory maximum working week, 2006 - Maximum hours per week

| CY | CZ | DK | FR | DE* | EL | HU | IE | IT | LT | LU | MT | NL | RO | SI | UK | AT | BG | EE | FI | LV | NO | PL | PT | SK | ES | SE | BE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 38 |

Subjects as: health and safety, quality in work (and quality of life in general), employment creation, productivity and competitiveness, are also themes of law regulations and collective bargaining and social dialog.

In our research, from the perspective of *quality in work* assumption, we should refer to the interval of 40-48 working hours/week.

**R3.3. Paid employment versus self-employment** – a short discussion as argument for the selected input variable "working with an employer in paid employment (15+ hours / week)"

**Comparative methodological approaches**

**Box 3**

**Employment**[33] is defined as follows in the Resolution concerning statistics of the economically active population, **employment**, **unemployment** and **underemployment**, adopted by the Thirteenth International Conference of Labour Statisticians (Geneva, 1982):

(1) The „employed" comprise all persons above a specific age who during a specified brief period, either one week or one day, were in the following categories:

*(a)* „**paid employment**":

*(a1)* "**at work**": persons who during the reference period performed ***some work*** for wage or salary, in cash or in kind;

*(a2)* „**with a job but not at work**": persons who, having already worked in their present job, were temporarily not at work during the reference period and had a formal attachment to their job.

This formal job attachment should be determined in the light of national circumstances, according to one or more of the following criteria:

(i) the continued receipt of wage or salary;

(ii) an assurance of return to work following the end of the contingency, or an agreement as to the date of return;

(iii) the elapsed duration of absence from the job which, wherever relevant, may be that duration for which workers can receive compensation benefits without obligations to accept other jobs.

*(b)* „**self-employment**":

*(b1)* „**at work**": persons who during the reference period performed some work for profit or family gain, in cash or in kind;

*(b2)* „**with an enterprise but not at work**": persons with an enterprise, which may be a business enterprise, a farm or a service undertaking, who were temporarily not at work during the reference period for any specific reason.

(2) For operational purposes, the notion „***some work***" may be interpreted as work for at least one hour.

(3) Persons temporarily not at work because of illness or injury, holiday or vacation, strike or lockout, educational or training leave, maternity or parental leave, reduction in economic activity, temporary disorganization or suspension of work due to such reasons as bad weather, mechanical or electrical breakdown, or shortage of raw materials or fuels, or other temporary absence with or without leave should be considered as in paid employment provided they had a formal job attachment.

(4) Employers, own-account workers and members of producers' cooperatives should be considered as in **self-employment** and classified as „at work" or „not at work", as the case may be.

(5) **Unpaid family workers at work** should be considered as in self-employment irrespective of the number of hours worked during the reference period. Countries which prefer for special reasons to set a ***minimum time criterion*** for the inclusion of unpaid family workers among the employed should identify and separately classify those who worked less than the prescribed time.

[33] http://laborsta.ilo.org/applv8/data/c2e.html

(6) Persons engaged in the production of economic goods and services for own and household consumption should be considered as in self-employment if such production comprises an important contribution to the total consumption of the household.

(7) Apprentices who received pay in cash or in kind should be considered in paid employment and classified as „at work" or „not at work" on the same basis as other persons in paid employment.

(8) Students, homemakers and others mainly engaged in non-economic activities during the reference period, who at the same time were in paid employment or self-employment as defined in subparagraph (1) above should be considered as employed on the same basis as other categories of employed persons and be identified separately, where possible.

(9) Members of the armed forces should be included among persons in paid employment. The armed forces should include both the regular and temporary members as specified in the most recent revision of the *International Standard Classification of Occupations (ISCO)*.

National definitions of employment may in a number of cases differ from the recommended international standard definition [1].

Note

[1] For information on the differences in scope, definitions and methods of calculation, etc., used for the national series, see ILO: *Sources and Methods: Labour Statistics* (formerly *Statistical Sources and Methods*), Vol. 2: „Employment, wages, hours of work and labour cost (establishment surveys)", second edition (Geneva, 1995); Vol. 3 : „Economically active population, employment, unemployment and hours of work (household surveys)" third edition (Geneva, 2004); Vol. 4 : „Employment, unemployment, wages and hours of work (administrative records and related sources)" (Geneva, 2004).

## R4. Resulted variable coverage, limits and significance

*The "cohort"[34] of people selected in view of realising the dynamic measures of employment state was build to be the most homogenous cohort as possible it could be.*

*This was made under the assumption* ***that we suppose that every member of the selected sample wish to / intended to attain the state of employment expressed by the PE001 Label 1****. We use this new assumption to generate, to explain and to describe the process of selection. So,* **the process of the people selection in the final stage is characterised by general attachment to some common approaches expressed through some essential values.** Those values could be explained, as a proxy, through the **strategies that individuals opted** in view **to be integrated and included in society** and how they participate to economic activity:

- preference to work with an employer against to work alone/by its own;
- the people who are integrated or intend to work in a net, organisational, institutionalised environment and plan to develop a specific sort of carrier pathway;
- the people who are the most probable integrated in the "industry society" model of employment. The contractual employment and the development of labour market in the strict sense are specific strongly correlated with industrial relations development. The strong link between the sectoral activity and the employment categories could be discussed in view of the alternations between employed and self employed fractions:

> ***„The secular development of self-employment:*** *The fraction of the labour force that is self-employed has in most Western countries decreased over a very long period until the mid 1970s. Since then the self-employment rate has started to rise again in several of these economies. Blau (1987) observes that the proportions of both male and female self- employed in the non-agricultural US labour force declined during most of this century but bottomed out in the early 1970s and started to rise until at least 1982. More recent data[2] regarding the period 1974-1994 show that the self-employment fraction in the USA has since then continued to rise gradually. More recently self-employment in several other countries, notably Austria, Canada, the Netherlands, New Zealand and the UK, has also risen."*[35]

[34] "A group of people who enter a study during a fixed time period and are followed over time is referred to as a *cohort*.'" , from SW 983 – SURVIVAL ANALYSIS AND COX REGRESSION.
http://www.socwel.ku.edu/tomm/SW%20983/Lecture%20notes/Survival%20analysis.doc

[35] *Sander Wennekers, Niels Bosma and André van Stel,* SECULAR TRENDS IN SELF-EMPLOYMENT,http://www.sbaer.uca.edu/research/icsb/1999/47.pdf

- people who are employed with payment, under the strict coverage of labour market; their competences and skills developed in this moment reflect "in the highest possible way" that the competences gained in school system are matching the labour market necessities/demands.

After applying the selection process, the results of Survival analysis could explain the success of those who reached the desired state.

**Limits of the model** - The model is blind to:

Limit 1. We are not able to distinct in this model between the people who intended to reach this type of employment and those who don't;
Limit 2. We don't explain the reasons for this transition;
Limit 3. We could not distinct between preference and opportunity existence and also access facilities on labour market in the analysed period.

**Characteristics of the selected persons**:

At the initial state (at school) - *starting point:*

- persons who reached the highest successfully completed **level** of education or training in 1993, without the dimension of the **field** of this highest level of education and training;
- individuals from the same household from wave1 (HID=HID1, only followed while living, in all waves, in the household from w1);
- from the same county (there are some difficulties for Germany and United Kingdom data, where the sources are National Ones);
- all these persons **are in searching** for paid work, to work with an employer, more then 15 hours/week.

In the final state (at work) - *occurrence of the desired event:*

- is reflected the economic behaviour of the people who intend to work in a net, organisational, institutionalised environment and plan to develop a specific sort of carrier pathway;
- individuals are not in education any more; are working at least 15 hours/week; are working with an employer; are paid workers – concomitantly!

## R5. Describing the process of transition between the initial (school) and the final state (work). Survival/Life Table Analysis results

At all the simplifying *assumptions* mentioned before, we add few others, *regarding the process of transition school-to-work, for every individual:*

- there is *no state dependence* in the meaning that there are no initial conditions/problems, no history transition prior to entry to the current state (otherwise the models of survival would also have to take in account the differential chances of being found in the current state, in the first place);
- the *current state* is considered to be the state of *searching for paid work, to work with an employer, more then 15 hours/week;*
- *the process is stationary*, the model parameters describing the transition process are fixed, or can be parameterized using explanatory variables; the process is stationary with *a single state* and *a single spell data for each individual.*

As we already mentioned, we are interested to describe and investigate - using the **Survival/Life Table Analysis** - the process/period of time between the two events/situations named **initial state: school** and the **final state: work**. From this perspective, the group membership is based on the occurrence of the event of getting into employment (under the specified conditions), as being the desired event. So, the two main objectives of interest are the occurrence of the event, its moment and the period of time, from the initial state/starting point to the event.

Survival analysis (a.k.a., life tables, event history analysis) provides an appropriate analytic tool for this situation. Because we are interested in the period of time/duration between two events, survival analysis is applied to *longitudinal* or *follow-up* studies. A group of people who enter a study during a fixed time period and are followed over time is referred to as a *cohort*. Survival analysis will sometimes be referred to as cohort analysis (also known as the actuarial or Cutler Ederer method).

The problem with the comparison of group means method is that all of the subjects in our study may not be observed for the same period of time and for some of them the event will not have occurred during the observation period.

**Life Table analysis is a non-parametric** type of statistic technique. Consequently, there are some advantages and few disadvantages.

***Advantages:***

a1) there are „no stringent requirements and do not made assumptions about the underlying population distribution"[36] (is referred as distribution free test sometimes);

a2) it is useful when the samples are very small; actually, we identified indications regarding the "*Required Sample Sizes:* in order to arrive at reliable estimates of the three major functions (survival, probability density and hazard) and their standard errors at each time interval, the *minimum recommended sample size is 30."*[37]

***Disadvantage/s:*** the method may fail to detect difference between groups, which actually exists.

To avoid that fact, we checked the assumptions: our sub-samples are from random samples and from independent observations; so, each person could be counted only once, cannot appear in more than one category or group, and the data from one subject cannot influence the data from another.

## R5.1. Life Table Analysis assumptions and first results

The Life Table Analysis technique is built under some specific *hypothesis*[38] (useful to be understood, mainly in the perspective of explaining the results):

» ***Censored cases not different****. The Life Table procedure, unlike Kaplan-Meier survival analysis or Cox regression, does* ***not handle censored cases*** *(cases for which the event has not yet occurred). If censored cases are in the dataset, they must not be different in nature from the uncensored cases.*

» ***Probabilities depend on time****. The Life Table procedure, unlike Cox regression, does not model multiple causes of time to event. Rather it is assumed that the* ***probabilities for the event of interest depend only on time****, within any level of the first or second order factors, if specified. (If time is not the only cause, Cox regression should be used. If causal factors are not fixed but rather vary over time, then Cox Regression with Time-Dependent Covariates should be used.)*

In view of an easier presentation of our study's results and a better understanding of these ones, we firstly made a short description of the Life Tables resulting general view (including the main definitions and formulas, useful for the next paragraphs 5.2, 5.3, 5.4; See Tables 5-6), followed by a synthesised presentation of the first results of our study (Table 7 –Life Table selection of the best results; and the Figures 6-10).

[36] Julie Pallant, SPSS, Survival Manual , A Step by Step Guide to Data Analysis using SPSS for Windows , third Edition, Open University Press, Mc Graw Hill, p. 210.
[37] http://sunsite.univie.ac.at/textbooks/statistics/stsurvan.html#lcumulative
[38] Garson, G. David (n.d.). " Life Tables ", from *Statnotes: Topics in Multivariate Analysis.* Retrieved 05/05/2008 from http://www2.chass.ncsu.edu/garson/pa765/statnote.htm.

**The Life Table** presents several columns, with corresponding data for each time interval (row).

**Table 5.**

**A short description of the Life Tables results in general view from different sources**

| **The life table has these columns with corresponding data for each time interval (row):** | ***Comments*** |
|---|---|
| 1. ***Interval start time***: Intervals are set by the researcher in the main Life Tables dialog. Intervals go from the start time up to, but not including, the next interval's start time.<br>*The beginning value for each interval. Each interval extends from its start time up to the start time of the next interval*. | |
| 2. ***Number entering***: This is how many surviving cases (cases not yet having experience the event) at the start of the interval.<br>*The number of cases entering the interval that have survived to the beginning of the current interval.*<br>*The number of surviving cases at the beginning of the interval.*<br>*Number of cases for whom the terminal event had NOT occured at the beginning og the interval* | *Number of persons from the selected cohort still searching to enter on/work the labour market at the beginning of every year between 1994-2001. In our specific case this number is equal with the number of persons exposed to the risk of entering to work/the labour market;* |
| 4. ***Number exposed to risk***: This is the number of surviving cases. However, if there are censored cases, the procedure tries to account for their effect by making the number exposed to risk equal to the number of surviving cases minus half the censored cases.<br>This is calculated as the number of cases entering the interval minus one half of those withdrawn during the interval. | |
| 3. ***Number leaving***: This is the number cases which are censored cases in the given interval.<br>*The number of cases entering the interval for which follow-up ends somewhere in the interval. These are censored cases; that is, these are cases for which the event of interest has not occurred at the time of last contact.*<br>Number Withdrawing during Interval. The number of censored cases in this interval.<br>**The number of cases for whom the terminal event had NOT occured, but for whom no further data was available (censored cases)** | |
| 5. ***Number of terminal events***. This is how many cases (states in our example) which experience the terminal event (ex., ratification) during the given interval.<br>*The number of cases for which the event of interest occurs within the interval.*<br>Number of cases that experience the terminal event in this interval.<br>Number of cases for whom the terminal event occured within the interval | *N**umber of persons** from the selected cohort having experience the event of **entering on work/the labour market**;* |
| 6. ***Proportion terminating*:** This is the number of terminal events divided by the number exposed to risk, from previous columns.<br>*Proportion of Terminal Events*. An estimate of the probability of the event of interest occurring in an interval for a case that has made it to the beginning of that interval. It is computed as the number of terminal events divided by the number exposed to risk.<br>The ratio of terminal events to the number exposed to risk. | ***Proportion of persons** from the selected cohort **entering on work/the labour market in every year (1994-2001)** which represent an **estimate of the probability** of the event of **entering on work/the labour market occurring in each** year between 1994-2001, at the beginning of the respective year;* |
| 7. ***Proportion surviving***: This is calculated as 1 minus the proportion terminating.<br>*The proportion surviving is 1 minus the proportion of terminal events.*<br>One minus the proportion terminating. | *Proportion of persons from the selected cohort not entering on work/the labour market in every year (1994-2001), persons still searching to enter on work/labour market in every year;* |

| | |
|---|---|
| 8. ***Cumulative proportion surviving with standard error***: This is the percentage of cases (ex., states) which are still surviving (ex., persons which still have not get in the desired state of employment by the end of the given interval.<br><br>*Cumulative Proportion Surviving at End. This is an estimate of the probability of surviving to the end of an interval. It is computed as the product of the proportion surviving this interval and the proportion surviving all previous intervals*.<br>*Standard Error of the Cumulative Proportion Surviving*. This is an estimate of the variability of the estimate of the cumulative proportion surviving.<br>The proportion of cases surviving **from the start of the table to the end of the interval.**<br>Usually reffered to as the probability of surviving at least until the beginning of the specified interval without experiencing the treminal event. Is NOT the same as the proportion surviving due to the consideration of the censored cases. | *The **percentage of persons which are still searching to on/work** the labour market by the end of the given year. This is an estimate of the probability of searching to enter on work/ labour market to the end of an year. Could be a speed…..of searching* |
| 9. ***Probability density with standard error***: This is the estimated probability of experiencing the event (ex., ratification) during the given interval.<br>*Probability Density*. The probability density is an estimate of the probability per unit time of experiencing an event in the interval.<br><br>*Standard Error of the Probability Density*. This is an estimate of the variability of the estimated probability density.<br>An estimate of the probability of experiencing the terminal event during the interval. | *The estimated probability per unit time of experiencing the event of **entering on work/the labour market** during the given interval year. Could be a speed of allocation of the labour force, an indicator of the absorbent power of the labour market for the new entrants;* |
| 10. ***Hazard rate with standard error***: This is the estimated probability of experiencing the event conditional on surviving to the start of the given interval.<br>The hazard rate is an estimate of the probability per unit time that a case that has survived to the beginning of an interval will experience an event in that interval.<br><br>An estimate of the risk of experiencing the terminal event during the interval, conditional upon surviving to the start of the interval.<br>Also known as the event risk. The proportion of those who survived to a given interval who are expected to reach the teminal event within the interval. | *The estimate of the probability per year that a person that has still searching to the beginning of an interval will experience the event **entering on work/the labour market** in that year, conditional on still searching to the start of the given year;* |
| 11. *Median survival times*. If a factor is specified, this table shows the median values of the groups formed by the levels of that factor.<br><br>*Median Survival Time*. Time point by which the value of the cumulative survival function is 0.5. That is, it is the time point by which half of the cases are expected to experience the event. | *The time point by which half of the persons included in cohort are expected to experience the event of enter on work/labour market, named also the median period of this transition process or the average searching period; / a measure of searching duration.* |

*Source:*


Garson, G. David (n.d.). " Life Tables ", from Statnotes: Topics in Multivariate Analysis. Retrieved 05/05/2008 from http://www2.chass.ncsu.edu/garson/pa765/statnote.htm

***, SW 983 – SURVIVAL ANALYSIS AND COX REGRESSION, http://www.socwel.ku.edu/tomm/SW%20983/Lecture%20notes/Survival%20analysis.doc, downloaded on May 2008

SPSS 15 Tutorial HELP

Melissa Ives, Rodney Funk & Michael Dennis, LI Analysis Training Series, Survival Analysis/Life Tables, (Last Revised: 4/17/2007 (2/17/2000)), Chestnut Health Systems, www.chestnut.org


An important indicator is **the median survival time -** the time point by which half of the cases is expected to experience *the event/of getting to work*.

**A short description of the Life Tables formulas used in SPSS15 programme** **Table 6**

Life Table(a)

Number alive at the beginning

| Interval Start Time | | Number Entering Interval | Number Withdrawing during Interval | Number Exposed to Risk | Number of Terminal Events | Proportion Terminating | Proportion Surviving | Cumulative Proportion Surviving at End of Interval | Std. Error of Cumulative Proportion Surviving at End of Interval | Probability Density | Std. Error of Probability Density | Hazard Rate | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| | | ***li*** | ***ci*** | ***ri*** | ***di*** | ***qi*** | ***pi*** | ***Pi*** | ***se(Pi)*** | ***fi*** | ***se(fi)*** | **λi** | ***se(λi)*** |
| | | $li=l_{i-1}-c_{i-1}-d_{i-1}$ | | $l_i-c_i/2$ | | $d_i/r_i$ | 1-qi | $P_{i-1}*pi$ | $se(Pi)=P_i\sqrt{\sum_{j=1}^{i}\frac{qj}{rjpj}}$ | $(P_{i-1}-P_i)/h_i$ | $se(fi)=\frac{Piqi}{hi}\sqrt{\sum_{j=1}^{i-1}(\frac{qi}{rjpj}+\frac{pi}{riqi})}$ | $\lambda_i=\frac{2qi}{hi(1+pi)}$ | $se(\lambda i)=\frac{Pi}{h}$ |
| *first interval* | | | | | | | | (P0=1) | | | $se(f1)=\frac{P1q1}{h1}\sqrt{\frac{p1}{r1q1}}$ | | *if qi=* |

| | |
|---|---|
| **Xj** | **Time from starting event to** |
| **wj** | **Weight for case j** |
| **k** | **Total number of intervals** |
| **ti** | **Beginning time for ith interval** |
| **hi** | **Width of interval i** |
| **ci** | **Sum of weights of cases censored in interval i** |
| **di** | **Sum of weights of cases experiencing the terminal event in interval i** |
| **N** | **Number of cases** |
| **X(k)** | **Survival time for case k, where** |
| **wk** | **Weight for case k** |
| **g** | **Number of nonempty groups in the** |
| **Wj** | **Sum of weights of cases in group j** |
| **Wc** | **Sum of weights of censored cases** |
| **Wu** | **Sum of weights of uncensored** |
| **W** | **Sum of weights of all cases** |

**Median Survival Time**

If Pk>0.5 the value printed for median survival tim tk+

Otherwise, let i be the interval for which Pi<0.5 and Pi–1≥0.5. The estimate of the median survival time is then

Md=(ti) +{$h_{i-1}(P_{i-1}-0.5)$}/($P_{i-1}-P_i$)

$$Md=(t_i+\frac{h_{i-1}(P_{i-1}-0.5)}{P_{i-1}-P_i}$$

Sources: SPSS15 HELP

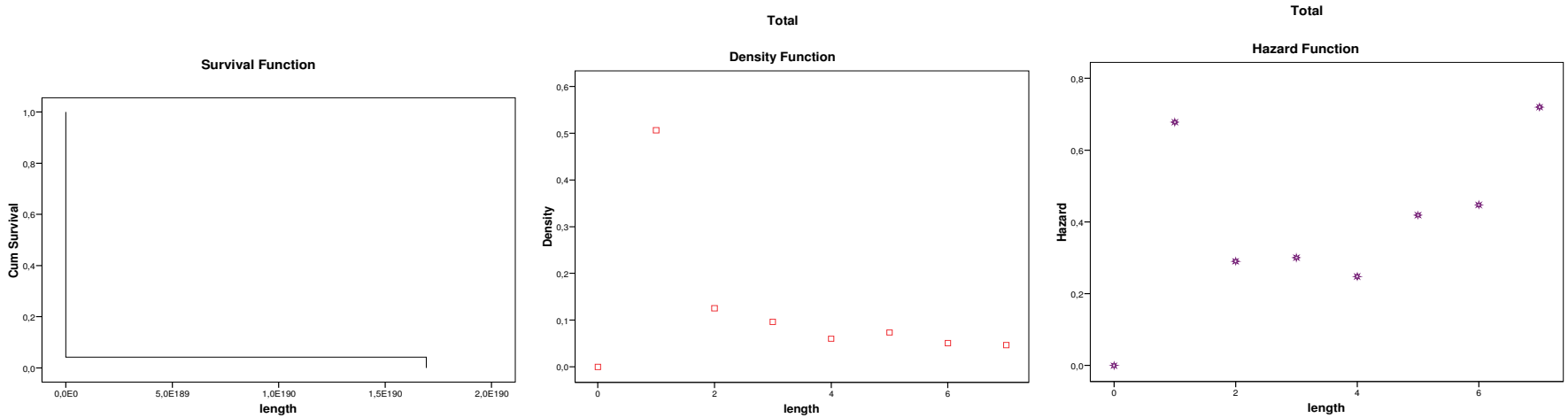
## Life Table Selection of the best results

Std.Error<=0,01
0,01<Std.Error<=0,05
0,05<Std.Error<=0,1

| | Interval Start Time | Number Entering Interval | Number Withdrawing during Interval | Number Exposed to Risk | Number of Terminal Events | Proportion Terminating | Proportion Surviving | Cumulative Proportion Surviving at End of Interval | Std. Error of Cumulative Proportion Surviving at End of Interval | Probability Density | Std. Error of Probability Density | Hazard Rate | Std. Error of Hazard Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | 0 | 1292 | 326 | 1129 | 0 | 0,000 | 1,000 | 1,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| | 1 | 966 | 0 | 966 | 489 | 0,506 | 0,494 | 0,494 | 0,016 | 0,506 | 0,016 | 0,678 | 0,029 |
| | 2 | 477 | 0 | 477 | 121 | 0,254 | 0,746 | 0,369 | 0,016 | 0,125 | 0,011 | 0,291 | 0,026 |
| | 3 | 356 | 0 | 356 | 93 | 0,261 | 0,739 | 0,272 | 0,014 | 0,096 | 0,009 | 0,300 | 0,031 |
| | 4 | 263 | 0 | 263 | 58 | 0,221 | 0,779 | 0,212 | 0,013 | 0,060 | 0,008 | 0,248 | 0,032 |
| | 5 | 205 | 0 | 205 | 71 | 0,346 | 0,654 | 0,139 | 0,011 | 0,073 | 0,008 | 0,419 | 0,049 |
| | 6 | 134 | 0 | 134 | 49 | 0,366 | 0,634 | 0,088 | 0,009 | 0,051 | 0,007 | 0,447 | 0,062 |
| | 7 | 85 | 0 | 85 | 45 | 0,529 | 0,471 | 0,041 | 0,006 | 0,047 | 0,007 | 0,720 | 0,100 |
| **Italy** | 0 | 341 | 108 | 287 | 0 | 0,000 | 1,000 | 1,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| | 1 | 233 | 0 | 233 | 143 | 0,614 | 0,386 | 0,386 | 0,032 | 0,614 | 0,032 | 0,885 | 0,066 |
| | 2 | 90 | 0 | 90 | 14 | 0,156 | 0,844 | 0,326 | 0,031 | 0,060 | 0,016 | 0,169 | 0,045 |
| | 3 | 76 | 0 | 76 | 21 | 0,276 | 0,724 | 0,236 | 0,028 | 0,090 | 0,019 | 0,321 | 0,069 |
| | 4 | 55 | 0 | 55 | 9 | 0,164 | 0,836 | 0,197 | 0,026 | 0,039 | 0,013 | 0,178 | 0,059 |
| | 5 | 46 | 0 | 46 | 16 | 0,348 | 0,652 | 0,129 | 0,022 | 0,069 | 0,017 | 0,421 | 0,103 |
| | 6 | 30 | 0 | 30 | 9 | 0,300 | 0,700 | 0,090 | 0,019 | 0,039 | 0,013 | 0,353 | 0,116 |
| | 7 | 21 | 0 | 21 | 12 | 0,571 | 0,429 | 0,039 | 0,013 | 0,052 | 0,014 | 0,800 | 0,212 |
| **Portugal** | 0 | 162 | 28 | 148 | 0 | 0,000 | 1,000 | 1,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| | 1 | 134 | 0 | 134 | 48 | 0,358 | 0,642 | 0,642 | 0,041 | 0,358 | 0,041 | 0,436 | 0,061 |
| | 2 | 86 | 0 | 86 | 18 | 0,209 | 0,791 | 0,507 | 0,043 | 0,134 | 0,029 | 0,234 | 0,055 |
| | 3 | 68 | 0 | 68 | 15 | 0,221 | 0,779 | 0,396 | 0,042 | 0,112 | 0,027 | 0,248 | 0,064 |
| | 4 | 53 | 0 | 53 | 10 | 0,189 | 0,811 | 0,321 | 0,040 | 0,075 | 0,023 | 0,208 | 0,066 |
| | 5 | 43 | 0 | 43 | 20 | 0,465 | 0,535 | 0,172 | 0,033 | 0,149 | 0,031 | 0,606 | 0,129 |
| | 6 | 23 | 0 | 23 | 7 | 0,304 | 0,696 | 0,119 | 0,028 | 0,052 | 0,019 | 0,359 | 0,133 |
| | 7 | 16 | 0 | 16 | 8 | 0,500 | 0,500 | 0,060 | 0,020 | 0,060 | 0,020 | 0,667 | 0,222 |
| **Spain** | 0 | 312 | 99 | 262,5 | 0 | 0,000 | 1,000 | 1,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 |
| | 1 | 213 | 0 | 213 | 76 | 0,357 | 0,643 | 0,643 | 0,033 | 0,357 | 0,033 | 0,434 | 0,049 |
| | 2 | 137 | 0 | 137 | 26 | 0,190 | 0,810 | 0,521 | 0,034 | 0,122 | 0,022 | 0,210 | 0,041 |
| | 3 | 111 | 0 | 111 | 13 | 0,117 | 0,883 | 0,460 | 0,034 | 0,061 | 0,016 | 0,124 | 0,034 |
| | 4 | 98 | 0 | 98 | 15 | 0,153 | 0,847 | 0,390 | 0,033 | 0,070 | 0,018 | 0,166 | 0,043 |
| | 5 | 83 | 0 | 83 | 21 | 0,253 | 0,747 | 0,291 | 0,031 | 0,099 | 0,020 | 0,290 | 0,063 |
| | 6 | 62 | 0 | 62 | 19 | 0,306 | 0,694 | 0,202 | 0,028 | 0,089 | 0,020 | 0,362 | 0,082 |
| | 7 | 43 | 0 | 43 | 21 | 0,488 | 0,512 | 0,103 | 0,021 | 0,099 | 0,020 | 0,646 | 0,133 |

**Life table results (survival function, density function and hazard function) for total sample, breakdown by sex**

**Figure 6**




***Total***

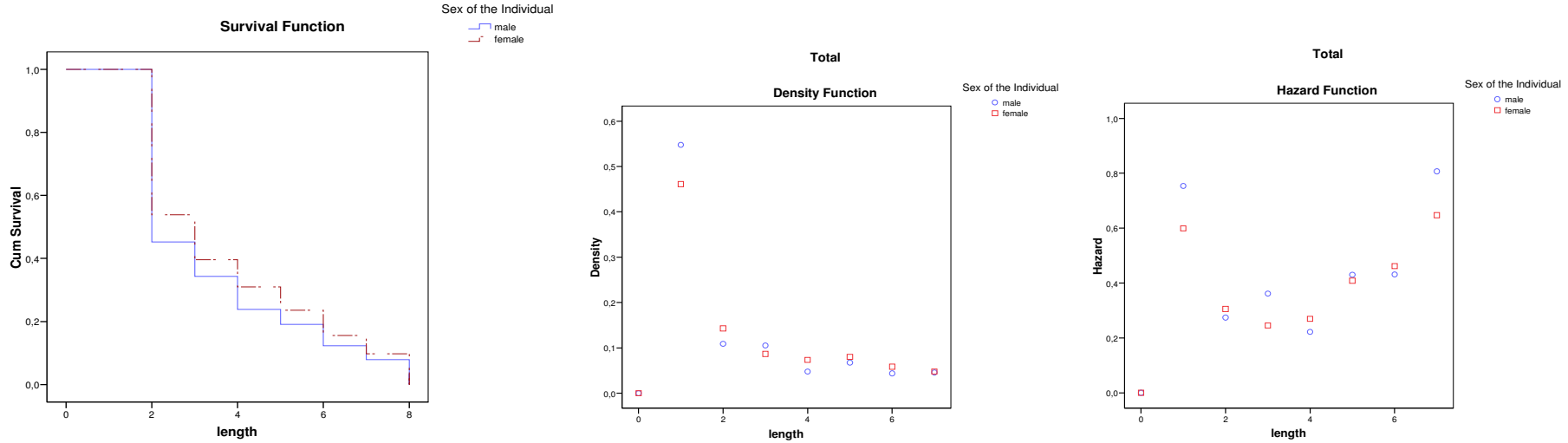
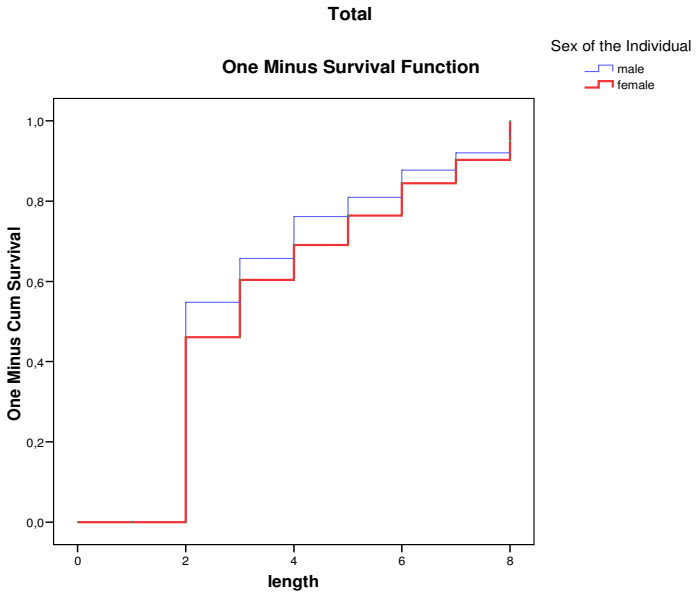
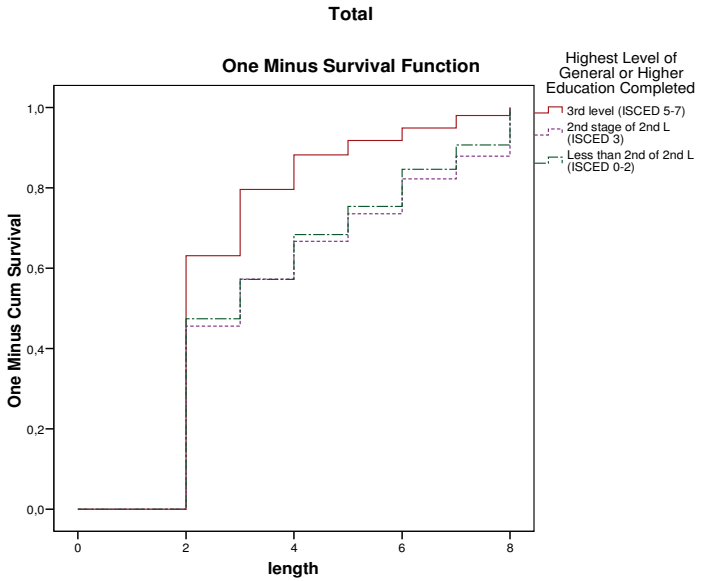
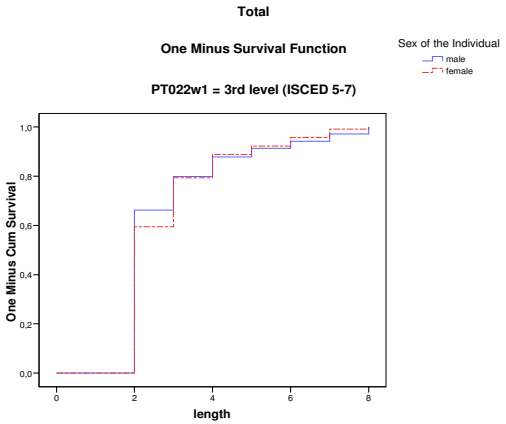


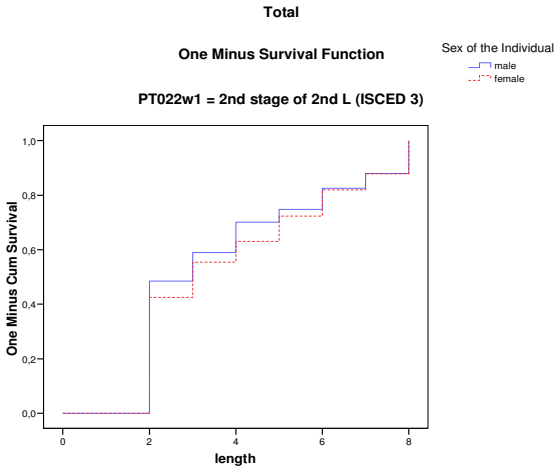
**Figure 7**

**Life table results (survival function, density function and hazard function) for total sample, breakdown by sex, level of education and sex and level of education**



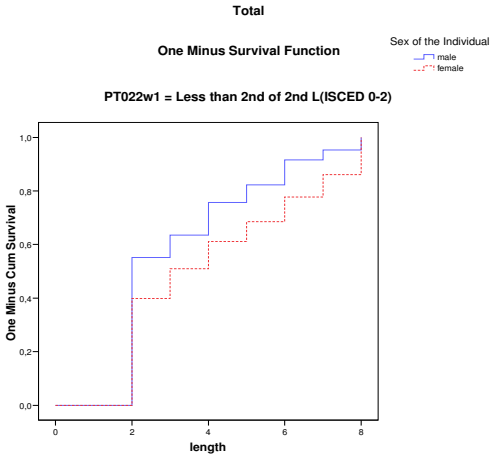



**Figure 8**

**Life table results (survival function, density function and hazard function) for Italy, total, breakdown by sex, level of education and sex and level of education**

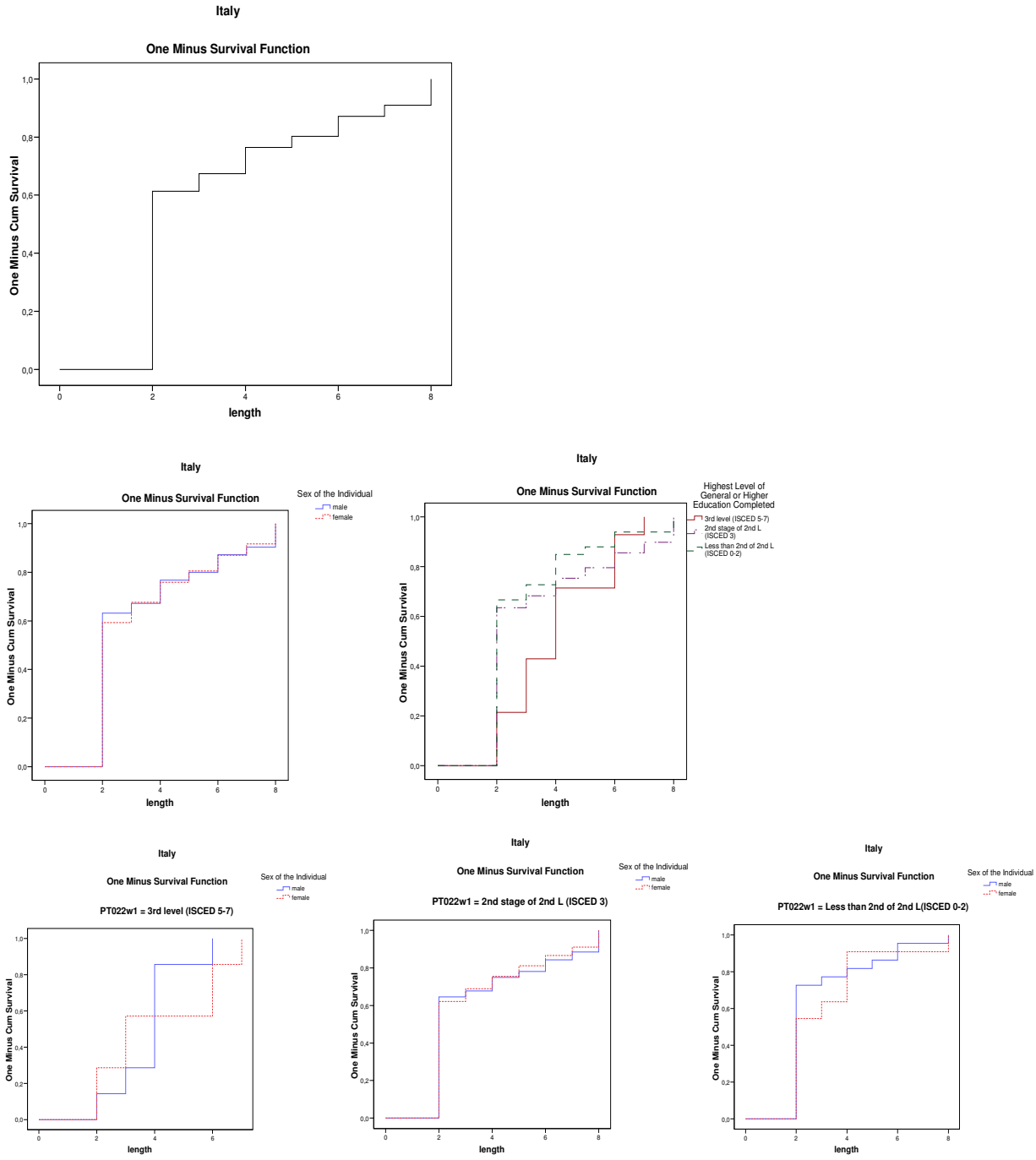
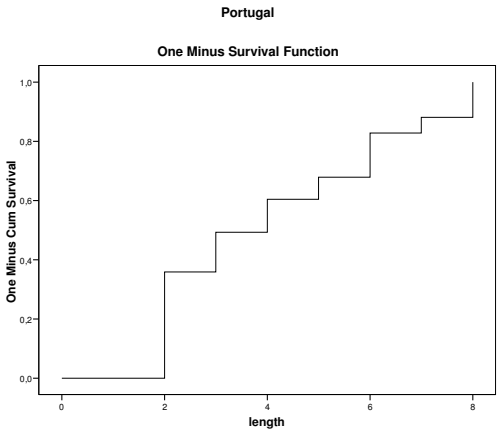
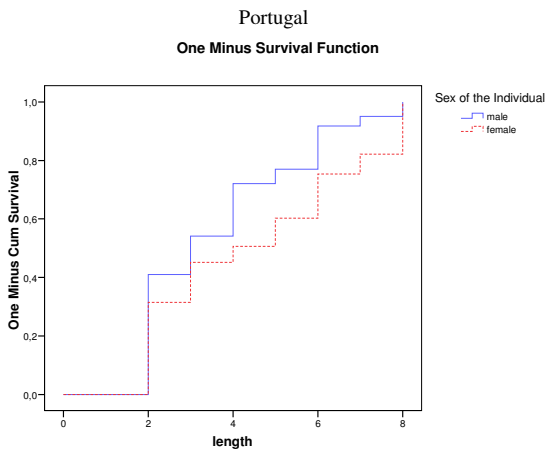
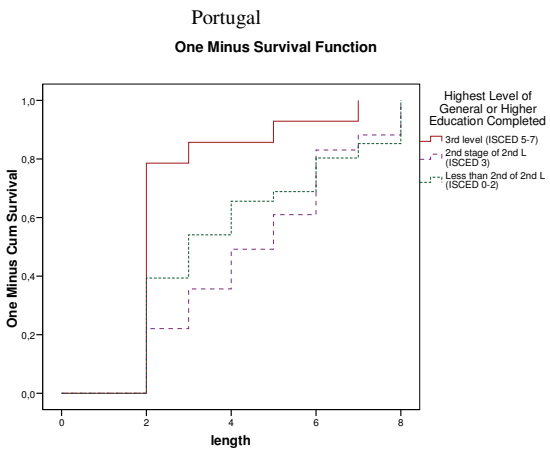


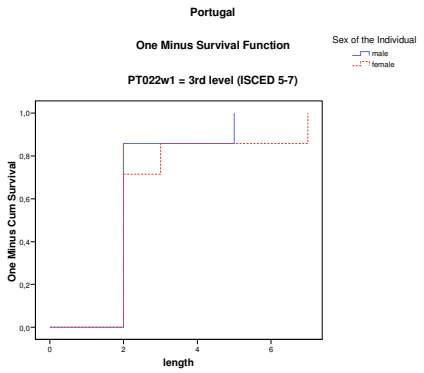
**Figure 9**

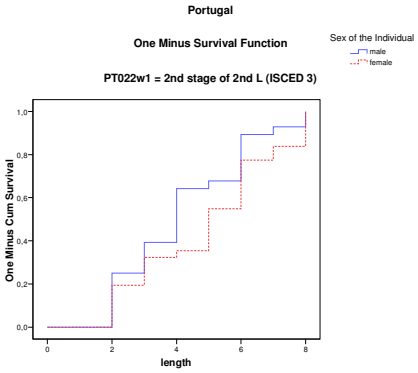
**Life table results (survival function, density function and hazard function) for Portugal, total, breakdown by sex, level of education and sex and level of education**



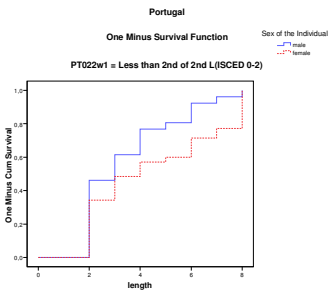
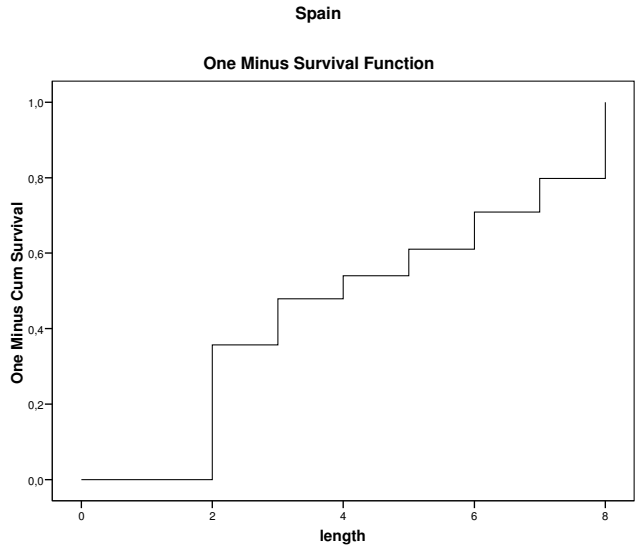
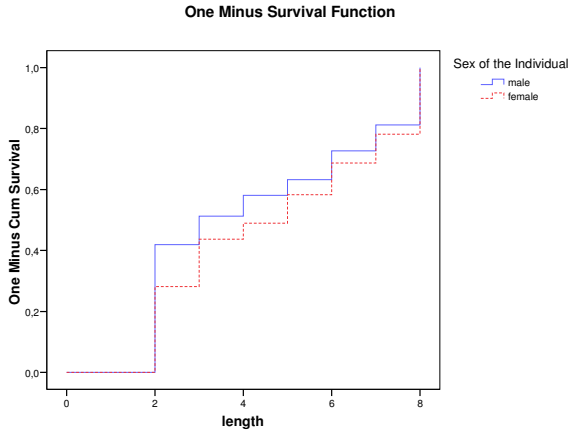
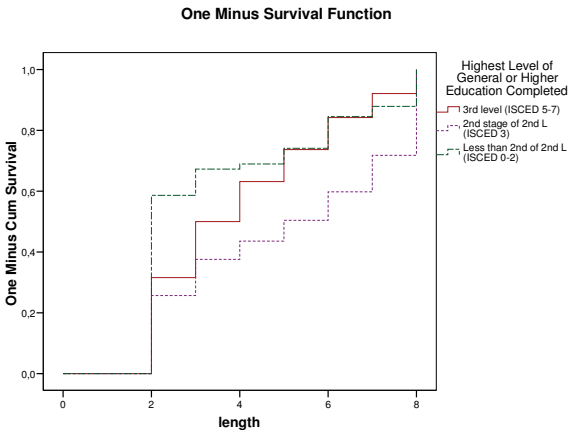



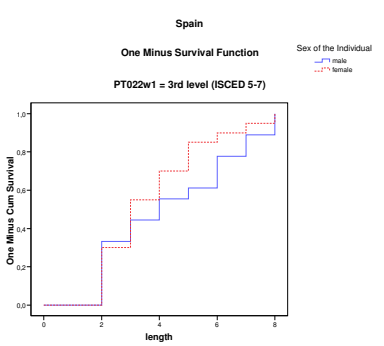
**Figure 10**

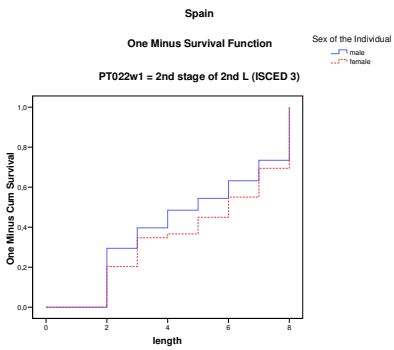
**Life table results (survival function, density function and hazard function) for Spain, total, breakdown by sex, level of education and sex and level of education**

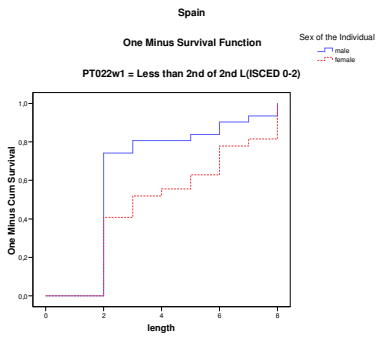


## R5.2. The cumulative proportion surviving at the end of an interval

From the Life table selection of best results (Table 6), in view to compare the process of searching for work/employment with the specified characteristics, we select the life table results for *Total, Italy, Portugal* and *Spain*. For these levels of survival probability at the end of each given interval (see Table 6. where "Survival to any time point is calculated as the product of the conditional probabilities of surviving each time interval the interval legend".[39]), the values of *standard error* of Cumulative Proportion surviving at the end of interval is *under the 0.05 level*.

The correspondence between the Interval start time used in SPSS15 programme and the Interval in years is presented in Table 8.

Table 8

| Interval start time | Interval in years | |
|---|---|---|
| 0 | 31.12.1993-31.12.**1994** | Wave 1 |
| 1 | 31.12.1994-31.12.**1995** | Wave 2 |
| 2 | 31.12.1995-31.12.**1996** | Wave 3 |
| 3 | 31.12.1996-31.12.**1997** | Wave 4 |
| 4 | 31.12.1997-31.12.**1998** | Wave 5 |
| 5 | 31.12.1998-31.12.**1999** | Wave 6 |
| 6 | 31.12.1999-31.12.**2000** | Wave 7 |
| 7 | 31.12.2000-31.12.**2001** | Wave 8 |

Using all these information, it is possible to affirm that, for the **total** sample:

* In the ***interval start time 1***, **year 1995**, after two years of searching for work/employment, the probability of *not* being employed is 0.494. Probability of being not employed at the end of the interval 1 was calculated from the proportion of surviving at time intervals before the reference time interval.

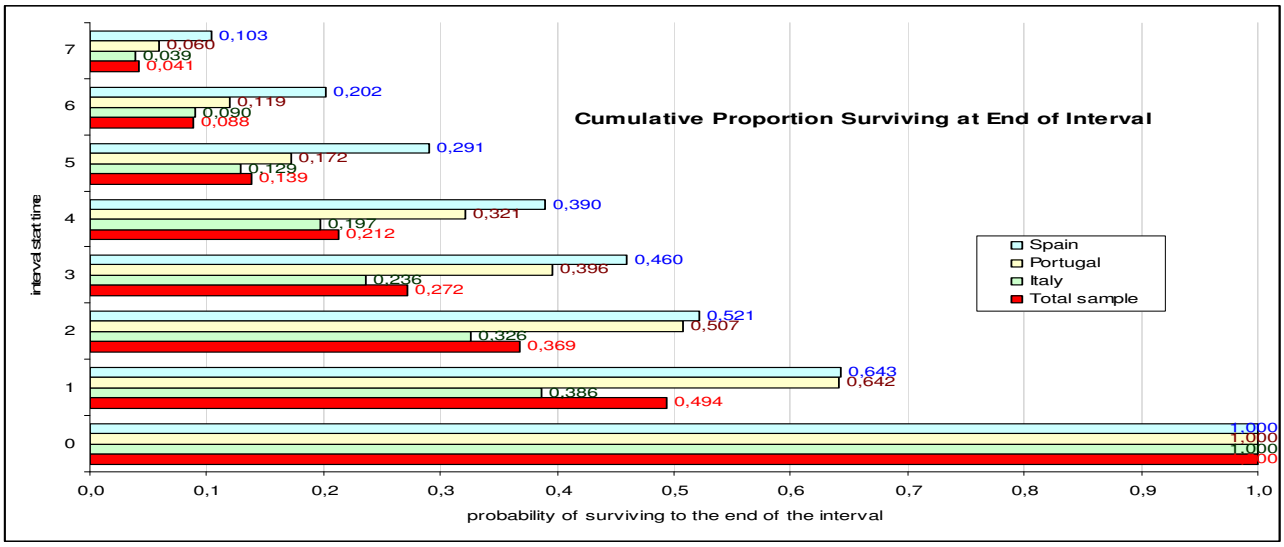
0.494=Proportion of surviving t0*Proportion of surviving t1=1*0.494

* *In the* ***interval start time 2*****, year 1996**, after 3 years of searching, the probability of *not* being employed is 0.369.

0.369=Proportion of surviving t0*Proportion of surviving t1*Proportion of surviving t2=1*0.494*0.746

It is clear that the survival probability is gradually decreasing with the increase in the interval; that means, in our case, that generally speaking the probability of *not* being employed, after a longer period of time, is decreasing.

**Figure 11**




*Std. Error of Cumulative Proportion Surviving at the End of Interval* ***≤0.05***

[39] *Girish* Singh, Estimation of the duration of postpartum amenorrhea in the presence of some censored data, *J Obstet Gynecol India Vol. 57, No. 1: January/February 2007 Pg 55.*

Using the cumulative proportion surviving at the end of time intervals, we could compare the cohort's behaviour in the *selected counties* and also with the *total* sample values, and observe that:

- there is the same initial condition, in the 0 interval start time, meaning at the end of 1994, all the selected persons (100%) are in the searching for employment process;
- at the end of 1995, almost 50% (1-0.494=0.506 or 50.6%) of the persons from the *total* sample are getting into the work and the others (49.4%) are still in searching. For *Italy* there are the best results with 61.4% of people to enter to work and respectively 38.6% are still in searching. At this moment, the differences between *Spain* and *Portugal* are very small: respectively 0.643 and 0.642 are the cumulative proportions of surviving at the end of the interval. This high level of surviving means that the labour market is not so dynamic and the allocation speed is small. In these countries, after two years of searching only 35.7% of people get into the work;
- at the end of 1996, after 3 years of searching, 36.9% from the *total* sample are still searching for work; during the last year, 12.5% from the *total* get into work and 13.4% in *Portugal* and 12.2% in *Spain*. In the case of *Italy,* the process is the slowest, only 6% get into work;
- at the end of 1997, after 4 years of searching, 27.2% from the *total* sample are still searching to work;
- after 8 years, there are still searching 4.1% from the *total* sample, 3.9% from *Italy*, 6% from *Portugal* and 10.3% from *Spain* failed to get into work.

The Table 9 presents, in a concentrated way, the image of these cohorts' behaviour searching for employment, respectively their *proportion to get into the labour market at the end of time intervals:*

**Table 9**

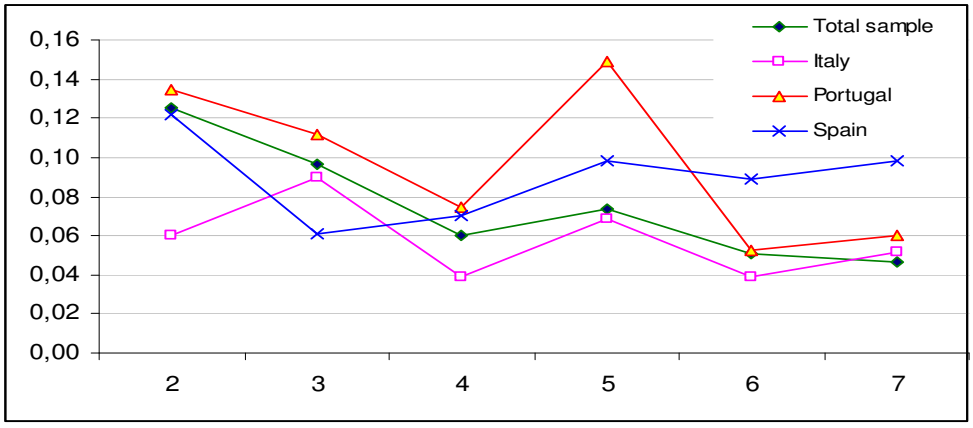
The proportion of persons from the selected cohort entering on work at the end of every interval

| | Total sample | Italy | Portugal | Spain |
|---|---|---|---|---|
| 0 | 0,000 | 0,000 | 0,000 | 0,000 |
| 1 | 0,506 | 0,614 | 0,358 | 0,357 |
| 2 | 0,125 | 0,060 | 0,134 | 0,122 |
| 3 | 0,096 | 0,090 | 0,112 | 0,061 |
| 4 | 0,060 | 0,039 | 0,075 | 0,070 |
| 5 | 0,073 | 0,069 | 0,149 | 0,099 |
| 6 | 0,051 | 0,039 | 0,052 | 0,089 |
| 7 | 0,047 | 0,052 | 0,060 | 0,099 |

The graphic in the Figure 12 is even more easy-to-read for the process of searching for employment:

**Figure 12**

**The proportion of persons entering on work at the end of every interval (after the second interval)**



Therefore, for the last 6 years –per *total*- the probability to get into work is decreasing over the time (12.5%, 9.6%, 6%, 7.3%, 5.1%, 4.7%).

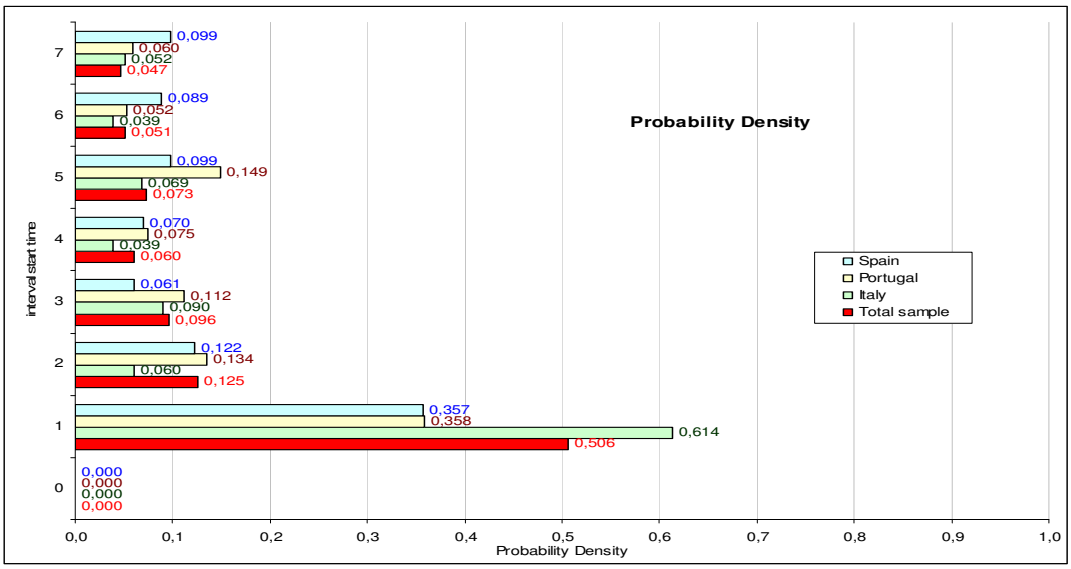
The exception is *Spain*, where there is an inverse tendency for the last 5 years (12.2%, 6.1%, 7%, 9.9%, 8.9%, 9.9%). In *Spain* the minim annual proportion entrance is registered on the 4-th year, 1997, with 6.1% proportion; it follows an increasing in 1998 to 7%, in 1999 to 9.9% and a bit of decreasing, to 8.9% in 2000, and then again, 9.9%, in 2001. It should be interesting (but it is not now the right moment/place) to search into the national employment and educational legal previsions, if during these years were some specific measures that could influence this behaviour, or it is something usual for Spain.

## R5.3. Probability density

The estimate of the ***probability of experiencing the event*** of entering on work during the given interval year is represented in Figure 13.

The *maximum* level of the probability to experience the entering to work is registered during the second year, 1995. So, there are 61.4% chances to get into work for the people in *Italy*, 50.6 chances for people from *aggregated sample*, and for *Portugal* and *Spain* there are similar levels 35.7/35.8 chances to get into work.

**Figure 13**




*Std. Error of Probability density* ***≤0.05***

After that period of time, the chances are sharply decreasing each year, with the value/level of chances included in the interval [3.9; 14.9].

Examples:

For *Italy* during the 4-th year (1997) there are 9% chances for the persons in searching to get into work during that time and for every other interval of time the chances are lower, with small variations, value chances being included into the interval [3.9; 6]; in the last year, 2001, there are only/still 5.2 chances to get in work.

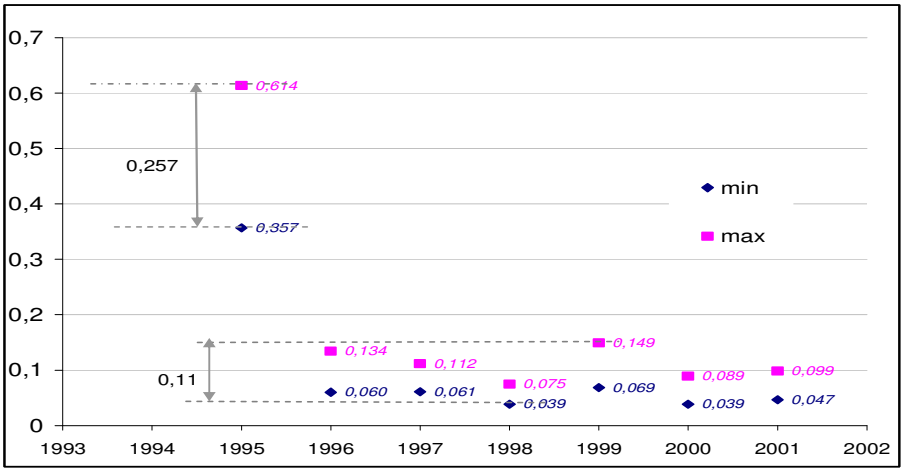
For *Portugal* during the 3-th year (1996) there are 13.4% chances to get in work and also close values for the year 4 (1997) with 11.2 chances and for the year 6 (1999) with 14.9 chances to get in work. Lower levels are in the year 5 (1998) with 7.5 chances, 7 (2000) with 5.2 chances and 8 (2001) with 6% chances to get in work. The decrease is to almost ½ from the initial one.

For *Spain* is visible a tendency to decrease the chances during the first 4 years: in the year 3 (1996) there are 12.2 chances to get in work, in year 4 (1997) there are 6.1 chances. After 1998 is starting to increase these chances from 7% to 9.9, for the years 1999 and 2001.

For *the total*, in the *aggregate sample,* the tendency to decrease the chances to get in work is dominant for all the period of 8 years, until it reaches only 4,7 chances for the last year, 2001.

**Figure 14**

**The studied samples described in terms of chances of tolerances (intervals) to get in work during every selected year**




In *terms of tolerance*, by the Figure 14, the studied samples could be described with **48.5 ±12.8** % chances to get in work during the second year, 1995. After that year, during any year, starting with 1996, those chances decrease to **9.4±5.5**%.

In the hypothesis that the ***probability density*** could be an *indicator of the absorbent power of the labour market for the new entrants*, it is likely to affirm that:

- The best matching school-work is realised in the second year, 1995, in view to get in work (under the mentioned employment conditions);
- It is possible that the moment of ending the education to be more visible than the signal of searching for employment, on the labour market;
- It is a problem with/of the labour market allocation mechanism;
- It is possible that the "freshness" of competences to be "of interest" only in the first period and become "superfluous" after the first 2 years (1994-1995).

It should be also interesting (but it is not now the right moment/place) to search for answers to the question: which is the explanation for the "fracture" in the chances of getting in work after the first "golden" period?

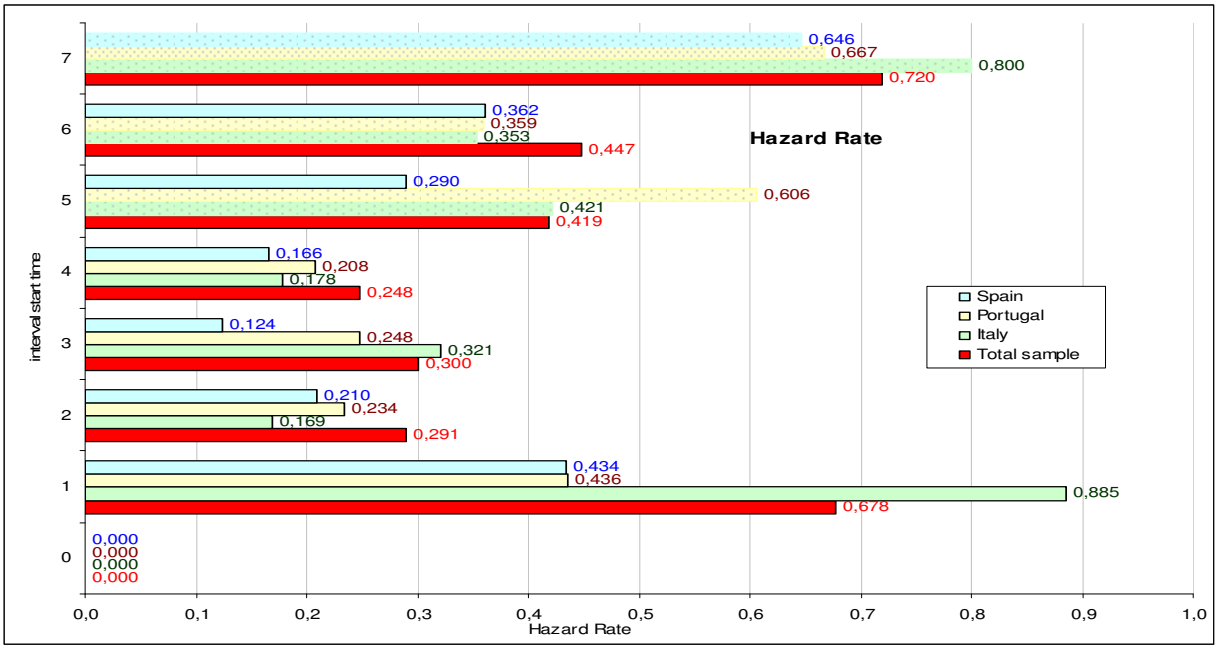
## R5.4. Hazard rate

In view to a better understanding of the meaning and specificity of the ***hazard rate***, we appeal to an example:

> "Survival distributions are usually described in terms of 2 functions: *the survival function*, S(t), defined as the probability that a person survives past a specified time t; and *the hazard function*, h(t), which is the instantaneous failure rate and is defined as: supposing a patient has survived to time t, then *the hazard function is the probability that the patient will have an event in the next instant*. The hazard function is conceptually useful in describing survival distributions but is rarely published. **The greater the hazard function, the shorter is the survival time**."[40]

[40] Sowmya R. Rao and David A. Schoenfeld, Survival Methods, ISSN: 1524-4539 Copyright © 2007 American Heart Association. All rights reserved. Print ISSN: 0009-7322. Online 72514 Circulation is published by the American Heart Association. 7272 Greenville Avenue, Dallas, TX, DOI: 10.1161/CIRCULATIONAHA.106.614859 2007;115;109-113 *Circulation,* http://circ.ahajournals.org/cgi/content/full/115/1/109, pg. 109.

**Figure 15**




*Std. Error of hazard Rate* ***≤0.1*** *(exception for Portugal and Italy for 5-7 interval start time and for Spain in the 7-th interval start time)*

***Few other definitions for hazard rate:***

*"The instantaneous rate at which a randomly-selected individual known to be alive at time (t - 1) will die at time t is called the* ***conditional failure rate*** *or* ***instantaneous hazard****, h(t). Mathematically, instantaneous hazard equals the number that fail between time t and time t + d(t) divided by the size of the population at risk at time t, divided by d(t). This gives the proportion of the population present at time t that fail per unit time. Instantaneous hazard is also known as the* ***force of mortality, the instantaneous death rate,*** *or* ***the failure rate****."*[41]

"In medical statistics, the hazard function is a *relationship between a proportion and time.* The proportion (also called the hazard ratio) is the proportion of subjects who die, from among those who have survived to a time "t". *The term can be applied in fields other than medical statistics,* in which case *it refers to the failure of a unit being studied,* rather than the death of a subject."[42]

*„The hazard rate is the probability that if the event in question has not already occurred, it will occur in the next time interval, divided by the length of that interval. The time interval is made very short, so that in effect the hazard rate represents an instantaneous rate…Clinicians may confuse* ***velocity,*** *the amount of distance travelled per unit of time, and the* ***hazard****, the* ***rate of events per person-time****. While velocity can be measured in a single object based on its distance travelled during a period of time, the hazard rates can only be inferred in a probabilistic sense from the occurrence of events in a population of at-risk individuals during a follow-up time interval."*[43]

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[41] Mark Stevenson, An Introduction to Survival Analysis, EpiCentre, IVABS, Massey University, December 2007, pg.8;
[42] http://www.statistics.com/resources/glossary/h/hazardfunc.php

[43] Spotswood L. Spruance, Julia E. Reid, Michael Grace, and Matthew Samore , Hazard Ratio in Clinical Trials, Antimicrobial Agents and Chemotherapy, August 2004, p. 2787-2792, Vol. 48, No. 8, 0066-4804/04/$08.00+0 DOI: 10.1128/AAC.48.8.2787-2792.2004, Copyright © 2004, American Society for Microbiology. All Rights Reserved., http://aac.asm.org/cgi/content/full/48/8/2787

**Box 4**

**Understanding the Shape of the Hazard Rate: A Process Point of View**[44]

*"In spite of apparent simplicity,* ***hazard rate is really an elusive concept****, especially when one tries to interpret its shape considered, as a function of time. It is then helpful to consider the hazard rate from a different point of view than what is common, and we will here consider survival times modelled as first passage times in stochastic processes…*

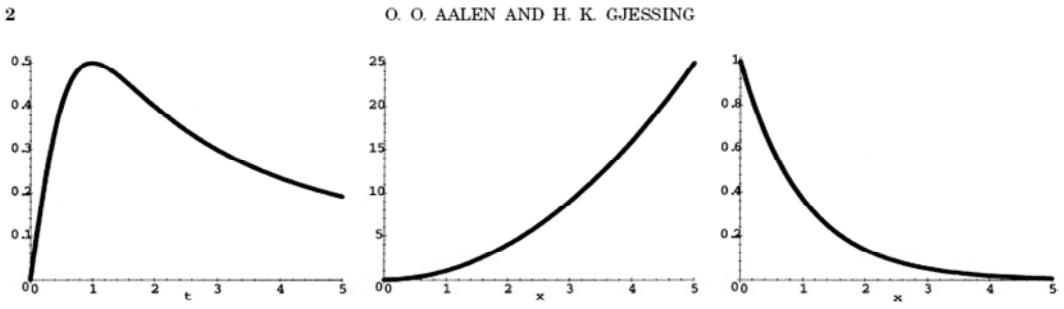
*The process point of view assumed here gives yet another explanation of these phenomena.* ***The shape of the hazard rate*** *is created* ***in a balance*** *between two forces:* ***the attraction of the absorbing state*** *and* ***the general diffusion within the transient space….****Simplifying quite a bit, one could say that* ***the shape of the hazard rate depends on the distance*** *between the starting point, or starting distribution, and the state of absorption: a* ***great distance*** *leads to an* ***increasing hazard rate****; an* ***intermediate distance*** *leads to a hazard rate that is* ***first increasing and then declining****; a* ***small distance*** *leads to an (essentially)* ***decreasing hazard rate****.*

*The* ***quasi-stationary*** *distribution, which is an important concept in probability theory, turns out to be useful in understanding the shape of the hazard. Examples of quasi-stationary distributions are exhibited for several models, both discrete and continuous. A major distinction exists between reversible and irreversible processes.*

*The distinction between progressive and non-progressive models is somewhat tentative. Discussion and examples for phase type models are given by Aalen (1995),( Figure 16)… Typically,* ***progressive models*** *will tend to have* ***increasing hazard rates****. A complication may be frailty (i.e., unobserved differences in transition rates between individuals) which may result in the hazard rate being "bent down" and eventually decreasing. For* ***non-progressive models****, the most typical shape, also in the absence of frailty, will be a* ***hazard rate that first increases and then decreases."***

**Figure 16**

**Typical shapes of hazard rates**




*a)* *b)* *c)*

In our specific case, the results of our study leaded to this shape of the hazard rate graphic (see Figures 17-18):

**Figure 17**

[44] Odd O. Aalen and H°akon K. Gjessing, Understanding the Shape of the Hazard Rate: A Process Point of View, *Statistical Science,* 2001, Vol. 16, No. 1, 1–22, http://projecteuclid.org/DPubS/Repository/1.0/Disseminate?view=body&id=pdf_1&handle=euclid.ss/998929473

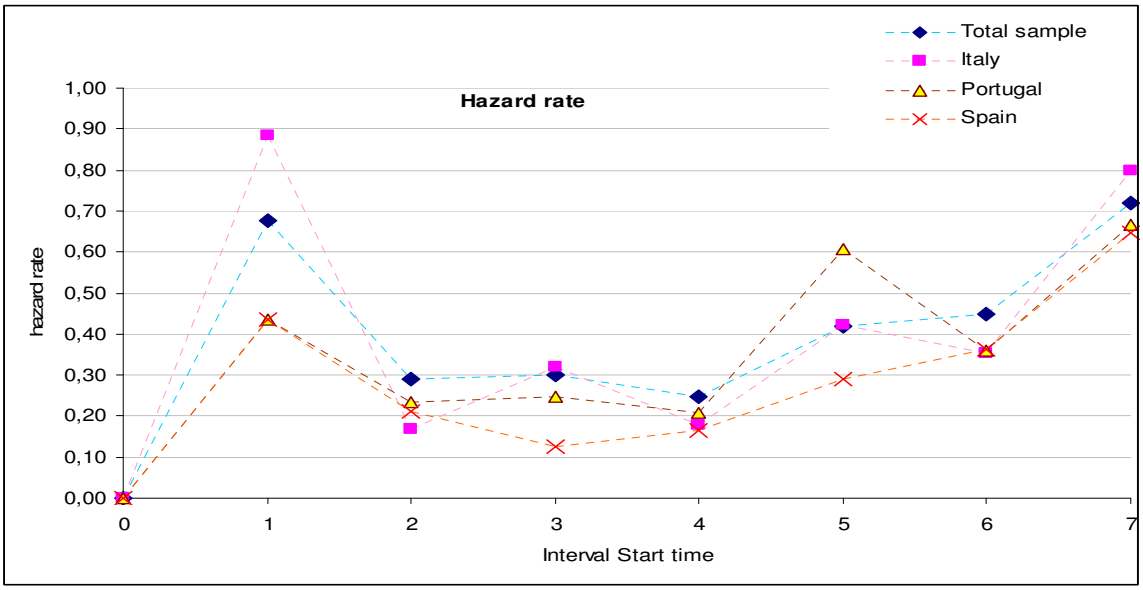
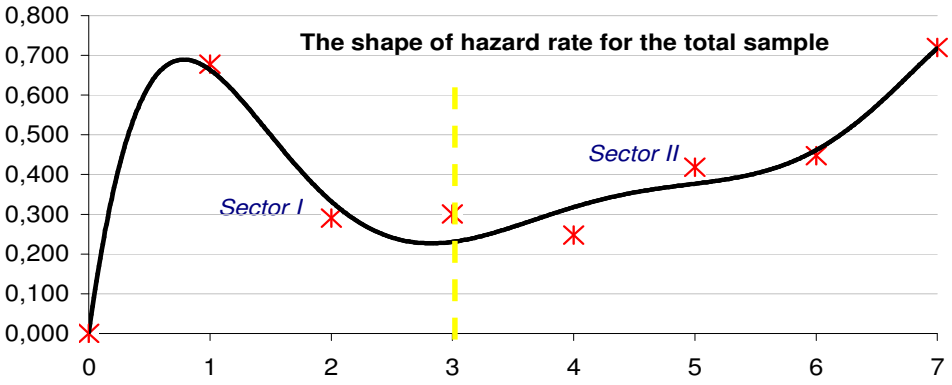



**Figure 18**




Trying to interpret the hazard rate shape of **our *total* sample**, it could be mentioned that, comparing it with the typical shapes of hazard rate (Aalen & Gjessing), it could be observed a mixture of these "standard" shapes, actually by *two distinct sectors*:

- in Sector I, it seems to be close to the *a) shape*; like as for an intermediate distance that leads to a hazard rate, which is *first increasing and then declining*; this is the most typical shape also for non-progressive models;
- in Sector II, it seems to be similar to the *b) shape*; like as for a great distance that leads to an *increasing hazard rate*; this is the typical shape also for progressive models.

These assumptions are done correctly if we admit that "the shape of the hazard rate depends on the distance between the starting point and the state of absorption" and/or "the progressive models and the non-progressive ones are in absence of frailty".

In our case, the shape of the hazard rate *could be viewed as* being created in a balance between *two forces*: the attraction of the absorbing state and the general diffusion within the transient space; where the absorbing state is the "work" (the employment under the specified conditions) and the transient space is formed by the period of different statuses on labour market (excluding the final event/the employment).

Under these properties we could interpreted the hazard rate as one way to measure the **"permeability characteristic" of the "local" labour market**, for our study at national level and also for total [*10 countries: Belgium, Denmark, France, Ireland, Italy, Greece, Spain, Portugal, Germany (ECHP – from national sources), United Kingdom (ECHP – from national sources)].*

We could affirm that, for the *total sample*, year-by-year, the hazard/instantaneous rate or the 'force' of getting in work has results which follow the described shapes. So:

- for the total sample, the 966 persons that are still searching in the year 1995, 'surviving' to the year 1994, reach the risk (or the probability) of get in work of 67.8%, during the mentioned year – with a high rate;
- the 477 persons that are still searching for job, at the beginning of the year 1996, 'surviving' to the year 1995 (not being entered in work), reach the risk (or the probability) of get in work of 29.1%, during the interval – with a lower rate;
- the 356 persons that are in searching for employment at the beginning of the year 1997 (and didn't enter in work during the 1996), reach the risk (or the probability) of get in work of 30%, during the interval – with a bit higher rate.

We should mention that the theory affirms that "a *great distance* leads to an *increasing hazard rate*; an *intermediate distance* leads to a hazard rate that is *first increasing and then declining*; a *small* distance leads to an (essentially) *decreasing* hazard rate"; in our specific case, we can not clearly specify that the shapes of the two sectors are precisely located in the respective periods (at great/intermediate/small distance), but the general shapes are following the typical ones.

## R6. Conclusions

For our conclusions we took in to account the *Sowmya R. Rao and David A. Schoenfeld's* statements: "The most commonly used descriptive statistics for survival data are based on an *estimate of the survival function*. Often the *median* is reported, which is the value of '**t**' where the survival function, S(t), equals 0.5 (i.e. 50% of the cohort is event free). Sometimes the value of S(t) is reported at t_1, 5, or 10. *The mean survival time is rarely reported because, as we shall see, it cannot be estimated reliably*."[45]

The next tables and figures (included in R6.1, R6.2) are meaningful, without need of many comments.

So, **searching for employment duration** (averaged at 2,0 years) is different:

* by countries (shorter for Belgium, Denmark, Ireland, Italy, Germany and longer for Spain, Portugal, Greece and France),
* by sexes (males need 1,9 years, comparing with females which search 2,3 years for employment; see Figure 22 – expressive for the "gender gap" in searching for employment after finishing studies, particularly in Spain, Portugal, Greece),
* by level of education (generally speaking, the higher is the level, the shorter is the duration of searching for employment);

and, consequently, also **the age of entrance on the labour market** is different.

The results of our study could be deeper analysed and interpreted taking into account the characteristics of the sample, the ECHP investigated period of time, the national (legal/policy) specificities of countries, the socio-economic environment, etc. However we like to underline that an accurate analyse could be done only without forgetting the clear restrictions/conditions we settled to our "homogeneous" cohort, that make it a bit "artificial" if we think to expand the conclusions as an enlarged view about the whole young people's process school-to–work.

[45] Sowmya R. Rao and David A. Schoenfeld, Survival Methods, ISSN: 1524-4539 Copyright © 2007 American Heart Association. All rights reserved. Print ISSN: 0009-7322. Online 72514 Circulation is published by the American Heart Association. 7272 Greenville Avenue, Dallas, TX, DOI:10.1161/CIRCULATIONAHA.106.614859 2007;115;109-113 *Circulation,* http://circ.ahajournals.org/cgi/content/full/115/1/109, pg. 109.

## R6.1. The searching duration for employment expresses through median survival time

**Table 10**

**The median survival time (years)**

| | Total | Males | Females | 3rd level (ISCED 5-7) | 2nd stage of 2nd L (ISCED 3) | Less than 2nd of 2nd L(ISCED 0-2) | Males with 3rd level (ISCED 5-7) | Females with 3rd level (ISCED 5-7) | Males with 2nd stage of 2nd L (ISCED 3) | Females with 2nd stage of 2nd L (ISCED 3) | Males Less than 2nd of 2nd L(ISCED 0-2) | Females with Less than 2nd of 2nd L(ISCED 0-2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Denmark | **1,7** | *1,9* | *1,5* | *1,7* | 1,8 | * | 1,8 | 1,6 | 1,9 | 1,5 | | |
| Belgium | 1,6 | *1,6* | *1,7* | 1,7 | 1,6 | 4,0 | 1,7 | 1,7 | 1,5 | 1,6 | 1,5 | 4,5 |
| France | 2,0 | 2,1 | 1,8 | 1,8 | 2,3 | 3,5 | 1,9 | 1,7 | 2,2 | 2,3 | 3,5 | |
| Ireland | 1,8 | *1,6* | 2,0 | 1,8 | 1,8 | 4,0 | 1,7 | 3,0 | 1,5 | 2,2 | 4,5 | 1,8 |
| Italy | 1,8 | 1,8 | 1,8 | 3,3 | 1,8 | 1,8 | 3,4 | 2,8 | 1,8 | 1,8 | 1,7 | 1,9 |
| Greece | 2,4 | 1,8 | 2,8 | 2,0 | 2,8 | * | 1,7 | 2,5 | 2,0 | 3,1 | * | * |
| Spain | 3,3 | 2,9 | 4,1 | 3,0 | 4,9 | 1,9 | 3,5 | 2,8 | 4,3 | 5,5 | 1,7 | 2,8 |
| Portugal | 3,1 | 2,7 | 3,9 | 1,6 | 4,1 | 2,7 | 1,6 | 1,7 | 3,4 | 4,8 | 2,3 | 3,2 |
| German-National source | 1,9 | 1,8 | 2,2 | 1,6 | 4,1 | 3,8 | 1,6 | *1,7* | 3,7 | 4,4 | 4,0 | 3,6 |
| Uk-National source | 1,8 | 2,0 | 1,6 | 1,7 | 5,0 | 1,8 | 1,8 | 1,5 | 5,5 | 3,5 | 2,0 | 1,6 |
| **Total** | **2,0** | **1,9** | **2,3** | 1,8 | 2,4 | 2,3 | **1,8** | 1,8 | 2,1 | 2,6 | 1,9 | **2,9** |

**Figure 19**

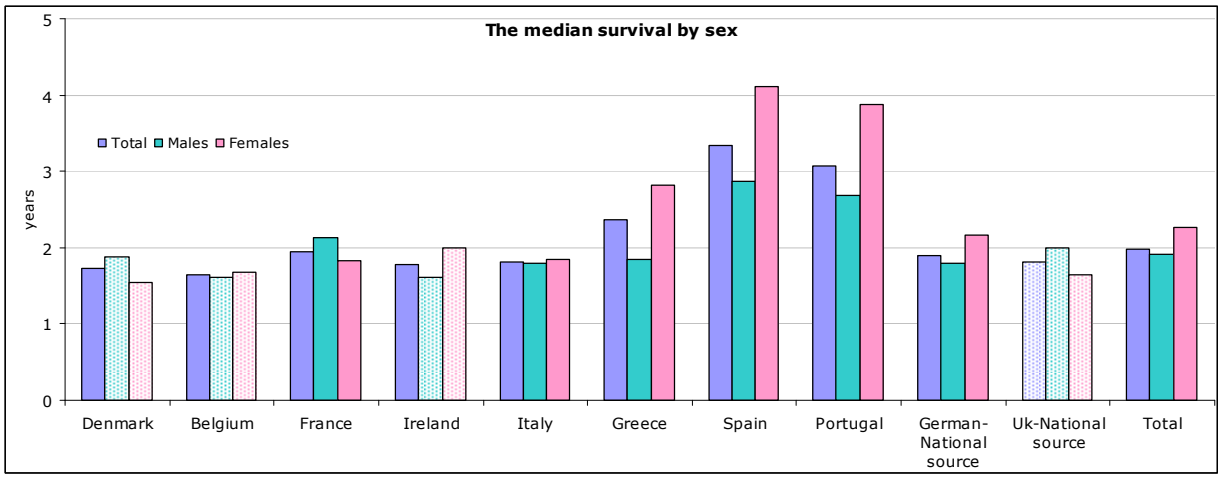



**Figure 20**

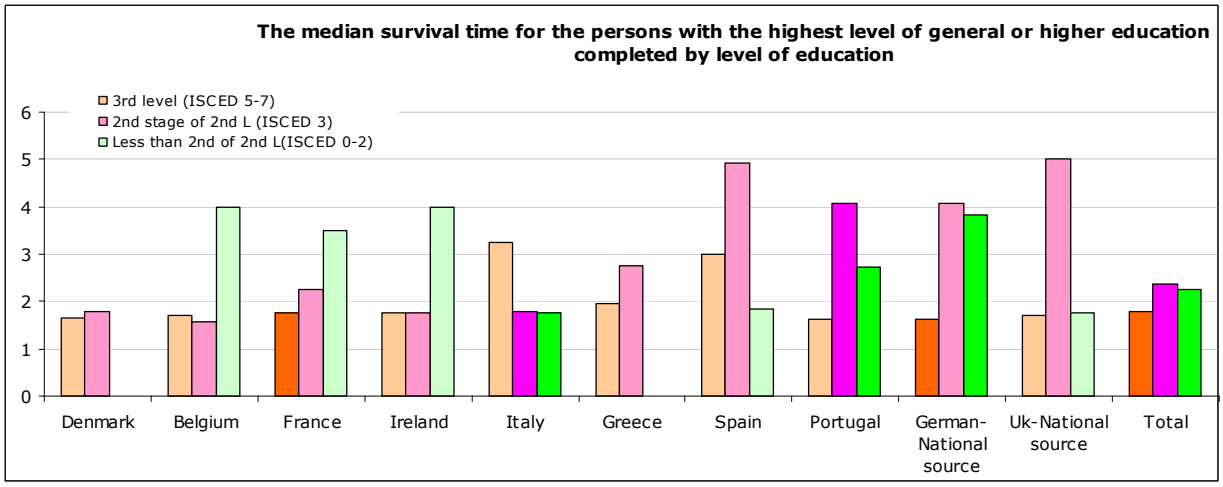


**Figure 21**

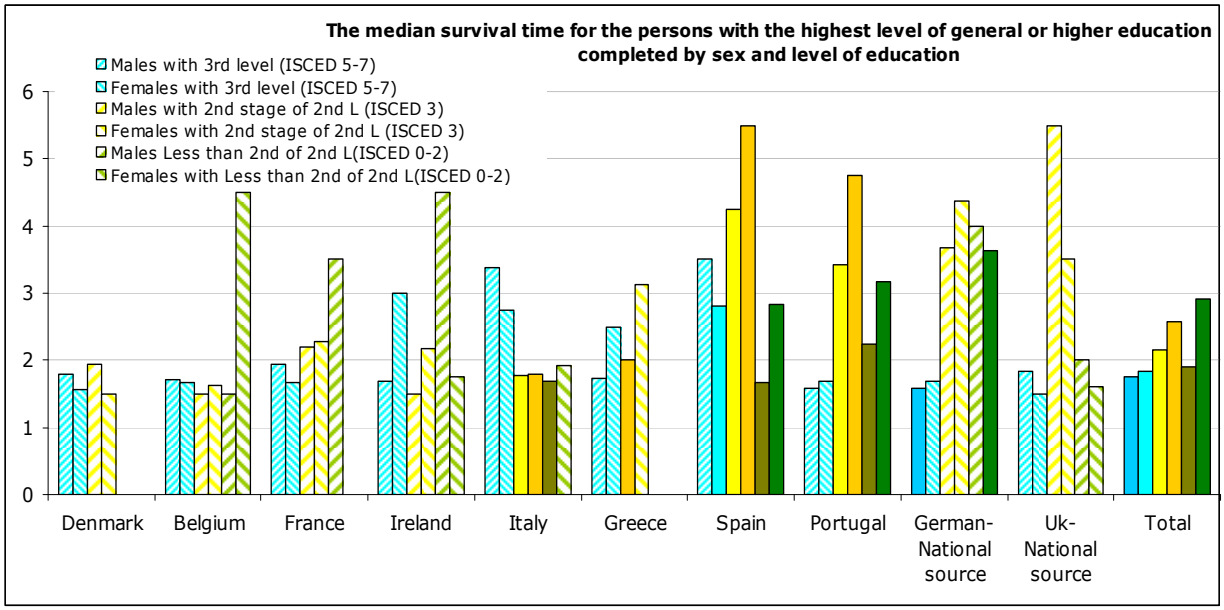
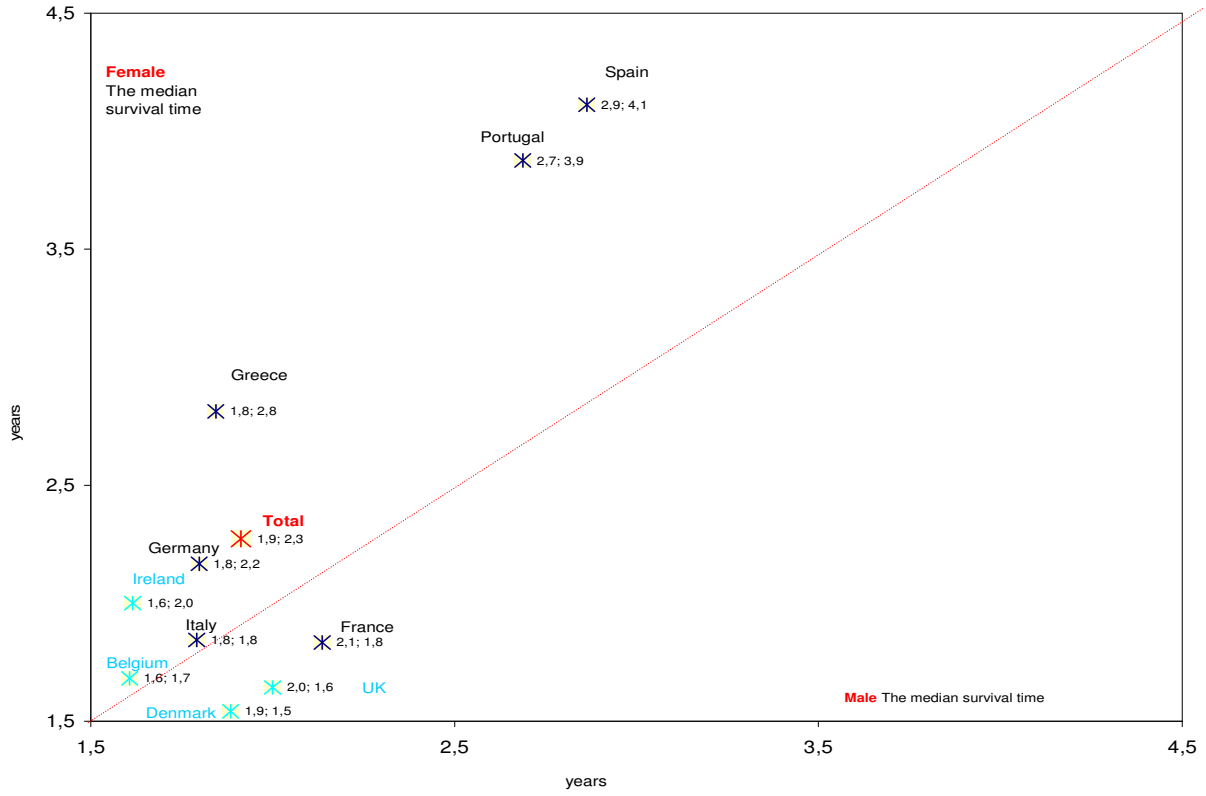



**Figure 22**

**The median survival time distribution by sexes for each country included in sample, relative to first bisector** (representing the equal gender distribution)



## R6.2. The age of entrance on the labour market

**Table 11**

**The average age of reaching the Highest Level of General or Higher Education Completed for the countries included in study**

years

| | Average age for Highest Level of General or Higher education Completed (Pt 022w1) is 3rd level (ISCED 5-7) | Level of General or Higher education Completed (Pt 022w1) is 2nd stage of 2nd L (ISCED 3) | Average age for Highest Level of General or Higher education Completed (Pt 022w1) is Less than 2nd of 2nd L(ISCED 0-2) |
|---|---|---|---|
| Belgium | 25,8 | 27,8 | 26,6 |
| France | 23,1 | 19,9 | 17,5 |
| Ireland | 28,2 | 20,6 | 23,1 |
| Italy | 27,7 | 26,7 | 32,6 |
| Greece | 24,6 | 20,3 | 19,0 |
| Spain | 24,1 | 21,2 | 31,3 |
| Portugal | 30,0 | 20,6 | 21,5 |
| German-National source | 32,9 | 18,9 | 18,7 |
| Uk-National source | 21,9 | 16,0 | 16,0 |
| Total sample | 27,4 | 23,1 | 25,1 |
| | | | *number of persons* |
| *Denmark* | *18* | *19* | *0* |
| *Belgium* | *16* | *18* | *5* |
| *France* | *44* | *29* | *4* |
| *Ireland* | *9* | *22* | *8* |
| *Italy* | *20* | *274* | *47* |
| *Greece* | *37* | *57* | *1* |
| *Spain* | *51* | *182* | *79* |
| *Portugal* | *14* | *74* | *74* |
| *German-National source* | *86* | *18* | *63* |
| *Uk-National source* | *7* | *14* | *14* |
| *Total sample* | *302* | *707* | *295* |

reliables estimates
unreliable estimates

**Figure 23**

**The frequencies for the average age reaching the Highest Level of General or Higher Education Completed for the countries included in study**

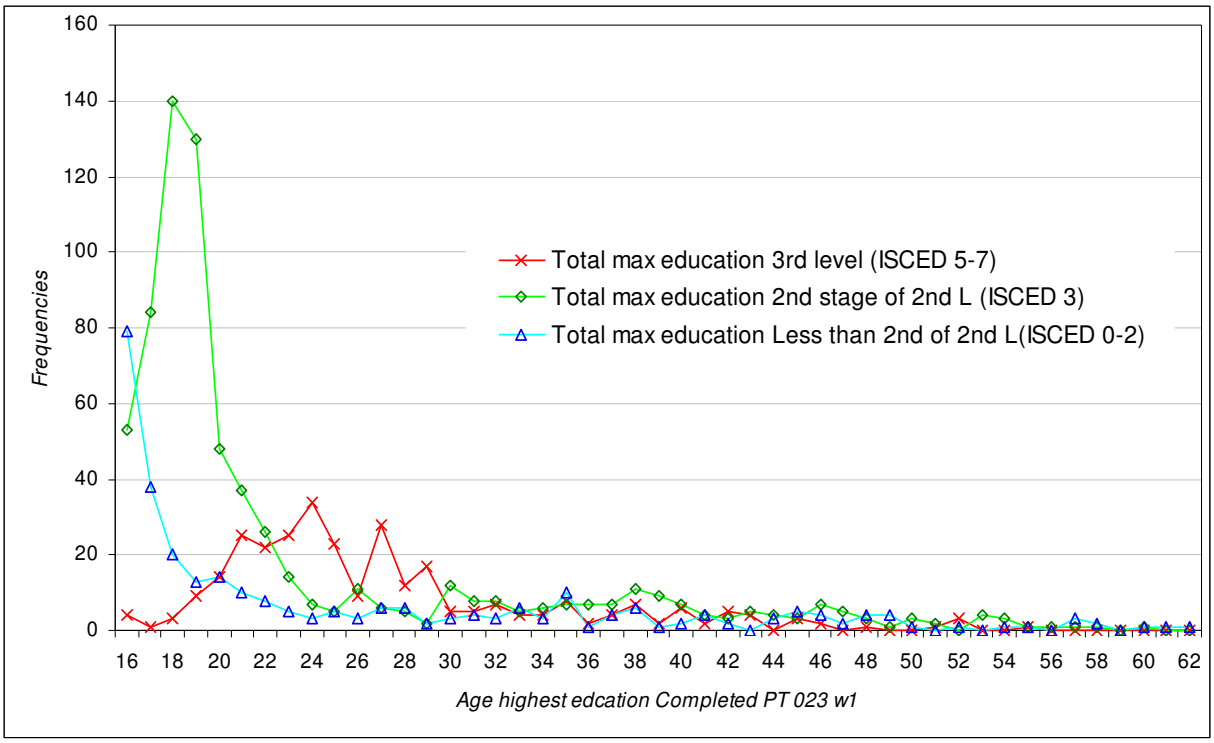


**Table 12**

**The average age of entrance on the labour market after the Highest Level of General or Higher Education is completed at 3rd level**

years

| | Average age for Highest Level of General or Higher education Completed (Pt 022w1) is 3rd level (ISCED 5-7) | The median survival time | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is completed at 3rd level |
|---|---|---|---|
| Uk-National source | 21,9 | 1,7 | 23,6 |
| France | 23,1 | 1,8 | 24,9 |
| Spain | 24,1 | 3,0 | 27,1 |
| Greece | 24,6 | 2,0 | 26,6 |
| Belgium | 25,8 | 1,7 | 27,5 |
| Denmark | 26,7 | 1,7 | 28,4 |
| Total sample | 27,4 | 1,8 | 29,1 |
| Italy | 27,7 | 3,3 | 30,9 |
| Ireland | 28,2 | 1,8 | 30,0 |
| Portugal | 30,0 | 1,6 | 31,6 |
| German-National source | 32,9 | 1,6 | 34,5 |

reliable estimates
unreliable estimates

**Figure 24**

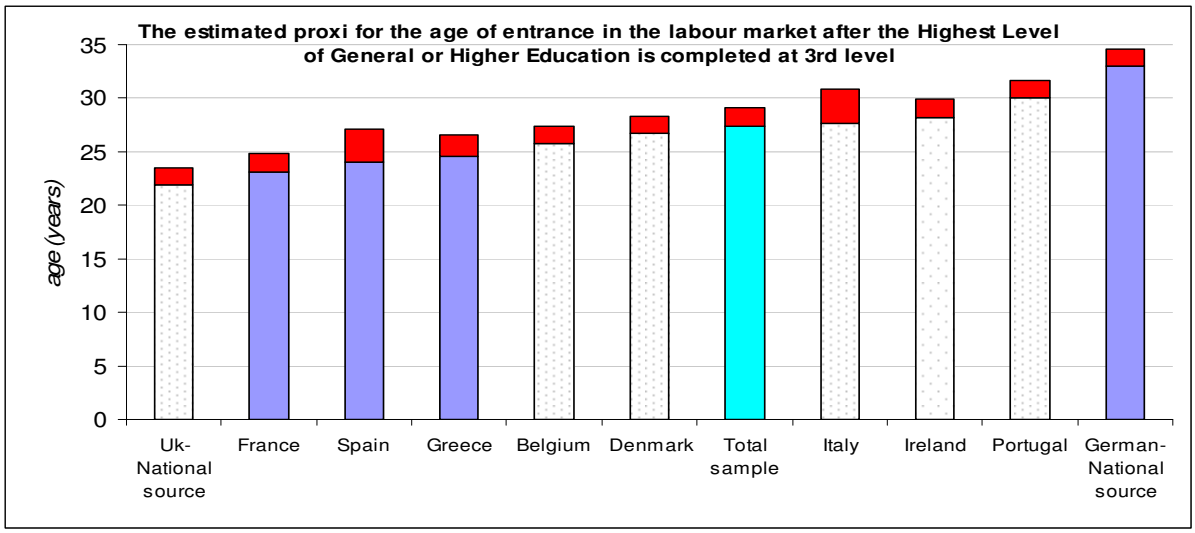



**Table 13**

**The average age of entrance on the labour market after the Highest Level of General or Higher Education is completed at 2nd stage of 2nd**

years

| | Average age for Highest Level of General or Higher education Completed (Pt 022w1) is 2nd stage of 2nd L (ISCED 3) | The median survival time | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is completed at 2rd level |
|---|---|---|---|
| Uk-National source | 16,0 | 5,0 | 21,0 |
| German-National source | 18,9 | 4,1 | 23,0 |
| France | 19,9 | 2,3 | 22,1 |
| Greece | 20,3 | 2,8 | 23,0 |
| Portugal | 20,6 | 4,1 | 24,6 |
| Ireland | 20,6 | 1,8 | 22,3 |
| Denmark | 20,7 | 1,8 | 22,5 |
| Spain | 21,2 | 4,9 | 26,2 |
| Total sample | 23,1 | 2,4 | 25,5 |
| Italy | 26,7 | 1,8 | 28,5 |
| Belgium | 27,8 | 1,6 | 29,3 |

reliable estimates
unreliable estimates

**Figure 25**

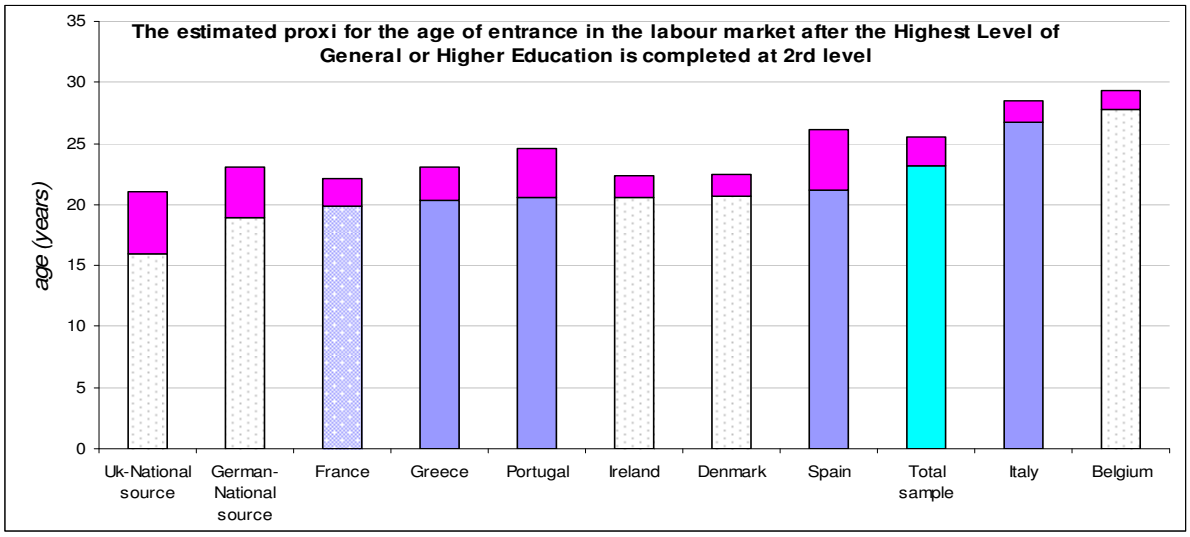



**Table 14**

**The average age of entrance on the labour market after the Highest Level of General or Higher Education is Completed is less than 2nd of 2nd Level (ISCED 0-2)**

years

| | Average age for Highest Level of General or Higher education Completed (Pt 022w1) is Less than 2nd of 2nd L(ISCED 0-2) | The median survival time | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is completed at 2rd level |
|---|---|---|---|
| Uk-National source | 16,0 | 1,8 | 17,8 |
| France | 17,5 | 3,5 | 21,0 |
| German-National source | 18,7 | 3,8 | 22,6 |
| Greece | 19,0 | * | * |
| Portugal | 21,5 | 2,7 | 24,2 |
| Ireland | 23,1 | 4,0 | 27,1 |
| Total sample | 25,1 | 2,3 | 27,4 |
| Belgium | 26,6 | 4,0 | 30,6 |
| Spain | 31,3 | 1,9 | 33,1 |
| Italy | 32,6 | 1,8 | 34,3 |

reliables estimates
unreliable estimates

**Figure 26**

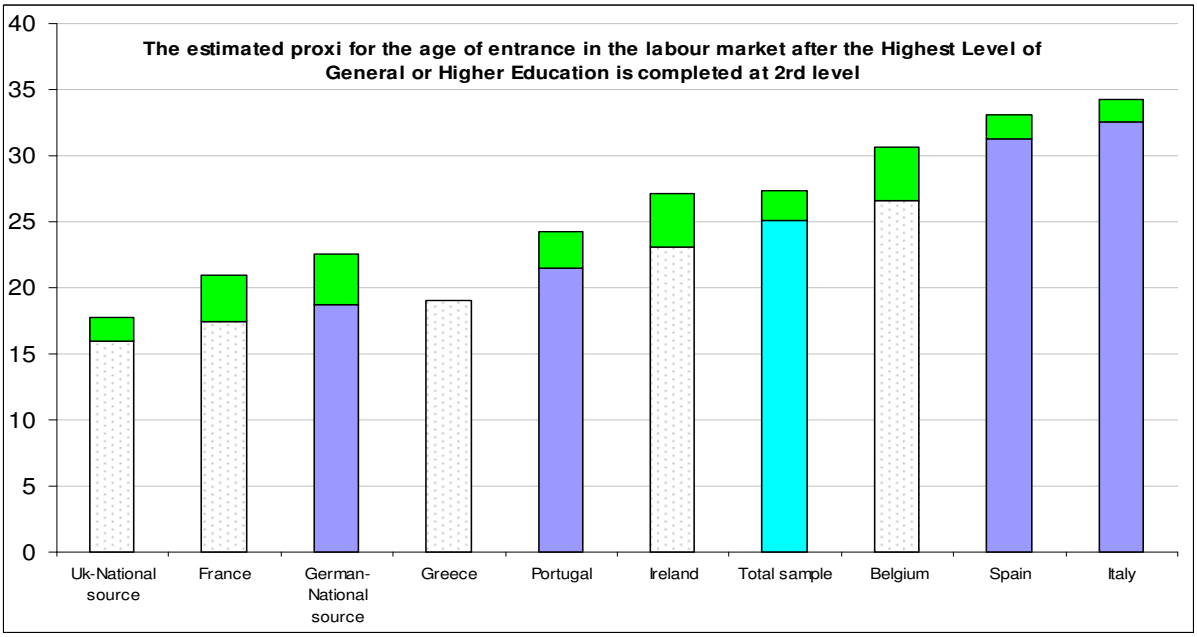
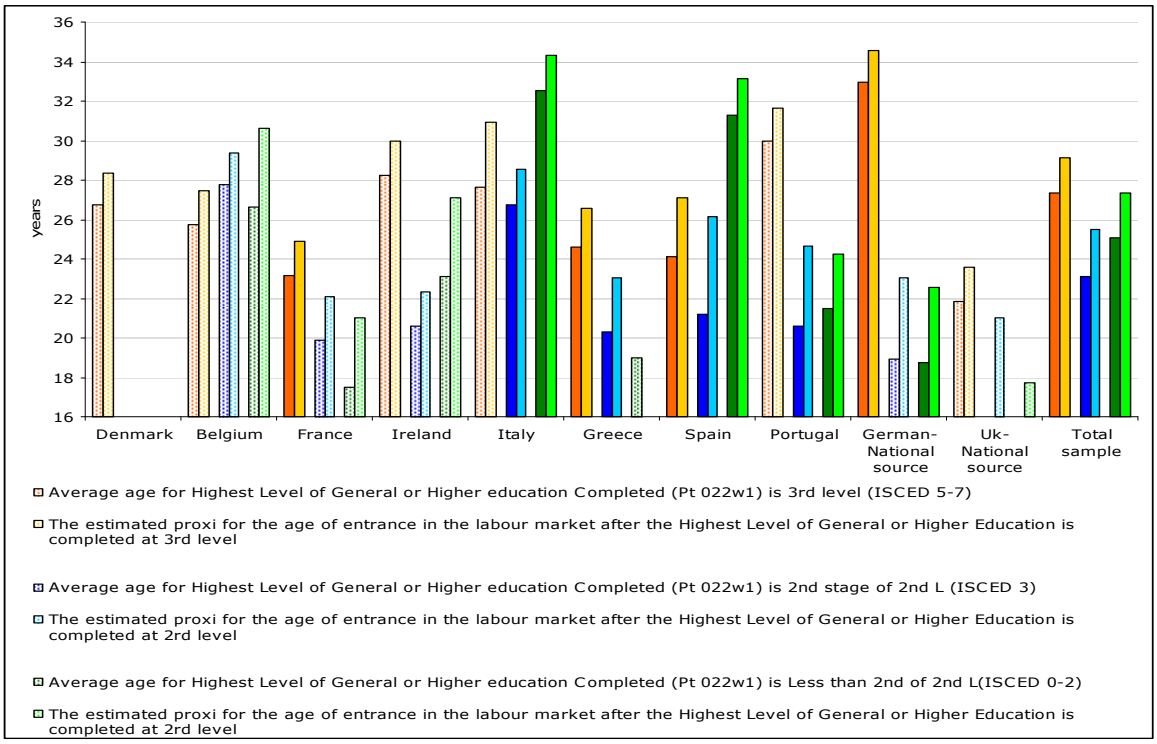


**Figure 27**

**The average age for Highest level of General or Higher Education Completed and the estimated proxi for the age of entrance in the labour market after the Highest Level of General or higher Education is Completed, by level and by country**




## R6.3. Estimation of the potential working life span

**Alternatives/supplementary methods estimating the future working-life[46] span**

Box 5

*(1) Work-life expectancy of the population. The average future years in the labour force were computed for men in the labour force. This definition seemed most consistent with the life-table concept. However, it is equally possible to compute the future working-life span of all persons living at a given year of age, regardless of their labour-force status at that time. Essentially this approach was used by Durand in estimating the 'average number of years in the labour force' for men of different ages. Using this method, for example, it would be possible to estimate the future working-life potential of a newly born infant-a measure of considerable intrinsic interest. This definition, moreover, takes account of trends in the age of entry into the labour force, as well as of separation, and therefore permits a more comprehensive measure of trends in the total work-life span. However, this measure seems somewhat less meaningful at the upper ages, when a large proportion of the population has already left the labour force.*

*(2) Alternative periods of labour-force activity. For certain purposes, measures of entries to and separations from the labour force based on concepts other than the current Census labour-force definitions might be desirable. As noted previously, at both age extremes of the population a large proportion of persons reported in the labour force are engaged in casual and part-time jobs. Measures based on major activity during the survey period (i.e. student, retired, worker) would yield a more realistic pattern of labour-force 'births' and retirements. The use of 'full-time' equivalents, by age, would also have a similar effect. Whereas the preceding methods would tend to reduce the estimated work-life span, a maximum measure would be obtained by including in the labour force all persons participating in the labour force at any time during the year, rather than at a given seasonal level of activity. In view of the seasonal fluctuations in labour-force participation and the large volume of shifting in worker status among teen-aged youths and, to a lesser extent, among older workers, the effect of this definition would be to produce an earlier average entry age and a later average age of retirement.*

*(3) Estimates of work-life span based on gainful employment. For purposes of measuring income-earning potential, estimates of working-life expectancy can be constructed based solely on periods of gainful employment for pay or profit, rather than on labour-force participation. Excluded, on this basis, would be periods of unemployment or of employment as unpaid family workers.*

*(4) Generation life tables. Finally, working-life tables could be developed based on a historical cohort analysis, rather than on a static pattern of mortality and labour force participation. If long-range projections of worker rates are available, tables could be developed using available mortality projections to show the prospective working-life span of persons currently entering the labour force. The development of such tables would be handicapped, however, by the absence of comparable labour-force data in sufficient age detail in Census years prior to 1940, and by inherent difficulties in long-range projections of trends in labour-force participation.*

[46] Seymour L. Wolfbein, **The Length of Working Life,** *Population Studies*, Vol. 3, No. 3. (Dec., 1949), pp. 286-294. cited pg. 292-293, Source: Stable URL:http://links.jstor.org/sici?sici=0032-4728%28194912%293%3A3%3C286%3ATLOWL%3E2.0.CO%3B2-Y

Based on our results and other available indicators, we draw a raw estimation for the *Work-life expectancy of the population*; actually there are 4 scenarios of working-life span, taking into account the calculated average entrance ages on the labour market (for our homogeneous cohort; see tab. 12, 13, 14) and different average exit ages from the labour market (reported to EU 15 (2001) statistics –see tab.1 and 2010 European Council target)[47].

Table 15

Estimations of the medium years / average number of years of activity
for our homogeneous cohort 1999 – 4 scenarios -

| | Average exit age from the labour market 2001 | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is Completed by ISCED level (cohort 1999) | Medium years of activity (The working life expectancy indicator) | years | UE 15 employment rate $_{2001}$ for 60- 64 (a) % |
|---|---|---|---|---|---|
| ISCED 5-7: | 60,3 | 29,1 | **31,2** | high skill | 42,8 |
| ISCED 3-5: | 60,3 | 25,5 | **34,8** | | |
| ISCED 0-2: | 60,3 | 27,4 | **32,9** | low skill | 20,2 |

| | Barcelona and Stockholm target 2010 | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is Completed by ISCED level (cohort 1999) | Medium years of activity | | All activity(b) rate $_{2005}$ for age 65 |
|---|---|---|---|---|---|
| ISCED 5-7: | 65 | 29,1 | **35,9** | EU27 | 12,1 |
| ISCED 3-5: | 65 | 25,5 | **39,5** | EA13 | 1,8 |
| ISCED 0-2: | 65 | 27,4 | **37,6** | NMS12 | 14,5 |
| | | | | NON-EU | 20 |

| | Maximum exit age by Eurostat calculations(c) | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is Completed by ISCED level (cohort 1999) | Medium years of activity (The working life expectancy indicator) | activity rate $_{2001}$ for 70+ |
|---|---|---|---|---|
| ISCED 5-7: | 70 | 29,1 | **40,9** | |
| ISCED 3-5: | 70 | 25,5 | **44,5** | |
| ISCED 0-2: | 70 | 27,4 | **42,6** | |

| | Extension of maximum exit age to 75(?) | The estimated proxi for the age of entrance in the labour market after the Highest Level of General or Higher Education is Completed by ISCED level (cohort 1999) | Medium years of activity (The working life expectancy indicator) | activity rate $_{2001}$ for 75+ |
|---|---|---|---|---|
| ISCED 5-7: | 75 | 29,1 | **45,9** | |
| ISCED 3-5: | 75 | 25,5 | **49,5** | |
| ISCED 0-2: | 75 | 27,4 | **47,6** | |

(a), The Stockholm and Barcelona targets:Increasing employment of older workers and delaying the exit from the labour market, COMMISSION STAFFWORKING PAPER, COMMISSION OF THE EUROPEAN COMMUNITIES, Brussels, 2.4.2003, SEC(2003) 429, COMMISSION STAFFWORKING PAPER, The Stockholm

[(b)&(c)] **Kurt Vogler-Ludwig, Nicola Düll**, Analysis of the average exit age from the labour force. Final report. Study for the European Commission, Employment, Social Affairs and Equal Opportunities DG Unit D1 Contract VC/2007/0140, Munich, 30 April 2008, pg.46.

Box 6[48]

The **Barcelona** European Council concluded that *"a progressive increase of about **5 years** in the effective average age at which people stop working in the European Union should be sought by 2010"*. The withdrawal from the labour force (into inactivity) mirrors the trend of the activity rate (participation) of older workers.

The **Stockholm** European Council agreed *"to set an EU target for increasing the average EU **employment rate** among older women and men (55-64) to 50 % by 2010"*.

%

| Employment rate of older workers | | | |
|---|---|---|---|
| | 2001 | 2007 | 2010 Stokholm target 2010 |
| EU27 | 37,7 | 44,7 | |
| EU15 | 38,8 | 46,6 | 50 |

*Note:* *The employment rate of older workers is calculated by dividing the number of persons aged 55 to 64 in employment by the total*

Source: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugi

We conclude our analyses with the *working life span* estimations because we are interested in regarding *the process of transition from school-to-work as a generator for the initial stage of path dependence in career development*; our perspective for the career development is a very simple one: this is viewed under the quantitative dimension expressed through the medium years / average number of years of activity (working life span/expectancy).

[47] Using other research results for the estimation of the exit age, we could point only a few important issues that make the exit age determination on different perspective: the retirement age (under the labour law); the health state/condition and the probability of surviving (mortality); withdrawal from the labour market .

[48] ***, The Stockholm and Barcelona targets:Increasing employment of older workers and delaying the exit from the labour market, COMMISSION STAFFWORKING PAPER, COMMISSION OF THE EUROPEAN COMMUNITIES, Brussels, 2.4.2003, SEC(2003) 429, COMMISSION STAFFWORKING PAPER, The Stockholm

Furthermore, we declared from the start our interest in *quality-in-work* issues (quality of life, generally) and the working life span obviously influences the working pay performance, the contribution to the social protection system, the public finance sustainability; actually the entire socio-economic sustainability system is functional with the activity developed during the working life span. Even this is not the main issue of this study, there are a lot of other interesting connected research topics (e.g.: the career qualitative aspects development; the family life and the leisure time; the working pay performance; the quality of life, etc).

## R.7. Final remarks

*The main objective of the project was accomplished through building life-table of survival analysis (event history analysis or duration analysis or transition analysis) for describing transitions from school-to-work using longitudinal micro-data. But, under this destination we encounter a lot of "traps" and "opportunities" in view to answer to a lot of questions.*

A. First set of questions is concentrated to a better understanding of the Life Table Main Results, their interpretation and analysis from the labour market perspective.

*Q1. The cumulative proportion surviving at the end of an interval could be a **speed of (still) searching** or a **speed of (no)allocation**?*

*Q2. Probability density / probability of experiencing the event of entering on work, during the given year interval, could be an indicator of **the absorbent power of the labour market for the new entrants**?*

*Q3. Could we consider the hazard rate as a way to measure the **"permeability characteristic"** of the "local" labour market?*

B. Second set of questions is strongly connected with some visible consequences of the duration measuring and analysis in perspective of shaping of the working life span. The **median period of this transition process** or the average searching period regarded as a measure of searching duration could be a starting point to determine:

*Q1. The "average age" of entrance on the labour market;*

*Q2. Discussion regarding the age borders for the young people's definition.*

We consider that our enterprise was concentrated to find new semantics for the main results obtained through Life Table Analysis, useful for better explaining the functioning and the characteristics of the labour markets at different levels (national, local and regional).

The idea of the journey from learning-to-know to learning-to-do represents a complex set of **interactions** between the individual/person/young and:

- itself, in the sense of making a lot of choices (intending to get employment under the personal strategy);
- the socio-economic environment, regarded in this article particularly as the labour market space (described under the absorptive, permeability and speed of allocation characteristics for the new entrants);
- unknown, in the sense of the efficient utilisation of all the resources under the new circumstances …

We tried to answer the questions and present our study results in this paper. For the moment: "that's it", even if the various analyses could continue and we suppose having made misinterpretations/inaccuracies/mistakes; we are expecting readers' comments in order to correct them.

The only reliable conclusion is that the Life Table Analysis could represent a useful tool/instrument to better understand and explain the differences in functioning and for better shaping the characteristics of the labour markets.

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Annex

| KILM Level | ISCED-97 Level | ISCED-76 Level | Description |
|---|---|---|---|
| **Less than one year** | X: No schooling | X: No schooling | Less than one year of schooling |
| **Pre-primary** | 0: Pre-primary education | 0: Education preceding the first level | Education delivered in kindergartens, nursery schools or infant classes |
| **Primary** | 1: Primary education or first stage of basic education | 1: First level | Programmes are designed to give students a sound basic education in reading, writing and arithmetic. Students are generally 5-7 years old. Might also include adult literacy programmes. |
| | 2: Lower secondary or second stage of basic education | 2: Second level, first stage | Continuation of basic education, but with the introduction of more specialized subject matter. The end of this level often coincides with the end of compulsory education where it exists. Also includes vocational programmes designed to train for specific occupations as well as apprenticeship programmes for skilled trades. |
| **Secondary** | 3: Upper secondary education | 3: Second level, second stage | Completion of basic level education, often with classes specializing in one subject. Admission usually restricted to students who have completed the 8-9 years of basic education or whose basic education and vocational experience indicate an ability to handle the subject matter of that level. |
| | 4: Post-secondary non-tertiary education | | Captures programmes that straddle the boundary between upper-secondary and post-secondary education. Programmes of between six-months and two years typically serve to broaden the knowledge of participants who have successfully completed level 3 programmes. |
| **Tertiary** | 5: First stage of tertiary education (not leading directly to an advanced research qualification); subdivided into: | | |
| | 5A | 6: Third level, first stage leading to a first university degree | Programmes are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes. Duration is generally 3-5 years. |
| | 5B | 5: Third level, first stage, leading to an award not equivalent to a first university degree | Programmes are of a typically "practical" orientation designed to prepare students for particular vocational fields (high-level technicians, teachers, nurses, etc.). |
| | 6: Second stage of tertiary education (leading to an advanced research qualification) | 7: Third level, second stage | Programmes are devoted to advanced study and original research and typically require the submission of a thesis or dissertation. |
| **Not definable** | | 9: Education not definable by level | Programmes for which there are no entrance requirements. |
| **Not stated** | ?: Level not stated | ?: Level not stated | |

Source: Key Indicators of the Labour Market (KILM) is published every other year (with the 5th edition launched in September 2007, **Educational attainment and illiteracy KILM 14, International Labour Organisation, Geneva, 2007, http://www.ilo.org/public/english/employment/strat/kilm/index.htm**

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