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Effective retirement age and duration of retirement in the industrial countries between 1950 and 1990

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Introduction

This paper presents a method for estimating the average age at which people retire as well as the expected duration of their retirement, therefore enabling comparisons between countries. Data are available for the years 1950, 1960, 1970,1980 and 1990. Results are provided both for countries which are members of the Organisation for Economic Cooperation and Development (OECD)[(1)] and for countries of Eastern and Central Europe. Although there have been considerable changes in the latter countries since 1990, results might prove useful to give an historical perspective and might provide an assessment basis for pension reforms.

A retiree is defined as a person who is no longer economically active, and the effective retirement age is obtained from the gradual reduction of activity rates with age. In other words, it is based on the cessation of economic activity and withdrawal from the labour market. Retirement is not linked directly to the entitlement to pensions, although the cessation of economic activity may give rise to the payment of pensions or other long-term benefits. The definition of "economically active population" used by the ILO to estimate activity rates includes all employed and unemployed persons looking for work. It covers employers, persons working on their own account, salaried employees, wage earners, unpaid family workers, members of producer's cooperatives and members of the armed forces.

Effective retirement age is calculated from cross-sectional observations of national activity rates: it measures the expected retirement age of a worker following the retiring pattern experienced by the people making up the population of retirees on the observation date. It is thus defined in a way similar to other demographic indicators, such as total fertility rates or life expectancy, also based on cross-sectional data.

The estimation of the duration of retirement is based on the life expectancy at time of retirement. It is calculated using model life tables that take into account the age patterns of mortality in each country (Coale and Demeny, 1989).

Results will be shown for both males and females, although female results have to be interpreted

more cautiously as the last decades have been characterized by mutations in both work and retirement practices.

Activity rates are published by the International Labour Office (ILO) in both the yearbook of labour statistics and in a publication on projections of the economically active population (ILO, 1988). Depending on the countries, activity rates are available by quinquennial age groups up to the ages of either 65, 70 or 75, and in a single age group for older people. Regression analysis will be used to obtain data on a quinquennial basis up to the age of 75 in all countries.

This paper is divided into two main sections. The first part is technical; it deals with the definition of the model used to estimate the effective retirement age and the duration of retirement. The results are shown in the second section. National data on activity rates and methodological information on the estimation of incomplete quinquennial data are provided in the appendix.

1. The model

The issues dealing with the definition of the model are grouped under two headings. The assumptions are defined in section I.1, and the mathematical formulae discussed in section I.2.

1.1 Assumptions

A minimum retirement age has to be defined as a starting point, considering that retirement experience is deduced from activity rates variations between age groups. Assumptions with respect to the distribution of the population and of retirement within each age group also have to be defined.

- **Minimum retirement age:** a minimum retirement age of 45 is set as the base assumption in order to estimate the retirement age for people who lead a full career. Complementary results specifying no minimum retirement age will be shown to measure the impact on the average retirement age of the early withdrawal of individuals from the labour market. It used to be an important phenomenon for women.

- **Distribution of the population**: a uniform distribution of the population within each quinquennial age group is assumed. For the 75 and over age group, active people are assumed to be uniformly distributed between 75 and 79.

- **Distribution of retirement**: the retirement distribution is derived from the assumption of a linear reduction of activity rates within each age group. In other words, the decrease in the average activity rates between two successive age groups is assumed uniform over the five years separating the two age groups and therefore, the retirement distribution of the population expected to withdraw from the labour market within these five years is uniform.

The distribution of retirement refers to five-year periods because the data are grouped on a quinquennial basis and retirement experience is deduced from activity rate variations between successive age groups.

A corollary may be inferred from these assumptions. It is presented below and will be examined more deeply in section I.2.

Corollary: The retirement age distribution of people of a given age group who retire within five years is symmetric and centred on the lowest age of the following age group.

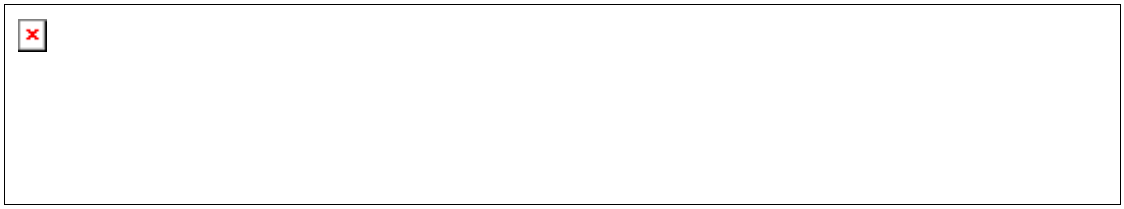
For instance, the people in the 55-59 age group who retire within a period of five years do so at 60 on average. This is consistent with the fact that the ages of 55, 60, 65 tend to be "central" ages for retirement.

An assumption of asymmetric distributions resulting for instance from the postponement of retirement up to a predetermined pension age has not been considered because there are differences between countries, age groups and calendar years. Nevertheless, the impact of an asymmetric distribution was tested assuming that people within six months of their next birthday will defer retirement up to then, in order to become entitled to a more substantial pension for instance. This deferral of retirement by people within six months of their next birthday will increase the average retirement age by a constant 0.125 year if the retirement behaviour of people within six months of their last birthday is assumed to be unchanged.

1.2 Mathematical formulation

The probability function of retirement within each age group is defined on the basis of the above-mentioned assumptions. It will then be possible to estimate the average retirement age and the expected duration of retirement of the whole population.

Defining Y as the random variable of retirement age, the probability to retire at age *y* for members of the age group *(x,x+4)* who retire within five years, between x and x+9, is expressed as:



The variable *y* is incremented by 0.5 year since *x* is the age last birthday (between *x* and *x+.999*) and it underestimates the exact age by 0.5 years on average (London, 1988). *Y* is a discrete random variable, since the distribution of retirement ages in the whole population will be deduced from the distribution of retirement age in successive age groups.

The average retirement age in the age group *(x,x+4)* is then defined as:

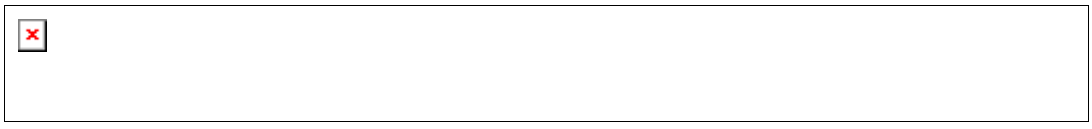
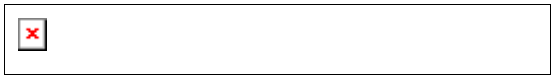


Figure 1 shows the probability distribution *p(y)* of retirement within each age group. It is symmetric and centred on the average retirement age *(x+5)*, as stated in the corollary.

Equation (2.1) can be solved to show that:



which implies that the results shown in the following sections would stand for all assumptions that would produce an average retirement age of *x+5*. This condition holds true for any symmetric probability distribution of retirement on *(x,x+9)*.

The retirement distribution of a whole population may be estimated based on the retirement distribution within each age group. It is then necessary to consider the proportion of the population in each quinquennial age group expected to retire over five years, and their respective average retirement age.

The following symbols are used in the development of the formulae:

x = age last birthday;

z = calendar year;

$\mathbf{P}^{\mathbf{z}}_{\mathbf{x,x+n}}$ = number living at middle of calendar year z who are aged from x to x+n;

$\mathbf{A}^{\mathbf{z}}_{\mathbf{x,x+n}}$ = average activity rates of the people aged from x to x+n at mid-year z;

${}_{\mathbf{5}}\mathbf{R}^{\mathbf{z}}_{\mathbf{x,x+n}}$ = number of people aged from x to x+n at mid-year z who retire within five years.

The function ${}_{\mathbf{5}}\mathbf{R}^{\mathbf{z}}_{\mathbf{x,x+n}}$ is defined by

for the quinquennial age groups, and by

for the 75 and over age group.

Only net reductions in activity rates are considered and swaps between new retirees and people in the same age group who join or reintegrate the labour market have no impact. In other words, retirement is defined on an aggregate basis as it refers to the gradual decrease with age of the economic activity of a population. Retirement age on an individual basis would be defined rather as the average age at which individuals retire permanently from the labour force.

The average retirement age is measured at a given point in time (year z) since it is measured on the basis of the difference in activity rates for two successive cohorts in that year ($A^{z}_{x,x+4}$-$A^{z}_{x+5,x+9}$). It would also be possible to estimate the retirement age over a period of 5 years in order to match cohorts ($A^{z}_{x,x+4}$-$A^{z+5}_{x+5,x+9}$), but this approach is sensible to changes in work patterns over time that concern newcomers or people who reintegrate the labour market.

In fact, this alternative cohort approach would not produce consistent results for females as there has been an increase in activity rates over time. The results obtained with the punctual approach considered in this paper will also be subject to a bias if the activity rates increase at different points in time for successive generations of women. Nevertheless, the extent of such a bias is limited compared to results obtained with the alternative approach of estimation over a period of 5 years.

The two approaches give consistent results for males and they should provide estimates similar to those obtained on an individual basis. Retirement occurs most often at an age when few people join or reintegrate the labour market, and unemployed persons looking for work and who have not retired permanently from the labour market are considered economically active for estimating retirement age on the aggregate basis.

The retirement age of the whole population is the weighted average of the retirement age in each age group. The function $_{5}\mathbf{R}^{\mathbf{z}}_{\mathbf{x,x+n}}$ is used as the weighting factor, since it represents the number of people in a particular age group expected to retire within five years. Assuming a minimum retirement age of 45, the average retirement age in the whole population is then defined as:

The term containing the expression $_{5}R^{z}_{40,44}$ represents the proportion of the people in the age group 40-44 who will retire between 45 and 49. They retire at 46.7 on average.

A modification of formula (4.1) will make possible the estimation of the duration of retirement. For a cohort of new retirees, it is measured as the life expectancy at time of retirement. For the whole population, it is calculated as the weighted average of the values of life expectancy obtained for each cohort, using once more the function $_{5}\mathbf{R}^{\mathbf{z}}_{\mathbf{x,x+n}}$ as the weighting factor. Therefore, the expected duration of retirement of a population of new retirees (RD) is defined as:

which may be approximated calculating the life expectancy at the average retirement age:

2. Results

Information on activity rates in the OECD countries is provided in section 2.1, followed by a discu age (section 2.2) and the duration of retirement in these countries (section 2.3). Finally, results for t and Central Europe are shown and briefly discussed in section 2.4.

2.1 Activity Rates

Males

The average activity rates of the male population aged 15 and over has decreased from 86% to 7 1990. This decrease in the general level of male economic activity is mainly attributable to reduct both ends of the age spectrum, as the average activity rates in the central age groups (30-49) have d around 2%. Details are shown in Table 1.

In 1990, approximately 50% of the male population aged between 60 and 64 was economically ranged from less than 20% in Austria, Belgium and Luxembourg to more than 75% in Iceland, J Activity rates in the 65 + age group reached 40% in Iceland, Japan and Turkey, compared with 15 than 5% in seven countries of the European continent (Austria, Belgium, France, Germany, Luxe National data are provided in the Appendix II.

Although the 60-64 and the 65+ age groups recorded reductions in activity rates of similar magnit 1990, the timing of the reduction has been different:

- for the 65+ age group, the bulk of the reduction was spread uniformly between 1950 and 1980;

- for the 60-64 age group, most of the reduction took place over the last twenty years (1970-1990).

Decrease in economic activity has also become substantial for the 55-59 age group in the recent d 5.4% during the 1980s, compared to 0.6% between 1950 and 1960.

Finally, male activity rates are maximal for the 30-34 or the 35-39 age group in most countries. In e years studied, at least 19 of the 24 countries had their highest rates in either one of these two maximum activity rates were usually reached in the 40-44 age group.(2) In other words, a s population would be assumed to retire as early as 30 or 35 if no minimum retirement age was specifi

Females

Female activity rates used to be maximal at earlier ages than men. Up to 1980, a majority of coun female activity rates in either the 15-19 or the 20-24 age groups. More recently, the distribution of has become more dispersed among age groups; several countries recorded maximal activity rates b significant number of women then reintegrated the labour market.

Of course, this phenomenon has been coupled with a general increase in the level of economic activ

average of 35% in 1950 to 49% in 1990. By then, it ranged from below 35% (Spain and Ireland) to above 60% (Denmark, Iceland and Sweden).

Activity rates increased in all the age groups, except the very young (15-19) and the very old (65+). The most significant increases were registered between 25 and 54. In 1990, 45% of the women aged between 55 and 59 were economically active, compared to 26% for the 60-64 age group, and 6% for the 65 and over age group.

2.2 Average Retirement Age

Males

The male average retirement age (RA) decreased in 23 of the 24 OECD countries between 1950 and 1990; Japan made exception. On average, it decreased by 6.3 years, going down from 68.5 in 1950 to 62.2 in 1990. The decrease has been especially important during the 1970s (2.1 years), and the smallest reduction was recorded during the 1980s (1.2 year). Average reductions of 1.4 and 1.6 years were registered during the 1950s and the 1960s. Detailed data are shown in Table 2a.

In 1950, the RA was above 65 in all OECD countries except Belgium and New Zealand. At the time, it was above 70 in Greece, Iceland, Ireland, Portugal, Spain and Turkey. Forty years later, it was only in Iceland and Japan that people still retired over 65 on average.

Between 1950 and 1960, an increase of the RA was noticed in Japan, New Zealand and, to a limited extent, Australia. During the 1960s, an increase was recorded in Japan and, to a limited extent, Germany. It decreased in all the countries during the 1970s, and went up in Iceland between 1980 and 1990.

Six European countries registered a RA below 60 in 1990 (Austria, Belgium, Finland, France, Luxembourg and the Netherlands). They were followed by Italy, Germany and Spain. In other words, these results reflect the tendency towards early retirement in Western Europe compared to other regions. Details are shown in Figure 2.

There is no clear evidence about whether national differences in RA have become more or less important over the years: the difference in RA between the 6 countries with the lowest retirement age (first quartile) and the 6 countries with the highest retirement age (fourth quartile) has remained relatively stable around 7 years throughout the period studied.

Finally, data in Table 2b show the limited impact of the minimum retirement age assumption on the retirement age estimates. For the five calendar years studied, the average retirement age decreases by about 0.5 year when no minimum retirement age is assumed. In fact, the impact is substantial just in Turkey. This country is characterized by a significant decrease in activity rates between the ages of 40 and 60, followed by relatively stable activity rates. It has the highest activity rates for the age group 65 and over.

Table 2c

Regional basis of classification

(OECD countries)

Region	Countries
Asia	Japan
Northern America	Canada
	United States
Northern Europe	Denmark
	Finland
	Iceland
	Ireland
	Norway
	Sweden
	United Kingdom
Oceania	Australia
	New Zealand
Southern Europe	Spain
	Greece
	Italy
	Portugal
	Turkey
Western Europe	Austria
	Belgium
	France
	Germany
	Luxembourg
	Netherlands
	Switzerland

Females

The female average retirement age was estimated using the same methodology, including the specification of a minimum retirement age of 45 as the base assumption. Early withdrawal used to be an important phenomenon for women and significant changes in their work pattern have taken place during the period studied.

A reduction of the female RA was recorded in the 24 OECD countries between 1950 and 1990. On average, it decreased from 66.0 in 1950 to 60.0 in 1990, most importantly during the 1970s (2.5 years) and, up to a certain extent, in the 1960s (1.7 year). It decreased by 0.8 and 1.0 years during the 1950s and the 1980s. Details are shown in Table 3a.

The reduction has been especially important for countries with a RA above 70 in 1950 (Spain, Portugal and Ireland). These countries were then characterised by low activity rates for all age groups above the minimum retirement age, but rather stable up to the age of 65. This pattern of activity rates generates a high retirement age, since it is estimated on the basis of the reduction in activity rates with age.

A majority of countries recorded a RA below 65 in 1950. Forty years later, only Iceland and Turkey recorded a ARA above that age, and it was then below 60 in 14 of the 24 OECD countries. Figure 3 shows regional differences in the female retirement age in 1990. As for males, the lowest average RA is recorded in Western Europe and the highest one in Japan. Relatively high RA are noticed also in both Northern and Southern Europe.

The period studied has also been characterized by a reduction in the difference in RA between countries. This is a consequence of the important reduction observed in countries that used to have a very high retirement age. The difference in the average retirement age between the 6 countries with the lowest RA and the 6 countries with the highest RA went down from 11.5 years in 1950 to 8.8 years in 1990. For males, it was stable around 7 years throughout the period studied.

The impact of ignoring a minimum retirement age assumption is far more important for females since activity rates used to decrease significantly in young age groups, following an early withdrawal from the labour market for many women. Maximum activity rates often being registered in the 15-19 age group for females, people are then assumed to retire around 20. However, the impact of the minimum retirement age has decreased significantly over the period studied, but there are now significant differences between countries.

The 1950 RA drops from 66.0 years to 42.9 years when the minimum retirement age assumption is disregarded. In 1990, the absence of a minimum retirement age assumption implies a difference of 5.1 years in the RA: the RA is 54.9 years when assuming no minimum retirement age, in comparison with 60.0 when specifying a minimum retirement age of 45.By then, there were only three countries (Ireland, Spain and Turkey) in which the RA was impacted by more than 10 years because of the specification of the minimum retirement age assumption. On the other hand, there were eight countries (Canada, Denmark, Finland, Iceland, New Zealand, Norway, Sweden and the United States) in which the impact on the RA was then inferior to 1 year. Details are shown in Table 3b.

Gender Difference in Retirement Age

Women retire earlier than men in a large majority of the OECD countries. The median difference in RA ranged from 2.2 to 3.0 years for the five calendar years studied. The number of countries with a higher RA for females decreased from five in 1950 (France, Portugal, Ireland, Spain and Turkey) to two in 1990 (Finland and Turkey).

Variations between countries have become less important over the years. In 1990, 13 countries out of 24 had a gender difference between 2.0 and 3.5 years. In comparison, the interval for the 13 "median" countries ranged from 0.8 to 4.8 years in 1950. This evolution is mainly attributable to the reduction of national differences in female RA. Details are shown in Table 4 and Figure 4.

2.3 Duration of retirement

Males

The expected duration of retirement for males in the 24 OECD countries increased from 10.8 years on average in 1950 to 16.8 years in 1990. Among these countries, it reached in 1990 close to 20 years for those which recorded the lowest retirement age. Three countries only had an expected duration of retirement inferior to 15: Iceland, Japan and Turkey. Details are shown in Table 5 and Figure 5.

The reduced number of retirement years in Japan and Iceland is explained entirely by their higher average retirement age, as they were the only two countries with a life expectancy at birth superior to 75 years in 1990 (United Nations, 1995). It ranged between 70 and 75 in all the other countries except Turkey, where it was 63.4 years.

People who retired in 1950 at the average age of 68.5 could expect to die at 79.3, following an expected retirement period of 10.8 years.(3) Forty years later, the expected age at death had remained virtually unchanged at 79.0, although people retired earlier, at 62.2 years on average, and for a longer period of 16.8 years. The proportion of the population who could expect to survive to retirement was lower in 1950 than in 1990, since both mortality and retirement age were then relatively high. In 1990, 84% of population aged 20 could expect to survive to retirement, compared to 63% in 1950.

Females

In 1990, the average duration of retirement for females in the OECD countries reached 22.6 years. It was superior to 25 years in 6 countries (Belgium, Netherlands, Italy, Australia, Luxembourg and Austria) and superior to 20 years in all the countries except Iceland and Turkey. It increased by 60% between 1950 and 1990, from an initial level of 14.1 years at the middle of the century. Details are shown in Table 6 and Figure 6.

In 1990, the gender difference in the expected duration of retirement was 5.8 years on average: 22.6 years for women versus 16.8 years for men. The female experience is characterized by both a lower average retirement age and a higher life expectancy.

Between 1950 and 1990, the duration of retirement has increased more for females: 8.5 years versus 6.0 years for males. This is a consequence of the substantial increase in female life expectancy, since the reduction in the average retirement age was slightly lower for females (6.0 years) than for males (6.3 years). Women who retired in 1990 could expect to die at the age of 82.6, compared to 80.1 years in 1950, and compared to an expected age at death of 79.0 years for males who retired in 1990.

2.4 Eastern and Central Europe

The activity rates for the male adult population (ages 15 and over) of Eastern and Central Europe are similar to those registered in the OECD countries. For females, the activity rates are higher in Eastern and Central Europe, as the contingent of women in the labour market has traditionally been more important in the communist countries. The situation is different for the older age groups (55 and over): activity rates are generally lower in the countries of Eastern and Central Europe when compared to the OECD countries. Details are shown in Table 7 and Figure 7. The male average retirement age in the East-European countries decreased from 67.6 in 1950 to 60.9 in 1990. This is approximately 1.3 years lower than the figures registered in the OECD countries over the same period. On the other hand, it is higher than in Western Europe (Austria, Belgium, France, Germany, Luxembourg, Netherlands and Switzerland). Details are shown in Tables 8a and 8b, as well as in Figure 8.

As mentioned earlier, a higher proportion of women traditionally led a full career in Eastern and Central Europe compared to those in the OECD countries. However, they retired earlier than their counterparts of the capitalist world: the average retirement age decreased from 62.5 (1950) to 57.6 (1990) in Eastern and Central Europe, in comparison to 66.0 years (1950) and 60.0 years (1990) in the OECD countries. Details are shown in Table 9a, Table 9b and Figure 9.

Finally, the duration of retirement for males in Eastern and Central Europe increased from 10.5 in 1950 to 15.6 in 1990. It used to be similar to the OECD figures; in 1990 only, the duration of retirement was significantly lower in Eastern and Central Europe (1.2 years). This is a consequence of the now enlarged difference in life expectancy. Details are shown in Table 10 and Figure 10.

Women of Eastern and Central Europe traditionally enjoyed longer retirement periods than their OECD counterparts. The difference has decreased over time, and in 1990, the duration of retirement was greater in the OECD countries: 22.6 versus 21.6 years. Details are shown in Table 11 and Figure 11.

Conclusion

A method for estimating the retirement age has been defined, and results discussed. Retirement has been defined on the basis of economic activity rather than pension entitlement.

The trend towards an earlier retirement is a widespread phenomenon. A reduction of the male average retirement age was observed in all the countries of Eastern and Central Europe and in 23 of the 24 OECD countries between 1950 and 1990. Japan is the exception: the reduction of the retirement age recorded between 1970 and 1990 (from 69.5 years to 67.6 years) compensated only partially for the increase recorded in the preceding 20 years.

Two broad conclusions may be drawn with regards to females. Firstly, a reduced proportion of females now leave the labour market at an early age and consequently, there has been an increase in the average retirement age obtained when specifying no minimum retirement age. It increased from 42.9 in 1950 to 54.9 in 1990 in the OECD countries. On the other hand, there has been a trend towards an earlier retirement among women who lead a full career and who are still active at the age of 45: their average retirement age decreased from 66.0 in 1950 to 60.0 in 1990. It decreased in all the OECD countries and it was lower than the male retirement age by close to 2.5 years on average. In Eastern and Central Europe, a greater proportion of women used to be economically active, but they retired earlier than the women of the OECD countries who worked up to retirement.

The duration of retirement has increased as a result of the reduction in the average retirement age and the increase in life expectancy. In 1990, the average values in the OECD countries as well as in Eastern and Central Europe were approximately 16 years for males and 22 years for females.

Finally, the 1980s could see the beginning of a slowing or reversing trend, as the average decrease of retirement age during this decade is relatively modest compared to the amplifying move towards earlier retirement registered previously

.

Appendix I: Incomplete data

Activity rates are shown on an aggregate basis, rather than on a quinquennial basis, from the age of either 65, 70, or 75. Using aggregate data from the age of 65 would not make possible a proper assessment of the proportion of the population retiring between 60 and 64. Moreover, it would make more difficult the estimation of the retirement age for those who retire after the age of 65.

In order to have in all cases quinquennial data up to the age of 75, activity rates in the age groups 65-69 and 70-74 are estimated for the countries and the calendar years in which only aggregate data are available from 65 or 70. The missing data are estimated by fitting a regression model based on a logistic function to the available activity rates.

A logistic function is commonly used for population projections or other demographic phenomenon as it is characterized by an asymptotic value corresponding, in our model, to an ultimate activity rate of zero when everybody has retired. An illustration of a logistic curve is shown in Figure A.1.

A logistic function was developed to give estimates of the variation of activity rates between successive age groups (first-order differences). The extrapolation on the basis of the variation of activity rates gave smoother and more realistic estimates of activity rates than those obtained when fitting a curve to the absolute values of activity rates.

The regression function is defined by:

which is equivalent to:

where

x= middle age of a quinquennial age group

a= activity rates in the age group 65 and over.

The function G(x,a) can easily be solved to obtain the value of the parameters $_0$, $_1$ and , since the *logit* transformation of G(x, a)
is a linear function.

The data available are clustered in four groups (OECD versus Eastern and Central Europe, males versus females) and a logistic function is defined for each group. The experience in each country is taken into account by incorporating into the model the parameter "a" whose value equals the activity rates for the 65 and over age group in the given country. In other words, the activity rates in the age group 65 and over are used to characterize a specific country in a calendar year, in order to estimate the activity rates of the country at the given point in time for the age groups 65-69, 70-74 and 75 and over.(4)

In order to obtain the values of the parameters $_0$, $_1$ and that best fit the available data for older age groups, the data for the age groups lower than 40 were ignored, as there is no clear correlation between activity rates for ages below 40 and activity rates for ages over 65: activity rates below 40 give no clear indication of national and time differences in activity rates at older ages. The fitness of the regression curve would then be reduced if it was extended to age groups below 40.

The regression curve may then be estimated using the activity rates of all age groups over 40, or simply those of age groups over 65 (65-69, 70-74, 75+). The tests performed showed the limited sensitivity of the results. The latter approach was finally adopted.

The main results from the regression analysis are shown in Table A.1.

Table A.1: Regression Analysis

Parameters	OECD countries		Eastern and Central Europe	
	Males	Females	Males	Females
0	-11.0	-7.7	-9.6	-6.4
1	-3.5	-7.7	-2.7	-4.8
	.16	.11	.14	.10
Adjusted R^2	.81	.67	.69	.61
N.B. $p<0.001$ for all parameters				

Appendix II: Activity rates

The tables referred to in the text have not been included in the Web document. In order to obtain a copy of the document please contact the Social Security Department at E-mail: blanvillain@ilo.org.

Appendix III: References

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Footnotes

1. The 24 member countries of the OECD in 1990. The data on Germany refers to the former FRG for the five years studied.

2. Over the years, males have tended to join the labour market at an older age, as there has been a change in the distribution of maximal activity rates in favour of older age groups (35-39 and 40-44), and a reduction in the number of countries where maximal activity rates are registered between 30 and 34. The following countries recorded maximal activity rates in the age group 40-44: Iceland (since 1960), Norway (1970 and 1980), Turkey (1960 and 1970), United Kingdom (1970 and 1980), Denmark (1990), Japan (1950), New-Zealand (1990), Sweden (1990) and Switzerland (1990). On the other hand, Belgium and the Netherlands recorded maximal rates in the 30-34 age group for the five calendar years studied.

3. Estimation based on the mortality pattern prevailing at the time of retirement

4. An adjustment factor is applied to the estimated activity rates to make sure they produce an average activity rate for the 65 and over age group equal to the real available value. The estimation error is then limited to the rate of decrease of activity rates after age 65. The impact of such an error on the retirement age estimates is low, especially when a substantial proportion of the population retires before the age of 65.

Updated by JD. Approved by ER. Last update 1 July 2000

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