Public pensions in Italy and Germany: a comparison based on panel data*

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Abstract

This paper analyzes the reasons underlying low labor force participation rates (LFPRs) of women and the elderly population in Italy and Germany. The international comparison highlights the effects of different institutional arrangements on labor market outcomes. The study is based on panel microdata, allowing to trace the dynamics of the retirement process at the individual level.

The empirical evidence shows that in both Italy and Germany workers tend to retire before reaching the normal retirement age and that female LFPRs are lower in Italy than in Germany, due mainly to lower education level. The data also show that, given the same social and economic characteristics of individuals, the male/female wage differentials are higher in Germany. So lower female LFPRs in Italy apparently do not depend on wage discrimination.

Although the education level of the elderly is relatively low in Italy, this is not sufficient to explain the trend towards early retirement that characterizes Italian labor force. The Italian early retirement scheme (*pensioni di anzianità*) seems to provide a stronger incentive to retire than the German pathways to early retirement.

JEL classification codes: C230, C810, J140, J210, J260, J310

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1 Introduction

The economic and financial imbalance of German and Italian pension systems due to institutional and demographic factors has motivated recent reform attempts.

In a Pay-As-You-Go (PAYG) system, where workers directly finance pension outlays, the policy maker has in principle four reform instruments: (1) letting wages increase faster than pensions, (2) cutting benefits, (3) increasing labor force participation rate (LFPR), (4) reducing the number of entitlements.

This is easily seen by considering the statistical equilibrium contribution rate $\alpha = PN_p/WN_w$, where P is the average pension, N_p is the number of pensioners, W average gross earnings and N_w the number of workers. Given that pensions are indexed (to net wages in Germany and to consumer price index in Italy) and that reducing benefits faces strong social and political opposition, α can be modified mainly through N_p and N_w.

The ratio N_p/N_w depends on demographic and socio-economic factors. Italian and German policy makers can hardly influence the demographic development and its projections are indeed dramatic: the dependency ratio, the ratio between population over 60 and population aged 15-59 as estimated by EUROSTAT (*Demographic Statistics*), will rise from today's 40% to 70% in year 2030. Afterwards, it will stabilize in Germany while continuing to rise in Italy (up to 85% in 2040). The total population, net of migration flows, will start falling after year 2010. This is mainly due to a sharp drop in total fertility rates well below the equilibrium ratio of 2.1 ever since the 70's. Today the two countries, together with Japan, record the world's lowest fertility rate, equal to 1.2.

Not only demographic factors are going to raise the contribution equilibrium rate: workers tend to retire earlier and female LFPRs is rising only slowly (EUROSTAT, *Community Labor Force Survey* [11] [12]). Male LFPRs in Italy between ages 60 and 64 has dropped from 70% in 1983 to 50% in 1998. For the same period and age group male LFPRs in Germany have

fallen from 78% to 64%. In Germany 60-64 is the first age group for which LFPRs show a substantial decline, whereas they start falling soon after age 50 in Italy. Characteristic of the Italian labor force is also the reduction of employment rates of young workers: they passed from 86% to under 70% between 1983 and 1998 for the age group 25-29. This is partly due to higher specific unemployment rates than in Germany.

The two countries also differ for what concerns female LFPRs. Female employment rates over age 50 in Italy are roughly half those of Germany. Rates for age group 60-64 remained stable around 20% in Italy and 40% in Germany between 1983 and 1998.

Looking at the elderly, it is assumable that at a certain age there is an incentive to retire from work and to get a pension. If individuals respond to this incentive, it is crucial for a policy maker to know something about its determination. While structural models, like Stock and Wise [22], Phelan and Rust [16], Rust [19], try to quantify these incentives, this study uses information to highlight how the two countries differ in providing them.

Despite the relevance of this topic, there are few microeconomic studies concentrate on incentives to retire and retirement behavior in the two countries. Main exceptions are in Germany studies by Börsch-Supan [5], who made an international comparison between the German and the American social security system [2], Riphan [17], Schmidt [18] and Siddiqui [20], and in Italy studies by Peracchi [15], Brugiavini [7] [8], Spataro [21]. Also Antolin, Scarpetta [1] and Miniaci [14] of the OECD's Economics Department analyze, for Germany and Italy respectively, the retirement decision of the elderly.

Normative regulations seem to be relevant to analyze and to compare LFPRs and retirement behavior in Italy and Germany. For this reason it is useful to stress first the institutional differences between the two pension systems.

2 Institutional details

Both Germany (1992) and Italy (1992, 1995) have recently undertaken pension reform processes, but they both require transitional periods to be fully implemented. For this reason the samples considered in this study are only marginally affected by the reforms. Only the main set of rules that directly influence the observed samples are therefore reported, with particular attention devoted to early and old-age retirement. Subsection 2.4 will briefly describe the recent reforms.

2.1 Organization

Public pension systems in both Italy and Germany are managed by a number of administrative bodies, of which the main ones are the *Istituto Nazionale della Previdenza Sociale* (INPS) in Italy and the *Landesversicherungsanstalten* in Germany. Insurance is mandatory and financed on a PAYG basis. Complementary and supplementary pensions have so far gained little relevance largely because of the high replacement rates offered by the public schemes.

2.2 Eligibility criteria

In Italy, eligibility for old-age pensions (*pensione di vecchiaia*) requires 15 years of contribution and 60 or 55 years of age for men and women respectively. Private workers are entitled to early retirement (*pensione di anzianità*) after 35 years of contributions without age limits. In the public sector instead, the years of contributions for early retirement could be less than 20.

Germany also has different exit pathways from work. Workers meet the eligibility criteria for old-age pensions when they reach age 65 after a minimum of 5 years of contribution (*Regelaltersrente*). Early retirement can be claimed after 35 years of contributions at a minimum age of 63 (*Altersrente für langjährig Versicherte*) or 60 in case of disability (*Altersrente für Schwerbehinderte, Berufs- oder Erwebsunfähige*). There are three cases in which

one can claim old age disability benefits: (1) being physically disabled to at least 50%; (2) passing a strict earnings test; (3) passing a weak earnings test. Of the two earnings tests, the latter refers to disability in a *specific* job, the former to disability in any *reasonable* occupation.

Workers unemployed for 12 of the last 18 months and aged 60 or more are entitled to early retirement if they contributed for 8 of the last 10 years and 15 years overall (*Altersrente wegen Arbeitslosigkeit*). Another important way to exit the labor force is the so called *57-Regel*: workers dismissed when 57 take up unemployment benefits for 3 years, until they meet the old-age unemployment pension age criteria. Finally, women born before 1952 can retire at age 60 if they have contributed for 15 years (of which 10 in the last 40).

2.3 Benefit computation

In Italy a rate of return of 2% on each year of contribution (up to a maximum of 40) is computed on the average actualized gross income over the last working years (5 years in 1993).

In Germany the computation is more complex: monthly benefits are the product of the employee's relative amount of contributions (converted in "income points"), a factor depending on type of pension, retirement age and the average pension.

Both system are progressive, because of capping on earnings minimum benefits. Labor income and pension benefits are, at least partially, not mutually exclusive. Finally, in Italy benefits are subject to income taxation, whereas in Germany contributions are taxed and pensions are tax free.

2.4 Recent reforms

The German reform has the explicit aim of eliminating the incentives to retire before age 65 and stabilizing real pension benefits to about 70% of net earnings.

This has been implemented by (1) actualizing the benefits for life expectancy at retirement, (2) introducing partial retirement (*Teilrente*), (3)

changing indexing of benefits from gross to net wages and, (4) raising and linking public financing of the system to demographic and economic developments, so redistributing their effects between pensioners and workers.

The same objectives have been pursued in Italy by the 1992 "Amato" and the 1995 "Dini" reforms. The 1992 reform, although maintaining the general organization of the system, heightened age and contributive eligibility criteria and lengthened the reference working period for the computation of benefits. It has gradually raised the normal retirement age up to 65 for men and 60 for women by year 2005. The 1995 reform has introduced flexible actuarially adjusted retirement between age 57 and 65. This more marked insurance characteristic of the system can be found also in the reduction from 20 to 5 years of the minimum contributive period for eligibility to benefits.

The 1995 reform has also switched from a retributive to a contributive pension formula tying benefits to the whole contributive history of workers. In this new formula the rate of return on contributions paid (currently 33% of payroll) is equal to a 5-years moving average of GDP growth rates. The final amount is then actualized by life expectancy at retirement.

3 Data description

The data presented in the introduction is taken from EUROSTAT. In particular we refer to the yearly *Demographic Statistics* and to the *Community Labor Force Survey* [11] [12].

The longitudinal microdata come from two different surveys carried out by the Bank of Italy and the *Deutsches Institut für Wirtschaftsforschung*. The Italian Survey of Household Income and Wealth (SHIW) is a biennial cross-section with, since 1989, a panel component [3], whereas the German Socio-Economic Panel (GSOEP), started in 1984, is annual and fully longitudinal [10]. Only the GSOEP's sample "A", referring to population residing in West Germany, has been used in this paper. The purpose of the GSOEP is to collect yearly representative microdata on individuals and households

Table 1: Comparison between the current and the prevalent working status in the Italian panel (in %)

	"current"			
"prevalent"	1991		1995	
	employed	unemployed	employed	unemployed
employed	98.79	1.21	98.36	1.64
unemployed	3.95	96.05	9.09	90.91

in order to measure stability and change in working and living conditions, while the SHIW focuses on income and wealth of households. Nevertheless, they both collect demographic, labor market, social security, housing, health and education information. The latest surveys available at the time of this study were the 1995 SHIW and 1996 GSOEP survey.

It was necessary to modify some variable definition in order to be able to compare the two surveys. Regarding education levels, the 1997 United Nations, *International Standard Classification of Education* (ISCED) has been adopted. The conversion rules are the same used by the Istituto Nazionale di Statistica (ISTAT) and by the *Bundesministerium für Statistik*: ISCED0 indicates illiteracy, ISCED1 stands for primary education, ISCED2 refers to first level secondary education (*scuola media/Realschule, Hauptschule*), which represents the lowest education level observed in the German sample. ISCED3 indicates an high school diploma (*Diploma di maturità/Abitur*), ISCED5 a university degree.

Another issue is related to different definitions of unemployment. In the SHIW the question is on the prevalent working status during the previous year, whereas in Germany the discrimination is based on the registration at the public labor office as unemployed. For 1991 and 1995 the Italian panel reports the current employment status. A comparison between the current and the prevalent status shows that the two variables are similar (table 1) as far as employment is considered. Unemployment data is more problematic: in 1995 9% of those reporting themselves "currently" unemployed are at the same time "in prevalence" employed during the year.

Important information, such as health status or municipality size is not

contemporaneously available in both surveys. In addition, due to privacy protection, information on household wealth is not accessible to foreign researchers in the German panel.

It was also necessary to adjust the data on earnings and pension benefits to make them comparable. While the GSOEP provides information on average monthly gross wages and current monthly net wage, the SHIW provides information on annual net wages. Multiplying German monthly earnings by the number of months worked we derived annual aggregates. We also choose to use net amounts instead of estimating gross values for Italy. Finally we added different kinds of fringe benefits to German earnings (i.e. Christmas bonus of a month's pay) already included in the Italian annual earnings.

SHIW has more detailed information on pensions while GSOEP aggregates data on invalidity and survivor benefits. This is why we limited ourselves to the analysis of work-related pensions.

Regarding sample selection, we concentrate on individuals for whom a minimum of two completed interviews are available. Self-employed workers have not been included in this sample, due to the underestimation of the their declared earnings [3] [6].

4 Non parametric analysis

The objective of this section is to highlight the more frequently used pathways out of the labor market. Since the surveys do not distinguish between old-age and early retirement pensions, the importance of the different retirement options is evaluated looking at the spikes in the frequency distribution of actual retirement ages (figure 1). Recalling the eligibility criteria, they reflect the key features of the two systems.

The curve relative to German men has three spikes: at age 60 (17%), at age 63 (16%), and at age 65 (9%), corresponding respectively to the age criteria for invalidity and unemployment old-age pension, long-service old-age pension and normal old-age pension. The Italian distribution also presents three spikes: at age 55 (8%), 60 (15%) the normal retirement age

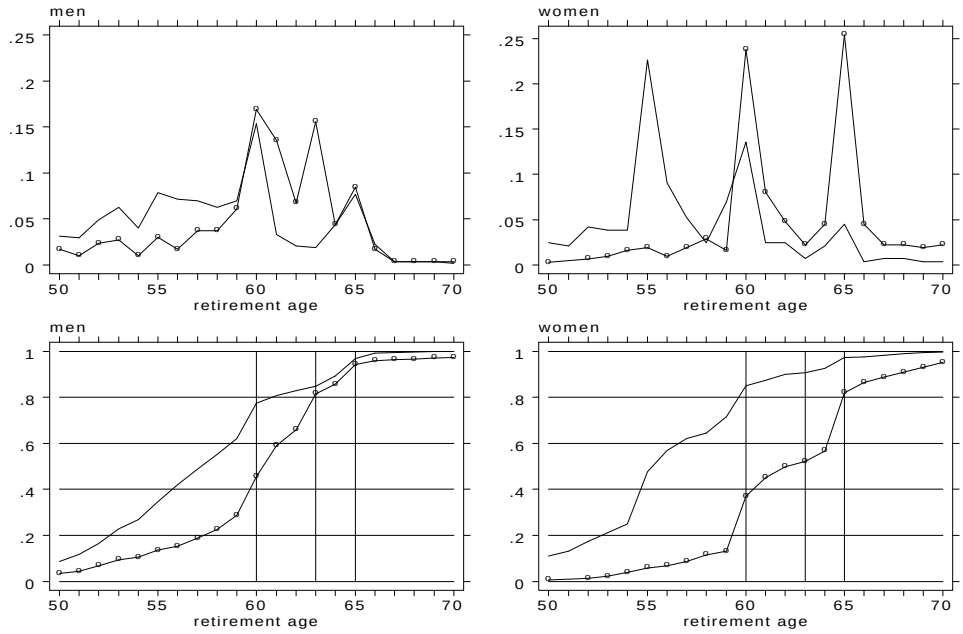

Figure 1: Above: age distribution of retirement. Below: cumulative distribution by age. Italy(-), Germany(o)

in the private sector and 65 (9%) the normal retirement age in the public sector.

Since in Italy there is no age limit to claim for seniority pensions, the curve is flatter and the cumulative distribution is always above the German one. At age 57, about 50% of Italian and 22% of German male workers have retired.

For women, the distance between the cumulative curves of the two countries is even more striking. This is due to the Italian sharpest spike at age 55 (23%), the normal retirement age in the private sector. The other two spikes are at age 60 (14%) and at age 65 (5%), the normal retirement age in the public sector. In Germany women mostly retire at age 60 (24%) and at age 65 (25%), the statutory limits for women and normal old-age pension respectively. As a result, while in Germany at age 55 there are nearly no retired working women, in Italy the percentage is about 50%. At 60 about 40% and 83% of women is retired in Germany and Italy respectively. The two curves converge only after age 65.

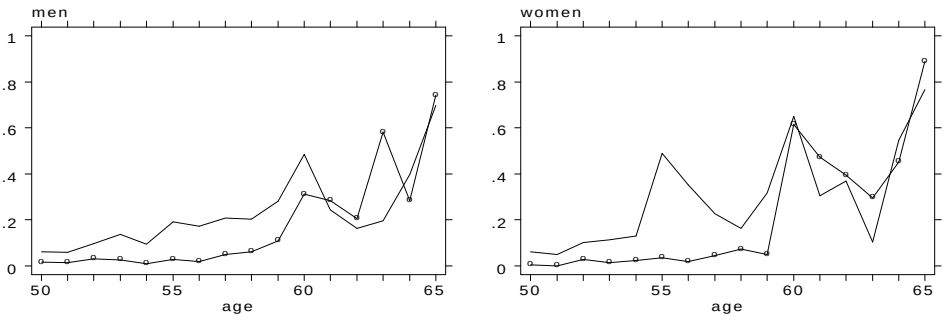

Figure 2: Hazard rates in Italy(-) and Germany(o)

The probability of retiring during the year for an individual aged T, working until age t and retiring between age t and $t+1$ is given by:

$$\lambda(t) \quad = \quad \Pr(t \leq T < t+1 \,|\, T \geq t). \tag{1}$$

Dividing the number of retired workers p_{it}, at age t, in year i by the population at risk r_{it}, the number of workers who have not yet retired, gives an estimate of the hazard rates out of the labor force related to the period,

$$\hat{\lambda}(t) \quad = \quad \sum_{i=s}^{S} \omega_i \frac{p_{it}}{r_{it}} \tag{2}$$

where w_i is the year-specific weight. Figure 2 plots the results which are comparable to those reported in Brugiavini [7].

The results show that until age 60 the Italian curves are always above the German ones with the spikes reflecting once again institutional characteristics. For example, in Italy a male worker aged 60 has a probability around 50% of retiring within the following year. In Germany the same probability is about 30%.

Italian workers tend to retire earlier than German ones. How much replacement rates, measuring the loss of purchasing power due to the transition from work to retirement, are responsible for this different behavior?

Replacement rates are defined as the ratio at the individual level between the first work-related monthly net pension benefit $p_{t,i}$ and the last monthly total net wage $y_{t-z,i}$. The lag between two surveys z is equal to one in Germany and 2 in Italy. There is no calendar information in the Italian survey

and it is impossible to reconstruct the monthly working condition. That is why in the case of retirement the average pension benefit has been divided by the average monthly wage of the previous survey to obtain replacement rates. To avoid biased replacement rates of workers who retire gradually, workers whose average working time in the last working year is under the 30 hours per week have not been taken into account. The average replacement rate of this subsample indexed i for survey t is therefore

$$\tau \quad = \quad \frac{1}{nT} \sum_{t=1}^{T} \sum_{i=1}^{n} \frac{p_{t,i}}{\pi_{t,z} y_{t-z,i}} \,, \tag{3}$$

where $\pi_{t,z}$ is the price index factor between $t-z$ and t.

This rates are reported in table 2. They are high in both countries, especially if compared with the ones recorded in the US and the UK [23]. This is because the two public systems are designed to extend the standard of living that was achieved during the working life into retirement. In both cases replacement rates range between 70 and 80%, close to the statutory maximum in Italy. The results obtained do not show trends able to account for differences in retirement behavior between Italy and Germany. It is also interesting to notice that, within each country, public sector and white collar workers show the highest rates. No cohort-specific trend could be detected in the analysis.

Cross-sectional survey studies, such as Börsch-Supan [2] and VDR (*Verband Deutscher Versicherungsträger*) [24] calculate replacement rates dividing the average net pension $E(p_t \,|\, p_t > 0)$ by the average net wages $E(y_t \,|\, y_t > 0)$. This formula is based on a different subsample and is in general different from τ.

5 Parametric Analysis

This section presents the econometric analysis trying to explain lower LFPRs of elderly workers and women in Italy. Tables reporting coefficients, standard errors, significance levels and r-squared of all of the models are shown in the appendix.

Table 2: Average (μ) and standard deviation (σ) of net replacement rates; n number of observations.

	Italy			Germany		
age group	μ	σ	n	μ	σ	n
18-22	0.626	0.588	3	0.334	0.000	1
23-27	0.796	0.463	27	0.873	0.576	15
28-32	0.652	0.322	83	0.866	0.305	124
33-37	0.796	0.280	134	0.847	0.311	128
38-42	0.769	0.246	109	0.865	0.391	38
43-47	0.795	0.203	44	0.777	0.145	12
men	0.767	0.305	315	0.849	0.275	230
women	0.724	0.257	85	0.864	0.446	88
private sector	0.713	0.297	298	0.827	0.346	206
public sector	0.887	0.250	102	0.902	0.296	112
blue collar	0.769	0.235	154	0.829	0.261	121
white collar	0.870	0.267	162	0.893	0.280	151
self-employed	0.522	0.314	81	0.627	0.520	28
total	0.758	0.295	400	0.853	0.331	318

5.1 Employment rates

The first model estimates the probability

$$\pi(x) = Pr(Y > 0|X = x) \tag{4}$$

of receiving labor income, using the linear logit specification:

$$\pi(x) \quad = \quad \frac{e^{\alpha+\beta' x}}{1 + e^{\alpha+\beta' x}} \, . \tag{5}$$

Probabilities of receiving earnings from work substantially coincide (table 3) with employment rates (see also [15]) and they are therefore treated as equal. The individual that we take as baseline in the model (indicated by the constant term α) is aged 50, with ISCED2 education level, is married with a child, his household is of three components and lives in tenancy. The baseline probability of receiving labor income is given by:

$$\pi(0) \quad = \quad \frac{e^{\alpha}}{1 + e^{\alpha}} \tag{6}$$

Table 4 shows the effects of education on employment rates. The estimated probabilities are particularly low in Italy, especially among young women and the elderly. In Germany, at age 60, the reference individual receives

Table 3: Percentage of recipients of labor income (Y), labor-related pensions (P) and residual category (Ø) compared to labor force (LF) status in 1989-95

	Italy				Germany			
	Y	P	Ø	Y&P	Y	P	Ø	Y&P
males								
out of LF	0.51	86.13	11.12	2.23	4.94	81.93	5.06	8.07
employed	88.05	1.59	7.47	2.89	95.71	0.11	1.05	3.14
unemployed	17.78	0.00	82.22	0.00	55.61	2.93	39.02	2.44
total	47.32	39.65	10.49	2.54	59.54	31.24	4.24	4.97
females								
out of LF	0.29	31.65	67.75	0.31	4.35	46.93	46.69	2.03
employed	84.71	2.19	11.15	1.94	96.01	0.06	2.14	1.79
unemployed	17.39	0.00	82.61	0.00	43.14	0.65	55.56	0.65
total	17.04	25.66	56.67	0.63	35.21	30.39	32.49	1.91

labor income with a probability of 58% against the 41% of Italy. For a woman of the same age and characteristics the probabilities are 11% and 6% respectively.

In the case of Germany, the number of ISCED0 and ISCED1 observations do not allow estimating the probabilities. Concerning Italy, low education levels have a considerable effect on employment, especially in the first years of working life.

Excluding Italian women, ISCED3 and ISCED5 slightly reduce LFPRs until 35-40 years. Afterwards, their impact is strongly positive and increasing with age: for an Italian male worker aged 60 with ISCED3 the LFPR is 62% (+49% than the baseline). Among women the effects of education are already tangible at younger ages: at 25 the LFPR is 40% (+42%), at 60 it is 22% (+256%!). ISCED5 widens these trends: a graduated woman at 60 has a probability of working 10 times higher than her ISCED2 counterpart.

In Germany, the effects of education are less marked. Men, in particular, do not show appreciable differences between ISCED3 and ISCED5. At 60, a worker with education higher than ISCED2 is employed with a probability of 74% (+20%). Again, the evidence show deeper differences among women: at age 60, the ISCED3 LFPR is 15% (+30%) while the ISCED5 rate is 32% (+185%).

Table 4: Probability estimates of receiving labor income. var.% is the percentage differential of probability with respect to the reference individual.

age	base	ISCED0	var.%	ISCED3	var.%	ISCED5	var.%
Italy - men							
25	0.909	0.784	-0.137	0.821	-0.097	0.724	-0.204
30	0.954	0.894	-0.062	0.922	-0.033	0.900	-0.056
35	0.967	0.932	-0.036	0.955	-0.012	0.956	-0.011
40	0.967	0.939	-0.029	0.963	-0.003	0.973	0.007
45	0.952	0.923	-0.030	0.958	0.006	0.977	0.026
50	0.903	0.866	-0.042	0.931	0.031	0.971	0.074
55	0.756	0.708	-0.064	0.849	0.124	0.949	0.256
60	0.414	0.386	-0.068	0.617	0.492	0.877	1.118
Italy - women							
25	0.271	0.111	-0.591	0.387	0.424	0.375	0.382
30	0.402	0.205	-0.489	0.565	0.405	0.618	0.536
35	0.478	0.288	-0.398	0.669	0.398	0.767	0.603
40	0.486	0.324	-0.334	0.704	0.448	0.835	0.718
45	0.424	0.300	-0.294	0.679	0.601	0.854	1.015
50	0.302	0.224	-0.259	0.586	0.941	0.837	1.772
55	0.161	0.128	-0.205	0.418	1.592	0.773	3.793
60	0.061	0.054	-0.115	0.216	2.560	0.631	9.396
Germany - men							
25	0.884	.	.	0.761	-0.138	0.813	-0.080
30	0.916	.	.	0.852	-0.070	0.882	-0.036
35	0.927	.	.	0.895	-0.035	0.914	-0.015
40	0.924	.	.	0.911	-0.014	0.924	0.000
45	0.905	.	.	0.910	0.005	0.920	0.017
50	0.859	.	.	0.891	0.037	0.899	0.046
55	0.761	.	.	0.843	0.107	0.849	0.115
60	0.577	.	.	0.743	0.287	0.743	0.287
Germany - women							
25	0.510	.	.	0.484	-0.051	0.464	-0.091
30	0.574	.	.	0.563	-0.020	0.581	0.012
35	0.591	.	.	0.594	0.005	0.648	0.097
40	0.563	.	.	0.580	0.030	0.670	0.191
45	0.488	.	.	0.520	0.065	0.651	0.334
50	0.370	.	.	0.414	0.120	0.587	0.588
55	0.230	.	.	0.276	0.199	0.473	1.054
60	0.113	.	.	0.146	0.300	0.321	1.846

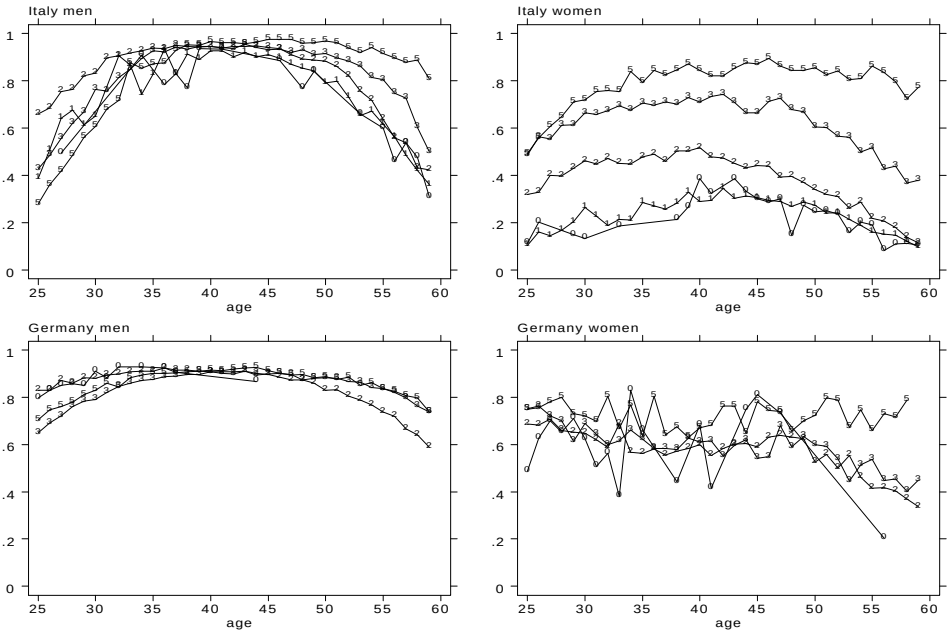

Figure 3: LFPRs estimates by education levels over the whole sample. The numbers used as labels indicates the ISCED level.

Figure 3 presents average values of LFPRs by education and age estimated for the whole sample. It clearly shows a higher volatility of employment rates in Italy, especially among women, where the differentials of employment rates at different education levels are striking.

To sum up, education seems to have a strong effect on employment, especially among women and especially in Italy. It is worth noting that Italian women at ISCED3 and ISCED5 show employment rates higher than the correspondent German ones.

Differences in LFPRs are therefore the result of a different distribution of education, reported for the 1995 sample in table 5. The distribution is substantially stable across age groups for males in Germany. Italian males and females in both countries show a large drop of education levels after age group 45-49. In 1995, Italian workers over age 50 show a large educational gap relative to German ones, due mainly to the high percentage of individuals at ISCED1. Moreover, roughly half of the women over 50 is at

most at ISCED1 with estimated employment rates around 10%. In Germany, between 70 and 75% of women is at ISCED2, the lowest recorded in that survey, with employment rates near 20%. These differentials in education are relevant to workers reaching retirement age (the effects of education on the retirement decision will be analyzed later on) whereas for younger generations the educational gap closes. In Italy the percentage of ISCED3 women is steadily increasing. In 1995, 15% of women in age group 55-59 held a ISCED3 degree, the percentage was 55% for age group 25-29, even higher than in Germany, where it stood at 30%.

Nevertheless, it is worth bearing in mind that in Germany, after formal education, one or two years are commonly spent in on-the-job training (*Lehre*). Since the Italian survey do not report data of this kind, apprenticeship is not included in the models estimated. This fraction of accumulated human capital has presumably a positive influence on the probability of being employed, especially at young ages. Between years 25 and 29, in fact, at ISCED3 and ISCED5 Italy shows employment rates lower than the German ones.

Since education of women is increasing with succeeding cohorts, their LFPRs in Italy will increase in the future. To make the process faster, investments in apprenticeship programs should be undertaken. For Italian women, a higher flexibility of working hours would be needed (figure 4), in order to reconcile professional and familiar duties.

5.2 Earnings estimates

Differences in LFPRs seem to depend on formal education, on-the-job training and labor market flexibility. It remains to be investigated if the positive correlation between education and employment rates acts through earnings. In fact, it is reasonable to hypothesize that an individual can refuse a wage offer if it is below his personal reservation wage (defined as the subjective evaluation of one own work). Assuming that personal reservation wages are less elastic than offered wages, especially when the latter are falling, low edu-

Table 5: Education levels distribution by age group in 1995 - (percentages)

age	ISCED0	ISCED1	ISCED2	ISCED3	ISCED5
Italy - men					
25-29	0.23	3.04	29.91	52.34	14.49
30-34	0.31	4.91	39.26	39.57	15.95
35-39	2.62	6.71	41.11	41.11	8.45
40-44	0.83	15.19	35.36	35.08	13.54
45-49	1.52	21.27	31.65	35.19	10.38
50-54	0.81	31.35	32.97	26.22	8.65
55-59	2.85	42.74	23.93	22.51	7.98
total	1.28	17.75	33.24	36.35	11.38
Germany -men					
25-29	4.31	.	43.13	36.12	16.44
30-34	2.39	.	40.58	37.40	19.63
35-39	1.71	.	41.98	33.79	22.53
40-44	0.38	.	48.46	30.77	20.38
45-49	0.00	.	49.79	31.38	18.83
50-54	0.00	.	48.69	30.37	20.94
55-59	0.00	.	56.09	25.83	18.08
total	1.55	.	46.25	32.82	19.38
Italy - women					
25-29	0.86	4.00	24.57	55.43	15.14
30-34	0.77	7.14	34.95	44.13	13.01
5-39	0.51	13.01	32.91	43.11	10.46
40-44	1.73	22.96	33.58	31.60	10.12
45-49	3.29	36.00	26.82	21.65	12.24
50-54	3.44	46.83	27.78	17.72	4.23
55-59	10.47	52.34	17.91	14.88	4.41
total	2.96	26.10	28.54	32.42	9.98
Germany - women					
25-29	5.28	.	56.30	28.74	9.68
30-34	3.71	.	52.00	35.14	9.14
35-39	0.92	.	55.38	30.77	12.92
40-44	1.16	.	60.08	25.97	12.79
45-49	0.84	.	66.11	22.18	10.88
50-54	0.00	.	71.63	21.86	6.51
55-59	0.40	.	76.89	19.52	3.19
total	2.02	.	61.34	27.13	9.50

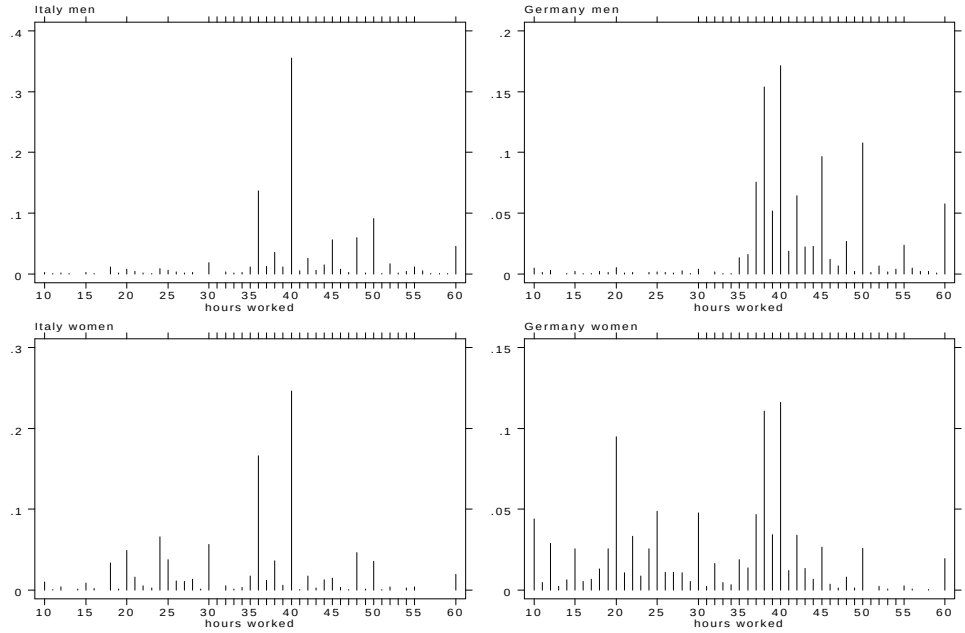

Figure 4: Average weekly working hours for men and women in Italy and Germany

cation levels will be associated with low observed wages and low employment levels. Nonetheless, differences between LFPRs of men and women may well be related to discrimination in pay, measured by remuneration differentials.

Therefore, a log-linear function for net earnings has been estimated with prices at 1998 values (table 12). Being the dependent variable the log of earnings y, $\ln \alpha^* = \alpha$ and $\ln \epsilon_i^* = \epsilon_i$, we obtain that:

$$\begin{aligned} y_i &= \alpha + x_i'\beta + \epsilon_i \\ e^{y_i} &= e^{\alpha + x_i'\beta + \epsilon_i} \\ Y_i &= \alpha^* e^{x_i'\beta} \epsilon_i^* \,. \end{aligned} \tag{7}$$

Coefficients of continuous variables measure rates of growth of earnings while coefficients of dummy variables measure differentials in rates of growth with respect to the baseline (aged 50, ISCED2, married, working the whole year, working 40 hours per week, his partner not employed, living in tenancy). Age enters in quadratic form and in linear combination with education levels. The hypothesis, suggested by the economic theory of human

capital [4], is that education-related differentials increase with age.

In fact, the functional form of (7) can be interpreted under this theory. If Y_0 are earnings obtained without education and Y_1 remuneration after a year of formal schooling, the rate of return of a year of education is:

$$r_1 = \frac{Y_1 - Y_0}{Y_0} . \tag{8}$$

Computing rates of return for years $1, 2, ..., s$ and assuming $r_1 = r_2 = ... = r_s = r$ sufficiently small, $(1 + r)$ can be approximated by e^r,

$$\begin{aligned} Y_2 &= Y_1(1 + r_2) = Y_0(1 + r_1)(1 + r_2) \\ &\vdots \\ Y_s &= Y_0(1 + r_1)(1 + r_2)...(1 + r_s) \\ Y_s &= Y_0 e^{rs} . \end{aligned} \tag{9}$$

Table 6 shows education-related earnings differentials.

With respect to the baseline, ISCED0, now joining ISCED0 and ISCED1, does not greatly reduce earnings in Italy. In Germany, bearing in mind the low number of observations, the effects are still negative but stronger. ISCED3 raises income for men, both Italian and German, by 5-10% at age 25 and by 30-33% at age 65. These trends are steeper for women, especially if Italian: 124% at age 25 and 148% at age 65.

The widest wage differentials are recorded at ISCED5. They are roughly 125% (150% for Italian women) at age 25 reaching in Italy for both sexes 190% at age 65. In Germany, differentials reach 232% for men and 280% for women.

Wage differentials between sexes with fixed socio-demographic characteristics are defined as the ratio between female and male wages. Table 7 shows that they are close to 60-65% in Germany and 75-80% in Italy. Excluding ISCED0 for the reasons already highlighted, differentials narrow at higher education levels. At ISCED3, for instance, they are 9 percentage points lower in Italy and 2 percentage points lower in Germany.

Differences between the two countries are striking, signaling a stronger protection of female work in Italy which is probably also a source of lower

Table 6: Education-related income differentials with respect to the reference category (ISCED2). ISCED0: illiteracy or low education level; ISCED3: high-school degree; ISCED5: university degree;

age	ISCED0	ISCED3	ISCED5	ISCED0	ISCED3	ISCED5
	Italy - men			Italy - women		
25	0.972	1.102	1.251	1.019	1.239	1.519
30	0.947	1.128	1.320	0.978	1.266	1.562
35	0.923	1.155	1.393	0.940	1.294	1.606
40	0.900	1.183	1.469	0.903	1.323	1.651
45	0.878	1.211	1.550	0.867	1.353	1.698
50	0.856	1.241	1.635	0.833	1.383	1.746
55	0.834	1.270	1.725	0.800	1.414	1.795
60	0.813	1.301	1.819	0.768	1.445	1.846
65	0.793	1.332	1.919	0.738	1.477	1.898
	Germany - men			Germany - women		
25	0.895	1.046	1.224	0.962	1.073	1.250
30	0.792	1.075	1.326	0.923	1.104	1.383
35	0.701	1.104	1.437	0.886	1.137	1.531
40	0.620	1.135	1.556	0.850	1.170	1.694
45	0.548	1.166	1.686	0.816	1.205	1.875
50	0.485	1.198	1.826	0.783	1.240	2.075
55	0.429	1.231	1.978	0.751	1.277	2.296
60	0.380	1.265	2.142	0.721	1.314	2.541
65	0.336	1.300	2.320	0.692	1.353	2.813

Table 7: Estimates of sex-related wage differentials by education levels. Values obtained as the ratio of remuneration of women and men.

age	ISCED0	ISCED2	ISCED3	ISCED5
Italy				
25	0.756	0.721	0.810	0.875
30	0.749	0.726	0.814	0.858
35	0.743	0.730	0.818	0.842
40	0.737	0.735	0.822	0.826
45	0.730	0.739	0.826	0.810
50	0.724	0.744	0.829	0.794
55	0.717	0.748	0.832	0.778
60	0.710	0.752	0.835	0.763
65	0.704	0.756	0.838	0.748
Germany				
25	0.742	0.691	0.708	0.705
30	0.747	0.641	0.658	0.668
35	0.766	0.606	0.624	0.646
40	0.802	0.585	0.603	0.637
45	0.856	0.576	0.595	0.640
50	0.932	0.578	0.598	0.657
55	1.035	0.591	0.613	0.687
60	1.172	0.617	0.641	0.732
65	1.354	0.657	0.684	0.796

employment levels. Assuming comparable reaction of German and Italian women to sex-related wage discrimination, it is possible to discard the latter as a source of lower LFPRs of Italian women.

5.3 Retirement

The aim so far has been to consider possible instruments to raise employment rates, in particular those of women, analyzing the whole population. In this section the retirement decision and the relative incentives are studied, estimating the probability of being retired, of receiving a work-related pension, of transition between working statuses and of retiring receiving work-related benefits.

While increasing employment has an immediate effect only on the contributive side of a PAYG pension system, reducing the number of beneficiaries acts on both the contributions and the outlays (in the equilibrium ratio $\alpha = PN_p/WN_w$ the numerator reduces and the denominator increases).

5.3.1 Definition of retirement from work

Quinn and Burkhauser [9] and Leazar [13] give a comprehensive survey of studies analyzing retirement from work. In this field, different results obtained from the same data, are due to the different definitions of retirement adopted. Here, retirement coincides with the first work-related pension benefit received.

5.4 Probability of receiving pension benefits

Table 13 presents the coefficients of the linear logit model estimated for the probability of receiving work-related pension benefits,

$$\omega(x) = \Pr(P > 0 | X = x). \tag{10}$$

The constant relates to the reference category whose estimated probability is:

$$\omega(0) \quad = \quad \frac{e^{\alpha}}{1 + e^{\alpha}} \, , \tag{11}$$

while

$$\omega(x) \quad = \quad \frac{e^{\alpha + \beta' x}}{1 + e^{\alpha + \beta' x}} \tag{12}$$

is the estimated probability for an individual with characteristics x.

Tables 8 and 9 show the estimated probabilities for the baseline (ISCED2) and the probabilities for the baseline with different education level. Reasonably, the probabilities raise with age. The column "base" shows that in Italy the probability for men is roughly double that of women and one third higher than in Germany. The model is able to highlight the institutional differences between the two countries: up to age 63, the first statutory limit for old-age benefits in Germany, estimates for Italy are higher. In the first years reported in the table, Italian percentages are roughly double than the German ones. The same is true for women. In this case, though, the catch-up takes place at age 60, the statutory limit to old-age benefits for women.

Table 8: Italy: estimates of the probabilities and the percentage differentials with the reference (ISCED2). ISCED0: illiteracy or low education level; ISCED3: high-school degree; ISCED5: university degree; var.% is the percentage probability differential with respect to the reference individual.

age	base	ISCED0	var.%	ISCED3	var.%	ISCED5	var.%
Italy - men							
50	0.090	0.085	-0.055	0.060	-0.334	0.038	-0.577
51	0.120	0.113	-0.053	0.081	-0.327	0.052	-0.568
52	0.156	0.148	-0.051	0.106	-0.318	0.069	-0.558
53	0.200	0.190	-0.049	0.139	-0.306	0.091	-0.545
54	0.250	0.239	-0.046	0.177	-0.293	0.118	-0.529
55	0.307	0.294	-0.042	0.222	-0.277	0.151	-0.509
56	0.369	0.354	-0.039	0.273	-0.258	0.190	-0.486
57	0.433	0.418	-0.035	0.330	-0.238	0.234	-0.459
58	0.497	0.482	-0.031	0.389	-0.217	0.284	-0.429
59	0.560	0.545	-0.027	0.450	-0.196	0.337	-0.397
60	0.619	0.604	-0.024	0.511	-0.174	0.394	-0.363
61	0.672	0.659	-0.020	0.569	-0.153	0.451	-0.329
62	0.720	0.708	-0.018	0.624	-0.134	0.508	-0.295
63	0.762	0.751	-0.015	0.674	-0.116	0.562	-0.262
64	0.798	0.788	-0.013	0.719	-0.100	0.613	-0.232
65	0.829	0.820	-0.011	0.758	-0.086	0.660	-0.204
Italy - women							
50	0.050	0.050	0.012	0.100	1.024	0.138	1.785
51	0.065	0.065	0.012	0.129	0.992	0.175	1.709
52	0.082	0.083	0.012	0.161	0.956	0.216	1.624
53	0.103	0.104	0.011	0.197	0.914	0.261	1.531
54	0.127	0.128	0.011	0.237	0.869	0.308	1.433
55	0.153	0.154	0.011	0.278	0.822	0.356	1.333
56	0.181	0.183	0.010	0.321	0.774	0.404	1.234
57	0.210	0.212	0.010	0.363	0.726	0.450	1.139
58	0.240	0.243	0.010	0.404	0.679	0.493	1.051
59	0.270	0.273	0.009	0.442	0.636	0.532	0.969
60	0.299	0.302	0.009	0.477	0.596	0.567	0.897
61	0.326	0.329	0.009	0.509	0.560	0.598	0.833
62	0.351	0.354	0.008	0.537	0.528	0.624	0.778
63	0.374	0.376	0.008	0.560	0.501	0.647	0.732
64	0.393	0.396	0.008	0.580	0.478	0.665	0.694
65	0.409	0.412	0.007	0.596	0.460	0.680	0.663

Table 9: Germany: estimates of the probabilities and the percentage differentials with the reference (ISCED2). ISCED0: illiteracy or low education level; ISCED3: high-school degree; ISCED5: university degree; var.% is the percentage probability differential with respect to the reference individual.

age	base	ISCED3	var.%	ISCED5	var.%
Germany - men					
50	0.058	0.043	-0.259	0.021	-0.634
51	0.072	0.054	-0.256	0.027	-0.630
52	0.091	0.068	-0.253	0.034	-0.626
53	0.115	0.086	-0.248	0.044	-0.619
54	0.147	0.111	-0.241	0.057	-0.611
55	0.188	0.144	-0.232	0.075	-0.599
56	0.240	0.187	-0.220	0.100	-0.583
57	0.305	0.243	-0.205	0.134	-0.561
58	0.383	0.312	-0.187	0.180	-0.531
59	0.472	0.394	-0.164	0.239	-0.493
60	0.566	0.487	-0.139	0.315	-0.444
61	0.659	0.585	-0.112	0.406	-0.385
62	0.745	0.680	-0.087	0.507	-0.319
63	0.818	0.766	-0.064	0.612	-0.251
64	0.875	0.836	-0.044	0.711	-0.187
65	0.917	0.890	-0.030	0.796	-0.132
Germany - women					
50	0.012	0.012	0.002	0.016	0.362
51	0.018	0.018	0.002	0.025	0.359
52	0.027	0.027	0.002	0.036	0.355
53	0.039	0.039	0.002	0.053	0.349
54	0.056	0.056	0.002	0.075	0.340
55	0.079	0.079	0.002	0.105	0.329
56	0.109	0.109	0.002	0.144	0.315
57	0.148	0.148	0.002	0.192	0.297
58	0.195	0.196	0.002	0.249	0.276
59	0.252	0.252	0.002	0.315	0.252
60	0.316	0.316	0.002	0.387	0.226
61	0.385	0.385	0.001	0.461	0.198
62	0.456	0.457	0.001	0.534	0.171
63	0.527	0.527	0.001	0.604	0.146
64	0.594	0.595	0.001	0.667	0.123
65	0.655	0.656	0.001	0.722	0.102

Disregarding as usual ISCED0, higher education levels reduce the probability of being a recipient of pension benefits for men and raises that of women. This is due to the wide differences in employment rates by education level within women, especially in Italy. For men, whose employment rates are high across education levels, there is a positive correlation between age of retirement and education. In fact, contributive criteria are met earlier by workers spending less years in formal schooling.

Thus higher education raises the probability of retirement among women and reduces it among men. In order to analyze the choice of retirement age, though, modelling the dynamics of retirement is needed.

5.5 Hazard rates estimates

Table 14 reports coefficients of the linear logit model for the probability of receiving the first work related pension benefit,

$$\eta(x) = Pr(P_t > 0 | P_{t-1} = 0, X = x) \; . \tag{13}$$

This probability is defined hazard rate:

$$\eta(0) = \frac{e^{\alpha}}{1 + e^{\alpha}} \tag{14}$$

$$\eta(x) = \frac{e^{\alpha + \beta' x}}{1 + e^{\alpha + \beta' x}} \; . \tag{15}$$

Equation (14) estimates the probability for the baseline, in this case aged 60 and not 50, whereas (15) is the probability for any other individual. Dummy variables for age have been used to capture hazard rate spikes.

Estimates of the hazard rates (figure 5) confirm the results of the non-parametric analysis of retirement. Concerning education levels, the behavior of women is clearer than the case for the estimated probabilities of receiving work-related pension income. With the exception of ISCED2 German women, hazard rates and education levels are negatively correlated. There is a strong difference within Italian women at ISCED0 (around 50% of the sample) and the others, the latter showing a more uniform behavior. As in the case of employment rates, younger, more educated cohorts will tend to retire later.

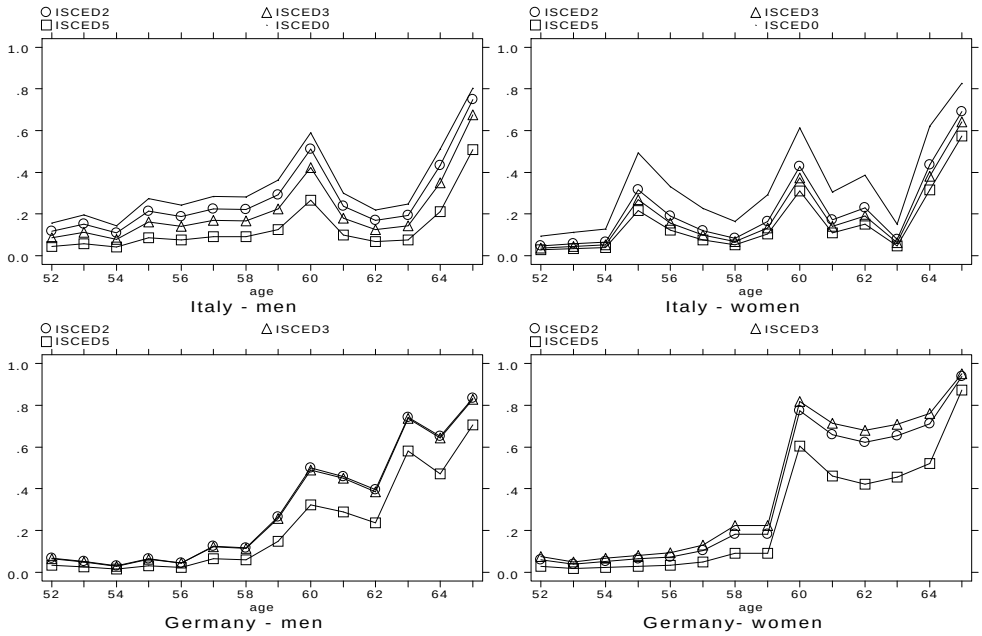

Figure 5: Logit probability estimates of receiving a work-related pension by education level.

Men will be following the same path, less marked for ISCED1 but extended to the transition through ISCED2, ISCED3 and ISCED5, which is associated with a substantial reduction of hazard rates. In Germany, the only education level that lowers hazard rates is ISCED5 and in the next 5-10 years only the number of graduate women will increase. Therefore, the scope for gains to the pension system are narrower than in Italy, independently from the reforms implemented.

5.6 Pension benefits estimates

The structure of education and sex-related differentials in pension income can be interpreted as a scheme of incentives for retirement.

Table 15 presents the coefficients and the standard errors of the estimates on the log of pension benefits. Here, education levels have not been interacted with age, so that dichotomous variables measure the log of the pension benefits differential with respect to ISCED2. The number of months of pension benefits received has been included. The remaining regressors are

Table 10: Estimates of pension benefit differentials by sex and education levels. Ratios of benefits for women against those of men.

age	ISCED0	ISCED2	ISCED3	ISCED5
Italy				
50	0.520	0.591	0.665	0.688
55	0.508	0.576	0.649	0.671
60	0.511	0.580	0.653	0.675
65	0.530	0.601	0.677	0.700
70	0.566	0.643	0.724	0.749
Germany				
50	0.537	0.456	0.614	1.063
55	0.442	0.375	0.505	0.874
60	0.364	0.308	0.416	0.719
65	0.300	0.254	0.342	0.593
70	0.247	0.210	0.283	0.489

comparable to those of the labor earnings models. Since for i close to zero $e^i \simeq 1 + i$, it is possible to compare the logs of education-related differential with those obtained for wages (table 6).

At ISCED0 and ISCED3 differentials are comparable to those obtained for earnings at ages between 50 and 60. At ISCED5 differential are lower: graduated Italian men receive pension earnings that is 52.7% higher ($= e^{0.42}$) while the income differential is equal to 92%. The loss of purchasing power (in absolute terms) and the delay in reaching contributive requirements help explaining delayed retirement. The same seems to hold for Germany and particularly for women, whose differentials are the highest.

Table 10 presents sex-related differentials wider than is the case of labor income (table 7). The highest differentials are in Germany and they are increasing with age, while they are roughly constant in Italy and narrower at higher education levels.

Differentials, wider for pension benefits than for wages, are thus partly inherited from work history and partly due to pension formulas. Working mothers, who are subject to prolonged interruptions of their work history, seem to be more penalized in Germany. In Italy, use of the last wages in pension computation guarantees higher benefits to working mothers.

6 Conclusions

This work has concentrated on a comparison of wage, pension income, labor force participation rates (LFPRs) and retirement behavior in Germany and Italy. Aging populations and the financial strain originating thereof, pose the issue of sustainability of PAYG pension systems. This analysis helps to shed some light on the effects of institutional arrangements in shaping workers behavior regarding LFPRs and retirement. These results can also help assessing the scope of recent and foreseeable reforms in affecting the financial sustainability of pension systems in Italy and Germany.

The underlying matter is whether a PAYG pension system will be financially sustainable and if the reforms implemented or planned in recent years move pension schemes towards the equilibrium.

The main tool used in this study has been the comparison allowed by two longitudinal surveys, SHIW for Italy and GSOEP for Germany.

The two countries, other than for mentality, traditions and history, are sufficiently similar for many demographic, social and economic aspects. For this reason, it is possible to isolate differences coming out from the data[1], also institutional differences, that determine in Italy lower LFPRs by women and elderly.

The main obstacle Italy is overcoming is the gap in average education levels. As a result, independently from labor market or pension system reforms, there should be an increase of LFPRs of women and of the average retirement age.

For women in particular, lower LFPRs are normally addressed as an effect of wage differentials with respect to men. The analysis shows that this is not the case: Germany shows higher differentials as well as higher LFPRs.

Education-related differentials are able to explain most of the differences between Italy and Germany in employment rates. But they are not able to

[1] An unobservable factor could be a different attitude in supplementing one's income "off the books" after being retired from work.

explain the lower retirement age in Italy, if compared to that in Germany. The data indicate as the main source of these discrepancies the incentives provided by the old Italian pension system. In particular, the absence of an age limit for long-service pensions is fully exploited by Italian workers: almost 80% of men retire before 60, the limit for old-age retirement before the 1992 reform.

The results drawn form the analysis refer to a sample of workers retired between 1990 and 1995, during the transition period of the reforms of 1992 in both countries and before the 1995 "Dini" reform in Italy. Changes happened between 1993 and 1995 have still an effect too limited to be caught by the data.

Nevertheless, the Italian reforms seem to be moving in the right direction conditioning early retirement on an age limit and raising female normal retirement age.

Given that Italian workers currently near retirement age present low education levels, and therefore a higher estimated probability to retire, the reforms would have on them the strongest impact. Without addressing the problem of vested rights and therefore the need of the gradual implementation of the reforms, these findings could be useful to the policy maker.

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A Appendix

Table 11: Coefficients, standard errors and significance level of the *logit* model: Probability to receive a labor related income (* indicates a significance level less than 10% and ** less than 5%). n are the number of observations and R^2 measures the statistic adaptation (like the linear R^2).

	Italy		Germany	
	men	women	men	women
age	-0.1854	-0.1342	-0.1093	-0.1158
	(0.0079)**	(0.0076)**	(0.0039)**	(0.0032)**
age^2	-0.0073	-0.0056	-0.0040	-0.0037
	(0.0004)**	(0.0003)**	(0.0002)**	(0.0002)**
year	-0.0800	0.0187	0.0004	0.0387
	(0.0150)**	(0.0108)*	(0.0042)	(0.0031)**
ISCED0	-0.3730	-0.4051		
	(0.0844)**	(0.0756)**		
ISCED3	0.3681	1.1861	0.2882	0.1855
	(0.1029)**	(0.0859)**	(0.0508)**	(0.0427)**
ISCED5	1.2656	2.4757	0.3762	0.8850
	(0.1964)**	(0.1597)**	(0.0660)**	(0.0778)**
ISCED0$*$age	0.0256	0.0275		
	(0.0083)**	(0.0074)**		
ISCED3$*$age	0.0458	0.0264	0.0462	0.0116
	(0.0065)**	(0.0059)**	(0.0034)**	(0.0030)**
ISCED5$*$age	0.1043	0.0800	0.0373	0.0428
	(0.0112)**	(0.0104)**	(0.0046)**	(0.0054)**
not married	-1.4667	0.4274	-0.5871	0.4428
	(0.0943)**	(0.0607)**	(0.0448)**	(0.0339)**
no children	-0.3559	0.1177	-0.1585	0.7874
	(0.0831)**	(0.0572)**	(0.0498)**	(0.0357)**
# components	-0.1243	-0.2660	-0.0649	-0.2773
	(0.0245)**	(0.0208)**	(0.0181)**	(0.0146)**
home owner	0.0812	0.2621	0.1584	-0.0182
	(0.0646)	(0.0479)**	(0.0366)**	(0.0268)
base	2.2379	-0.8373	1.8074	-0.5342
	(0.1064)**	(0.0854)**	(0.0520)**	(0.0404)**
n	10393	11049	29499	29624
R^2	0.21	0.16	0.06	0.09

Table 12: Coefficients, standard errors and significance level of the log-linear model for yearly net wages (* indicates a significance level less than 10% and ** less than 5%). n are the number of observations and R^2 measures the statistic adaptation

	Italy		Germany	
	men	women	men	women
age	0.0046	0.0057	-0.0108	-0.0081
	(0.0012)**	(0.0024)**	(0.0008)**	(0.0012)**
age^2	-0.0002	-0.0002	-0.0007	-0.0003
	(0.0001)**	(0.0001)**	(0.0000)**	(0.0001)**
not married	-0.1481	-0.0121	-0.1656	0.1425
	(0.0128)**	(0.0225)	(0.0079)**	(0.0119)**
partner employed	-0.0121	0.0251	-0.0291	0.0143
	(0.0094)	(0.0212)	(0.0064)**	(0.0121)
hours worked	0.0091	0.0158	0.0096	0.0337
	(0.0006)**	(0.0007)**	(0.0004)**	(0.0004)**
months worked	0.1584	0.1583	0.1853	0.1753
	(0.0023)**	(0.0026)**	(0.0025)**	(0.0026)**
ISCED0	-0.1559	-0.1831	-0.7233	-0.2447
	(0.0143)**	(0.0285)**	(0.1483)**	(0.1471)*
ISCED3	0.2155	0.3241	0.1807	0.2152
	(0.0144)**	(0.0264)**	(0.0103)**	(0.0174)**
ISCED5	0.4916	0.5571	0.6020	0.7299
	(0.0195)**	(0.0331)**	(0.0124)**	(0.0258)**
age∗ISCED0	-0.0051	-0.0081	-0.0245	-0.0082
	(0.0014)**	(0.0029)**	(0.0071)**	(0.0076)
age∗ISCED3	0.0047	0.0044	0.0054	0.0058
	(0.0011)**	(0.0018)**	(0.0007)**	(0.0012)**
age∗ISCED5	0.0107	0.0056	0.0160	0.0203
	(0.0016)**	(0.0025)**	(0.0009)**	(0.0018)**
year	-0.0057	-0.0138	0.0117	0.0130
	(0.0025)**	(0.0038)**	(0.0008)**	(0.0012)**
base	3.3691	3.0731	3.7821	3.2334
	(0.0120)**	(0.0273)**	(0.0090)**	(0.0157)**
n	5537	3352	21812	13476
R^2	0.60	0.66	0.37	0.55

Table 13: Coefficients, standard errors of the *logit* model: probability of receiving a labor-related pension (* significance level less than 10% and ** significance level less than 5%). n indicates the number of observations, R^2 indicates a pseudo r-squared.

	Italy		Germany	
	men	women	men	women
age	0.3195	0.2857	0.2230	0.4156
	(0.0170)**	(0.0139)**	(0.0154)**	(0.0171)**
age^2	-0.0040	-0.0076	0.0082	-0.0053
	(0.0008)**	(0.0005)**	(0.0009)**	(0.0007)**
year	0.0775	0.0159	0.0044	-0.0123
	(0.0165)**	(0.0146)	(0.0065)	(0.0060)**
ISCED0	-0.0618	0.0126	3.0928	1.5376
	(0.0821)	(0.0831)	(0.5104)**	(0.3451)**
ISCED3	-0.4396	0.7603	-0.3161	0.0023
	(0.1025)**	(0.1082)**	(0.0609)**	(0.0615)
ISCED5	-0.9149	1.1220	-1.0428	0.3134
	(0.1499)**	(0.1690)**	(0.0902)**	(0.1138)**
not married	-0.1815	0.0139	-0.1092	-0.0500
	(0.1181)	(0.0681)	(0.0832)	(0.0578)
no children	0.1321	-0.2771	-0.3437	-0.2086
	(0.1030)	(0.1213)**	(0.1049)**	(0.1411)
#components	-0.1503	-0.1977	-0.1872	-0.2059
	(0.0315)**	(0.0300)**	(0.0353)**	(0.0351)**
home owner	0.0779	0.4078	-0.2680	-0.2479
	(0.0762)	(0.0666)**	(0.0553)**	(0.0477)**
base	-2.3107	-2.9523	-2.7837	-4.4014
	(0.1391)**	(0.1565)**	(0.1117)**	(0.1630)**
n	7141	7803	15760	17753
R^2	0.40	0.18	0.51	0.43

Table 14: Coefficients, standard errors of the *logit* model: probability of receiving the first labor-related pension (* significance level under 10% and ** significance level under 5%). n indicates the number of observations, R^2 indicates a pseudo r-squared.

	Italy		Germany	
	men	women	men	women
year	0.2464	0.2077	0.0676	0.0832
	(0.0300)**	(0.0486)**	(0.0124)**	(0.0154)**
ISCED0	0.3219	0.7505	0.8485	2.3150
	(0.1383)**	(0.2527)**	(1.7965)	(1.2097)*
ISCED3	-0.3490	-0.2314	-0.0352	0.2578
	(0.1705)**	(0.2877)	(0.1154)	(0.1656)
ISCED5	-1.0494	-0.5145	-0.7365	-0.8137
	(0.2808)**	(0.4244)	(0.1689)**	(0.2752)**
no child	0.5626	0.3578	-0.4740	-0.5592
	(0.1832)**	(0.4123)	(0.2173)**	(0.3496)
#components	-0.1365	-0.1080	-0.2144	-0.0948
	(0.0499)**	(0.0831)	(0.0627)**	(0.0794)
home owner	0.0599	0.7734	-0.1086	-0.0990
	(0.1289)	(0.2190)**	(0.1076)	(0.1321)
base	0.0420	-0.2876	-0.0039	1.2381
	(0.2816)	(0.5625)	(0.2494)	(0.3686)**
$\chi^2(13)$	176**	107**	666**	666**
n	2298	827	5644	3225
R^2	0.15	0.21	0.26	0.40

Table 15: Coefficients, standard errors and significance level of the log-linear model for yearly net labor-related pensions (* indicates a significance level less than 10% and ** less than 5%). n are the number of observations and R^2 measures the statistic adaptation.

	Italy		Germany	
	men	women	men	women
age	-0.0113	-0.0193	0.0333	-0.0061
	(0.0043)**	(0.0045)**	(0.0037)**	(0.0078)
age^2	-0.0001	0.0005	-0.0010	-0.0010
	(0.0002)	(0.0002)**	(0.0001)**	(0.0003)**
not married	-0.0908	0.0252	-0.0592	0.3005
	(0.0240)**	(0.0190)	(0.0181)**	(0.0226)**
employed partner	-0.3747	-0.2629	-0.3882	-0.0526
	(0.0489)**	(0.0639)**	(0.0496)**	(0.1295)
months	0.1397	0.1219	0.1391	0.1656
	(0.0057)**	(0.0071)**	(0.0040)**	(0.0069)**
ISCED0	-0.3140	-0.1874	-0.0920	-0.2568
	(0.0187)**	(0.0268)**	(0.0737)	(0.1443)*
ISCED3	0.2005	0.4460	0.1783	0.3121
	(0.0251)**	(0.0328)**	(0.0151)**	(0.0295)**
ISCED5	0.4238	0.7032	0.4747	1.1570
	(0.0385)**	(0.0471)**	(0.0235)**	(0.0540)**
year	0.0107	-0.0101	0.0075	0.0261
	(0.0038)**	(0.0045)**	(0.0018)**	(0.0032)**
base	3.1315	2.4785	3.1038	2.4828
	(0.0310)**	(0.0373)**	(0.0276)**	(0.0629)**
n	3102	2117	5099	5161
R^2	0.36	0.41	0.30	0.22