ETUC SociAll

Contribution rates: Fairness and social sustainability of European pensions

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2021

With the financial support
of the European Union

Index

1. INTRODUCTION

The ETUC calls for greater coherence between the right to adequate pensions prescribed by the EPSR and the fiscal policy directions set out in the framework of the European Economic Governance. Taking into account the current economic, labour market and employment situation, the ETUC SociAll project also investigates possible reforms that could foster greater fiscal sustainability of adequate pension systems. It does so by proposing an integrated approach to equal opportunities, quality jobs, employment conditions and social protection rights, in the belief that such approach could determine a more balanced pension policy between fiscal sustainability and social rights priorities.

In this context, the ETUC decided to prepare an expert study providing insights into the social protection contributory systems across Europe and their capacity to support the fiscal sustainability of adequate and effective pensions in times of demographic change.

This study was carried out to meet this request.

The study aims to give a more technical view of public welfare, in particular with regard to the contribution rates for old-age pensions and retirement pensions as well as related benefits, the calculation method and the financing systems. This study also offers a quantitative analysis that allows us to better understand some particularities of pension systems across Europe.

2. CONTRIBUTION RATE AND REVENUES OF EMPLOYEES AND SELF-EMPLOYED

This section provides, in a summary table, a general overview of the contribution rates to the 1st pillar, in the view of old age/retirement pensions and other related benefits applied on work-related income in all EU countries in all EU countries separated by work status: employees or self-employed.

In particular, for the employees the division of contributory obligations between employer and employee will be analysed.

With regard to the contribution rate of the first pillar there are considerable differences between the various countries that make up the EU, both as an overall measure and as a distribution of the burden between the employer and the worker. The aforementioned rates relate to 2018.

Table 1 indicates wide differences between the different countries. These differences are often linked to a different social security history and must be interpreted keeping this aspect into due account. A possible harmonisation of such differences can be achieved only considering the reasons behind them.

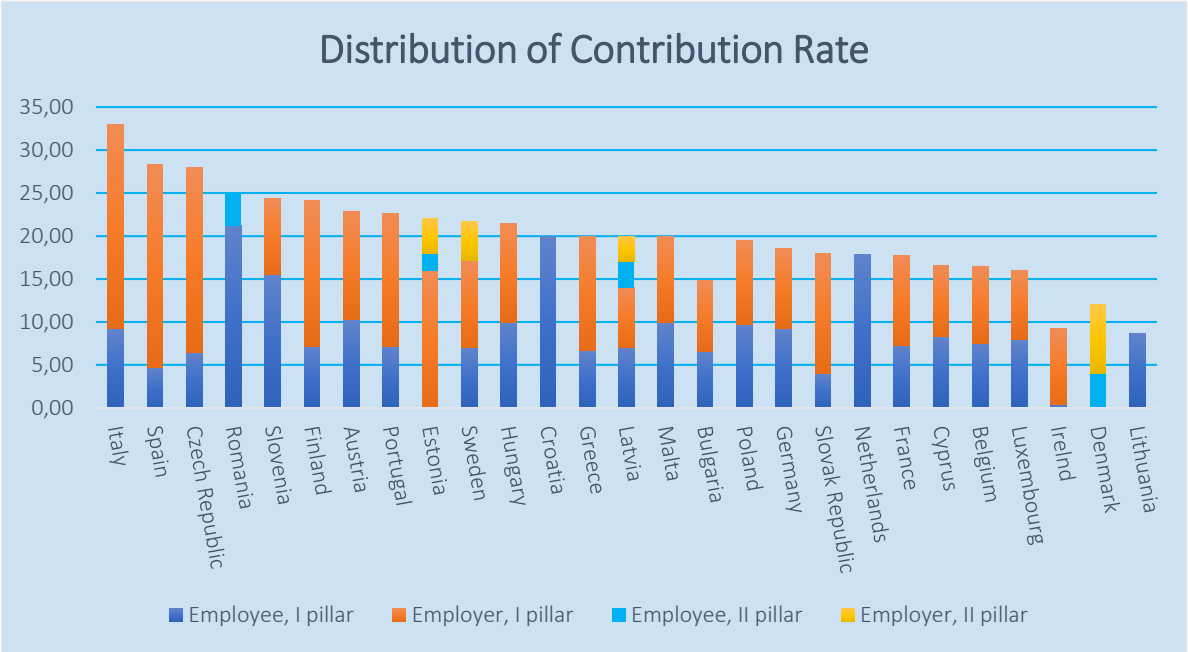
Analysing the total contribution rates for employees in the first pillar, the situation in Italy certainly stands out. In Italy we have the highest contribution rate (33%) for employees, pertaining to the accrual of old age pension, early retirement, survivor benefits. Immediately below Italy comes Spain, with a rate almost 5 points lower than Italy (28.3%).

Table 1: Contribution rate in the main fund in 2018 (percentage value)

	Employee, I pillar	Employer, I pillar	Employee, II pillar	Employer, II pillar	Total	Self-Employed
Austria	10,25	12,55			22,80	22,80
Belgium	7,54	8,86			16,40	20,50
Bulgaria	6,58	8,22	2,20	2,80	19,80	19,80
Croatia	20,00	0,00			20,00	20,00
Cyprus	8,30	8,30			16,60	15,60
Czech Republic	6,50	21,50			28,00	28,00
Denmark	Tax-financed		4,00	8,00	12,00	Inhomogeneous
Estonia	0,00	16,00	2,00	4,00	22,00	22,00
Finland	7,15	16,95			24,10	24,10
France	7,30	10,45			17,75	17,75
Germany	9,30	9,30			18,60	Inhomogeneous
Greece	6,67	13,33			20,00	Fixed amount
Hungary	10,00	11,50			21,50	21,50
Ireland	0,40	8,80			12,80	4,00
Italy	9,19	23,81			33,00	24,00
Latvia	7,00	7,00	3,00	3,00	20,00	20,00
Lithuania	8,72	0,00			8,72	8,72
Luxembourg	8,00	8,00			16,00	16,00
Malta	10,00	10,00			20,00	15,00
Netherlands	17,90	0,00			17,90	12,10
Poland	9,76	9,76			19,52	9,76
Portugal	7,18	15,47			22,65	21,41
Romania	21,25	0,00	3,75		25,00	25,00
Slovak Republic	4,00	14,00			18,00	18,00
Slovenia	15,50	8,85			24,35	24,35
Spain	4,70	23,60			28,30	28,30
Sweden	7,00	10,21	0,00	4,50	21,60	17,20
The colours of the lines refer to the division of the contribution burden between employer and employee:						
Balance between Employee & Employer						
Prevalence of Employee						
Prevalence of Employer						
Source of data: Missoc, OECD, EU Commission						

In the graph below, the countries are shown in descending order with regard to the overall tax rate for employees, which generally accounted for the majority of workers.

Graph 1 - Contribution rate in 2018
(Percentage Value)



The difference in contribution rates in the first pillar is one of the elements that conditions access to the second pillar. It is difficult to develop the second pillar where the basic contribution is already very high. However, in the countries with the lowest rates (e.g. Sweden and Denmark), the second pillar is partly mandatory. The average rate is 20.27%.

Taking into consideration the first-pillar financing system that is pay-as-you-go (PAYG) in all EU countries, as we will examine later, a modification of the current rates, especially for countries where they are particularly high, cannot take place without a long transition period, to avoid consequences in the labour market[1], as raising rates would risk to directly increase labour costs or reduce available wages.

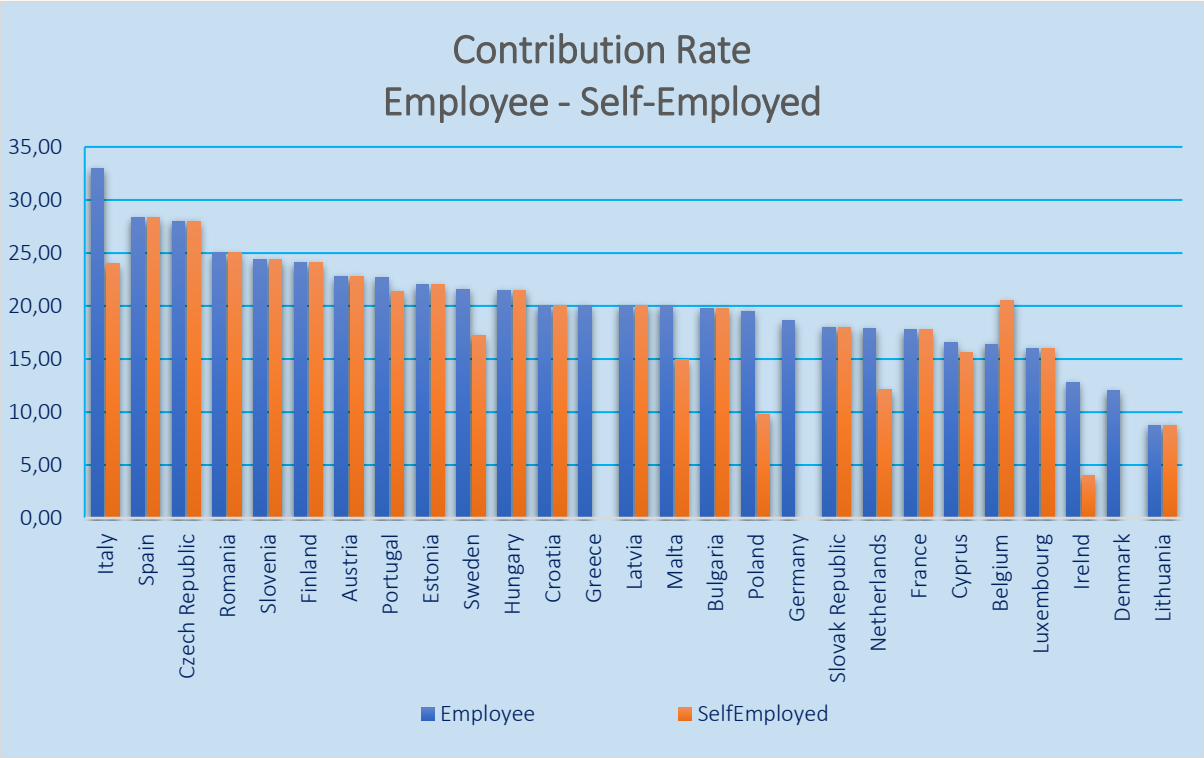
[1] Contributions represent a sort of 'obligation' to save, which will then serve to create an entitlement (you do not put anything aside, but the entitlement grows: PAYG) to have a replacement income from the state when you no longer work. So, one pays during the period of work and gets benefits afterwards. If the employer pays, the employer has an annual outflow that

The subdivision of the contribution rate between worker and employer, represented in the graph by the colours of the bars, reflects the history of social security systems and of industrial relations. In general, the rates are at least the same, when those of the employer are not higher, except in countries where the first pension pillar is "younger".

In countries where the social security system is younger, for historical and political reasons, it is easier to maintain low contribution rates while fulfilling the pension promise, thanks to the fact that the pension expenditure is still economically sustainable. One reason for this could be that, for example, there are still few or no pensions being paid out, or that the new systems haven't yet undergone developments based on workers' rights, trade union demands and social dialogue or collective bargaining claims as it happened in 'older' systems.

As summarised in Graph 2, the contribution rates of self-employed are, with one exception, equal to or lower than the rates set for employees (the average rate is 19%).

Graph 2 - Contribution rate in the main public fund in 2018 (Percentage Value)



is added to the salary paid to the employee. If the individual pays (out of his gross salary), a decrease in income available for consumption occurs.

2.1. CONTRIBUTION RATE OLD AGE PENSION, EARLY RETIREMENT, SURVIVOR BENEFITS IN SINGLE COUNTRIES

Austria

Contribution rate:

Employee: Total: 22.80%, Employee: 10.25%; Employer: 12.55%;

Self-employed people: (under the Farmers' Social Insurance Act or Commercial Social Insurance Act): 22.80%.

Note: Unemployed beneficiaries' contributions are also covered with the same rate.

Belgium

Contribution rate:

Employee: Total: 16.40%, Employee: 7.54%; Employer: 8.86%;

Self-employed: 20,5%

Note: The social protection system as a whole is mainly financed by social contributions, which represent on average more than 70% of the total revenues (for the year 2019). The reported contribution rate is paid exclusively for the 1st pension pillar, for old age, deferred pensions and related benefits.

Bulgaria

Contribution rate: The amount of the contribution depends on the labour category. There are three categories relating to the dangerousness/arduousness of the occupation with the 3rd category (workers in normal working conditions) being the least dangerous/arduous.

- For persons working under the 3rd category of labour born before 01/01/1960: 19.8% of gross earnings, of which:
  - 8.78% paid by the employee,
  - 11.02% paid by the employer.
- For persons working under the 3rd category of labour born after 31/12/1959: 14.8% of gross earnings, of which:
  - 6.58% paid by the employee,
  - 8.22% paid by the employer.

If the insured person works under the 2nd or the 1st category of labour, the employer pays an additional contribution of 3%.

The employer pays an additional contribution of 3% for ballet dancers.

Self-employed:

- For those born before 01/01/1960: 19.8% of the contributory income
- For those born after 31/12/1959: 14.8% of the contributory income.

Supplementary compulsory pension insurance in universal funds for persons born after 31/12/1959: 5% of gross earnings or declared earnings, of which:

- 2.2% paid by the employee,
- 2.8% paid by the employer
- 5.0% paid by the self-employed.

Note: Contributions in professional pension funds (2nd pillar) are paid solely by employers.

Croatia

Contribution rate:
Employee:
First pillar only: Total: 20.00%, Employee: 20.00%; Employer: 0%;
First and second pillar: Total: 20.00%, Employee: 20.00% (15% to the first pillar and 5% to the second pillar);
Employer: 0%;
Self-employed: Same as employee
The insurance base is defined by regulations as a monthly amount for all social insurance branches financed by contributions:
Minimum HRK 3,321.96 (€446)
Maximum HRK 52,452.00 (€7,041)
Note: The global pension insurance contributions cover the risks of old-age, invalidity and survivors, including long-term benefits for accidents at work and occupational diseases.

Cyprus

Contribution rate:
Employee: Total: 16.60%, Employee: 8.3%; Employer: 8.3%;
Gross Earnings on which contributions and benefits are calculated up to a maximum ceiling of six times the Basic Insurable Earnings (Βασικές Ασφαλιστέες Αποδοχές) of €175.90 per week. Insurable Earnings are determined annually by an enactment in compliance with the Social Insurance Law (Νομοθεσία Κοινωνικών Ασφαλίσεων).
Self-employed: 15.6% of notional income: A compulsory minimum insurable income determined by Regulations for each category of self-employed persons.

Czech Republic

Contribution rate:
Employee: Total: 28%, Employee: 6.5%; Employer: 21.5%;
Ceiling: 48 times the monthly average wage (CZK 1,672,080 (€63,703)) per annum.

Self-employed contributions: 28% of declared earnings (declared earnings = 50% of difference between income and expenses). Minimum assessment base: 1/4 of monthly average wage (CZK 8,709 (€332) per month).
Ceiling: 48 times the monthly average wage (CZK 1,672,080 (€63,703)) per annum.
Note: These contribution rates only cover old-age, survivor's and invalidity pensions.

Denmark
Contribution rate:
Old Age pension (Folkepension): Tax-financed
Supplementary pension Contribution: DKK 284 (€38) per month: 1/3 employee, 2/3 employer.
Compulsory pension scheme (Obligatorisk Pensionsordning): 0.3% of benefit is paid to the scheme. This rate will be increased until 2030.

Estonia
Contribution rate:
Employee: Total: 16%, Employee: 0%; Employer: 16.0%;
Funded pensions contribution (kogumispensioni makse): Employees 2% Employer: 4%.
Note: The second pillar is mandatory for all persons born in 1983 and later.

Finland
Contribution rate:
Statutory earnings-related pension contribution rates are:
Employer:
- 16.95% (on average) by the private sector;
- 16.82% by local governments;
- 16.70% by the State (estimate);
- 21.65% by the church;
- 11.4% by seafarer employer

Employees:
- 7.15% (8.65% from the age of 53 to 62);

Farmers, scholarship recipients, self-employed:
- 24.1% (25.6% from the age of 53 to 62);

For seafarers:
- 7.15% (8.65% from the age of 53 to 62) by employees.

Note: Pension contributions are credited for the following periods: unpaid periods of earnings-related social security benefits; home care of a children under three, and university studies.

Contribution rate also finances disability or invalidity benefits.

France

Contribution Rate: The contribution rate is levied up to a social security ceiling and another rate applies with no limit.

15.45% with ceiling (2020: €3,428 per month; €41,136 per year):

- 6.90% by employee;
- 8.55% by employer.

2.30% without ceiling, of which:

- 0.40% by employee;
- 1.90% by employer.

Self-employed:

Agriculture

The contributions of a farmer are calculated on the basis of occupational income.

Crafts, trade and industry and the liberal professions

The basic scheme for craft workers, traders and industrial workers: 17.75% of earned income for the portion below €41,136 and 0.6% above. A minimum contribution is paid on an income equivalent to 11.5% of the social security ceiling: €478.

Germany

Contribution rate: Total: 18.6%, Employee: 9.30%; Employer: 9.30%.

For those with marginal earnings (up to €450 per month), employers pay a contribution of 15%, and 5% for those with marginal earnings employed as domestic workers.

Annual ceiling 2020: €82,800 in the old federal states and €77,400 in the new federal states.

Self-employed persons are not subject to the Statutory Pension Insurance (SPI). However, this simple rule is complicated by a multitude of derogations. The contributions rate for some categories: 18.7%.

The (so-called) regular contribution, which is not based on actual income, amounts to €543,24per month in West Germany and €471,24 per month in East Germany.

However, it is possible in the first three years of self-employment to pay only half of the regular contribution.

Note: Contribution rates also finance disability or invalidity benefits.

Greece

The national pension is not financed by contributions, but directly from the State budget (taxes).

Contribution rate: Social contributions rates for invalidity, old-age and survivors: Employee: Total: 20%, Employee: 6.67%; Employer: 13.33%;

Self-employed and independent professionals (e.g. lawyers, engineers, doctors), as well as farmers: pay a fixed amount each month, chosen among 6 insurance categories.

Insurance Category Monthly:

1st: €155

2nd: €186

3rd: €236

4th: €297

5th: €369

6th: €500

Special insurance category for self-employed with less than 5 years of insurance: €93.

Farmers pay a different fixed amount each month.

Hungary

Contribution rate:

Employee: 10%

Employer: 11.05%

In addition, certain groups of people pay a pension contribution of 10% of total gross income (e.g. recipients of job-seeking support, of certain child-raising benefits, rehabilitation benefit; ecclesiastical persons in church service; members of social cooperatives etc.).

Self-employed: The self-employed basically pay the same social security contributions as employees. 21% of gross income as pension contribution.

Note: Employee: included in the payment of the "social security contribution" (társadalombiztosítási járulék), which is 18.5% of total gross earnings, 54% of the amount collected is allocated to the Pension Insurance Fund. Employer: included in the payment of the "social contribution tax" (szociális hozzájárulási adó), which is 15.5% of gross earnings, 71.63% of the amount collected is allocated to the Pension Insurance Fund.

Ireland

Contribution rates:

Class A (i.e. most employees)

employers:

- 8.8% for earnings between €38 - €386 per week.
- 11.05% for earnings above €386.

These include a 1% National Training Fund levy.
Employees: 4% on earnings over €352 per week.
Self-employed: 4% or €500, whichever is higher.
Note: Social security contributions cover all the social security expenditure

Italy
Contribution rate:
Employee:
Private sector: Total: 33%, Employee: 9.19%; Employer: 23.81%;
For civil servants (State): Total: 33%, Employee: 8.80%; Employer: 24.20%.
For civil servants (Local Entities and NHS centres): Total: 32.65%, Employee: 8.85%; Employer: 23.80%.
Ceiling related to the annual salary ceiling (€103,055 for 2020).
Self-employed: (Gestione separata): 24%
Note: Independent professionals (e.g. lawyers, engineers, doctors) have specific contribution rates.

Latvia
Contribution rate:
First pillar contribution rate: Total: 14%, Employee: 7%; Employer: 7%;
The State budget pays compulsory contributions for certain groups of people.
Second pillar: Total: 6%, Employee: 3%; Employer: 3%;
Note: There is also a tax-financed flat-rate universal system for people who have reached the legal retirement age and who are not insured.

Lithuania
Contribution rate:
First pillar compulsory: employees and self-employed: 8.72%.
Second pillar: private contributions: 3%; by state budget: 1.5% of the national average wage.
Self-employed: Same overall contribution rate for employees, 8.72%
Note: The second pillar was voluntary but became mandatory from 2019.
Contribution rates also finance disability or invalidity benefits.

Luxembourg
Contribution rate:
Employee: Total: 16%, Employee: 8.00%; Employer: 12.55%

Ceiling of €10,709.97 (annual ceiling estimated at €128,519.64 as of 1 January 2020)
Self-employed: 16%
Exemption from social security on request if the income from the activity does not exceed one-third of the minimum social wage per year or, in the case of a farmer, if the size of the farm does not exceed a certain threshold.
Note: Contribution rates also finance disability or invalidity benefits

Malta
There is a single overall contribution rate of 10% of earnings.
Over 18 years of age whose basic weekly wage does not exceed €179.33: contribution rate is €17.93 per week;
Born up to 31/12/1961 and whose basic weekly wage is €179.34 and does not exceed €365.72: contribution rate is €36.57 per week;
Born on 01/01/1962 onwards and whose basic weekly wage is between €179.34 and does not exceed €480.49: 10%; if it exceeds €480.50: Social Security Contribution is €48.05.

Employers contribute an equal amount of social security contributions for each employee on their payroll.
Self-employed engaged in any activity earning more than €910 per annum pay an overall social contribution rate which is 15% of the annual net income. The lowest contribution rate is €30.77 per week and the highest rate is €54.85 per week for those born in 1961 or before and €72.08 per week for those born in 1962 or after.
Self-employed who are below 65, ordinarily resident in Malta, neither employed nor self-occupied persons and earn less than €910 per year and self-employed persons who are single whose income is less than €9,205 pay a fixed rate of €26.55 per week.

Netherlands
Contribution rate:
Employee: Total: 17.9%, Employee: 17.90%; Employer: 0%
Annual earnings ceiling € 35.129 (on 2021)
Self-employed: 12,1%

Poland
Contribution rate:
Employee: Total: 19.52%, Employee: 9.76%; Employer: 9.76%
Self-employed: 9.76%

The maximum level of earnings base is 30 times the projected national average wage as set out in the budget law; this ceiling applies to the combined contribution of the employer and insured person.
Note: Contribution rates also finance disability or invalidity benefits.

Portugal
Employee contribution rate only for pension system: Total: 22,65%, Employee: 7,18%; Employer: 15,47%
Social security contributions are shared by the employee and the employer.
Self-employed: 24.41%
Note: Social security contributions are shared by the employee and the employer. The contributions are due on the employee's gross remuneration at rates of 11% and 23.75% by the employee and the employer, respectively. These contributions cover family, pension, and unemployment benefits.

Romania
Contribution rate:
Employees and self-employed: 25% (including 3.75% for Second compulsory Pillar)
Employer: the contribution rate varies with the working conditions, Normal 0%, Difficult 4%, Special 8%.
Self-employed: 25%
Insurance under the public system of pensions is compulsory if the monthly average net income is above the Minimum Gross Wage, (e.g. RON 2,230 in 2020)

Slovakia
Contribution rate:
Employee: Total: 18.00%, Employee: 4%; Employer: 14% (possibility to transfer 5% to the 2nd pillar);
Self-employed: 18% (possibility to transfer 5% to the 2nd pillar);
Old-age insurance is mandatory for self-employed with annual income in 2019 over €6,078, while it is voluntary for those who earn less than this amount.

Slovenia
Contribution rate:
Employee: Total: 24.35%, Employee: 15.50%; Employer: 8.85%
Self-employed and farmers: 24.35% of insurance base.
Note: Contribution rates also finance disability or invalidity benefits

Spain

Contribution rate:

Employee: Total: 28.30%, Employee: 4.70%; Employer: 23.60%

Self-Employed: The general contribution rate is currently between 26.50% and 29.80%. Minimum €250 per month for most freelancers.

The State finances the guaranteed amounts to reach the minimum pension (pensión mínima) of the contributory systems.

Sweden

Contribution rate:

Employee: Total: 17.21%, Employee: 7%*; Employer: 10.21%

Self-Employed: 10.21% + 7%*

Note:*7% general pension contribution paid by employees and self-employed up to a ceiling of 8.07 times the income base amount = SEK 539,076 (€51,448) (8.07 x 66.800).

3. PENSION INCOME

Summary tables in this section offer a general overview of the replacement rate, average income, Theoretical Gross Replacement Ratio, pensioners at risk of poverty or social exclusion, average pension and poverty across Europe.

Table 2 summarises the EUROSTAT Aggregate replacement ratios for pensions. The indicator is defined as the ratio of the median individual gross pensions of 65-74 age category relative to median individual gross earnings of 50-59 age category, excluding other social benefits.

We compared the Aggregate replacement ratios for the EU countries by gender.

It must be said that the replacement ratio is a synthetic measure useful for a general comparison, but presents many limitations. In fact, the percentage represents only the difference between the average income before and after retirement. Therefore, it is not a reliable indicator of the adequacy of pensions, if analysed individually.

The replacement rate is the result of the crystallisation of the income situation, therefore more fragile careers can give higher replacement rates or very strong careers can generate lower replacement rates in percentage terms, according to the different methods of calculating the benefit.

The highest gender gap is recorded in Spain. The best data in favour of women are recorded in Estonia, where the average replacement rate for women is 11 percentage points more favourable than that of men.

The most favourable replacement rate for men or women is determined by multiple factors. One of the most important, as mentioned, is closely related to the labour market, to wage differences and to the discontinuity of careers, especially for women.

Another factor of considerable importance is the mechanisms of integration of minimum pension schemes or mechanisms to enhance the value at retirement of the work of care or motherhood.

If we consider the data in relation to the contributions paid during the working career, we note that Luxembourg, which records the highest replacement rates, has a contribution equal to 16% below the average of the other European countries. The Czech Republic, which has one of the highest contribution levels in Europe, records replacement rates below the European average.

This different correlation is generated by the type of benefit calculation applied by the EU states, for example if the system is based on the Defined Benefits or Defined Contributions.

Table 2: Aggregate replacement ratio for pensions (excluding other social benefits) by gender (percentage value)

	MALE	FEMALE	Difference
Austria	64,0	58,0	**-6,0**
Belgium	50,0	50,0	**0,0**
Bulgaria	49,0	36,0	**-13,0**
Croatia	43,0	43,0	**0,0**
Cyprus	48,0	36,0	**-12,0**
Czechia	48,0	52,0	**4,0**
Denmark	44,0	53,0	**9,0**
Estonia	35,0	46,0	**11,0**
EU - 27	61,0	55,0	**-6,0**
Finland	53,0	53,0	**0,0**
France	66,0	67,0	**1,0**
Germany	45,0	48,0	**3,0**
Greece	69,0	57,0	**-12,0**
Hungary	58,0	60,0	**2,0**
Ireland	37,0	40,0	**3,0**
Italy	75,0	61,0	**-14,0**
Latvia	39,0	43,0	**4,0**
Lithuania	41,0	43,0	**2,0**
Luxembourg	89,0	71,0	**-18,0**
Malta	60,0	51,0	**-9,0**
Netherlands	56,0	56,0	**0,0**
Poland	67,0	59,0	**-8,0**
Portugal	73,0	59,0	**-14,0**
Romania	65,0	50,0	**-15,0**
Slovakia	56,0	61,0	**5,0**
Slovenia	48,0	44,0	**-4,0**
Spain	75,0	50,0	**-25,0**
Sweden	60,0	54,0	**-6,0**
Source of data: Eurostat EU-SILC survey - 2018			

Table 3 shows the percentages by gender of the population at risk of poverty or social exclusion in the EU countries.

We want to draw attention to these data which can help to assess the adequacy of social security instruments with better accuracy, precisely because the replacement rate, as mentioned, is a tool that offers only a partial analysis.

In fact, the data show us a greater risk of social exclusion for women over 65, generally widespread in all member states, although in the previous Table 2 we could see how the data on the replacement ratio was heterogeneous.

Even in countries that have equivalent replacement rates between genders (France, Germany, Netherlands), women still suffer from a greater exposure to the risk of poverty.

In the case of Estonia, it is evident that the extremely positive replacement rate in comparison for women, + 11%, does not produce decisive effects in relation to social exclusion, in that half of women over 65 are exposed to poverty risk.

Table 3: People at risk of poverty or social exclusion by age and gender - Over 65 (percentage value)

	Male	Female
Austria	9,5	18,4
Belgium	16,2	18,4
Bulgaria	35,7	51,5
Croatia	27,3	35,2
Cyprus	20,8	25,9
Czechia	7,9	21,5
Denmark	9,9	9,4
Estonia	36,1	53,3
EU - 27	15,5	20,7
Finland	9,3	17,7
France	9,0	10,6
Germany	17,1	20,8
Greece	18,7	23,4
Hungary	9,6	15,6
Ireland	15,8	25,3
Italy	17,5	22,3
Latvia	40,1	53,4
Lithuania	29,8	49,2
Luxembourg	7,2	12,6
Malta	23,6	29,4
Netherlands	11,7	12,0
Poland	13,6	21,0
Portugal	18,0	23,6
Romania	25,8	37,4
Slovakia	10,0	13,1
Slovenia	14,4	24,4

Spain	16,3	18,7
Sweden	9,5	19,2
Source of data: Eurostat - 2018		

Table 4 shows the data from the Pension Adequacy Report 2018 relating to Theoretical Gross Replacement Ratio. These summarise the 40-year projections of how the replacement rate will evolve by evaluating the EU countries' pension systems in 2016. It should therefore be noted that the data do not take into consideration any regulatory interventions subsequent to 2016.

In Table 4 we wanted to compare the data for 2016 with the relative projections by gender. A minimum fluctuation in the replacement rates of the single states emerges with contained increases and decreases.

Table 4: Theoretical Gross Replacement Rates (TRRs)
Projections 2016 – 2056
AWG Career length case
(percentage value)

	Male		Female	
	2016	2056	2016	2056
Austria	71,1	74,1	76,2	68,4
Belgium	54,3	58,5	52,5	54,7
Bulgaria	45,5	60,4	46,3	55,4
Croatia	44,4	29,9	37,7	26,7
Cyprus	54,0	59,0	53,0	na
Czechia	47,9	41,4	47,0	36,7
Denmark	51,7	79,9	51,7	41,0
Estonia	33,1	43,1	34,6	41,3
Finland	55,8	56,9	55,1	55,8
France	61,3	57,2	52,9	49,5
Germany	41,8	51,5	41,8	49,9
Greece	na	na	na	na
Hungary	56,1	59,1	51,9	54,3
Ireland	42,0	33,4	40,6	35,5
Italy	70,4	67,3	66,2	68,8
Latvia	46,7	43,5	46,7	41,7
Lithuania	39,9	38,6	37,0	36,5
Luxembourg	81,8	68,7	80,6	67,6
Malta	60,0	67,5	6,00	60,8
Netherlands	96,4	94,2	52,3	50
Poland	74,7	39,2	61,7	30,9
Portugal	89,7	56,8	84,6	53,4
Romania	55,7	22,4	45,2	20,7
Slovakia	50,4	50,0	42,1	45,6

Slovenia	36,6	38,2	39,1	39,4
Spain	78,0	81,2	84,2	81,2
Sweden	66,5	53,8	62,0	51,1
Source of Data: Member State and OECD; European Commission, DG ECFIN - 2016				

We, therefore, believe that for a correct assessment of the adequacy of pensions it is necessary to evaluate the risk of poverty in old age. Consequently, it is necessary to anchor the replacement ratio to both the fiscal sustainability and the social adequacy of the pension benefit amounts.

Furthermore, for a correct comparison of the adequacy of social security systems, one cannot ignore the contribution levels paid by workers during their careers to which a "pension promise" by the state is bound.

4. PENSION SYSTEMS AND LIFE EXPECTANCY

In this section we show the current relation between the legal retirement age, the actual average retirement age and the life expectancy of men and women in individual member states.

The data refer to 2018 and are summarised graphically in Table 5.

An analysis of the data shows that there is no widespread correlation between real life expectancy and retirement age.

For example, France is the nation where men and women have a higher life expectancy in the face of a legal and effective retirement age well below the European average. Italy, second in life expectancy at 65 for men and women, has one of the highest legal ages of access to retirement in Europe and an effective age of more than 2 years for men compared to France. By contrast Latvia, which has the lowest life expectancy for men, has an effective retirement age on average higher than the legal one and above the European average. The same is true for women in Romania, where life expectancy at 65 for women is the lowest in Europe, but the effective retirement age is 64.4 years, higher than the legal one and higher than the European average for women.

Table 5: Legal old age retirement age, the actual average retirement age and the life expectancy
(Value expressed in Years)

	Men				Women			
	Effective	Legal	Life expectancy at 60	Life expectancy at 65	Effective	Legal	Life expectancy at 60	Life expectancy at 65
Austria	63,5	65,0	22,4	18,5	60,8	60,0	26,0	21,6
Belgium	61,6	65,0	22,6	18,6	60,5	65,0	26,1	21,9
Bulgaria	63,8	63,2	17,3	14,2	62,3	61,5	22,0	18,0
Croatia	62,4	65	19,1	15,7	60,7	62,5	23,6	19,3
Cyprus	63	65	23,3	19,1	63	65	26,3	21,8
Czech Republic	63,2	63,2	19,9	16,2	61,3	62,7	24,1	19,8
Denmark	65,1	65,0	22,0	18,0	62,5	65,0	24,9	20,7
Estonia	65,5	63,3	18,9	15,7	65,7	63,3	24,9	20,6
EU-27	64,0	64,3	21,9	18,3	62,3	63,3	25,9	21,6
Finland	64,3	65,0	22,5	18,6	63,4	65,0	26,4	22,0
France	60,8	63,3	23,5	19,7	60,8	63,3	28,1	23,8
Germany	64,0	65,5	21,8	18,0	63,6	65,5	25,3	21,1
Greece	61,7	62,0	22,9	19,1	60,0	62,0	26,3	21,9
Hungary	63,4	63,5	17,5	14,6	60,0	62,0	22,4	18,5
Ireland	65,6	66,0	23,2	19,0	64,1	66,0	26,0	21,6
Italy	63,3	67,0	23,7	19,6	61,5	66,6	27,3	22,8

Latvia	65,7	62,8	17,2	14,1	64,7	62,8	23,0	19,0
Lithuania	64,3	63,6	17,6	14,5	63,0	61,9	23,8	19,7
Luxembourg	60,5	62,0	22,8	18,8	61,3	62,0	26,5	22,1
Malta	62,5	63	23,3	19,2	61,5	63	26,6	22,3
Netherlands	65,2	65,8	22,9	18,7	62,5	65,8	25,4	21,1
Poland	62,8	65,0	19,1	15,8	60,6	60,8	24,2	20,1
Portugal	68,5	65,2	22,0	18,2	65,4	65,2	26,5	22,0
Romania	64	65	17,7	14,7	64,4	61	22,4	18,4
Slovak Republic	61,1	62,2	18,8	15,4	59,9	62,2	23,4	19,3
Slovenia	63,1	62,0	21,6	17,8	60,1	61,7	26,1	21,8
Spain	62,1	65,0	23,4	19,5	61,3	65,0	28,0	23,5
Sweden	66,4	65,0	23,4	19,2	65,4	65,0	26,0	21,6
Source of data: Eurostat - 2018								

We, then, analyse the legislation in force regarding the adjustments to the legal retirement age and the calculation of the benefit in relation to possible increases in life expectancy.

In Table 6, we have summarised which mechanisms are applied across the EU member states.

Some states have already implemented or are in the process of equalising the age of access to retirement between men and women, for example, Austria, where equalisation is expected between 2024 and 2033, or Croatia, where an increase in the legal retirement age is expected until reaching 65 in 2030.

Other states, as provided for in current legislation, have measures aimed at increasing the retirement age of both genders with deadlines set by law, for example the Netherlands, which in 2024 will reach 67 years and then anchor the legal retirement age to the increases in life expectancy.

To date, 4 states have automatic mechanisms for increasing the legal retirement age, Denmark (every 5 years), Italy (every 2 years), Portugal and Sweden.

There are, then, 5 states that provide a coefficient for the calculation of the benefit. Of these, only Italy and Portugal apply automatisms also for the legal retirement age, and only Italy applies a coefficient on the calculation of the benefit for both old-age pension and early retirement pension.

We then highlight the Spanish case which provides for a "safeguard clause" linked to the sources of funding, which means that in the event of insufficient funding, the legal age of access to a pension is increased by 2 months for each year.

Table 6: Adjustment of legal retirement age

	Increasing legal retirement age	Benefit calculation
Austria	Only for Women	
Belgium	Set by law	
Bulgaria	After 31/12/2037	
Croatia	Only for Women	
Cyprus	From 2024	
Czech Republic	Not mandatory	
Denmark	Every 5 years	
Estonia	From 2027	
Finland	From 2027	
France		
Germany	Set by law	
Greece		
Hungary	Set by law	
Ireland		
Italy	Every 2 years	Yes
Latvia	Set by law	Yes
Lithuania	Set by law	
Luxembourg		
Malta	Set by law	
Netherlands	From 2025	
Poland		Yes
Portugal	Yes	Only early retirement
Romania	Only for Women	
Slovak Republic	Until 2030	
Slovenia		
Spain	Set by law + Finance linked	
Sweden	Yes	Yes

Source of data: Missoc

The data on life expectancy and the correlation with the legal and effective retirement age are heterogeneous and do not show an objective rule shared between countries.

Also the application or provision of rules to regulate access to retirement does not seem strictly related to the demographics of individual countries.

It is presumed that some corrective actions on age are dictated more by the logic of budget balance than of social equity, as for example in Spain.

It should also be noted that life expectancy is closely related to other determinant social protection factors, such as access to care and the adequacy of pension benefits.

4.1. SINGLE COUNTRY OVERVIEW

Austria

Progressive increase of age limit for women until the same retirement age as for men will be reached between the years 2024 and 2033.

Belgium

The retirement age for men and women is as follows:

- 65 for retirement before 1 February 2025;
- 66 for retirement between 1 February 2025 and 31 January 2030;
- 67 for retirement after 1 February 2030.

Bulgaria

From 1/1/2018 the retirement age is being increased as follows:

- for women: by 2 months per calendar year until 31/12/2029 and by 3 months from 1/1/2030 until it reaches 65;
- for men: by 2 months per calendar year until 31/12/2017 and by 1 month from 01/01/2018 until it reaches 65.

After 31/12/2037 the retirement age will be linked to life expectancy.

Croatia

In the transitional period from 2020 to 2029 the retirement age for women is being gradually increased by 3 months per calendar year to reach 65 in 2030.

Cyprus

Retirement age will be revised every 5 years, starting from 2024, according to the change in life expectancy during 2018-2023.

Czech Republic

The legal retirement age for men is gradually being raised by 2 months each year until it reaches 65 years.

The legal retirement age for women is increased by 6 months each year until it equals that of men. After that, the increase will also be 2 months per year until it reaches 65 years.

Further changes in retirement age will result from a review, the modalities of which are set by law, which needs to take into account developments in life expectancy.

Denmark

The retirement age is being gradually increased to 68 by 2030.
On 1 July 2020 the pensionable age was 66.
The pensionable age is linked to developments in life expectancy at age 60. It is adjusted every 5 years.

Estonia
Since 2017 the gradual increase in the retirement age has continued and will reach 65 for men and women by 2026.
From 2027, retirement age will be linked to changes in life expectancy.

Finland
From January 2017, the retirement age is raised by 3 months annually until it reaches 65 years in 2027. Thereafter, it will be linked to life expectancy.
The retirement age of persons born in 1965 and later will be adjusted according to life expectancy which will be determined at the age of 62 years.

Calculation method or pension formula:
Statutory earnings-related pension
Accrual rate on the annual earnings and unpaid periods: 1.5% from 17 to birth-year related age (68-70).
In YEL insurance (YEL-vakuutuksesta) from 18 to birth-year related age.
Those born in July – December 1956 and those born in January – March 1957 will reach their retirement age of 63 years and 6 months and 63 years and 9 months respectively in 2020. Starting earnings-related pensions are adjusted with the life expectancy coefficient. The life expectancy coefficient for those born in 1958 has been confirmed at 0.95404. It reduces the cohort's monthly pensions starting in 2020 by 4.6%.

Germany
The standard retirement age will be gradually increased to 67 years from 2012 to 2029, starting with those born in 1947. The first increase amounts to one month per year (65 to 66) and the following to two months per year (66 to 67). For all those born after 1963, the standard retirement age of 67 years shall apply.

Hungary
Retirement age is increased by 6 months for each age cohort, from 62 for those born before 1952 to 65 for those born in 1957 and after (i.e. for those born in 1952, it is 62 plus 6 months, for those born in 1953, 63 and so on). In 2020, people born in 1956 can retire at age 64 and 183 days.

Ireland
State pension age is due to increase further to 67 in 2021 and 68 in 2028.

Italy
The standard legal retirement age is 67 years for both men and women in all sectors.
The retirement age will continue to be gradually increased according to the increase in life expectancy every 2 years.
Calculation method or pension formula determining factors:
For periods of contributions accrued by 31/12/2011 by persons insured before 1/1/1996, the earning-related calculation below applies:

- Earnings up to €47,332 (ceiling): 2% x n x E, with n = number of years of insurance (max.: 40), E = reference earnings;
- Partial amount up to €62,951.56 (ceiling x 1.33): 1.6% x n x E;
- Partial amount up to €78,571.12 (ceiling x 1.66): 1.35% x n x E;
- Partial amount up to €89,930.80 (ceiling x 1.90): 1.1% x n x E;
- Earnings over € 89,930.80: 0.9% x n x E.

For periods of contributions accrued since 1/1/2012, the relevant pension amounts shall be calculated according to the contribution-related calculation system: contribution amounts are adjusted yearly, according to the average increase in GDP over the last five years.
The pension amount is calculated by multiplying the total contribution amount by a transformation coefficient (i.e. an actuarial coefficient which varies according to age, which is gradually increased according to life expectancy).

Latvia
The legal retirement age is gradually increasing by 3 months per year until reaching 65 years in 2025.
Calculation method or pension formula determining factors:
First pillar:
Pension formula (i.e. for those whose social insurance period is from 1996): P = K / G where

- P: annual pension;
- K: the pension capital of insured person;
- G: time period (in years), during which pension disbursements are planned, starting from the pension allocation year (projected life expectancy at a certain retirement age).

Lithuania

From 2012 onwards, the retirement age increases annually by 4 months for women and by 2 months for men until it reaches 65 for both women and men in 2026.

Netherlands

The legal retirement age in:

- 2020 and 2021 is 66 years and 4 months
- 2022 is 66 years and 7 months
- 2023 is 66 years and 10 months
- 2024 is 67 years

As of 2025 the legal retirement age is linked to the remaining life expectancy and will rise by 8 months for every year of increasing life expectancy.

Malta

The legal retirement age for men and women born:

* in the years 1952 to 1955: 62;
* in 1956-1958: 63;
* in 1959-1962: 64;
* in 1962 and subsequent years: 65.

Poland

Factors determining calculation method or pension formula:

Old-age pension for persons born from 1/1/1949, the amount of the old-age pension is calculated as follows:

The total pension assets accumulated in the individual's account are divided by the average remaining life expectancy at the age of application for pension.

Portugal

Since 2015 the normal age for access to a pension varies depending on the average life expectancy at the age of 65.

When the beneficiary reaches the age of 65, the normal retirement age is reduced by four months for each calendar year after the contribution period of 40 years, with a 60-year threshold.

Calculation method or pension formula determining factors:

Only in the case of an early retirement, the factor of financial sustainability (related to the average life expectancy evolution) is applied to the amount of the pension calculated above, corresponding to the year when the pension started (the sustainability factor is not applied to early retirement within the framework of the flexibilisation scheme and in case of long contribution careers).

The financial sustainability factor is based on the relation between the average life expectancy in 2000 and that of the year preceding the claim for pension.

Romania
Women: 61 years, gradually increasing to 63 years by 1 January 2030.

Spain
Progressive increase until 2027: 65 years (with 38 years and 6 months of contributions); 67 years (with less than 38 years and 6 months of contributions).
Increase in the legal age (in case of insufficient contributions) of 2 months per year.

Slovakia
From 1 January 2020, retirement age is based on the year of birth, sex and number of children raised with a maximum age of 64 for both men and women.
The retirement age will also depend on average life expectancy until 2030.

Sweden
Flexible retirement age from 62 for earnings-related pensions and from 65 years for Guaranteed pension.
The target age has been introduced to determine when to retire. It replaced the former standard age of retirement of 65 with a retirement age that takes account of the increasing life expectancy in Sweden and it is based on the gradual increase in the retirement age.
Calculation method or pension formula determining factors:
Earnings-related old-age pension:
Accrued pension rights are indexed annually according to the development of average wages.
Pensions will be calculated by dividing total accrued pension assets by an annuity factor depending on the average life expectancy for a cohort, on the age of retirement for an individual and on a "norm" for (expected) increase of average wages.
The "norm" for increase in average wages is 1.6%. It is used in the index for the yearly adjustment of pensions as well as in the factor for calculating the first year's pension. Payments are made monthly.

5. FINANCIAL MANAGEMENT SYSTEMS

In the analysis of a social security or welfare system, the definition of the financial management system is important. That is the criterion for calculating the current average values of contributions and pension benefits, to meet the condition that the budget and collective equilibrium is satisfied.

With reference to the traditional actuarial literature, various financial management systems can be identified, methods for achieving the actuarial balance between contributions and benefits:

- financial systems with capitalisation, individual or collective;
- pay-as-you-go financial systems, pure or hedge capital.

Capitalised financial management systems are based on an actuarial balance, on an individual or collective basis, between the average current value of contributions and the average current value of benefits; while in the pay-as-you-go financial systems the balance is sought between the contributions received and the services provided during the year, calculating the latter with reference to the charges for the year (pure distribution) or the capital value of the benefits paid for the year (distribution of hedging capital).

In particular:

Individual capitalisation: the individual contributions make up the social security position of the individual; upon the occurrence of the event, the service is provided based on the contributions paid and revalued.

The calculation of the current average values of contributions and benefits is based on the principle of individual actuarial equity; therefore it is not possible to redistribute the risk among all members of the community. The contributions paid by the individual form an "individual amount" which is transformed into a performance upon the occurrence of the event for which one is insured. The amount of benefits an individual is entitled to depends on the contributions they have paid: the more contributions they have paid up to retirement age, the greater the benefits they will be entitled to.

Collective capitalisation: the sum of the amounts accumulated by the community forms the reserve available to fund the services for the events relating to the members of the same community over time.

Against the payment of an average premium equal for all (in absolute value or as a rate of remuneration) and calculated through the principle of collective actuarial equity, everyone is guaranteed the same rules on performance based, for example, on a guaranteed return, of income or contributory seniority or upon the occurrence of a specific event (typically invalidity or premature death).

A redistribution of risk is then carried out. The amount of contributions paid by the community and the returns obtained from their investment form the reserve to cover the benefits to be paid to them upon the occurrence of the insured events.

Annual PAYG: contributions paid by members during the year are used to pay the services provided in the same year.

Hedge capital PAYG: the contributions paid by members during the year are used to finance the average current value of the costs of the new services arising in the year.

Both pay-as-you-go forms can be spread over more than one year, with the multi-year distribution calculated as a weighted average of the annual values.

Taking into account the public welfare choices made by European countries, it is useful to try to construct a table highlighting the strengths and weaknesses of pay-as-you-go and capitalisation systems.

Table 7: Pros and Cons finance system
Funded vs PAYG (Pay as you go)

FUNDED	PAYG
Sound and prudent management of investments is required over a very long-term period (over 35 years) There is a structural limit to the amount of resources the market could manage. (In 2018 the EU 27 used €1,291 billion for pensions, for a funded first pillar we have to imagine, in a simplistic way, 35 times that amount of money) This system in directly linked to the economic crisis.	You can choose to pay pensions immediately with the contribution of active workers. So you can respect the agreement with citizens even following huge economic crisis, war or other unforeseen circumstances. With demographic change (longevity) you could share with future generations the cost of the social security system. The system is prey to the phenomenon of population ageing, i.e. the ratio of active workers to the number of new pensioners. It postpones the cost of benefit rights acquired by workers; shifts onto future generation the costs related to actual workers; It is slow to react to economic changes; is based on balance between financial income and benefit costs. So it could lead to increased benefits in good economic periods, with promises that cannot be kept during periods of recession.

6. EUROPEAN NATIONAL PENSION SYSTEM, THE CALCULATION OF PENSION BENEFITS SYSTEM

In this chapter, the different national pension systems are analysed according to:

- The calculation of pension benefits system: Defined Benefit (DB), Defined Contribution (DC or NDC), Hybrid system. It will be noted if minimum pension schemes are part of the national pension systems. Moreover we analyse the links between minimum schemes and the social contributions or the insurance periods;
- The financing system for social security benefits (pay as you go, fully funded, hybrid)

The main data collected are summarised in Table 8.

Table 8: Social security system
I Pillar Calculation method, Financing, Minimum schemes

	Payment	Financing	Minimum schemes
Austria	DB	Pay as you go	Yes
Belgium	DB + DC**	Pay as you go	Yes
Bulgaria	DB + DC**	Pay as you go + Funded scheme	Yes
Croatia	DB +DC**	Pay as you go + Funded scheme	Yes
Cyprus	DB	Pay as you go	Yes
Czech Republic	DB	Pay as you go	
Denmark	DB + DC**	Pay as you go + Funded scheme	
Estonia	Points	Pay as you go	Yes
Finland	DB	Pay as you go	Yes
France	DB + Points	Pay as you go	Yes
German	Points	Pay as you go	
Greece	DB	Pay as you go	
Hungary	DB	Pay as you go	Yes
Ireland	DB	Pay as you go	
Italy	NDC	Pay as you go	Yes****
Latvia	DB + DC**	Pay as you go	Yes****
Lithuania	DB	Pay as you go	
Luxembourg	DB	Pay as you go	Yes
Malta	DB	Pay as you go	Yes
Netherlands	DB + DC**	Pay as you go + FDC**	Yes
Poland	DB+DC or DC	Pay as you go	Yes
Portugal	DB	Pay as you go	Yes
Romania	DB + DC**	Pay as you go	Yes
Slovakia	DC	Pay as you go + Funded**	Yes
Slovenia	DB	Pay as you go	Yes
Spain	DB	Pay as you go	Yes
Sweden	NDC + DB***	Pay as you go	Yes

** Compulsory second pillar
***Supplementary pension
**** Only partial (age or category)

6.1. SINGLE COUNTRIES' SYSTEMS

Austria

Payment-based (defined benefit – DB) compulsory social insurance scheme covering employees providing earnings-related pensions depending on contributions and the duration of affiliation. It is financed on a pay-as-you-go basis.

Belgium

Compulsory social insurance scheme (by current income financing ("pay as you earn")) financed mainly by contributions covering the active population (employees and self-employed) providing specific benefits depending on contributions and the duration of affiliation with rates depending on family situation.

Bulgaria

Public pension insurance, functioning as a standard pay-as-you-go system based on defined benefits principle. It is mandatory and covers all employees, self-employed, farmers, individuals working without a formal labour contract and others (nearly 30 categories of insured persons).
Second Pillar: Supplementary compulsory pension insurance based on a defined contributory fully-funded principle. There are two types of funds within this second pillar. The first one is the so-called Universal Pension Fund and covers all persons born after 31/12/1959. The second one is the Professional Pension Fund and covers persons working under the first or the second labour category (severe and harmful working conditions).

Croatia

Compulsory social insurance (pay-as-you-go) scheme for the active population based on defined benefits depending on previous earnings (earning related) and duration of employment, supplemented by a compulsory funded second-pillar system based on defined contributions (hybrid scheme).

Cyprus

Compulsory Social Insurance Scheme (Pay-as-you-go) financed by contributions covering employees and self-employed providing defined benefits (earnings-related pensions and other benefits) depending on contributions and the duration of affiliation.

Czech Republic

Compulsory social insurance scheme financed by contributions covering employees and self-employed and assimilated groups on a PAYG basis. The system is based on defined benefits. The scheme provides earnings-related pensions depending on contributions and the duration of affiliation.

Denmark

Tax-financed universal protection PAYG scheme covering all inhabitants with flat-rate defined benefit (DB) pensions depending on the duration of residence. Supplementary pension (arbejdsmarkedets tillægspension, ATP): Compulsory social insurance scheme on defined contributions (DC) covering employees and recipients of social security. Compulsory pension scheme (Obligatorisk Pensionsordning): Compulsory social insurance scheme on defined contributions (DC) for people receiving some social benefits (e.g. unemployment benefit, disability pension, etc.). The State pays a contribution to the compulsory pension scheme for these people and they get the same rights as those covered by the supplementary pension (arbejdsmarkedets tillægspension, ATP). Cumulation of contributions in cases where the contributions are paid both to the compulsory pension scheme and to the supplementary pension.

Estonia

Old-age Pension (vanaduspension): Universal social insurance scheme financed by contributions providing pensions depending on the duration of activity (until 1998) and on contributions (since 1999).
National Pension (rahvapension): Tax-financed universal scheme guaranteeing a minimum pension for persons who are not entitled to an Old-age Pension.
Supplementary Pension (kogumispension): Fully-funded pension insurance based on private asset management under State supervision with contribution defined pensions. Subscription to the funded pension is mandatory for persons entering the labour market, e.g. persons born in 1983 or later.

Finland

Insurance system (statutory earnings-related pension, Työeläke) financed by contributions covering employees, self-employed, farmers providing earnings-related pensions.
Defined benefit scheme, operated mainly on a pay-as-you-go basis, but some pensions are built on the principle of partial funding.

Tax-financed universal coverage system (national pension (Kansaneläke) and guarantee pension (Takuueläke)) guaranteeing a minimum flat-rate pension.

France
Basic and supplementary compulsory social insurance systems funded according to the distribution principle: the contributions of working people directly fund the pensions of people who no longer work. The pensions depend on earnings, contributions and the duration of affiliation. System based on defined benefits.

Germany
Compulsory social insurance scheme financed by contributions and taxes under the 'pay as you go' system covering employees and certain groups of self-employed providing earnings-related pensions depending on contributions and the duration of affiliation (point system).

Greece
Compulsory social insurance scheme financed by contributions to the contributory pension, covering employees and self-employed, and providing earnings-related pensions depending on contributions and the duration of affiliation. The national pension is not financed by contributions, but directly from the State budget. The system is managed on a pay-as-you-go basis with defined benefits for the contributory pension and flat-rate benefits for the national pension.

Hungary
Compulsory State pension scheme for employees and self-employed, based on defined benefits, financed by social security contributions (PAYG) with earnings-related benefits depending on contributions and the duration of affiliation.

Ireland
Compulsory social insurance scheme financed by contributions on a pay-as-you-go basis for employees and self-employed with flat-rate defined benefits related to the level of contributions made. State Pension (Contributory) is payable at age 66 to all persons satisfying the contribution conditions (retirement is not a condition for receipt of this pension). Also, a State Pension (Non-Contributory) is provided.

Italy
Work Insurance General Compulsory Scheme covering employees in the private sector by providing benefits calculated according to two determining factors: age and accrued contributions. Other compulsory schemes are provided for self-employed and a certain number of specific categories of workers, such as civil servants, professionals, atypical workers. Resources are managed on a PAYG basis.

The pension system is based on a notional defined contributions (NDC) scheme for those who entered the labour market after 1 January 1996. For those who entered the labour market before that date, the system is "hybrid" (a mix of DB and NDC).

Latvia

Both first and second pillars of social insurance scheme are compulsory.
First pillar: pay-as-you-go-scheme providing earnings-related pensions depending on contributions and the duration of affiliation (notional defined contributions).
Second pillar: funded scheme providing pensions depending on accumulated contributions and the pension fund selected (defined contributions). Those who are not entitled to old-age pension can receive the State Social Security Benefit under certain conditions.

Lithuania

Compulsory social insurance scheme financed by contributions on a pay-as-you-go basis covering employees and self-employed and providing a pension with a flat-rate and an earnings-related element. Benefits are calculated according to the defined benefits (DB) scheme.

Luxembourg

Compulsory social insurance scheme financed by contributions with a participation by the State, employees and self-employed with benefits depending on the duration of the affiliation (flat-rate) and on contributions (earnings-related). System based on pay-as-you-go principle.

Malta

Compulsory social insurance scheme financed by contributions on a pay-as-you-go basis covering employees and self-employed/self-occupied, and providing earnings-related pensions depending on contributions and the duration of affiliation. The system is based on defined benefits (DB).

Netherlands

Both first and second pillars of social insurance scheme are compulsory.
First pillar: social insurance scheme for all inhabitants financed by tax-related premiums on earned incomes on a PAYG basis and additional financing through public expenditure. The scheme provides flat-rate pensions with rates depending on the household situation.

Second pillar: supplementary pension schemes for most employees based on agreements between social partners.
Note: The classification based on the way benefits are defined is not applicable to the statutory flat-rate pension scheme.

Poland
Compulsory social insurance scheme financed by contributions covering employees and self-employed and providing earnings-related pensions depending on contributions and the duration of affiliation. Mixed system composed of a first pillar, financed on a pay-as-you-go basis, and a funded second pillar. Persons born before 1949 are subject to the first-pillar system only and the pension is based on defined contributions (DC). Persons born after 1969 are subject to the new hybrid system (defined benefits) and defined contributions. Those born between 1949 and 1968 could choose whether to remain in the old or to join the new system.

Portugal
Compulsory social insurance scheme based on the pay-as-you-go principle with earnings-related benefits depending on registered earnings and the duration of contribution career.

Romania
Both first and second pillars of social insurance scheme are compulsory.
First pillar: social insurance (PAYG) scheme, defined benefits, financed by contributions covering employees and self-employed, and providing earnings-related pensions depending on contributions and the duration of affiliation (first pillar).
Second pillar: funded social insurance scheme financed by contributions covering employees and assimilated groups providing pensions depending on contribution.

Slovakia
Both first and second pillars of social insurance scheme are compulsory.
First pillar: Pay-as-you-go social insurance scheme based on contributions and solidarity principle, where the sum of the benefit is derived from earnings activity during the whole working life. The pension is based on defined-contributions (DC).
Special scheme for police officers, soldiers and customs officers.
Second pillar: Funded scheme based on contributions (paid by employers, employees and by the State) and on an assessment of the money deposited with benefits linked to the accrued pension capital. The pension is based on defined contributions (DC).

Slovenia

Compulsory social insurance scheme financed by contributions on a pay-as-you-go basis covering employed and self-employed, providing earnings-related pensions depending on contributions and the duration of affiliation. The system is based on defined benefits (DB). Benefits are earnings-related.

Spain

Compulsory social insurance scheme (PAYG) financed by contributions covering employees and assimilated groups providing earnings-related retirement pensions. Defined benefit system depending on contributions and the duration of affiliation. Specific social assistance to older people is provided by regions.

Sweden

The public old-age pension system is a compulsory and universal scheme consisting of three parts:

1. the earnings-related old-age pension which is a notional defined contribution system (NDC), and the earnings-related supplementary pension, which is a defined benefit system, financed by contributions on a pay-as-you-go basis;
2. the fully-funded premium reserve pension with defined contributions placed in individual accounts (DC);
3. the tax-financed Guaranteed pension (*garantipension*) which gives a defined benefit for all residents with low or no earnings-related old-age pension (DB).

7. PENSION BENEFITS CALCULATION METHOD

In order to analyse the differences between the different countries, it is useful to explain some basic concepts regarding methods of calculating pension benefits. In particular, to define the two principal methods of calculation:

- Defined Contribution (DC)
- Defined Benefit (DB)

The DC method is strictly based on the contributions paid by the worker and/or the employer.

For the calculation of the pension benefits it is necessary to:

- identify the annual salary;
- calculate the contributions of each year on the basis of the rate in force from time to time;
- determine the individual amount: this is the sum of the annual contributions paid and revalued according to the revaluation rule provided by the law;
- apply a transformation coefficient, which varies according to the age of the worker and is commensurate with the duration of the residual life of the worker and, if applicable, of his/her family unit.

The DB method it is generally based on three elements:

- work seniority, or insurance periods (years of contributions paid);
- the retirement salary, which can be the average of the salaries of several working years, revalued according to the specific legislation;
- life expectancy upon retirement.

In the following Table 9 we want to show the evident strengths and weaknesses of the two calculation methods, for comparison.

Table 9: Pros and Cons DB and DC method

DEFINED BENEFIT	DEFINED CONTRIBUTION
Future pension benefits CAN BE easily estimated by workers during their careers Demographic dynamics are more difficult to predict as they concern long-term projections (Work life + Retirement life) Can be easily integrated with Social Solidarity Benefits (e.g. Minimum Schemes, Gender Rebalance Schemes)	Future pension benefits CAN'T BE easily estimated by workers during their careers Balance between Contribution Rate and pension benefits is always verifiable Determines differences between generations in different economic periods Economic crisis had negative impact on pension savings Reflects wage differences Demographic dynamics are easier to predict Social Solidarity Benefits (e.g. Minimum Schemes, Gender Rebalance Schemes) can't be easily integrated without specific contributions

8. THEORETICAL EXERCISE ON ACTUARIAL BALANCE IN DB AND DC SYSTEM

8.1. THEORETICAL EXERCISE ON DC SYSTEM

In order to better define a balance between the replacement rate and the contribution rate, it is useful to present some theoretical examples, calculated in an actuarial equilibrium situation, of the possible replacement rates obtainable with the current rates envisaged for the employee I pillar.

By actuarial balance we mean the equality between the contributions paid during the working life and the pension annuities received after the achievement of the requirement. This balance allows, even in a PAYG financing system, equity between generations.

The calculation of the replacement rate with the contribution calculation method is done under the following assumptions:

- contribution rate equal to the contribution currently in place for employees;
- constant income for the entire period of activity;
- zero real growth rate of the total contribution;
- 35 years of seniority or insurance;
- retirement age at 65 years old;
- estimated pension period equivalent to the average life expectancy of each country

Table 10: Theorical Defined Contribution Replacement Rate
At 65 years old with 35 years of insurance

	Contribution Rate (Percentage Value)	Life Expectancy (years)	Theorical DC Replacement Rate (Percentage Value)	Effective Replacement Rate 2018 (Percentage Value)
Austria	22,8	20,1	**39,70**	**62,00**
Belgium	16,4	20,3	**28,30**	**50,00**
Bulgaria	19,8	16,1	**43,00**	**41,00**
Croatia	20	17,5	**40,00**	**40,00**
Cyprus	16,6	20,5	**28,30**	**43,00**
Czech Republic	28	18	**54,40**	**50,00**
Denmark	12	19,4	**21,60**	**49,00**

Estonia	22	18,2	**42,30**	**41,00**
Finland	24,1	20,3	**41,60**	**54,00**
France	17,75	21,8	**28,50**	**67,00**
Germany	18,6	19,6	**33,20**	**46,00**
Greece	20	20,5	**34,10**	**64,00**
Hungary	21,5	16,6	**45,30**	**59,00**
Ireland	12,8	20,3	**22,10**	**35,00**
Italy	33	21,2	**54,50**	**73,00**
Latvia	20	16,6	**42,20**	**40,00**
Lithuania	8,72	17,1	**17,80**	**40,00**
Luxembourg	16	20,5	**27,30**	**87,00**
Malta	20	20,8	**33,70**	**60,00**
Netherlands	17,9	19,9	**31,50**	**53,00**
Poland	19,52	18	**38,00**	**60,00**
Portugal	22,65	20,1	**39,40**	**67,00**
Romania	25	16,6	**52,70**	**51,00**
Slovak Republic	18	17,4	**36,20**	**61,00**
Slovenia	24,35	19,8	**43,00**	**45,00**
Spain	28,3	21,5	**46,10**	**70,00**
Sweden	21,6	20,4	**37,10**	**56,00**

It is to be noted that the theorical replacement rates are less than 60% in all cases and are generally lower than the current replacement rates found (we underline that in some cases the contribution rate also includes the mandatory second pillar).
In countries with the lowest life expectancy at 65 years, the expected replacement rate is higher than the current one, while even in countries with the highest rates, the current replacement rate is not achieved.
This result represents an imbalance between past and future generations, with different characteristics, in all countries.
The construction of a pension scheme, in fact, is strongly linked to the phenomena that determine the trends in contributory income and pension outflows, and therefore to the economic and demographic situation of the country.

In a theoretical situation. In a PAYG financing system for a "young" population, in economic and demographic growth, at the beginning it is possible to build adequate services even for those with a few years of seniority, but over time the benefits and contributions will have to rebalance.

An "elderly" population, on the other hand, in a phase of demographic ageing, will find itself having to contribute more to rebalance the demographic differences, and will lead to a real shock if the moment of demographic decline coincides with an economic crisis.

8.2. THEORETICAL EXERCISE ON DB SYSTEM

To understand what an equilibrium contribution could be at this moment to reach an average substitution level of 60%, the following theoretical calculation was carried out, under the same assumptions:

- constant income for the entire period of activity;
- 35 years of seniority or insurance;
- retirement age at 65 years old.

The following Table 11 shows, alongside the current contribution rate, the theoretical contribution to obtain, on average, a pension equal to 60% of the last earned income.

Table 11: Theorical DB Contribution Rate For Technical Balance

	Theorical DB Replacement Rate (percentage value)	Life Expectancy (years)	Contribution Rate (percentage value)	Technical Balance Contribution Rate (percentage value)
Austria	60	20,1	**22,80**	**34,47**
Belgium	60	20,3	**16,40**	**34,81**
Bulgaria	60	16,1	**19,80**	**27,61**
Croatia	60	17,5	**20,00**	**30,01**
Cyprus	60	20,5	**16,60**	**35,16**
Czech Republic	60	18,0	**28,00**	**30,87**
Denmark	60	19,4	**12,00**	**33,27**
Estonia	60	18,2	**22,00**	**31,21**
Finland	60	20,3	**24,10**	**34,81**
France	60	21,8	**17,75**	**37,39**
Germany	60	19,6	**18,60**	**33,61**
Greece	60	20,5	**20,00**	**35,16**
Hungary	60	16,6	**21,50**	**28,47**
Ireland	60	20,3	**12,80**	**34,81**
Italy	60	21,2	**33,00**	**36,36**
Latvia	60	16,6	**20,00**	**28,47**
Lithuania	60	17,1	**8,72**	**29,33**
Luxembourg	60	20,5	**16,00**	**35,16**

Malta	60	20,8	**20,00**	**35,67**
Netherlands	60	19,9	**17,90**	**34,13**
Poland	60	18,0	**19,52**	**30,87**
Portugal	60	20,1	**22,65**	**34,47**
Romania	60	16,6	**25,00**	**28,47**
Slovak Republic	60	17,4	**18,00**	**29,84**
Slovenia	60	19,8	**24,35**	**33,96**
Spain	60	21,5	**28,30**	**36,87**
Sweden	60	20,4	**21,60**	**34,99**

Table 11 shows how, under the assumptions made and with the current rates, none of the countries analysed reaches the target.

The countries with the highest contribution rates are the countries with the longest life expectancy, which in any case should contribute the most to achieving the goal.

9. CONCLUSION

From the analysis of the tables and data presented, there is an extreme heterogeneity between countries with regard to contribution rates, the calculation method, retirement age and the size of pension benefits.

From the calculations made, aimed at showing in a synthetic and virtual way what the actuarial equilibrium would be by applying either the DC or DB method, it is evident that to date the relationship between the current contribution rates and the average life expectancy at 65 years would produce a replacement rate below the theoretical expectations.

Assuming, in fact, long and continuous careers of 35 years and taking into consideration only the compulsory contributions of the first and second pillar, the summary figure of the actuarial balance, that between income and life expectancy, would make a replacement rate well below theoretical 60% and generally lower than the effective replacement rate recorded in 2018.

This theoretical exercise shows us that to pursue the social objective of adequacy and social security coverage one cannot ignore the logic of solidarity between generations, but also between different categories of workers, for example in favour of those who perform hazardous jobs (linked to life expectancy), or for gender rebalancing, or a re-evaluation of family care work.

As regards the age of access to retirement, it is very important to evaluate diversified life expectancies not only by gender, but also in relation to the different wear and tear of jobs.

Furthermore, it is desirable that active ageing policies consolidated in the various states are implemented in order to fully exploit the working resources.

To increase the adequacy of first-pillar social security benefits, we believe that there are many paths to follow, starting with a reshaping of contribution rates, especially in those states that have low or highly unbalanced rates to the detriment of workers. Obviously, an increase in the cost of labour is a delicate issue that deserves an in-depth study and a cautious transition.

However, it is clear that social security systems cannot ignore a strengthening of the labour market and that they must be oriented towards solidarity logic with interventions that rebalance this aspect.

To achieve these objectives, an overall action is required that is not limited to just raising contributions or applying diversified calculation methods.

As shown in the theoretical simulation "*virtus in medio stat*".

To make social security systems efficient, in the various states, one could pursue the path of structuring hybrid systems with a first pillar based on a strong solidarity logic. This would be in line with the PAYG financing system used by all member states. This system easily allows for the implementation of minimum pensions, gender rebalancing mechanisms, enhancement of parenting, training and family care periods, as well as providing mechanisms for the protection of workers with highly discontinuous careers.

At the same time, the evolution of the second "occupational" pillar could be implemented and supported, based on personal capitalisation and therefore closely related to the career.

In any case, any social security reform of the European systems needs slow transition periods and can be implemented with greater foresight and efficiency in the phase of economic recovery.

The current economic and health contingency could weaken the measures necessary to make the welfare systems of individual states fully efficient and adequate.

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In January 2016 I was elected as workers' representative on the board of Assofondipensione, the association of Italian occupational pension funds. At the same time, I was elected by the directors of the pension funds as CTO for Assofondipensione.

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From October 2017 to October 2019, I was a member of ETUC's Fiscal and Tax Committee. Since October 2019 I have been deputy member of ETUC's Social Protection Committee.