DESCRIPTION OF THE FRAMEWORK OF THE OECD PROJECT ON RETIREMENT SAVINGS ADEQUACY

This document describes the main characteristics of the general framework for the Retirement Savings Adequacy project. While assumptions used to estimate pension rights have to be country-specific, there is a need for a common framework for all countries analysed to model the retirement readiness of people currently of working age. The ultimate goal is to be able to compare the final output (the proportion of people prepared for retirement) across countries.

The analysis is based on the measure of what people have already accumulated in terms of pension rights and pension assets. It complements this stock of rights and assets with what people may accumulate from now until the day they retire using different scenarios regarding what may happen during this period. These scenarios are defined following the values taken by 5 parameters: inflation, productivity, age of retirement, rate of return on assets and discount rate.

I. Parameters of the model

- Inflation: constant value at 0%, 2% or 4%.
- Productivity: constant value at 0.7%, 1.5% or 2.7%.
- Age of retirement: as early as possible, at the average age of retirement currently observed in the population, or either at the official age of retirement or at the observed age + 2 years, whichever is larger.
- Real rate of return on assets: constant value at 1%, 3.5% or 6.1%.
- Real discount rate: constant value at 0.4%, 2% or 3.7%.

II. Sample selection

- If household level information is available, the sample includes the head of the household and the spouse. The other household members are excluded as usually no detailed information is available for them in surveys.
- The sample only includes households where both spouses are older than 35,[1] at least one of the spouses is younger than 65, and the head[2] of the household does not declare him/herself as retired and not in the labour force.

1 . The study shuns from the younger workers (i.e. those aged 16 to 24 and 25 to 34) as their past labour histories may be short or non-existent and thus strong assumptions about their future work histories would be required.

- If there is a maximum age of retirement in the country analysed, individuals who have already reached that age should be excluded from the sample.

- The sample only includes individuals with a working history, *i.e*. who have worked at least once since the beginning of their career. Individuals who have never worked at the time of the data collection are therefore excluded. If the working history is only partially known, only individuals who were working at the time of the data collection or who have worked during the 5 preceding years are included in the sample.

- To avoid excluding a significant part of working age population, the sample also includes non-working spouses, as long as they are living with a partner with a working history.

- There are cases when wages for the full working history may not be necessary to calculate benefits from pay-as-you-go (PAYG), DB and DC pension plans. In most surveys, there is already data or information available that may render data on past wages unnecessary, *e.g.*:

  – if the number of pension points accumulated at the time of the data collection is available for social security systems with points (*e.g*. Germany);

  – if assets accumulated in DC pension plans at the time of the data collection are available;

  – if the number of years already passed in DB pension plans at the time of the data collection is available.

- As long as one of these conditions is not met, there is a need to work on a sub-sample of individuals with wages for their full working history.

III. Age of retirement

- The analysis considers that each individual in the household takes his/her own retirement decision. Three different assumptions are considered to determine the **age of retirement**.

  1. The individual retires as early as possible. This corresponds to the minimum age of retirement. It usually comes with a reduced pension. It may depend on the number of years the individual has been contributing to the system.

  2. The individual retires at the actual average age of retirement observed in the country analysed.

  3. The individual retires at the official or statutory age of retirement. That age may be the same for all individuals or may depend on the date of birth. It is usually the age when the individuals are entitled to a full PAYG pension. It may depend on the number of years the individual has been contributing to the system.

- In case the actual average age of retirement is larger than the official age of retirement, the study assumes that the individual retires at the actual average age of retirement plus two years rather than assuming s/he retires at the official age of retirement.

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2 . We assume that the head of the household is the prime wage earner. Being the head of the household is indeed a better predictor for having the highest wage of the household than being the oldest spouse.

- The individual may not be allowed yet to receive benefits from all his/her pension sources at the assumed age of retirement.[3] In those cases, the study assumes that s/he stops contributing and accruing pension rights from that date. However, the amount of pension benefits s/he may get at retirement is calculated at a later date, when s/he is allowed to receive all his/her pension benefits.

- If at the time of the data collection the individual is already older than the age of retirement assumed in the hypothesis chosen, the study assumes that s/he retires as of the following year.

- If both spouses do not retire the same year, the benefits of the one retiring the first are adjusted to the year when the second spouse retires, in line with the rules in each pension system.

IV. Employment status and earnings going forward

- **Inflation** is assumed to be fixed and can take any value in the model. In particular, the model looks at 0%, 2% or 4%.

- **Productivity gains** are assumed to be fixed and identical across individuals (any value can be plugged in the model, in particular 0.7%, 1.5% and 2.7%).[4]

- The extrapolation of future earnings is based on past earnings which are adjusted by inflation and productivity.

  – Wages in year N are equal to wages in year N-1 adjusted by inflation and productivity for individuals employed in year N. If the wage in year N-1 is 0 or missing, the wage in year N is set equal to the last non-zero wage.

  – Individuals unemployed or out of the labour force in a given year are assumed to have a zero wage that year. If they go back to employment, we assume they earn the same wage as their last non-zero wage. Wages earned thereafter are adjusted by inflation and productivity, until retirement.

- The employment status going forward is based on the most reasonable scenario for each country and on data availability.

- As a baseline, individuals are randomly assigned an employment status in each year of the simulation based on the long-term unemployment rate in the country analysed and on the probability to ever suffer a spell of unemployment during one's career. If the unemployment rate observed at the time of the data collection is higher (respectively lower) than the long-term unemployment rate, we randomly select individuals unemployed (respectively employed) at the time of the survey and assume they go back to employment (respectively lose their job) during the following five years so that the unemployment rate converges towards its long-term value. We also assume random spells of unemployment for individuals employed at the time of the data collection but who have never suffered spells of unemployment yet, so that the proportion of

3 . For instance, in the Netherlands, people cannot receive their public pension benefits before the age of 65, but may retire earlier from their occupational pension plan.

4 . The model may consider variable productivity gains according to age and educational level at a later stage.

individuals experiencing unemployment equals 40%[5] in each age group. They are assumed to suffer only one spell of unemployment.

- As an alternative to the baseline case, the study uses transition probabilities between the different employment statuses and wage equations estimated from survey or administrative data.

V. Projection of PAYG/public pension benefits

- This part depends on each country's pension system.

- PAYG pension benefits should be adjusted upward (respectively downward) for late (respectively early) retirement according to the rules in the country analysed.

- If both spouses do not retire the same year, the PAYG pension benefits of the one who retires first are adjusted to inflation (or to any other index depending on the rule in the country analysed) to get an equivalent value up to the year the second spouse retires.

VI. Projection of DB funded pension benefits

- We assume that the individual covered by a DB pension plan at the time of the data collection will continue to be included in the current DB plan until s/he retires.

- We therefore calculate the total number of years in the plan as the number of years in the plan as of the data collection plus the remaining number of years until retirement. If the number of years in the plan is missing or not available, the current tenure in the job offering the plan is used. If both the number of years in the plan and the tenure in the job offering the plan are not available, we assume the individual has been covered in each year he has been employed. Years during which the individual is unemployed are not counted as years in the plan.[6]

- We calculate DB expected benefits using the actual formula, if available. Otherwise they are calculated as (total number of years in the plan) x (accrual rate) x (reference wage). If the accrual rate is not available, we assume 1.5%. The reference wage taken into account in the benefit formula can be for instance the final wage, the average wage during the career, or the average wage during the last x years. If this information is not available, we assume a final wage DB formula.

- If the individual has a DB plan with a former employer and already receives benefits from it, we use the amount of benefits declared by the individual. The benefits are adjusted by inflation to get an equivalent value the year the individual effectively retires if the benefits are adjusted for the cost of living.

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5 . According to the labour market literature, on average, only around 40% of individuals in any given cohort suffer spells of unemployment. See Taylor, M. and A. Booth (1996), "The changing picture of male unemployment in Britain", ESRC Research Centre on Micro-social Change, University of Essex; Dex, S. and A. McCulloch (1998), "The Reliability of Retrospective Unemployment History Data", *Work, Employment & Society*, Vol. 12, No. 3; and Schmillen, A. and J. Möller (2010), "Determinants of lifetime unemployment", IAB Discussion Paper 3/2010.

6 . We assume that an individual covered by a DB plan and suffering unemployment goes back to employment with the same employer or within the same industry, then keeping rights in his/her DB plan.

- If the individual has a DB plan with a former employer and expects to receive benefits in the future from it, we use the amount of expected benefits declared by the individual. If the individuals do not know what their expected benefits will be, we calculate them using exactly the same formula as for the current DB plan (if the number of years in the former DB plan is available or can be estimated).

VII. Projection of benefits from funded pension plans based on assets accumulated (DC / hybrid)

- We consider here all plans in which the benefits are determined based on the level of assets accumulated in the plan at the time of retirement. This is obviously the case of defined contribution pension plans, but also of hybrid DB plans, in which benefits depend on a rate of return credited to contributions (*e.g.* cash balance plans).

- We assume that the individual covered by a DC or hybrid pension plan at the time of the data collection will continue to be included in the same plan until s/he retires.

- In order to estimate benefits from DC and hybrid pension plans, we need information on contribution rates and on the level of assets accumulated at the time of the survey.

- We consider both employee and employer contribution rates. If employer (respectively employee) contributions are mandatory, missing values in the survey are replaced by the average employer (respectively employee) contribution rates observed for individuals with positive employer (respectively employee) contribution rates.

- If the contribution rate is not available, we need to know the level of contributions, which is transformed into a contribution rate by dividing contribution levels at the time of the data collection by the gross amount earned in the main job at the time of the survey. If the amount earned in the main job is missing, we use total wages and salaries earned (possibly from several employments).

- If the level of assets at the time of the survey is available, the further accumulation up to retirement assumes a constant contribution rate (equal to the one observed at the time of the data collection – employee plus employer) and a constant **real rate of return** on assets (in particular, the model looks at 1%, 3.5% or 6.1%).

- If the level of assets at the time of the data collection is not available, we need to build the whole accumulation, from the time the individual joined the plan to retirement, assuming the same contribution rate (equal to the one observed at the time of the survey) and real rate of return during the whole period. If the total number of years in the plan is missing, we use the current tenure in the job.

- If the individual suffers unemployment, we assume s/he keeps the assets accumulated in the plan and transfers all the assets when going back to employment into a new plan with the same characteristics. This is equivalent to assuming that the individual stays in the plan but do not contribute during the years of unemployment. The assets therefore continue to accumulate even during unemployment periods with the return credited to past contributions.

- We transform estimated assets accumulated at retirement into a stream of pension income by dividing assets accumulated by an annuity factor calculated as $\frac{1}{nominal\ discount\ rate} \times \left(1 - \frac{1}{(1+nominal\ discount\ rate)^{lexERA}}\right)$, where lexERA is the life expectancy at the effective age of

retirement. We use a fixed **real discount rate** (in particular, the model looks at 0.4%, 2% or 3.7%) and latest available life expectancy tables by age and gender.

- Benefits already in receipt or expected in the future from former plans are also taken into account.

VIII. Evolution of private pension coverage for voluntary systems

- The coverage of private pension plans going forward is based on the most reasonable scenario for each country.

- In countries where coverage increases with age, the model randomly selects individuals not covered by any private pension plan at the time of the data collection to become members of a plan during the simulation, following the age-specific coverage rates currently observed in the data.

- In countries where new private pension products have been introduced recently and are expected to cover a larger share of the population in the future, the model randomly selects individuals not covered by any private pension plan at the time of the data collection to become members of a plan during the simulation, with the coverage rate converging asymptotically towards a reasonable target based on the current trend.

- Considering the shift from DB to DC schemes, all new pension plan members are supposed to join a DC plan.

- The contribution rate that new pension plan members will have corresponds to the average contribution rate observed for individuals currently having a DC pension plan, broken down by age and income level.

- Assets in the new DC plan are accumulated from the year the individual gains membership until retirement and are transformed into a stream of pension income using the same annuity formula as for current hybrid and DC pension plans.

- The impact of country-specific policy options to increase coverage is analysed separately.

IX. Accounting for household composition

- Once all pension sources have been projected at retirement for each member of the household, the corresponding incomes are summed across households' partners. The total household pension income is then divided by 1.5 in the case of couples (using the OECD equivalence scale which assigns a weight of 1 for the first adult and of 0.5 for the second) and the result is assigned to the head and his/her spouse.

- Non-contributory pension benefits (e.g. safety net or solidarity pension programmes) may be also added to the total household income, before dividing by the equivalence factor of 1.5. If the total pension income of the household falls under a certain threshold, which is usually inflation indexed, we calculate the amount of non-contributory pension benefits that the household is entitled to.

X. Scenarios

- The impact of some of the assumptions on retirement readiness is examined by focusing on scenarios. We move from a pessimistic scenario to an optimistic scenario by changing one parameter at a time. This allows assessing the individual impact of each parameter on the results.

- We focus on 3 main scenarios as described below:

Parameters	Pessimistic	Intermediate	Optimistic
Inflation	4%	2%	2%
Productivity	0.7%	1.5%	2.7%
Real rate of return	1%	3.5%	6.1%
Real discount rate	0.4%	2%	3.7%
Age of retirement	Early	Observed	Official or Observed + 2

- We start calculating the indicators for the pessimistic scenario. We then assess the impact of inflation by calculating the results when inflation moves from 4% to 2% and 0% (keeping all the other parameters constant). Moving forward, we keep the value of 2% for inflation (the value of the optimistic scenario) and then assess the impact of productivity (0.7%, 1.5%, or 2.7%). We then keep the value of 2% for inflation and 2.7% for productivity and assess the impact of the real rate of return, and so on until we finally assess the impact of the age of retirement. The indicators for the intermediate scenario are calculated separately from this process.

XI. Retirement savings adequacy indicators

- Pension benefits in national currency: pension benefits are discounted by wage growth (i.e. inflation and productivity) in order to be able to compare amounts for people retiring in different years

- Replacement rate: different ratios are calculated[7]

  - Ratio of pension income at retirement to the last wage just before retirement[8]

  - Ratio of pension income at retirement to the average wage over the career

  - Ratio of pension income at retirement to the average income of the population

  - Ratio of pension income at retirement to the average income of the individual's income group

- The first two ratios allow replying to the question: can people sustain their consumption level? The last two allow replying to the question: can people remain in the same income level relatively to their society?

- Poverty line: we calculate the proportion of individuals who will have a pension income higher than the poverty threshold the year the household retires (i.e. the first year when both partners are retired). In the case of a fixed poverty threshold, the level is usually inflation indexed.

7 . In the case of couples, the denominator for the first two ratios corresponds to the equivalised wage.

8. If the individual was not working the year just before retirement, we use the last available wage, adjusted by inflation and productivity.

- Depending on data availability, indicators could be broken down by home ownership and the value of the house.

- Finally, we compare projected pension benefits with the actual pension income of people who just retired (during the last 5 years).

- In all the cases, the indicators are broken down by age (5-years age brackets), gender and income (3 groups: 20% lowest income; 20% highest income; 60% remaining middle income).