

**Key results**

The financial and economic crisis of 2008 has meant that investment risk has been at the forefront of policy makers minds when thinking about pensions. Private pension funds in OECD countries lost 24% of their value on average, worth USD 5.4 trillion. However, it is important to bear in mind that private pensions are only a part of the overall retirement-income package: a major part of retirement income is generally not affected by investment risk. In some countries, means-tested pensions protect low-income workers from much investment risk and the tax system can also act as an “automatic stabiliser” of retirement incomes.

**Measuring investment risk**

The scale of investment risk has been analysed using historical data for eight OECD countries: Canada, France, Germany, Italy, Japan, Sweden, the United Kingdom and the United States. Detailed econometric results were then used to simulate a distribution of outcomes and probabilities for a 40-year investment horizon. The two main assets in pension-fund portfolios were analysed: equities and government bonds. The results for a portfolio split equally between these two assets are shown in the table below.

The raw results of the exercise give higher returns than those shown in the table. These were adjusted downwards to reflect, among other things, administrative charges (on which see Part II.6 the indicator of “Pension fund operating costs and fees”).

**The degree of investment risk:  
Implications for pensions**

Distribution of returns, percentile point (%)	10	25	50	75	90
Annual real return (%)	2.5	3.3	4.3	5.3	6.0
Replacement rate (%)	26.9	31.9	39.9	50.5	60.0

Note: Portfolio of 50% domestic equities and 50% domestic government bonds. Replacement-rate calculation assumes 10% contribution rate and OECD average mortality rates.

Source: OECD pension models; D’Addio, A.C., J. Seisdedos and E.R. Whitehouse (2009), “Investment Risk and Pensions: Measuring Uncertainty in Returns”, *Social, Employment and Migration Working Paper*, No. 70, OECD Publishing, Paris.

The table above shows that 50% of the time, investment returns will be higher or lower than 4.3% a year in real terms. This is higher than the baseline assumption of 3.5% of this report. Some 10% of the time, the real return is expected to be less than 2.5% or more than 6.0%. The table shows that these returns generate a large range of replacement rates, ranging from 27% in the worst cases to 60% in the best.

**Investment risk in practice**

The table opposite shows gross and net replacement rates with low, middle and high returns: the 10th, 50th and 90th percentile of the distribution of returns respectively. On the left-hand side of the table there are 10 countries where defined-contribution plans are mandatory. The nine countries on the right-hand side have broad coverage of voluntary private plans (see the indicator of “Coverage of private pensions”).

The way investment risk affects retirement incomes depends crucially on the structure of the retirement-income package. First, many benefits – from public earnings-related schemes or basic pensions – are unaffected by investment returns. In Hungary, for example, the defined-contribution pension in the best scenario is worth 2.6 times its value in the worst (also see chart). However, the overall benefit varies only by a factor of 1.5 times.


Secondly, means-tested benefits can offset some of the investment risk: a smaller defined-contribution pension results in higher benefits from targeted programmes. In Australia, for example, the defined-contribution pension is 2.4 times higher in the best rather than worst scenario for returns. Overall income, including means-tested benefit, varies by a factor of just 1.6. Means-tested benefits also play an important role in Denmark.

The final stabiliser of retirement incomes in the face of investment risk is the tax system. Because marginal tax rates are generally higher than average rates (i.e. personal income taxes are progressive), a fall in income from defined-contribution pensions results in a more than proportionate reduction in tax liability. The effect is strongest in Denmark. Before taxes, the ratio of total pension in the best and worst cases is 1.8 compared with 1.5 after taxes are taken into account. The impact of taxes is also noticeable in Poland, but pensions in Hungary are not taxed and so there is no automatic stabiliser of retirement incomes.

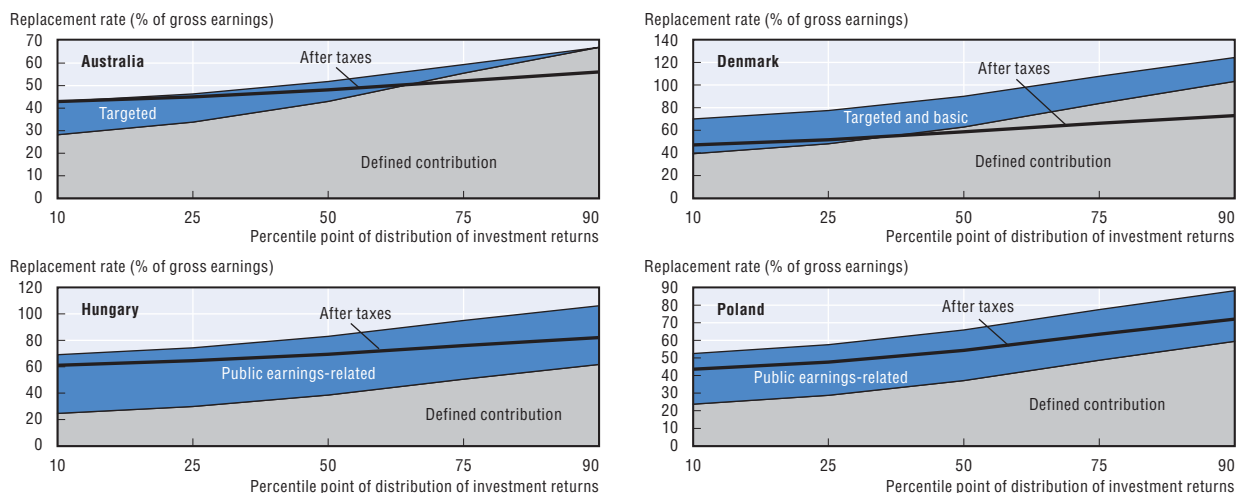
**Gross and net pension replacement rates with different rates of investment return**

Mandatory or quasi-mandatory defined-contribution plans						Voluntary or mainly voluntary defined-contribution									
Gross replacement rate (%)			Net replacement rate (%)			Gross replacement rate (%)			Net replacement rate (%)						
Percentile of rate of return	10	50	90	10	50	90	Percentile of rate of return	10	50	90	10	50	90		
Annual real return (%)	2.5	4.3	6.0	2.5	4.3	6.0	Annual real return (%)	2.5	4.3	6.0	2.5	4.3	6.0		
Australia	DC	28.2	43.0	67.0	36.4	51.6	72.4	Belgium	DC	12.2	19.1	30.6	15.5	23.3	35.2
	Other	14.7	8.8	0.0	19.0	10.6	0.0		Other	42.0	42.0	42.0	53.3	51.2	48.3
	Total	43.0	51.8	67.0	55.4	62.2	72.4		Total	54.3	61.2	72.6	68.8	74.5	83.5
Chile	DC	32.6	51.2	82.2	47.4	71.6	104.1	Canada	DC	24.2	37.8	60.5	31.3	49.0	78.5
	Other	5.9	0.4	0.0	8.5	0.5	0.0		Other	38.9	38.9	38.9	50.3	50.4	50.5
	Total	38.5	51.6	82.2	55.9	72.1	104.1		Total	63.0	76.7	99.3	81.6	99.4	129.0
Denmark	DC	39.4	63.0	103.2	45.0	69.6	102.8	Czech Republic	DC	8.8	13.8	22.1	11.0	17.0	26.8
	Other	30.6	27.1	21.1	35.0	29.9	21.0		Other	50.2	50.2	50.2	62.6	61.8	60.7
	Total	70.0	90.1	124.3	80.0	99.5	123.7		Total	59.1	64.1	72.4	73.6	78.8	87.5
Estonia	DC	17.9	27.4	42.7	22.2	32.6	48.9	Germany	DC	13.1	21.0	34.5	17.6	27.8	44.7
	Other	25.5	25.5	25.5	31.6	30.4	29.2		Other	42.0	42.0	42.0	56.4	55.7	54.5
	Total	43.4	52.9	68.3	53.8	63.1	78.1		Total	55.2	63.0	76.5	74.0	83.5	99.2
Hungary	DC	24.7	38.6	61.7	35.3	52.2	77.3	Ireland	DC	29.5	46.1	73.8	34.1	48.5	72.9
	Other	44.4	44.4	44.4	63.6	60.2	55.7		Other	29.0	29.0	29.0	33.5	30.5	28.6
	Total	69.1	83.0	106.1	99.0	112.4	133.0		Total	58.5	75.1	102.8	67.6	79.0	101.5
Israel	DC	38.9	62.2	102.0	44.7	68.8	105.5	New Zealand	DC	11.5	18.0	28.8	12.2	19.0	30.3
	Other	19.4	19.4	19.4	22.3	21.5	20.1		Other	38.7	38.7	38.7	41.1	41.0	40.8
	Total	58.4	81.7	121.5	67.0	90.3	125.6		Total	50.2	56.7	67.5	53.3	60.0	71.1
Mexico	DC	24.4	37.9	60.2	25.4	39.4	62.7	Norway	DC	9.3	14.8	24.3	10.7	16.7	26.8
	Other	4.3	0.0	0.0	4.5	0.0	0.0		Other	51.5	54.8	60.3	59.1	61.7	66.4
	Total	28.7	37.9	60.2	29.9	39.4	62.7		Total	60.8	69.6	84.7	69.8	78.4	93.2
Poland	DC	23.8	37.1	59.4	27.6	42.8	67.9	United Kingdom	DC	28.3	45.8	76.0	33.9	52.5	85.2
	Other	28.7	28.7	28.7	33.4	33.1	32.8		Other	31.9	31.9	31.9	38.1	36.6	35.7
	Total	52.5	65.9	88.2	61.0	75.9	100.8		Total	60.3	77.7	107.9	72.0	89.1	120.9
Slovak Republic	DC	25.2	38.2	58.9	32.7	49.4	76.2	United States	DC	30.1	48.1	78.9	36.4	57.4	91.4
	Other	26.0	26.0	26.0	33.6	33.6	33.6		Other	39.4	39.4	39.4	47.7	47.0	45.7
	Total	51.2	64.1	84.8	66.3	83.1	109.9		Total	69.5	87.5	118.3	84.1	104.4	137.1
Sweden	DC	18.1	27.4	42.2	18.2	27.1	40.9								
	Other	31.1	31.1	31.1	31.3	30.8	30.2								
	Total	49.3	58.5	73.4	49.5	57.8	71.1								

Source: OECD pension models; see also Whitehouse, D'Addio and Reilly (2009).

StatLink  <http://dx.doi.org/10.1787/888932370892>

**Gross pension replacement rate and taxes and contributions paid on pensions with different rates of investment return**



Source: OECD pension models; see also Whitehouse, D'Addio and Reilly (2009).

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