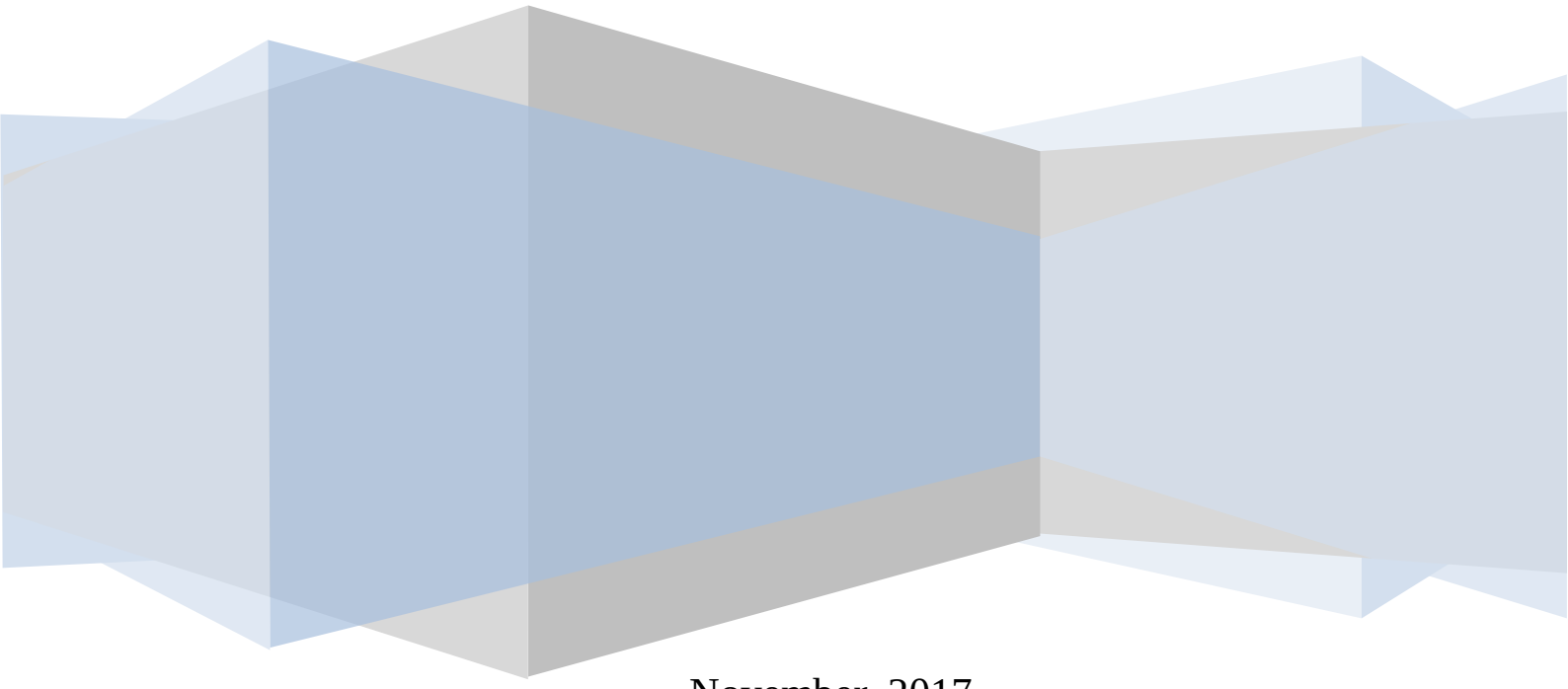
Hungarian Ministry for National Economy
Central Administration of National Pension Insurance

COUNTRY FICHE ON PENSION
HUNGARY



November, 2017

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1. Overview of the Hungarian pension system and other relevant pension-like benefits

1.1. Description

The Hungarian mandatory pension system is a pure pay-as-you-go state pension system. It covers all persons who are engaged in any kind of employment as well as recipients of unemployment and certain child care benefits. This is a defined-benefit PAYG system with an earnings related public pension. This scheme covers the following pension benefits:

- old age pension benefit,
- pension benefit for women with "40 years' eligibility period",
- survivors' pension benefit.

Other modelled "pension benefits" that are not part of the mandatory pension system:

- disability benefits, old-age allowance, other social allowances etc. (see below section 1.1.1-1.1.4 and section 3.1.1)

Indexation of all pension benefits

As from January 2012, pensions are indexed to inflation. Pension benefits are increased accordingly to the level of consumer price-index planned for the relevant economic year and defined in the annual budgetary act. A retroactive correction takes place every year in November, if fact CPI data exceeds the planned CPI in the budget.

Financing the Pension System

The rate of pension contribution is 10% (of the employee's gross wage). The rate of social contribution tax (paid by the employer) decreased from 27% to 22% as from 2017 and decreases further to 19.5% as from 2018. It is shared between the Pension Insurance and Health Insurance Fund. In 2018, 79.5% of the total social contribution goes to the Pension Insurance Fund while 20.5% is directed to the Health Insurance Fund.

1.1.1. Old age pension benefit

Retirement age

The standard retirement age for old-age pension ("öregségi nyugellátás") was 62 years in 2013 and it will have been gradually increasing, related to the year of birth. Beginning with the people born in 1952, the statutory retirement age will gradually ascend six months for each cohort both for women and men until 65 years of age by 2021.

TABLE 1 Qualifying condition for retiring

			2016	2020	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period – men*	20	20	20	20	20	20	20
		Retirement age – men	63	64.5	65	65	65	65	65
		Contributory period – women	20	20	20	20	20	20	20
		Retirement age – women*	63	64.5	65	65	65	65	65
	Statutory retirement age – men		63	64.5	65	65	65	65	65
	Statutory retirement age – women		63	64.5	65	65	65	65	65
Qualifying condition for retirement WITHOUT a full pension	Early retirement age – men		-	-	-	-	-	-	-
	Early retirement age – women		-	-	-	-	-	-	-
	Penalty in case of earliest retirement age		-	-	-	-	-	-	-
	Bonus in case of late retirement		0.5% /m	0.5% /m	0.5% /m	0.5% /m	0.5% /m	0.5% /m	0.5% /m
	Minimum contributory period – men		15	15	15	15	15	15	15
	Minimum contributory period – women		15	15	15	15	15	15	15
	Minimum residence period – men		-	-	-	-	-	-	-
	Minimum residence period – women		-	-	-	-	-	-	-

** For women there is an option to retire if they have 40 years eligibility period (gained only from work and childcare years) regardless their age, other early retirement schemes are largely abolished (see in Section 1.1.2 and 1.1.4)*

TABLE 2 Number of new pensioners by age group – administrative data (TOTAL)

Age group	All	Old age	Disability	Survivor	Other (incl. minimum)
15 - 49	4,950	48	3,500	4,902	
50 - 54	2,534	298	2,552	2,236	
55 - 59	22,883	18,488	4,365	4,395	
60 - 64	99,309	84,112	2,036	15,197	
65 - 69	10,339	2,046	0	8,293	
70 - 74	8,166	97	0	8,069	

Calculation of benefits

The calculation of benefits is based on 1) the number of service years and 2) the average of wages earned since 1988 (which were liable to pension contribution).

Step 1: Calculation of net wages for each year

Earnings have to be reduced by employees' social security contributions (for pension, health and unemployment) and personal income tax (the amount of which is only computed on wages net of contributions).

Step 2: Valorisation of net wages for each year

Thereafter, all earnings are revalued (valorised) by the growth of nationwide net average earnings up to one year before the retirement (i.e. in 2017 to year 2016).

Step 3: Calculation of the average pensionable monthly income

For higher levels of the accordingly calculated average valorised net wages (above a pre-set level – HUF 372,000 [ca. EUR 1,200]) there is a progressive reduction to be applied. (Only 90% of the incomes between HUF 372,000 and 421,000 [ca. EUR 1,350], and 80% of the monthly incomes above 421,000 have to be taken into account)[1].

[1] E.g. if the average monthly income is HUF 500,000, the pensionable average income is HUF 479,300. (372.000*100%+((421,000-372,000)*90%+(500,000-421,000)*80%).

Step 4: Taking into account the number of service years
Finally, the average of these adjusted earnings is multiplied by a rate pertaining to the number of service years the person has acquired (for example, this rate is 80 per cent for 40 service years). The rates belonging to the number of service years are not linear.

Service years	Multiplier (%)	Service years	Multiplier (%)	Service years	Multiplier (%)	Service years	Multiplier (%)
15	43	**22**	57	**29**	67	**36**	74
16	45	**23**	59	**30**	68	**37**	75.5
17	47	**24**	61	**31**	69	**38**	77
18	49	**25**	63	**32**	70	**39**	78.5
19	51	**26**	64	**33**	71	**40**	80
20	53	**27**	65	**34**	72	**40+**	+2/year
21	55	**28**	66	**35**	73		

Bonus for postponing retirement
If someone retires after the standard retirement age and earns further service periods, he/she will automatically be entitled to a bonus of 0.5 per cent of the pension benefit for each additional 30 days period.

Minimum amount of pension
The minimum amount of pension (28,500 HUF/month [ca. EUR 90]) is for those who are eligible to full pension (having minimum 20 service years), and according to the benefit calculation their pensions do not reach this amount. This is a very rare case.

Pensioners above retirement age can get pension benefits and continue working without any limitation on their income in the private sector. Whereas the pension benefit is suspended if a pensioner continues working in the public sector.

1.1.2. Pension for women with 40 years eligibility period

Pension for women with 40 years eligibility period ("nők 40 év jogosultsági idővel szerzett kedvezményes nyugdíja") is the only early pension scheme, available for those women, regardless of age, who have gained at least 40 years eligibility period. Eligibility period means any period gained with gainful activity (work) or benefits connected to child raising or nursing fee. At least 32 years of gainful activity is needed besides the periods of child raising; or 30 years of gainful activity in case of nursing fee. The eligibility period is decreased by 1 year after every child raised in the household. Women raising 5 or more children can gain altogether a maximum of 7 years eligibility period. In this scheme, women are entitled for full pension benefits, i.e. benefits are not reduced because of early retirement.

1.1.3. Survivors' benefits

Survivors' benefits ("hozzátartozói ellátás") are calculated on the basis of the pension that the deceased person was or would have been entitled to. The two types of survivors' benefits are widows' pension ("özvegyi nyugdíj) for the spouse and orphans' benefit ("árvaellátás") for the children of the deceased person.

1.1.4. Other pension-like benefits

Disability benefits

Disability benefits are financed from the Health Insurance Fund. Based on the complex evaluation of the incapacitated persons' health status, they are eligible for rehabilitation or disability provisions („rehabilitációs ellátás" or „rokkantsági ellátás"). Those who can be rehabilitated are eligible for rehabilitation benefit and receive financial support as well as services aimed at facilitating their (re-)entry into the labour market. Whereas those who cannot be rehabilitated or can be rehabilitated but have less than 5 years to retirement, are eligible for disability provisions and only receive financial support. The period of time spent in employment while receiving rehabilitation or disability provisions is taken into account when service years are calculated.

Early pensions, temporary benefits under retirement age

Benefits provided below the retirement age were largely eliminated by regulations introduced in 2011. The only two groups of workers who may be entitled to early pension benefits are miners and artists with at least 25 service years. Benefits for the participants of former early retirement schemes have been transformed to the new "benefit under retirement age" ("korhatár előtti ellátás") that functioned the same way as the previous benefits and were converted to regular old-age pensions upon reaching the retirement age. These benefits were gradually phased out between 2012 and 2016. The early pension of armed forces or dangerous and hazardous jobs has been abolished as well. Benefits of pensioners formerly worked in the armed forces and close enough to the retirement age (born in 1954 or before) are practically unchanged. Younger beneficiaries of this group were offered jobs in the public sector or they had to accept a 16% lower army benefit ("szolgálati járandóság"). Both type of pension will be phased out. No new early pension of armed forces will be established in the future, and no new rights for early pension of dangerous and hazardous jobs can be acquired in the future. Accordingly this (rather minor – expenditures of 0.04% of GDP in 2016) scheme is also phased out in the next decades.

Old-age allowance

Those who reach the standard retirement age, but are not eligible for social security pension and have no other source of sufficient income can apply for a means-tested old-age social allowance ("időskorúak járadéka"). This allowance is financed by taxes and forms part of the social assistance system. It is provided up to 2 years, after which re-application is necessary.

Pension-like supplementary social allowances

Disability allowance ("rokkantsági járadék"), work-accident allowance ("baleseti járadék"), spouse supplement ("házastársi pótlék"), regular allowances for agricultural workers ("mezőgazdasági szövetkezeti járadékok"), merit, victims and deprived persons, WWII heroes or 1956 Hungarian Revolution war heroes and other allowances.

1.1.5. Voluntary supplementary pension schemes

The projection does not cover voluntary, privately managed, supplementary pension schemes, which provide additional benefits for elders depending on their choice and possibilities to save and not part of the mandatory system. Existing voluntary pension schemes are the following:

- occupational pension institutions – new possibility for employers, only one institution operates with very few members
- voluntary pension funds (individual, DC) – approximately 26% of employed participates in this scheme,
- voluntary privately managed pension funds (ex-mandatory) – less than 2% of employed participates in this scheme, no further payments,
- retirement saving accounts,
- pension insurance products.

1.2. Reforms included in the projections

Since the 2015 Ageing Report, the rate of the social contribution tax was reduced, while on the expenditure side only a few minor changes were introduced to the pension system, all of them included in pension projection.

The following sub-sections list furthermore the numerous other more significant reforms that were implemented in the past decade (and have been introduced continuously) and that thus were already taken into account in the previous exercise. Most important of which: increase of statutory retirement age to 65 between 2013 and 2021; cancellation of early retirement schemes between 2012 and 2016; restructuring the disability system in 2012.

1.2.1. Social contribution tax reduction
(as from 1 January 2017)

The rate of social contribution tax was cut from 27% to 22% and decreases further to 19.5% in 2018. The tax is shared between the Pension Insurance and Health Insurance Fund. In 2018, 79.5% of the total social contribution goes to the Pension Insurance Fund while 20.5% is directed to the Health Insurance Fund. The disability schemes are financed from the Health Insurance Fund. In the model all social contribution tax going to the Pension Insurance Fund and a given proportion of the part going to the Health Insurance Fund is taken into account. ***This change decreases the pension revenues in the projection.***

1.2.2. Changes in the calculation of minimum and maximum disability benefits
(as from 1 May 2015)

The indexation of the minimum and maximum amount of disability benefits follows the rules of pension indexation. ***This change slightly increases pension expenditures in the projection*** since disability benefits were indexed to inflation in the former projections.

1.2.3. Former changes to the pension system introduced in the past decade

Pension benefits indexed to inflation (as from 1 January 2012)
As from January 2012, pensions are indexed only to inflation. Before 2012 the indexation was linked to the proportion of inflation and wage index, depending on the real GDP growth rate.

No new entrants into early retirement (as from 1 January 2012)
Before 2012 there were several options to retire prior to reaching the statutory retirement age that were largely abolished and remaining provisions have broadly been phased out since. (see section 1.1.4.)

Reform of the disability system (as from 1 January 2012)
Starting from January 1, 2012 disability ceased to be part of the pension system, and the disability pension was transformed to disability benefit ("rokkantsági ellátás") and rehabilitation benefit ("rehabilitációs ellátás"), the latter being different from the former rehabilitation annuity, which was also withdrawn. The disability benefit functions in effect in the same way as the disability pension. People belonged to disability pensioners' class 1 and 2 (both include people with high disability) receive this new provision. The same applies to people classified to the 3rd category (at least 50% disabled) provided they were born in 1954 or before. The rest obtained rehabilitation provision which focuses more on rehabilitation. After a complex review of the health condition and rehabilitation options of the beneficiary – depending on the result of this review – the provision is transformed to disability benefit (if the client cannot be rehabilitated) or a reduced amount of rehabilitation (if he/she can be rehabilitated) or withdrawn (if health conditions allow the client to work).

Suspension of pension benefits for those who continue working in the public sector (as from 1 January 2013)
If workers in the public sector remain in status their pension benefits shall be suspended.

New preferential tax regime for self-employed (as from 1 January 2013)
Small entrepreneurs can meet their total tax and contribution obligation with a flat amount (HUF 50,000). It is an attractive option for a number of entrepreneurs but it implies slightly less pension eligibility periods. As the ensuing base for the pension calculation is below the minimal wage, they can only collect shorter length of service years. Nevertheless when the minimum length of service years for pension eligibility is calculated (20 years), the whole period can be taken into account, so it does not affect the number of persons, who are eligible for pensions. It has only an impact on the amount of pension benefits. If the person wants to get one year service year for every working year, s/he can pay a higher amount of flat tax (HUF 75,000).

Contribution allowances for those who have too small income to use the whole family tax allowance (as from 1 January 2014)
In the Hungarian tax system, those who have children can deduct a pre-set amount from their personal income tax base. As from 2014, those who have not enough income and thus PIT base to deduct the maximum allowance can get the remaining allowance from the health contribution. If this is still insufficient for the whole deduction, they can deduct the remaining part from the pension contribution.

1.3. Description of the actual constant policy assumptions used in the projections

In case of some benefits and allowances (e-g. old age social allowance), there is no rule for indexation, though in order to have more realistic modelling assumption, similar to the pension benefits, a CPI indexation was applied for all the benefit except for the old-age social allowance (wage indexation).

Old age social allowance is not a base or minimum pension. It is provided for persons who have no other income from other sources. Outturn data shows that only 20-25% of those persons, who are not entitled to other benefits included in the modelled receive this kind of benefits. This ratio was kept constant for the whole simulation period.

2. Demographic and labour forces projections

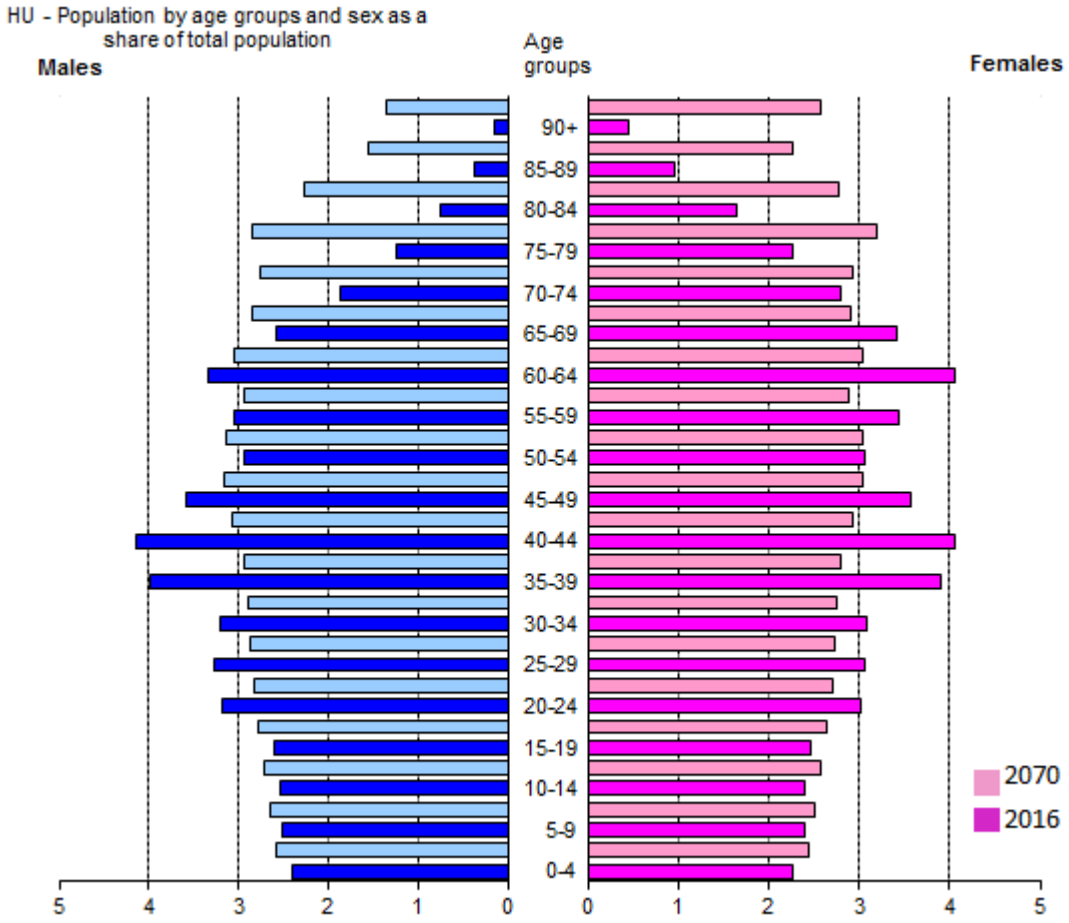
2.1. Demographic development

Table 3 Main demographic variables evolution

	2016	2020	2030	2040	2050	2060	2070	Peak year*
Population (thousand)	9,824	9,785	9,656	9,463	9,279	9,110	8,872	2016
Population growth rate	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	2020
Old-age dependency ratio (pop65/pop15-64)	27.5	31.3	35.2	41.8	49.1	53.2	52.0	2062
Ageing of the aged (pop80+/pop65+)	23.4	22.8	27.9	32.7	31.7	40.5	42.2	2070
Men - Life expectancy at birth	72.8	73.7	76.0	78.2	80.3	82.1	83.9	2070
Men - Life expectancy at 65	14.9	15.4	16.8	18.2	19.5	20.8	22.0	2070
Women - Life expectancy at birth	79.6	80.4	82.3	84.0	85.7	87.2	88.6	2070
Women - Life expectancy at 65	18.7	19.2	20.6	21.9	23.1	24.3	25.4	2070
Men - Survivor rate at 65+	73.6	75.5	80.0	83.6	86.7	89.2	91.2	2070
Men - Survivor rate at 80+	36.4	39.5	47.3	54.6	61.3	67.3	72.5	2070
Women - Survivor rate at 65+	87.0	88.0	90.1	91.8	93.2	94.4	95.4	2070
Women - Survivor rate at 80+	60.1	62.6	68.5	73.7	78.1	81.8	85.0	2070
Net migration	18.2	19.9	16.2	20.8	15.3	13.8	11.2	2019
Net migration over population change	-0.9	-2.5	-1.0	-1.2	-0.9	-0.7	-0.5	2019

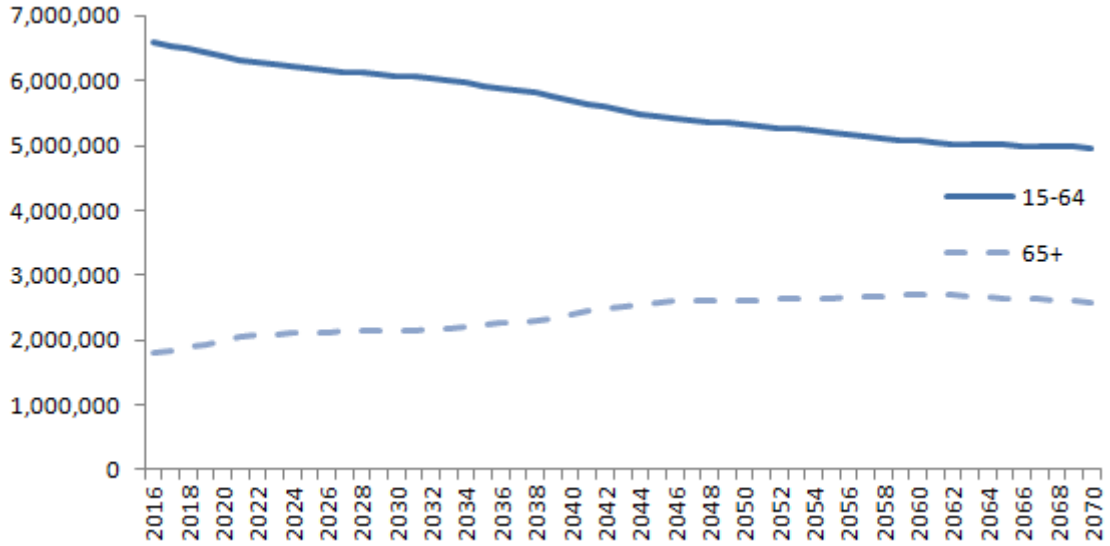
2.1.1. Ageing in the period of 2016-2070

Chart 1 – Age pyramid 2016 vs 2070



The number of people aged 65+ continuously rises throughout the projection horizon by 0.8 million people (+42.5%). Parallel to the increase in the number of elders, the active age population sharply decreases from 2016 to 2070 by 1.6 million people (-24.6%).

Chart 2 – Evolution of population between 2016 and 2070



As a result, the old age dependency ratio is expected to double by 2070 and to reach 53.4%. It has a large impact on the sustainability and forced Hungary to implement reforms in the pension system. The increase in retirement age (from 62 to 65 years) and the cancellation of early retirement options mitigate the adverse budgetary effect of ageing.

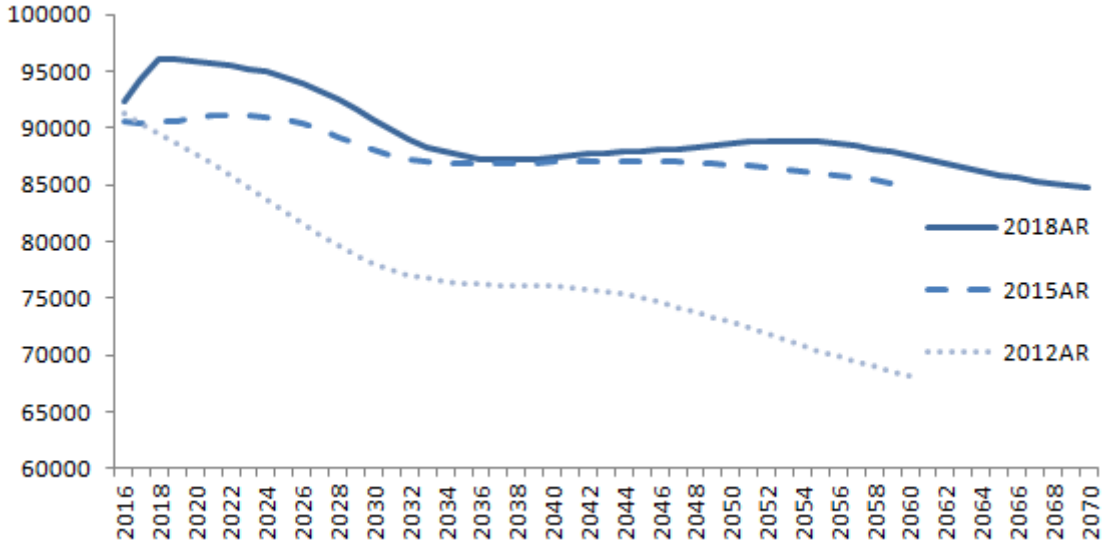
Due to the baby boom cohorts, there are some slight fluctuations in the development of the proportion of persons aged 80+ compared to that of 65+; but the growth of old-age cohorts is continuous.

The average life expectancy rises continuously by 11.1 years for male and 9.0 for female over the projection horizon.

2.1.2. Effects of new demographic projections

The EUROPOP 2016 in case of Hungary provides broadly similar results as the EUROPOP 2013. Fertility rate assumption is somewhat higher in the new projection. Whereas the old age dependency ratio is also slightly higher in the new projection in 2060 when it is expected to increase to 53.4% (compared to 52.6% in EUROPOP 2013) and stay also at that level in 2070.

Chart 3 – Evolution of projected number of births between 2016 and 2070



2.2. Labour forces

Table 4	**Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74**							
	2016	2020	2030	2040	2050	2060	2070	Peak year*
Labour force participation rate 55-64	52.2	55.6	80.2	79.8	81.5	81.2	81.3	2064
Employment rate for workers aged 55-64	50.0	53.7	76.8	76.5	78.1	77.9	78.0	2064
Share of workers aged 55-64 on the labour force 55-64	95.6	96.6	95.8	95.8	95.9	95.9	95.9	2021
Labour force participation rate 65-74	4.2	3.4	9.5	12.4	10.1	11.5	11.2	2041
Employment rate for workers aged 65-74	4.1	3.4	9.3	12.2	10.0	11.4	11.0	2041
Share of workers aged 65-74 on the labour force 65-74	99.2	99.3	98.5	98.5	98.8	98.8	98.8	2020
Median age of the labour force	40.0	41.0	44.0	44.0	43.0	43.0	43.0	2038

The changes implemented in this decade have significant impact on the labour market. Participation and employment rates increased visibly since 2010. The most important measures were the following:

- The rise in statutory retirement age and cancellation of early retirement options increase the effective retirement age and prolong the working carrier.
- Since 2010 Hungary also implemented significant measures on the supply and demand side of the labour market, the tax burden on labour decreased, the period to get unemployment benefit has been lowered to 3 months and many other measures were implemented to whiten the economy and the labour market.

Due to the increase of the effective retirement age, labour force participation of the persons aged 55-64 rises, although some lead time is needed for the labour market to take up those who lose their right to retire earlier. This is facilitated by the Job Protection Act that provides financial incentives for the employment of specific vulnerable groups including elderlies.

Chart 4 – Improving employment assumptions underlying Ageing Reports

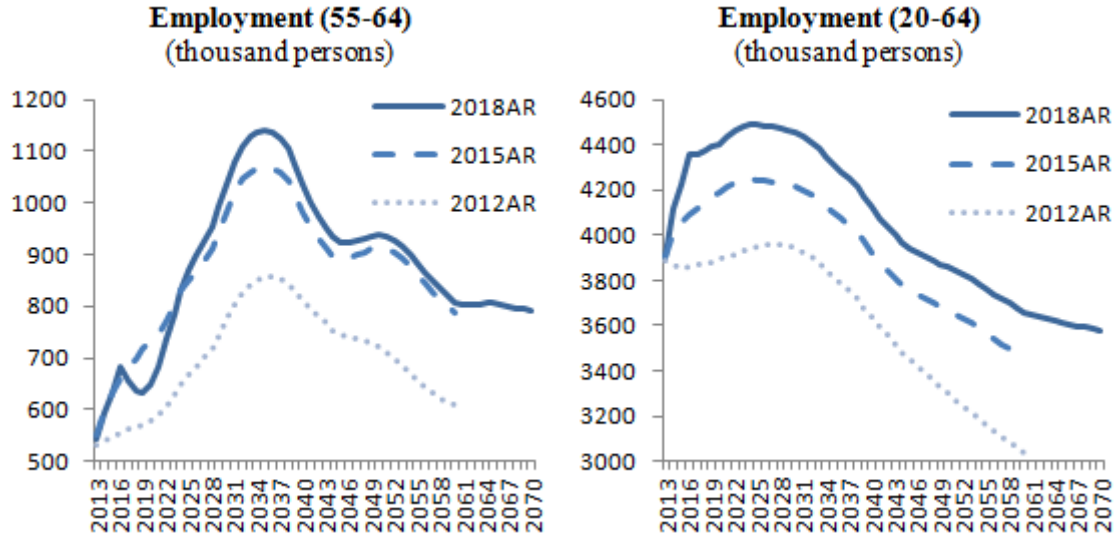


TABLE 5a	**Labour market effective exit age and expected duration of life spent at retirement – MEN**							
	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	62.5	63.2	65.3	65.3	65.3	65.3	65.3	2023
Contributory period	33.6	34.7	37.7	38.3	36.9	38.4	38.0	2039
Duration of retirement	16.8	16.7	16.8	18.2	19.5	20.8	22.0	2070
Duration of retirement/contributory period	0.5	0.5	0.4	0.5	0.5	0.5	0.6	2070
Percentage of adult life spent at retirement	27.4	27.0	26.2	27.8	29.2	30.5	31.7	2070
Early/late exit	4.2	2.9	0.5	0.4	0.3	0.3	0.3	2017

TABLE 5b	**Labour market effective exit age and expected duration of life spent at retirement – WOMEN**							
	2017	2020	2030	2040	2050	2060	2070	Peak year
Average effective exit age (CSM) (II)	61.0	62.4	64.8	64.8	64.8	64.8	64.8	2022
Contributory period	35.0	34.4	36.7	37.2	37.9	36.8	37.1	2052
Duration of retirement	22.0	21.6	20.6	21.9	23.1	24.3	25.4	2070
Duration of retirement/contributory period	0.6	0.6	0.6	0.6	0.6	0.7	0.7	2070
Percentage of adult life spent at retirement	33.8	32.7	30.6	31.9	33.0	34.2	35.2	2070
Early/late exit	6.4	4.3	0.7	0.5	0.5	0.4	0.5	2017

3. Pension projection results

3.1. Extent of the coverage of the pension schemes in the projections

3.1.1. Covered benefits

The projection covers the mandatory social security pension scheme, the disability benefits, the old-age social allowances, all pension-like supplementary social allowances and the temporary benefits below the retirement age. (For more detailed description see section 1.1.1-1.1.4)

Benefits covered by the projection

Name of the benefit	**No. of beneficiaries** (August 2017, thousand persons)
Old age and early retirement schemes	
old age pension (above statutory retirement age) (*korbetöltött öregségi nyugdíj*)	1,859,599
women with 40 service years	154,461
disability provision above retirement age (*rokkantsági ellátás*)	54,059
miners allowance – ***to be abolished system***	2,900
pension of armed force born before 1955 – ***to be abolished scheme***	2,065
allowance of armed force born after 1954 *(szolgálati járandóság)* – ***abolished scheme***	29,711
below-retirement-age provisions (*korhatár előtti ellátások*) – ***abolished schemes***	9,836
Survivor's benefits (hozzátartozói ellátások)	
widows' and parentals pensions *(özvegyi és szülői nyugdíj)*	73,995
orphans' benefit *(árvaellátás)*	59,259
Disability provisions	
disability provisions below retirement age (*rokkantsági ellátás*)	254,302
rehabilitation provision (*rehabilitációs ellátás*)	36,945
miners' health impairment allowance (*bányász egészségkárosodási járadék*)	1,958
Other benefits	
disability allowance *(rokkantsági járadék)*	32,896
old age allowance *(időskorúak járadéka)*	6,958*
accident allowance *(baleseti járadék)*	7,069
spouse's supplement *(házastársi pótlék)*	2,968
regular allowances for agricultural workers *(mezőgazdasági szövetkezeti járadékok)*	1,610
other allowances *(egyéb járandóság)*	6,882

Source: Central Administration of National Pension Insurance
**Average number of beneficiaries in 2016, source: Hungarian Central Statistical Office*

The projection does not cover the voluntary privately managed supplementary pension schemes, which may provide additional benefits for elders depending on their choice and possibilities to save and are not part of the mandatory system.

3.1.2. Difference between ESSPROS and AWG numbers

TABLE 6	**Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)**							
	2007	2008	2009	2010	2011	2012	2013	2014
1 Eurostat total pension expenditure	10.3	10.8	10.9	10.8	10.8	9.4	9.4	9.0
2 Eurostat public pension expenditure	10.3	10.8	10.9	10.8	10.8	9.4	9.4	9.0
3 Public pension expenditure (AWG)	10.6	11.0	11.1	10.9	11.0	11.6	11.5	10.7
4 Difference (2) - (3)	0.3	0.2	0.2	0.1	0.2	2.2	2.1	1.7

3.2. Overview of the projection results

The number of employed people continuously decreases because of demographic reasons (as the fertility rate is below 2.1).

TABLE 7 Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2016	2020	2030	2040	2050	2060	2070	Peak year*
Gross public pension expenditure	9.7	9.0	8.4	9.4	10.6	11.1	11.2	2063
Private occupational pensions	-	-	-	-	-	-	-	-
Private individual pensions	-	-	-	-	-	-	-	-
Mandatory private	-	-	-	-	-	-	-	-
Non-mandatory private	-	-	-	-	-	-	-	-
Gross total pension expenditure	9.7	9.0	8.4	9.4	10.6	11.1	11.2	2063
Net public pension expenditure	9.7	9.0	8.4	9.4	10.6	11.1	11.2	2063
Net total pension expenditure	9.7	9.0	8.4	9.4	10.6	11.1	11.2	2063
Contributions	2016	2020	2030	2040	2050	2060	2070	Peak year*
Public pension contributions	9.4	8.3	8.5	8.5	8.4	8.4	8.5	2016
Total pension contributions	9.4	8.3	8.5	8.5	8.4	8.4	8.5	2016

3.2.1. Total pension expenditure

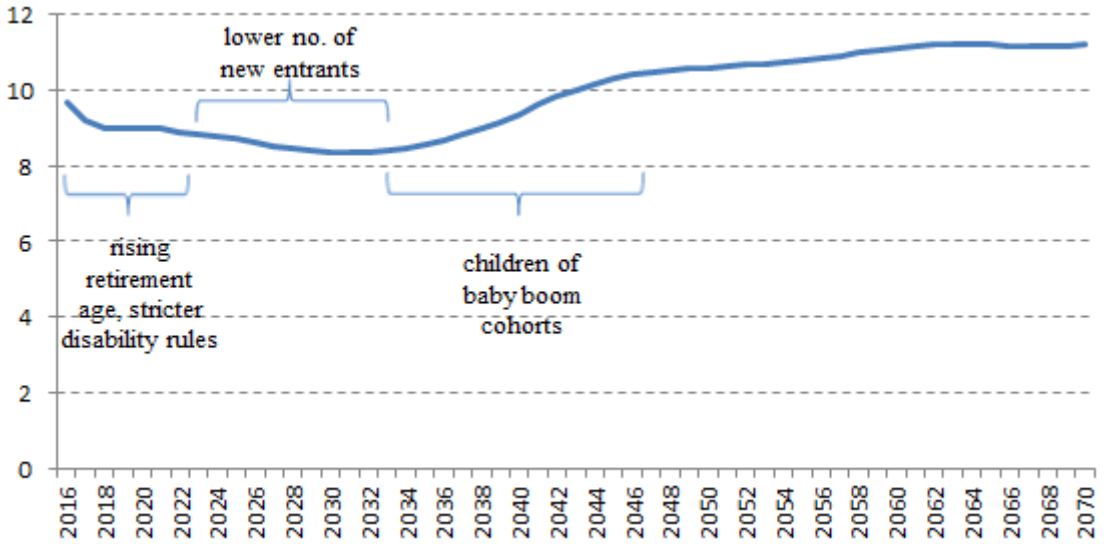
Pension expenditures in Hungary are projected to decline until 2031 then they are projected to increase until 2063 and level off thereafter. Overall public spending on pension increases from 9.7% to around 11.2% of GDP over the projected period (2016-2070) which means that pension expenditure level in the 2060s is projected to be broadly at the level experienced around 2010. As the Hungarian pension benefits are not the subject to taxation, gross and net expenditure results are the same.

TABLE 8 Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	9.7	9.0	8.4	9.4	10.6	11.1	11.2	2063
of which								
Old age and early pensions:	8.0	7.4	7.0	8.2	9.5	10.1	10.2	2063
Flat component	-	-	-	-	-	-	-	-
Earnings related	7.9	7.4	7.0	8.2	9.5	10.1	10.2	2063
Minimum pensions (non-contributory) i.e. min. income guarantee for people 65+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2016
Disability pensions	0.71	0.70	0.67	0.65	0.57	0.54	0.55	2022
Survivor pensions	0.94	0.82	0.63	0.50	0.44	0.42	0.40	2016
Other pensions	0.07	0.06	0.05	0.06	0.07	0.07	0.07	2016

The most important factors that influence the development of public pension expenditures are the following. In the beginning of the projection period the largest cohorts of the baby boom generation of the 1950s retire, which drives the level of pension expenditures upwards in the 2010s. While the statutory retirement age increases between 2012 and 2021 from 62 to 65 and this gradual increase has a downward effect on pension expenditures. Spending on pension starts to increase again when the children of the baby boom generation start to retire in the mid-2030s.

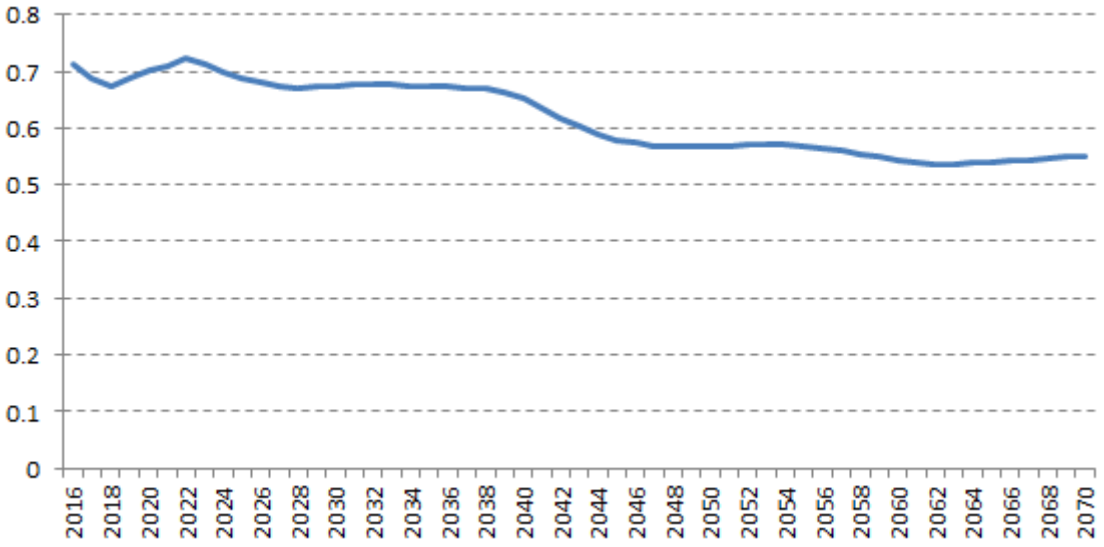
Chart 5 – Evolution of pension expenditures
(per cent of GDP)



3.2.2. Disability pension expenditures

Disability provisions have been tightened considerably since 2012. As a result of the 2012 reform the provision of benefits ceases to exist without a complex review of the health conditions of the beneficiary (after which s/he can receive disability or rehabilitation benefit that is to reintegrate people into the labour market and can only be provided for up to 3 years). Recent trends accordingly show a reduction of the recipients of these (disability+rehabilitation) benefits. The model assumes that these recent trends (2012-2016) continue. As a consequence of the stricter eligibility rules for the disability system along with the expected improvement in health status the number of disabled decreases remarkably in the long run.

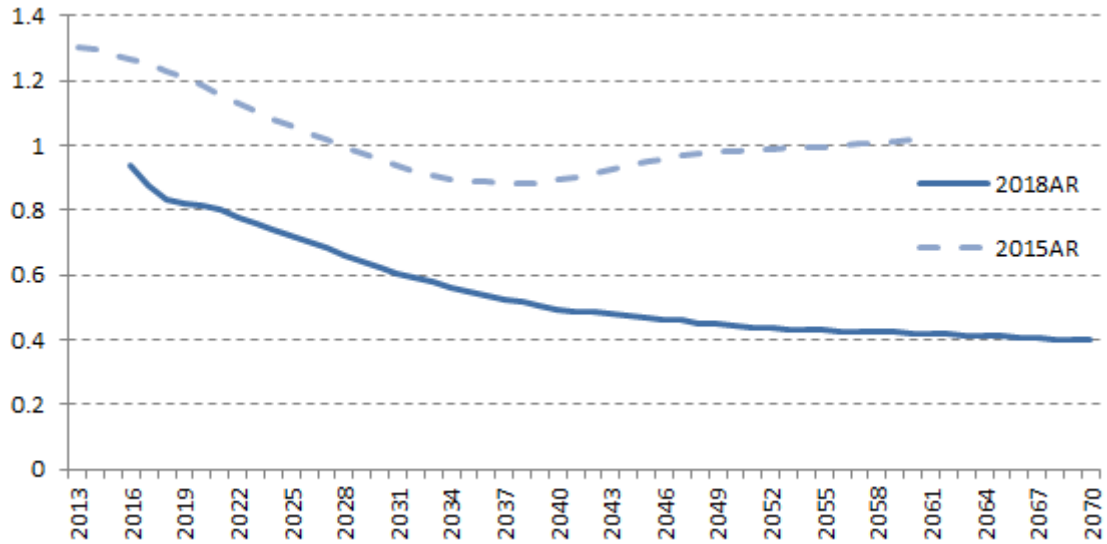
Chart 6 – Evolution of disability pension expenditures
(per cent of GDP)



3.2.3. Survivor pension expenditures

Survivor pension expenditures show a continuous decrease throughout the projection horizon due to constant probability assumptions on marriages and divorces with values based on outturn data (that show a trend of less permanent marriages). The results are lower than expenditures included in the 2015 Ageing Report due to firstly new outturn data being lower than previously projected (broadly constant difference in the first part of the projection period). Secondly the change to a micro simulation model enables better modelling of family structures (and assuming constant individual probabilities lead to lower share of marriages than in the previous exercise) which explains the slightly different evolution in the latter part of the projection period.

Chart 7 – Evolution of survivor pension expenditures
(per cent of GDP)



3.2.4. Contribution

The results on contribution are mostly affected by the number of actives and wage assumptions.

The reduction of the rate of social contribution tax decreases the pension revenues compared to previous projections. (See section 1.2.1)

3.3. Description of the main driving forces behind the projection results and their implications for main items from a pension questionnaire

3.3.1. Main driving forces

The main driving force of the increase in pension expenditures is the significant growth of the number of older people. In this decade the baby boom generation of the 1950s (number of births was the highest in 1954) retires which worsen the dependency ratio. This effect is partially offset by the reduction of coverage ratios, especially those for the early ages of retirement due to the abolishment of early retirement schemes in 2012.

TABLE 9a	Factors behind the change in public pension expenditures between 2016 and 2070 using pension data (in percentage points of GDP) – pensions							
	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-0.7	-0.6	1.0	1.2	0.5	0.1	1.5	0.028
Dependency ratio effect	1.3	1.1	1.6	1.6	0.9	-0.2	6.4	11.4%
Coverage ratio effect	-0.8	-0.5	-0.6	-0.6	-0.3	0.1	-2.9	-5.4%
*Coverage ratio old-age**	-0.3	-0.4	-0.5	-0.2	-0.1	0.0	-1.4	-2.7%
*Coverage ratio early-age**	-1.3	-1.4	0.4	-0.6	0.1	-0.1	-2.9	-5.5%
*Cohort effect**	-1.2	0.5	-1.6	-1.9	-1.4	0.3	-5.3	-10.4%
Benefit ratio effect	-0.6	-0.6	0.2	0.3	0.0	0.2	-0.6	-1.0%
Labour Market/Labour intensity effect	-0.4	-0.6	-0.1	0.0	0.0	0.1	-1.1	-2.0%
Employment ratio effect	-0.4	-0.5	0.0	0.0	0.0	0.0	-0.9	-1.7%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Career shift effect	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.2	-0.3%
Residual	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.3	-0.1%

** Sub components of the coverage ratio effect do not add up necessarily.*

TABLE 9b	Factors behind the change in public pension expenditures between 2016 and 2070 using pensioners data (in percentage points of GDP) – pensioners							
	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-0.7	-0.6	1.0	1.2	0.5	0.1	1.5	0.028
Dependency ratio effect	1.3	1.1	1.6	1.6	0.9	-0.2	6.4	11.4%
Coverage ratio effect	-0.8	-0.2	-0.3	-0.4	-0.2	0.1	-1.8	-3.4%
*Coverage ratio old-age**	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.3%
*Coverage ratio early-age**	-1.3	-1.3	0.4	-0.6	0.1	-0.1	-2.8	-5.2%
*Cohort effect**	-1.2	0.5	-1.6	-1.9	-1.4	0.3	-5.3	-10.4%
Benefit ratio effect	-0.7	-0.9	-0.2	0.1	-0.1	0.2	-1.6	-3.0%
Labour Market/Labour intensity effect	-0.4	-0.6	-0.1	0.0	0.0	0.1	-1.1	-2.0%
Employment ratio effect	-0.4	-0.5	0.0	0.0	0.0	0.0	-0.9	-1.7%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Career shift effect	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.2	-0.3%
Residual	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.3	-0.1%

** Sub components of the coverage ratio effect do not add up necessarily.*

3.3.2. Replacement rate and benefit ratio

In the first third of the projection period the benefit ratio (BR) is calculated to decrease while the replacement rate (RR) to slightly increase and they both stay practically at that level afterwards. The reason behind the different evolution of the two indicators is that (the numerator of the) RR is driven by the average level of newly awarded benefits that are mostly determined by wage growth (because of valorisation rules based on past wage growth), while the BR is primarily influenced by the increase in the much larger amount of already awarded benefits that are indexed to inflation. The deceleration and then halting of the BR growth in 18-20 years reflects the time needed for the change of the stock of old-age pensions, that is, the constant difference of about 1.5-2 pp between inflation and wage growth assumptions is (broadly) fully built in the system in about 18 years.

It has to be highlighted that replacement rates are gross figures. As in Hungary there is no tax on pensions and pension benefits are calculated on a net basis, RR projections show the proportion of net pensions to gross wages. Therefore gross replacement rates are much lower than the net ratios. The denominator (gross wages) includes the personal income tax of 15%, the individual pension contribution of 10%, the health contribution of 7% and the labour force contribution of 1.5%.

TABLE 10	**Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)**						
	2016	2020	2030	2040	2050	2060	2070
Public scheme (BR)	40%	37%	33%	32%	32%	32%	33%
Public scheme (RR)	38%	34%	37%	40%	39%	39%	39%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Public scheme old-age earnings related (BR)	40%	38%	33%	33%	33%	33%	33%
Public scheme old-age earnings related (RR)	45%	46%	48%	49%	49%	49%	49%
Coverage	81.9	81.5	82.0	84.3	87.6	89.0	89.1
Private occupational scheme (BR)	-	-	-	-	-	-	-
Private occupational scheme (RR)	-	-	-	-	-	-	-
Coverage							
Private individual scheme (BR)	-	-	-	-	-	-	-
Private individual scheme (RR)	-	-	-	-	-	-	-
Coverage							
Total (BR)	40%	37%	33%	32%	32%	32%	33%
Total (RR)	38%	34%	37%	40%	39%	39%	39%

3.3.3. Number of pensioners compared to total and inactive population

The number of pensioners compared to the total population is largely stable throughout the projection horizon, only the pensioners to population ratio in the age group 60-64 shows a marked reduction in 2020 and then it broadly stays at the decreased level for the rest of the projection period. This is explained by the statutory retirement age rising to 65 and the cancellation of early retirement schemes. The effect is mitigated for females by the early retirement option of the "Women40" scheme (see section 1.1.2).

The ratio comparing the number of pensioners to the inactive population is consequently mainly influenced by the developments in inactivity. In this context very high (100%<) figures for pensioners to inactive population, especially for women, particularly in the cohort just below the statutory retirement age from 2030 are driven by two aspects: first, the assumed favourable employment developments (in the case of the cohort 60-64 notably by a spectacular drop in the corresponding inactivity ratios as a result of gradual increase of statutory retirement age to 65); second, the pensioners' possibility to work while receiving a pension.

Below 100% and slightly lower levels of pensioners to population ratios for the oldest cohort (75+) with regard to younger ones are attributable to lower provision of the so-called old age allowance for the most elderly as underpinned by available data. This type of social allowance to those with no pension and insufficient income is not provided automatically but has to be applied for every two years. Furthermore eligibility criteria limit the income per capita (at a very low level around the minimum pension) that is easily surpassed e.g. if old people move to one household with relatives.

TABLE 11	System dependency ratio and old-age dependency ratio						
	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	2,542.5	2,571.7	2,720.2	2,927.6	3,057.2	3,086.5	2,974.0
Employment (thousand) (II)	4,427.4	4,470.8	4,572.1	4,295.7	4,005.3	3,812.1	3,711.0
Pension System Dependency Ratio (SDR) (I)/(II)	57.4	57.5	59.5	68.2	76.3	81.0	80.1
Number of people aged 65+ (thousand) (III)	1,813.5	1,991.0	2,142.2	2,387.2	2,613.5	2,695.4	2,584.2
Working age population 15 - 64 (thousand) (IV)	6,587.9	6,364.1	6,080.5	5,711.0	5,324.6	5,065.4	4,967.8
Old-age Dependency Ratio (ODR) (III)/(IV)	27.5	31.3	35.2	41.8	49.1	53.2	52.0
System efficiency (SDR/ODR)	2.1	1.8	1.7	1.6	1.6	1.5	1.5

TABLE 12a	Pensioners (public scheme) to inactive population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	8.4	8.9	8.8	7.6	6.7	6.3	6.1
Age group 55-59	84.3	104.8	136.1	139.1	142.5	144.8	143.0
Age group 60-64	92.1	76.2	186.4	180.2	185.4	189.4	192.4
Age group 65-69	101.7	100.6	115.5	116.9	116.7	117.5	117.8
Age group 70-74	98.6	97.9	100.1	101.5	101.4	101.8	101.8
Age group 75+	93.7	93.6	94.9	95.8	96.3	96.4	96.7

TABLE 12b	Pensioners (public scheme) to total population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	3.5	3.6	3.6	3.2	2.9	2.7	2.7
Age group 55-59	22.9	24.1	19.5	20.0	19.0	19.2	18.9
Age group 60-64	60.6	48.4	48.9	45.1	44.5	45.7	45.9
Age group 65-69	96.3	95.3	94.6	92.9	94.0	94.1	94.2
Age group 70-74	96.0	96.9	98.8	99.0	99.2	99.4	99.6
Age group 75+	93.7	93.6	94.9	95.8	96.3	96.4	96.7

TABLE 13a	Female pensioners (public scheme) to inactive population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	7.4	8.1	8.5	7.2	6.1	5.8	5.6
Age group 55-59	84.9	112.8	151.6	162.7	171.3	174.9	172.7
Age group 60-64	93.8	91.7	240.1	227.1	242.4	251.3	256.8
Age group 65-69	100.7	100.1	117.3	118.7	118.1	119.3	119.7
Age group 70-74	97.4	97.9	100.2	101.5	101.4	101.8	101.8
Age group 75+	93.8	93.9	95.2	96.0	96.5	96.6	96.8

TABLE 13b	Female pensioners (public scheme) to total population ratio by age group (%)						
	2016	2020	2030	2040	2050	2060	2070
Age group -54	3.3	3.6	3.8	3.3	2.9	2.7	2.6
Age group 55-59	27.6	30.3	24.9	26.9	25.7	26.1	25.7
Age group 60-64	71.9	63.8	69.5	66.3	66.9	69.5	70.2
Age group 65-69	96.5	96.4	98.4	96.7	97.5	97.7	98.0
Age group 70-74	96.0	97.2	99.2	99.4	99.5	99.6	99.8
Age group 75+	93.8	93.9	95.2	96.0	96.5	96.6	96.8

3.3.4. New pensioners

Table 14 shows the trends in new old age pensions and early earnings related pensions. The hike of the statutory retirement age is implemented gradually until 2022. As the legislation increases the retirement age by 0.5 year for each concerned individual cohort, there are years in which only half of the cohorts gains new eligibility. This explains the low new pension

expenditures e.g. in 2020, when only those who were born between January and June 1956 gain new eligibility (in the standard old age pension scheme). For women the difference is nuanced by the option to retire with 40 contribution years (that is independent from the date of birth).

The accrual rate for shorter contributory period is higher.

As almost continuous retirement during the whole years is assumed, the model calculates with an average of around 6 months paid in the first year for new entrants. However during the gradual (6 months per cohort) increase in the retirement age (2013-2022) when only half of the cohorts reaches the statutory retirement age, the "average number of months paid in the first year" is lower than 6 month (3 months for men and somewhat higher for women due to the option of retirement with 40 years eligibility period). This phenomenon explains the numbers of Table 14a, 14b and 14c.

Cohorts	Retirement age	Date of retirement
1951	62	2013
1952	62.5	H2 2014 – H1 2015
1953	63	2016
1954	63.5	H2 2017 – H1 2018
1955	64	2019
1956	64.5	H2 2020 – H1 2021
1957 or later	65	2022 or later

TABLE 14a	**Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)**						
New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (million EUR)	233.3	152.0	419.4	954.8	974.4	1,499.5	1,936.7
II. Average contributory period	32.8	34.5	37.2	37.8	37.4	37.6	37.5
III. Monthly average pensionable earnings	464.6	540.9	830.1	1,329.0	1,858.0	2,880.2	4,175.8
IV. Average accrual rates (%)	2.4	2.3	2.2	2.1	2.1	2.1	2.1
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	53.1	29.0	52.2	74.5	55.6	55.2	49.3
VII Average number of months paid the first year	5.6	3.8	5.8	5.8	5.6	5.6	5.8
Monthly average pensionable earnings / Monthly economy-wide average wage	52.6%	50.3%	51.2%	53.9%	50.5%	53.6%	54.3%

TABLE 14b	**Disaggregated new public pension expenditure (old-age and early earnings-related pensions) – MEN**						
New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (million EUR)	116.8	48.4	203.2	492.6	473.0	764.6	998.3
II. Average contributory period	32.6	34.7	37.7	38.3	36.9	38.4	38.0
III. Monthly avg. pensionable earnings	503.1	599.8	882.5	1,379.4	1,915.1	2,938.2	4,301.4
IV. Average accrual rates (%)	2.5	2.5	2.3	2.2	2.1	2.1	2.1
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	24.1	7.9	22.6	35.9	26.1	27.3	24.3
VII Average number of months paid the first year	5.7	2.8	5.7	5.7	5.6	5.5	5.7
Monthly avg. pensionable earnings / Monthly economy-wide average wage	56.9%	55.8%	54.4%	55.9%	52.1%	54.7%	55.9%

TABLE 14c	Disaggregated new public pension expenditure (old-age and early earnings-related pensions) – WOMEN						
New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (million EUR)	116.5	103.6	216.3	462.3	501.4	735.0	938.3
II. Average contributory period	33.0	34.4	36.7	37.2	37.9	36.8	37.1
III. Monthly avg. pensionable earnings	429.9	524.5	785.6	1,274.1	1,812.0	2,824.8	4,051.6
IV. Average accrual rates (%)	2.4	2.3	2.1	2.1	2.1	2.1	2.1
V. Sustainability/Adjustment factor	:	:	:	:	:	:	:
VI. Number of new pensions ('000)	29.0	21.1	29.6	38.5	29.6	27.9	25.0
VII Average number of months paid the first year	5.5	4.4	5.9	5.8	5.7	5.6	5.9
Monthly avg. pensionable earnings / Monthly economy-wide average wage	48.7%	48.8%	48.4%	51.6%	49.3%	52.6%	52.7%

3.4. Financing the pension system

The evolution of contributions to GDP can be explained by the higher employment and the gradual reduction in the employers' contribution rate. As from 2011 all the insured pay the whole contribution only to the public pillar. Employees' contribution is 10% of gross wages and the employers' contribution (social contribution tax) is 22%, which declines to 19.5% in 2018. The tax is shared between the Pension Insurance and Health Insurance Fund. In 2018, 79.5% of the total social contribution goes to the Pension Insurance Fund while 20.5% is directed to the Health Insurance Fund. The disability schemes are financed from the Health Insurance Fund. In the model all social contribution tax going to the Pension Insurance Fund and a given proportion of the part going to the Health Insurance Fund is taken into account. Furthermore there are specific contribution allowances for individuals and entrepreneurs that are also taken into account in the model. This explains the slight differences from the above mentioned proportions.

In addition employment figures have improved and are projected to improve further explaining the growing number of contributors by the beginning of the 2030s.

TABLE 15	Revenue from contribution (Millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)		
	Public employees	Private employees	Self-employed
Contribution base	gross wage	gross wage	declared monthly earnings
Contribution rate/contribution			
Employer	until 2016: 27,0% as from 2017: 22% as from 2018: 19.5%	until 2016: 27,0% as from 2017: 22% as from 2018: 19.5%	10% of declared monthly earnings and 27%/22%/19.5% of declared monthly earnings in the form of a social contribution tax.
Employee	10.0%	10.0%	
State	-	-	-
Other revenues	-	-	-
Maximum contribution	-	-	-
Minimum contribution	-	-	-

TABLE 16	Revenue from contribution (Millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)						
	2016	2020	2030	2040	2050	2060	2070
Public contribution	10,603.5	11,440.8	17,601.7	25,141.7	34,756.3	48,297.8	67,599.1
Employer contribution	6,950.7	6,715.8	10,332.4	14,758.3	20,402.2	28,351.2	39,681.2
Employee contribution	3,652.8	4,725.0	7,269.4	10,383.3	14,354.1	19,946.6	27,918.0
State contribution	-	-	-	-	-	-	-
Other revenues	-	-	-	-	-	-	-
Number of contributors (I)	4,349.4	4,470.8	4,572.2	4,295.6	4,005.1	3,812.0	3,711.0
Employment (II)	4,427.4	4,470.8	4,572.1	4,295.7	4,005.3	3,812.1	3,711.0
Ratio of (I)/(II)	1.0	1.0	1.0	1.0	1.0	1.0	1.0

3.5. Sensitivity analysis

TABLE 17	Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)						
	2016	2020	2030	2040	2050	2060	2070
Public=Total Pension Expenditure							
Baseline	9.7	9.0	8.4	9.4	10.6	11.1	11.2
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.2	0.3	0.5	0.6
Higher TFP (+0.4 pp.)	0.0	0.0	0.0	-0.2	-0.6	-0.8	-0.9
Lower TFP (-0.4 pp.)	0.0	0.0	0.0	0.3	0.7	1.0	1.1
Higher emp. rate (+2 pp.)	0.0	0.0	-0.2	-0.2	-0.3	-0.3	-0.2
Lower emp. rate (-2 pp.)	0.0	0.1	0.2	0.3	0.4	0.4	0.3
Higher emp. of older workers (+10 pp.)	0.0	-0.1	-0.4	-0.5	-0.6	-0.6	-0.6
Higher migration (+33%)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.2
Lower migration (-33%)	0.0	0.0	0.0	0.1	0.2	0.3	0.3
Lower fertility (-20%)	0.0	0.0	0.0	0.1	0.6	1.1	1.8
TFP risk scenario	0.0	0.1	0.5	0.8	0.7	0.6	0.6
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	-0.2	-0.7	-0.8	-1.4	-1.6

Higher life expectancy

The higher life expectancy increases the number of pensioners and the length of the average period spent in retirement. This increases the pension expenditures as a percentage of GDP, that are 6% higher in 2070 compared to the baseline scenario.

Higher total factor productivity

Higher wage assumptions in this scenario lead to higher benefits and increase the amount of pension benefits. This is nonetheless more than offset by the positive effect on GDP growth; therefore pension expenditures as a percentage of GDP are lower throughout the projection horizon than in the baseline scenario.

Lower total factor productivity

Lower wage assumptions in this scenario lead to lower benefits and decrease the amount of pension benefits. This is nonetheless more than offset by the negative effect on GDP growth; therefore pension expenditures as a percentage of GDP are higher throughout the projection horizon than in the baseline scenario.

Higher employment

The higher employment assumptions lead to higher average service years that increase the average amount of pension benefits. As the positive effect on GDP growth is nonetheless more significant, pension expenditures as a percentage of GDP are lower during the projected period.

Lower employment

The lower employment assumptions lead to lower average service years that decrease the average amount of pension benefits. As the negative effect on GDP growth is nonetheless more significant, pension expenditures as a percentage of GDP are higher during the projected period.

Higher employment of older workers

The higher assumptions for the employment of older workers lead to higher average service years that increase the average amount of pension benefits. It does not influence the number and share of pensioners, as according to the model people continue working above the retirement age parallel to receiving pension benefits (and claim for the increase of benefit according to their income in each year). As the positive effect on GDP growth is nonetheless more significant, pension expenditures as a percentage of GDP are lower during the projected period.

Higher migration:

Higher migration increases both the number of pensioners and GDP, but the effect of higher GDP arrives earlier.

Lower migration

Lower migration decreases both the number of pensioners and GDP. Although there are some shifts in the two tendencies, the effect of lower population arrives earlier.

Lower fertility:

Lower fertility decreases the GDP, therefore pension expenditures as a percent of GDP are higher throughout the projection horizon than in the baseline scenario.

TFP risk scenario

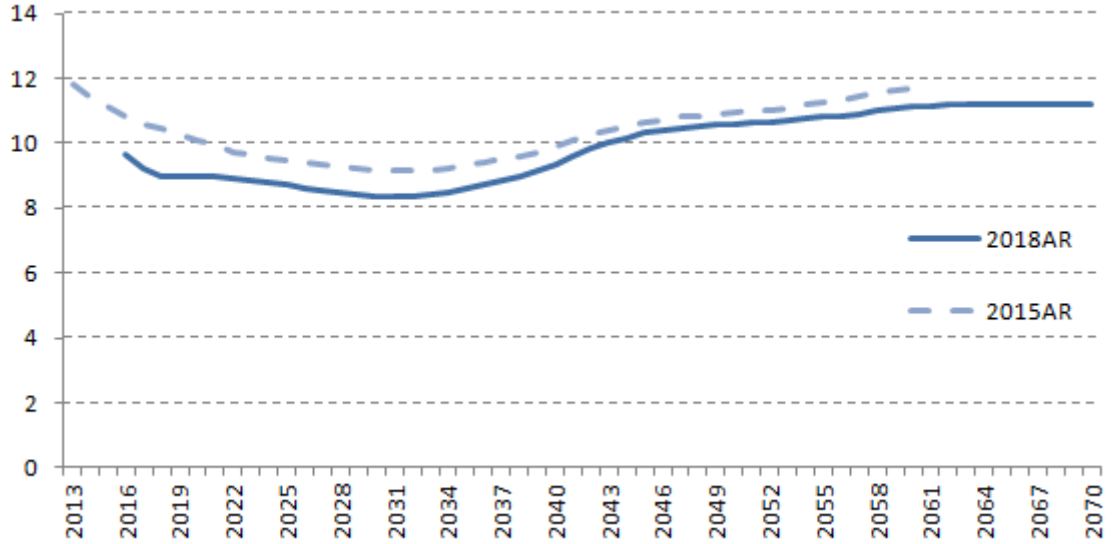
The "TFP risk" scenario shows similar changes in the final results as the ones in the "lower TFP" scenario, although there are some fluctuations in the projected period due to the differences in the assumptions (lower growth / larger difference compared to the baseline assumptions in the first part of the projection period).

Policy scenario: linking retirement age to increases in life expectancy (dynamic retirement age scenario)

Currently there is a retirement age increase in process, which is faster than the increases in life expectancy, thus the first cohort that would be affected by this scenario is the cohort of 1963, the members of this cohort are expected to retire in 2029. With the continuous rise in the life expectancy pension expenditures are projected to decrease.

3.6. Description of the changes in comparison with the 2006, 2009, 2012 and 2015 projections

Chart 8 – Difference between pension expenditure projections 2015AR vs. 2018AR
(per cent of GDP)



Overall projected pension expenditures show a similar picture compared to the previous exercise. Whereas the difference between the starting and end points of the projection periods grew from -0.1% to 1.5% of GDP this seemingly deteriorating result is entirely attributable to a much more favourable starting point due to implemented reforms in the pension system and on the labour market. Expenditures are projected to be lower than in the previous exercise throughout the projection horizon.

TABLE 18 Overall change in public pension expenditure to GDP underthe2006, 2009, 2012 and 2015 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. interaction effect)
2006 *	6.43	10.49	-4.47	-1.11	1.95	:	-0.44
2009 **	-0.20	8.91	-4.64	-1.12	-2.66	:	-0.69
2012 ***	0.50	9.59	-4.94	-1.44	-1.86	0.00	-0.85
2015****	-0.12	7.95	-3.84	-1.70	-1.81	0.00	-0.72
2018*****	1.53	6.39	-2.87	-0.95	-0.57	0.01	-0.47

** 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060; *****2016-2070*

Regarding the development of projection result on a longer retrospective horizon in 2009 the figures for pension expenditures improved largely due to the significant parametric reforms (increase of the statutory retirement age from 62 to 65, change of swiss indexation to CPI indexation, cancellation of 13th month pension benefits). In the 2012 Ageing Report pension expenditures were projected again higher due to the closure of the mandatory funded private pension schemes. From 2011 the mixed pension system has been practically transformed to a solely state PAYG system (the preponderant part of members switched back fully to the pure PAYG system and members that stayed in the private pillar pay also their contribution to the PAYG system). As pensions that would have been paid from the mandatory private pillar will be paid from the state PAYG system, this systemic change increased significantly the public spending on pension (parallel to increase in revenues). Since the 2015 Ageing Report, only

very minor changes were introduced to the pension system and marginal change in the results are mainly due to the changes in the assumptions.

3.6.1. Change in assumptions

The macroeconomic assumptions result in a somewhat higher growth path (average annual real GDP growth rate is 0.1 pp higher) and accordingly a somewhat higher nominal GDP path throughout the projection horizon compared to the 2015 Ageing Report. The main factors behind the higher GDP path are both more favourable employment indicators and higher TFP growth.

Demographic changes nonetheless are somewhat less favourable in terms of their impact on pension expenditures, as the dependency ratio is higher than it was projected in the last exercise. (See Section 2.1.)

3.6.2. Improvement in the coverage or in the modelling

The change from a macro to a micro simulation model made the modelling of individual life cycles possible.

3.6.3. Change in the interpretation of constant policy

In case of old age social allowance, outturn data shows that only 20-25% of those persons who are not entitled to other provision receive this kind of benefits. This is not a permanent allowance, those who have no other income have to apply for it in every two years. The ratio observed in the past was kept constant for the whole simulation period (contrary to the previous exercise when it was doubled through the projection horizon).

3.6.4. Policy related changes

Since the 2015 Ageing Report, the rate of the social contribution tax was reduced, while on the expenditure side only a few minor changes were introduced to the pension system, all of them included in pension projection. No major policy related change has been implemented that would have significant impact on the results.

In the past decade numerous reforms were implemented (and have been introduced continuously) that thus were already taken into account in the previous exercise. Most important of which: increase of statutory retirement age to 65 between 2013 and 2021; cancellation of early retirement schemes between 2012 and 2016; restructuring the disability system in 2012.

4. Description of the pension projection model and its base data

4.1. Institutional context in which those projections are made

The Department for Economics and Analytics of Central Administration of National Pension Insurance has developed the used model and the Department is still in charge of maintaining and updating the model if needed.

One of the main purposes of estimating the long term incomes and outcomes of the pension system is to make our report to AWG. The other reason, why estimation of the long term incomes and outcomes of the pension system is of major importance in pension policy is analysing the long term effects of measures concerning the pension system.

4.2. Assumptions and methodologies applied

The model used here belongs to the MIDAS dynamic microsimulation model whose first and dominant member –MIDAS_BE– was developed and is still continuously being developed by the experts of the Federal Planning Bureau of Belgium. It is a cross-sectional model of the whole population that simulates processes at the level of the individual and household, and then at annual period level. The development of the population in this model is the result of birth, death and migration processes.

The current version of MIDAS_HU simulates such elements of the lives of the model persons (nearly 2 million individuals) that are of relevance to the pension scheme, by yearly periods, starting from the basis year of 2012.

The simulated data were aligned to the macroeconomic assumptions of the Hungarian AWG baseline scenario. When a particular AWG forecasting for alignment was not available, e.g. marriage or divorce, then the corresponding Central Statistical Office in Hungary (hereinafter referred to as CSO) and Hungarian Demographic Research Institute, Population projection data were used for model adjustment. The adjustment was always based solely on proportions and not on the absolute numbers.

4.3. Data used to run the model

The starting data for the model consists of a 20% random sample of the 2012 population stratified by age, gender, work status (employed, unemployed) and type of provision (old-age pension, widow's pension and orphan's allowance) and, therefore, the first simulated time period is 2013.

The choice of the basis year was determined by the available database. During the model development phase it was its latest – full year – entitlement database that constituted the point of departure for projections. Incidentally, 2012 was a good year for the acquisition of entitlement. On the one hand, relatively recent data were used as the basis for the model, reducing the number of estimated periods together with errors stemming from estimation. Moreover, data for after 2012 are also continuously available therefore an adequate testing period is available for calibrating the model.

4.4. Reforms incorporated in the model

All the reforms and changes in legislations are incorporated in our model. For further information, please see Section 1.2. Reforms included in the projections.

4.5. General description of the model(s)

Since the model uses discrete time, it is possible to specify the hierarchy and running sequence of the various modules making up the model right from the initial data of 2012 up to the generation of the projected data. This process is illustrated in the figure below.

Main modules of the model include:

- marriage market,
- labour market, and
- pension register module with a pension calculator.

Marriage market module
The original data consisted of various socio-economic characteristics of the subjects. It however did not include any information on the family relations between the individuals. Therefore, in order to be able to simulate the marriage market, various family relationships, e.g. marriage, cohabitation, parent-child relationships were imputed using logistic regression models, whose coefficients had been estimated using the 2011 census data. If needed, adjustments were made using the corresponding CSO data.

Labour market module
The simulation of the labour market activity in the model is based on logistic regression models as well. Two characteristics play a central role in these models. The first is the lagged employment status (employed or unemployed) of the individual. The second key variable describes the so-called labour market profile, which reflects for each individual the long-term event history of the occupational changes since 1990; a period which includes large-scale political, societal and economic transformations in Hungary.

Pension calculator and pension register module
Within this module the amount of pension is calculated in several steps according to law. During the pension payment period the amount paid is indexed until the end of provision.

4.6. Additional features of the projection model

The selection algorithm applied in the MIDAS_HU – and the MIDAS model family – LIAM2 system is regarded as the most important element of the projection methodology.

The key element of selection is a logistic regression (logit) model, along with the alignment procedure applied together with it. The operation of the procedure is illustrated through the example of the selection of employees. In the first step the probability of being employed during the current period is estimated for each model person, with the help of a logistic regression exercise on the basis of the relevant parameters of each person, such as labour market status in the preceding period, age, gender as well as a random error component. This is followed by assigning the model persons to groups on the basis of age and gender, in a decreasing order of estimated probability within each group.

This is followed by picking the n individuals having the highest estimated probability from each group, making sure that the ratio of the number of those so selected (n), to the total number of individuals in that particular group, equals or is as close as possible to the macro data specified in the alignment table.

Model calibration
For model-checking and cross-calibration the validation sample of 2013-2014 was used against the development sample of 2012 within the framework of microsimulation modelling with alignments.